

## Quarterly reports of the E-AMDAR Quality Evaluation Centre on AMDAR data

**2003-I**

Report number 14    4 July 2003

Period: 1 JANUARY 2003 – 31 MARCH 2003

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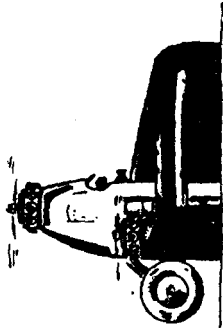
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## 1) Introduction

AMDAR offers the potential for a large increase in upper air wind and temperature data, observed for use as input for models. To improve the usefulness of these data, quality evaluation is essential in combination with appropriate impact studies. Today the E-AMDAR fleet will number approximately 651 assigned aircraft, 80% of which will fly predominantly European routes and the remainder long haul. All E-AMDAR data for evaluation will be made available on the GTS with in near real time performances. ***It should be noted that not all identified aircraft are fully operational at present*** (operational on April, 1<sup>st</sup>, 2003: 446).

The purpose of this report is to provide statistical information on the quality, quantity and availability of aircraft reports made available from all Participating Members. The information will be used for further impact studies and feed back to the E-AMDAR operators to improve the quality of the E-AMDAR observing system.

The Quality Evaluation Centre has monitored AMDAR reports received at KNMI since September 17<sup>th</sup> 1999. The aim of the monitoring process is to detect and identify any incorrectness or anomalies of the data or transmission within 24 hours and to instigate fault correction procedures. Such a process is vital for maintaining data quality and credibility at the required level. The monitoring of the observations covers data availability, receipt delays, reporting frequency and checks on the consistency and quality of the meteorological data.

The EUMETNET Council agreed in September 1998 that the Met Office would be the Responsible Member for the E-AMDAR Programme. On January, 1<sup>st</sup> 2003, however, this responsibility is transferred to SMHI and from that date the Programme Manager is Mr Ture Hovberg. Nevertheless, the appointed Technical Co-ordinator, Mr Stewart Taylor, has continued the work that will ensure that any faults identified are investigated and rectified in a timely manner. All irregularities on E-AMDAR data will be reported to the Programme Manager.

***Observations period:*** The coverage of the data used for the statistical analysis for AMDAR reporting aircraft is the period January 1<sup>st</sup>, 2003, 00:00 UTC to March 31<sup>st</sup>, 2003, 24:00 UTC (2003Q1).

## 2) Operational AMDAR units

Data from the set of 450 *activated* E-AMDAR units producing **FM 42-IX** or **BUFR AMDAR** code were received and analysed at KNMI HQ in De Bilt during the stated period. However, from 30 activated aircraft no data was received. In addition to these aircraft, data was received during this period from other 12 'officially' *de-activated* aircraft. As a result E-AMDAR data was received from 432 aircraft. This significant increase with respect to the 2002Q4 quarter (284 reporting aircraft) is largely due to the first 2003 *High Frequency Data Trial*, sponsored by EUCOS. This Special Observation Period started on March 5<sup>th</sup> and continued until April 15<sup>th</sup>. During this SOP

approximately 50% more aircraft were activated than during nominal operations resulting in a data increase at the beginning of approximately 80%.

Notice that a number of aircraft only report during the ascending and descending phases. For a list of reporting aircraft and their identifiers, see [table 1](#). In this table aircraft are indicated, which were activated or deactivated during this period.

### 3) List of outstanding issues

#### Code errors

In previous quarterly reports a number of issues concerning errors in the FM 42-IX AMDAR code bulletins were presented. During this quarter, both the standard error check routine and regular random checks did find only a few erroneous bulletins, which is very remarkable with respect to many other WMO bulletins, disseminated through the GTS. Many of the previous coding errors have been corrected due to new quality checking routines implemented within the E-AMDAR Data Acquisition System (E-ADAS). This is the central processing system for AMDAR data before insertion to the GTS. More information on E-ADAS can be obtained from the E-AMDAR Technical Co-ordinator. Although the issue of code errors seems to be diminished to a highly acceptable minimum, the code checking of the received bulletins will be continued.

A remarkable erroneous bulletin found was:

```
[received 2003-04-14 00:15]  INCORRECT REPORT
163
UDNT02 EGRR 140017
AMDAR 1423
LVR EU5129 4844N 05601W 142331 F370 MS445 249/036 TB/ S031=
LVR EU5129 4917N 05442W 142338 F390 MS440 243/042 TB/ S031=
LVR EU5129 4948N 05322W 142345 F390 MS455 234/042 TB/ S031=
LVR EU5129 5019N 05200W 142352 F390 MS450 228/042 TB/ S031=
LVR EU5129 5048N 05036W 142359 F390 MS450 232/046 TB/ S031=
```

Although this bulletin looks correctly encoded on first sight, the date/time field starts incorrectly with 14 and not with 13 (the bulletin was received just after 00:00 UTC, April 14<sup>th</sup>). It is found that such bulletins are always generated just after midnight and with all observational data from the period before midnight. This problem is currently being investigated by the E-AMDAR TC, E-ADAS developers and airline contacts.

### 4) Monitoring results

#### a) Data Availability

AMDAR reports are received via the different collecting centres with ground based receiving stations and consequently through GTS. Some aircraft fly "long haul" routes and where no ground station coverage available, send AMDAR data via satellite communications systems. An overview for all aircraft involved is presented in [table 2](#). At the end of this table also a list of aircraft is presented for which more than one percent of the observations took more than two hours to arrive at the QEvC.

The total number of observations evaluated during the period is 2348762. The ten aircraft, which produced the highest number of observations, evaluated at QEvC, are presented in the following table:

no.	aircraft	amount
1	EU2389	18716
2	EU4591	17342
3	EU0022	17074

4	EU0745	17044
5	EU5167	16705
6	EU4607	16703
7	EU9245	16024
8	EU3908	15983
9	EU4573	15662
10	EU7866	15429

**Special issues**

- Although de-activated, observations were reported by the following 12 aircraft: EU0123, EU0632, EU0947, EU1002, EU1275, EU1789, EU3201, EU3803, EU4316, EU4321, EU4387, EU5141.

More details on availability issues are presented in [table 3](#).

**b) Data coverage**

Aircraft carrying the AMDAR units fly prominently within Europe. To get a brief impression of the EU AMDAR coverage of Europe and the Atlantic two figures are presented in [Annex I](#).

**c) Data Timeliness**

The delay between observation and reception at the GTS nodes should be small. During the period, 97.4% of all reports were received within one hour of observation time and 99.2% within 2 hours from observation. Overall, the data timeliness is very good. This is demonstrated by figure 1 below, where from the cumulative frequency distribution it follows that 50% of all recorded observations is received within 12,0 minutes. Such figures present the delay in receiving a specific percentage of data and might be used for defining timeliness parameters as well (e.g. 98% levels)

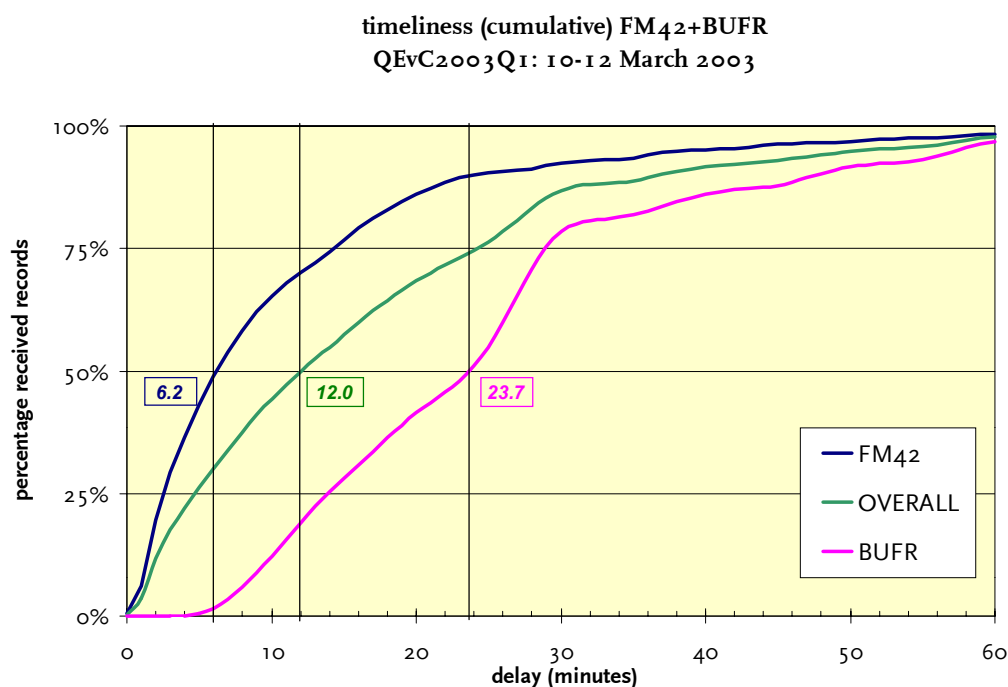


Fig. 1. Cumulative frequency distribution for all FM42 and BUFR encoded EU-AMДАР observations during the period 10 - 12 March 2003 as a function of the interval between observation and time of reception. (Median values: FM42 encoded data: 6,2 min, BUFR encoded data: 23,7 min., overall result: 12,0 minutes).

Note, however, the difference between FM42 and BUFR encoded data with 50% values at 6,2 min. and 23,7 min. respectively. By considering the figure in more detail, an typical anomaly for BUFR encoded data at 30 minutes can be recognised. Such an anomaly can be explained by the assumption that some BUFR data is received within sets of bulletins every 30 minutes.

#### d) Frequency of reporting AMDAR observations

During level flight at cruising height the reporting frequency of AMDAR reports is expected to be one report per 7 minutes or 10 minutes depending on the Aircraft software. During the ascent or descent phase reports should be generated more frequently (*i.e.* every 50 hPa) with the higher frequency applying to the lower part of the atmosphere (*i.e.* every 10 hPa). It was found that the BUFR encoded AMDAR bulletins contain observations repeatedly done within one minute when in ascending or descending phase. As a consequence the reporting frequency of BUFR AMDARS is extremely high during that phase. Most of the aircraft operate within Europe and within relatively short travel distance.

#### e) Data quality evaluation

Every day quality control procedures are performed. By comparing the meteorological and positional information supplied by the AMDAR units with a reference background, suspect reports are selected and presented. FM42-IX and BUFR encoded AMDAR bulletins passing through the KNMI MSS are analysed for statistical evaluation purposes. Incorrectly encoded reports are stored apart and kept outside further evaluation.

The differences between observations and model-forecast fields from the HIRLAM-3 1-level-global-forecast-model are used for analysing the quality of AMDAR reports. These differences between the values from the observation and the model background (indicated by "O-B") are calculated for the levels from 950 to 400 hPa (ascent/descent levels) and for 350 to 150 hPa (cruise levels). Average values and standard deviations of the calculated differences for temperature, wind speed and wind direction are derived for all reports from any AMDAR unit separately and by taking into account time and place/position. For the evaluation process the most actual output from the HIRLAM model is used as reference. Note that this model has a 3 hours update interval. Consequently quality evaluation is performed every 3 hours. From this evaluation process AMDAR units are selected as an entry for identifying as a suspect report in case of overriding the stated criteria. As a result from this evaluation process a daily report is generated for direct transmission by e-mail to the E-AMDAR technical co-ordinator and all E-AMDAR operators. With the exception of rejected reports and of observations outside the HIRLAM area, **all** data is evaluated<sup>1</sup> [see footnote]. However, for practical reasons, the daily reports present **only** those aircraft with identifiers starting with 'EU' (E-AMDAR) or ending on 'Z' (ASDAR).

##### **Criteria**

The critical (absolute) margins used for selecting entries are:

- Air Temperature:  $|T_A(O)-T_A(B)| \geq 0,5 \text{ }^\circ\text{C (0,5 K)}$
- Wind speed:  $|f(O)-f(B)| \geq 2,0 \text{ m/s (4 Knots)}$
- Wind direction:  $|d(O)-d(B)| \geq 20 \text{ }^\circ \text{(Degrees)}$

**No criterion** is stated concerning standard deviations.

The Obs-Background mean temperature differences vary between  $-0,5 \text{ }^\circ\text{C}$  and  $+1,1 \text{ }^\circ\text{C}$  (50% within  $-0,25$  and  $+0,4 \text{ }^\circ\text{C}$ ). Aircraft with a mean difference, typically significant larger than

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<sup>1</sup> The E-AMDAR Technical Co-ordinator using other data sources evaluates aircraft outside the HIRLAM area.

expected are: EU3194 ( $\Delta T = 8,9\text{ }^{\circ}\text{C}$ ) and EU1800 ( $\Delta T = -8.7\text{ }^{\circ}\text{C}$ ) (aircraft with frequent faults: EU7910, EU3201 and EU3194). For windspeed, aircraft with a mean difference, typically significant larger than expected are EU0632 ( $\Delta F = 4,8\text{ m/s}$ ) and EU1800 ( $\Delta F = 3,7\text{ m/s}$ ). Aircraft exceeding the wind speed tolerances *frequently* are: EU3201, EU0316 and EU7910. Aircraft exceeding the wind directions tolerances *frequently* are: EU0002, EU0022 and EU0021. For a number of aircraft the wind direction exceeded tolerances significantly *on average*: EU2618, EU5134, EU5777, EU5821, EU5802 and EU0046. In [Annex II](#), three figures are shown, presenting the frequency distribution of the mean O-B temperature differences, wind speed differences and wind direction differences as found for the set of aircraft.

For a number of observations extreme temperature differences were observed:

AIRCRAFT	Day	Time (UTC)	Latitude	Longitude	Altitude (m)	Temperature [observed] ( $^{\circ}\text{C}$ )	Temperature [background] ( $^{\circ}\text{C}$ )	Temperature difference ( $^{\circ}\text{C}$ )
EU3194	2003-01-27	16:11	53.79	10.12	10980	277.8	213.3	64.5
EU3201	2003-03-18	12:14	59.92	30.31	10060	274.2	211.5	62.7
EU1800	2003-02-02	13:09	51.04	3.40	100	219.0	279.7	-60.7
EU0134	2003-03-20	15:38	47.00	3.30	3470	208.7	266.6	-57.9
EU4685	2003-02-04	23:55	49.80	-62.40	730	210.0	265.1	-55.1

Aircraft with *occasionally* extreme temperature differences ( $\Delta T > 50\text{ K}$ ) are: EU0120, EU0134, EU1800, EU3194, EU3201, EU4685 and EU7910.

Remarkable wind speed differences were observed for:

AIRCRAFT	Day	Time (UTC)	Latitude	Longitude	Altitude (m)	Wind speed [observed] (m/s)	Wind speed [background] (m/s)	Wind speed difference (m/s)
EU1929	2003-02-23	01:11	50.40	-61.90	11550	10.8	99.7	-88.9
EU3201	2003-03-14	15:58	49.38	10.58	300	43.7	4.1	39.6
EU1800	2003-02-02	12:56	51.46	0.60	100	40.1	5.5	34.6
EU7910	2003-02-13	14:41	52.56	10.80	540	37.6	12.4	25.2

Aircraft with occasionally *extreme* wind speed differences ( $> 20\text{ m/s}$ ) are EU0203, EU1800, EU1929, EU2595, EU3201, EU7910 and EU8605.

Occasionally wind direction differences of  $90^{\circ}$  or more are observed, even up to  $180^{\circ}$ , e.g.:

AIRCRAFT	Day	Time (UTC)	Latitude	Longitude	Altitude (m)	Wind direction [observed] ( $^{\circ}$ )	Wind direction [background] ( $^{\circ}$ )	Wind direction difference ( $^{\circ}$ )
EU1929	2003-02-23	01:11	50.40	-61.90	11550	10.8	99.7	-88.9
EU3201	2003-03-14	15:58	49.38	10.58	300	43.7	4.1	39.6
EU1800	2003-02-02	12:56	51.46	0.60	100	40.1	5.5	34.6
EU7910	2003-02-13	14:41	52.56	10.80	540	37.6	12.4	25.2

Aircraft with extreme wind direction differences are: **EU0002**, **EU0021**, **EU0022**, EU0032, **EU0041**, EU0043, EU0045, **EU0047**, EU0049, EU0051, EU0052, EU0054, EU0055, EU0059, EU0061, EU0081, EU0167, EU0204 and EU0303 (aircraft with frequent faults are in **bold**). An impression of the individual wind direction differences is given in figure 2., where a distribution is presented of  $\langle |\Delta DD| \rangle (= \text{AVG}(\text{ABS}(\text{DD}_{\text{OBS}} - \text{DD}_{\text{MOD}})))$ :

**frequency of large wind direction differences  
2003Q01**

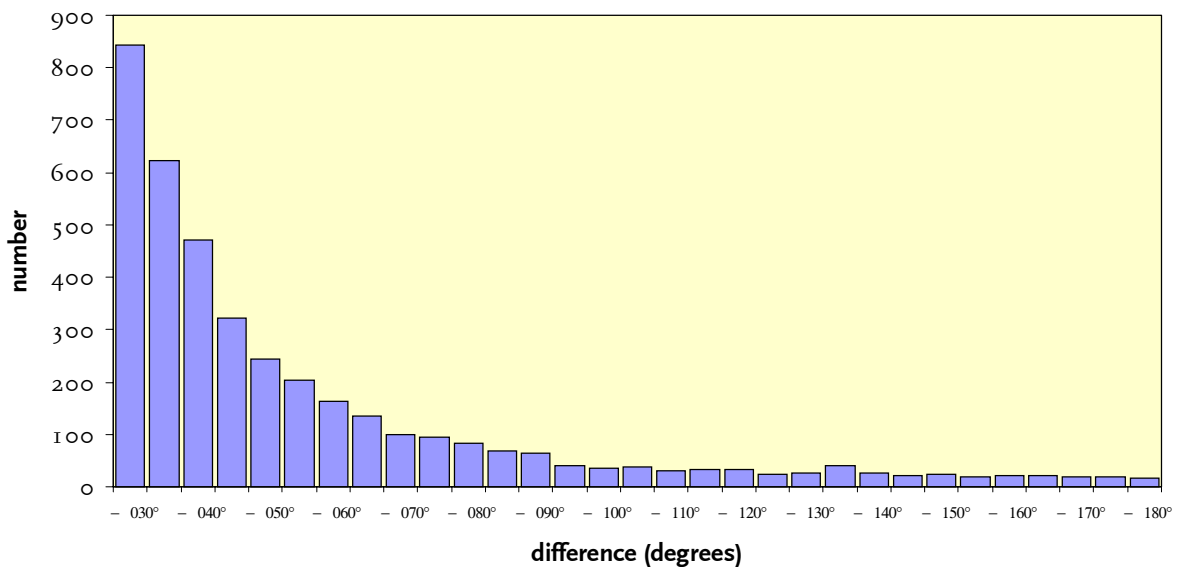


Fig. 2. Distribution for the individual O-B obs wind direction differences,  $\langle |\Delta DD| \rangle$  as a function of altitude. Note that for most of the observations it holds that  $\langle |\Delta DD| \rangle < 30^\circ$ , so this figure presents only a **very small** subset of the total amount of received data: i.e. **0,2 %**.

**f) Results (tables)**

In the tables 4 to 6 attached to this report all (EU-)AMDAR units are presented together with the observed total of average differences and standard deviations. All these tables are divided in two lists, one for the DES/ASC phase and the other for the cruise level phase. No statistics are presented for the UNS phase (unstable).

**5) Outstanding identified anomalies.**

The identified anomalies are to be considered by the Responsible Members. Reports from published detailed investigations on these issues will be summarised in the following quarterly report. Typical problems/faults (apart from routine maintenance) are presented in table 3 (information provided by the appointed Technical Co-ordinator of the E-AMDAR Programme).

**6) Solutions and actions taken from the previous period.**

Errors or problems, traditionally mentioned in paragraph 3 are found to be accidentally and of minor importance only. Relevant issues are solved by direct contact between the appointed Technical Co-ordinator of the E-AMDAR Programme and the E-AMDAR operator(s).

**7) Summary.**

Timeliness and data quality: Timeliness is comparable to ASDAR data or better. The number of anomalies is very low with respect to the total number of reports (94.3% within 45 min).

1. The number of aircraft reporting (EU-)AMDAR was **432**. The number of evaluated observations was **2348762**.

2. Since reports are generated automatically, in general data is error free at the reception site.
3. Significant temperature, wind speed or wind direction anomalies were not found, except for the issues stated under par. 4.e. Overall, anomalies of  $-0,15 - 0,4^{\circ}\text{C}$ ,  $0,05 - 0,73 \text{ m/s}$ ,  $\pm 6,5^{\circ}$  (for LVR/LVW) and  $\pm 13,5^{\circ}$  (for ASC/DES) are typical (see [Annexes II and III](#)). These values are based on a 50% cumulative level score, i.e. 50% of all data are within these ranges.

## 8) Special case studies

### a) Frequency distribution of the mean O–B differences

In [Annex II](#) of this report three figures are presented to indicate the frequency distribution of the mean O-B differences for temperature, wind speed and wind direction for the set of observing aircraft (N=432). In these figures distinction is made between observations in flight level (LVR/LVW) and observations during ascent or descent (ASC/DES). Note that only the absolute values of wind direction are analysed. Obviously differences (averaged over this quarter) vary within ranges of approx.  $-0,5$  to  $+1,3^{\circ}\text{C}$ ,  $-0,2$  to  $+0,8 \text{ m/s}$  and  $\pm 12^{\circ}$  (for LVR/LVW) to  $\pm 20^{\circ}$  (for ASC/DES) (to be considered as the *uncertainty* of observation).

### b) Trends in the daily amount of observations

From January 1<sup>st</sup> to March 31<sup>st</sup> the amount of observations is registered on a daily base. In [Annex III](#) of this report the trend of this daily amount is presented. Obviously number of received data is stable during this period until the start of the first 2003 *High Frequency Data Trial*. The Special Observation Period started on March 5<sup>th</sup> and continued until April 15<sup>th</sup>. During this SOP approximately 50% more aircraft were activated than during nominal operations. A data increase of approximately 80% is found at the beginning of this SOP. In this annex also an overall overview is presented for the reporting behaviour of the individual aircraft.

### c) Trends in the mean O–B differences.

In [Annex IV](#) of this report the results of a case study on the trends in the mean O–B differences are presented for the individual aircraft.

### d) The daily cycle and observation times.

In [Annex V](#) of this report four figures are presented, which gives a clear impression of AMDAR/ASDAR/AIREP data availability during a 24h cycle. In these figures (source: ECMWF) positional information is presented for the four main intervals of a day. Typically, very little AMDAR data are available around 00:00 UTC.

### e) Case study: Differences between *ascending* and *descending* temperatures.

In [Annex VI](#) a case study is presented based on an analysis temperature observations during ascent and descent. Because of expected delay caused by the sensor response time, differences might be expected between the ASC and DES data. Overall such difference is not found to be really significant. However a more detailed statistical approach shows a slight, but significant difference indicating a systematic error in the altitude data.

### f) Case study: E-AMDAR observations over Europe (continued)

In [Annex VII](#) an analyses is presented regarding the areas in Europe where atmospheric profiles can be generated by E-AMDAR data and relative frequently. It is found that a number of specific areas are covered very well (typically around the larger international airports of course). The impact of the *high frequency trial* is significant.

**Table 1, List of operational AMDAR units**

(A: activated, D: deactivated during this quarter)

Identifier	Identifier	Identifier	Identifier	Identifier	Identifier
EU0002	EU0204	EU0482 A	EU1346 A	EU2495 A	EU3194 A
EU0006 A	EU0206 A	EU0490 A	EU1411	EU2512 A	EU3250 A
EU0021	EU0209	EU0498	EU1437 A	EU2530	EU3257
EU0022	EU0221 A	EU0511	EU1446	EU2547	EU3260 A
EU0023	EU0230	EU0520 A	EU1456	EU2559	EU3268
EU0032	EU0233 A	EU0558	EU1498	EU2578 A	EU3270
EU0034	EU0234	EU0568	EU1532	EU2590	EU3293 A
EU0041	EU0251	EU0575	EU1538 A	EU2595	EU3311 A
EU0043	EU0254 A	EU0576 A	EU1547	EU2610	EU3317
EU0045	EU0263	EU0583	EU1567	EU2618	EU3321
EU0046 A	EU0274 A	EU0601	EU1593	EU2622	EU3358
EU0047	EU0281	EU0620	EU1599 A	EU2630	EU3362 A
EU0049	EU0290 A	EU0631 A	EU1635 A	EU2634 A	EU3375 A
EU0051	EU0299	EU0646 A	EU1666 A	EU2673	EU3400
EU0052	EU0300 A	EU0676	EU1673	EU2689 A	EU3421
EU0054	EU0301	EU0707	EU1688 A	EU2690 A	EU3455
EU0055	EU0303	EU0711	EU1698	EU2717 A	EU3469
EU0059	EU0307	EU0720 A	EU1700 A	EU2751	EU3472 A
EU0060	EU0310	EU0723	EU1731 A	EU2752	EU3484 A
EU0061	EU0311	EU0734 A	EU1790	EU2773	EU3527 A
EU0063 A	EU0312 A	EU0745	EU1800 A	EU2792 A	EU3533
EU0072	EU0313	EU0802	EU1863	EU2795 A	EU3544
EU0073	EU0316	EU0807	EU1929	EU2800 A	EU3598
EU0078	EU0319	EU0810	EU2017	EU2829 A	EU3599
EU0080 A	EU0321	EU0826	EU2020 A	EU2845	EU3621
EU0081	EU0332 A	EU0875	EU2043	EU2846 A	EU3633
EU0082	EU0335 A	EU0921	EU2055	EU2896 A	EU3647 A
EU0086	EU0350 A	EU0934	EU2120 A	EU2897 A	EU3654
EU0101 A	EU0354 A	EU0942 A	EU2130	EU2905 A	EU3660
EU0106	EU0359	EU0961	EU2165	EU2912 A	EU3684
EU0109	EU0367	EU0985	EU2189	EU2936 A	EU3701 A
EU0110	EU0372 A	EU0999	EU2200	EU2978	EU3714
EU0120	EU0373	EU1001	EU2201	EU2979 A	EU3725
EU0121 A	EU0385 A	EU1012 A	EU2235 A	EU2983 A	EU3733 A
EU0124	EU0394	EU1035 A	EU2247	EU2984	EU3755
EU0134 A	EU0405 A	EU1054 A	EU2301	EU3000	EU3768 A
EU0140 A	EU0413	EU1056 A	EU2327	EU3042	EU3824 A
EU0154	EU0432	EU1232 A	EU2356	EU3048 A	EU3845 A
EU0158	EU0442	EU1234	EU2360 A	EU3075 A	EU3855 A
EU0167	EU0451 A	EU1282	EU2378	EU3094 A	EU3874
EU0177 D	EU0453	EU1301	EU2389	EU3096 A	EU3908
EU0185	EU0456	EU1312	EU2399 A	EU3114 A	EU3953 A
EU0201	EU0457	EU1320 A	EU2401	EU3115 A	EU3961 A
EU0202	EU0458	EU1334	EU2405	EU3147 A	EU3972
EU0203 D	EU0476	EU1337	EU2430	EU3181	EU3992 A

Identifiser	Identifiser	Identifiser	Identifiser	Identifiser	Identifiser
EU4002	EU4565	EU4976 A	EU5587	EU7082	EU8605
EU4004 A	EU4573	EU5050 A	EU5591	EU7119	EU8632
EU4021	EU4579 A	EU5073	EU5593	EU7218	EU8733
EU4035 A	EU4582	EU5098	EU5612	EU7285	EU8736
EU4066 A	EU4589	EU5129	EU5613	EU7293	EU8742
EU4075	EU4591	EU5134	EU5673 A	EU7314	EU8787
EU4083 A	EU4593	EU5167	EU5777 D	EU7382	EU8789
EU4112 A	EU4607	EU5175	EU5802 D	EU7412	EU8891
EU4137 A	EU4611 A	EU5182	EU5821	EU7427	EU8943
EU4169 A	EU4623 A	EU5185 A	EU5891	EU7521	EU8969
EU4172 A	EU4650 A	EU5191	EU6264	EU7536	EU9013
EU4205 A	EU4685	EU5245	EU6281	EU7548	EU9023
EU4235 A	EU4687 A	EU5261 A	EU6287	EU7610	EU9145
EU4264 A	EU4699	EU5264 A	EU6321	EU7629	EU9158
EU4278	EU4710 A	EU5318	EU6349	EU7634	EU9234
EU4300 A	EU4721	EU5331	EU6386 A	EU7635	EU9245
EU4333	EU4723 A	EU5349	EU6444	EU7643	EU9356
EU4392 A	EU4756	EU5351	EU6524	EU7654	EU9378
EU4426 A	EU4773 A	EU5360	EU6527	EU7724	EU9544
EU4444	EU4792	EU5372	EU6544	EU7864	EU9589
EU4450 A	EU4824 A	EU5387 A	EU6556	EU7865	EU9622
EU4463	EU4833 A	EU5397 A	EU6564	EU7866 A	EU9678
EU4473 A	EU4838	EU5420 A	EU6723	EU7888	EU9680
EU4491	EU4853	EU5429	EU6735	EU7894	EU9692
EU4508 A	EU4864 A	EU5435	EU6743	EU7910	EU9723
EU4519	EU4865	EU5441	EU6821	EU8264	EU9729
EU4527	EU4896	EU5478	EU6890	EU8431	EU9734
EU4529	EU4950	EU5486 A	EU6893	EU8478	EU9743
EU4532	EU4954 A	EU5529	EU6923	EU8520	EU9883
EU4540	EU4956	EU5544 A	EU7001	EU8598	EU9967

[450]



**Table 2, Quantity and Timeliness of AMDAR Reports**

<b>Summary</b>	
Number of days in this period	90
Number of aircraft reporting AMDAR	432
Number of E-AMDAR activated aircraft	450
Total number of observations evaluated during the period	<b>2348762</b>
Average daily number of aircraft reporting AMDAR	273 (61% of activated aircraft)
Percentage of data available within 60 minutes is	97.4%
Percentage of data available within 120 minutes is	99.2%
Average reports per day, per reporting aircraft is	96

<b>Legend</b>	
AIRCRAFT	Aircraft identifier
Total No of Reports	Number of reports received by E-AMDAR Quality Centre, exclusive of erroneous data.
Days of Reports	Number of days reports were received from aircraft by QEvC
Actual/possible	Ratio of Number of days aircraft reported/ maximum possible days in %
Average reports/day	Average number of reports per day of report from each aircraft
0 – 45 min	percentage of total reports received within 45 minutes of observation time
0 – 60 min	percentage of total reports received within 60 minutes of observation time
0 – 120 min	percentage of total reports received within 120 minutes of observation time

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/possible</b>	<b>Average reports/day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU0002	7459	75	83%	99	98.8%	98.8%	99.4%
EU0006	551	15	17%	37	65.1%	89.1%	97.0%
EU0021	11810	76	84%	155	99.9%	100.0%	100.0%
EU0022	17074	90	100%	190	99.9%	100.0%	100.0%
EU0023	1159	23	26%	50	73.8%	92.9%	98.2%
EU0032	5747	84	93%	68	99.2%	99.7%	99.7%
EU0034	4949	61	68%	81	100.0%	100.0%	100.0%
EU0041	8796	86	96%	102	88.8%	94.7%	98.3%
EU0043	9407	86	96%	109	88.9%	95.2%	98.3%
EU0045	4916	37	41%	133	99.4%	99.4%	99.4%
EU0046	1087	27	30%	40	67.0%	90.8%	96.7%
EU0047	10085	87	97%	116	90.8%	96.7%	99.1%
EU0049	6473	67	74%	97	100.0%	100.0%	100.0%
EU0051	6954	45	50%	155	100.0%	100.0%	100.0%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU0052	5383	55	61%	98	94.2%	97.4%	98.3%
EU0054	10298	83	92%	124	100.0%	100.0%	100.0%
EU0055	7821	74	82%	106	100.0%	100.0%	100.0%
EU0059	7500	88	98%	85	91.9%	95.8%	97.3%
EU0060	2501	46	51%	54	100.0%	100.0%	100.0%
EU0061	7742	87	97%	89	94.4%	97.5%	99.1%
EU0063	5493	29	32%	189	99.8%	100.0%	100.0%
EU0072	12515	87	97%	144	99.8%	99.8%	99.9%
EU0073	9219	84	93%	110	83.4%	95.2%	98.7%
EU0080	692	15	17%	46	67.2%	95.2%	100.0%
EU0081	13314	85	94%	157	100.0%	100.0%	100.0%
EU0082	8273	73	81%	113	100.0%	100.0%	100.0%
EU0086	7430	78	87%	95	80.4%	93.2%	97.8%
EU0101	2861	28	31%	102	100.0%	100.0%	100.0%
EU0106	4693	51	57%	92	95.0%	98.5%	100.0%
EU0109	14792	89	99%	166	99.7%	99.7%	99.9%
EU0110	8829	74	82%	119	99.9%	100.0%	100.0%
EU0120	6580	82	91%	80	80.4%	93.1%	97.8%
EU0121	4687	24	27%	195	100.0%	100.0%	100.0%
EU0123	174	3	3%	58	100.0%	100.0%	100.0%
EU0124	7160	68	76%	105	99.3%	100.0%	100.0%
EU0134	2631	23	26%	114	100.0%	100.0%	100.0%
EU0140	1278	20	22%	64	79.3%	96.1%	100.0%
EU0158	7633	85	94%	90	91.7%	96.8%	98.8%
EU0167	4728	59	66%	80	93.0%	97.8%	98.7%
EU0177	959	12	13%	80	81.9%	95.2%	99.8%
EU0185	6986	82	91%	85	91.7%	96.3%	98.4%
EU0201	1573	18	20%	87	100.0%	100.0%	100.0%
EU0202	8156	77	86%	106	99.9%	99.9%	100.0%
EU0203	5542	59	66%	94	78.3%	91.3%	97.3%
EU0204	10264	78	87%	132	99.6%	99.6%	99.8%
EU0206	1428	26	29%	55	71.7%	91.7%	97.5%
EU0221	2580	26	29%	99	100.0%	100.0%	100.0%
EU0230	10472	85	94%	123	99.7%	99.7%	99.8%
EU0233	1342	23	26%	58	75.2%	92.6%	99.5%
EU0234	6760	57	63%	119	100.0%	100.0%	100.0%
EU0251	8441	84	93%	100	95.4%	98.4%	99.7%
EU0254	3113	28	31%	111	100.0%	100.0%	100.0%
EU0263	8461	66	73%	128	100.0%	100.0%	100.0%
EU0274	1897	25	28%	76	100.0%	100.0%	100.0%
EU0290	168	4	4%	42	69.0%	93.7%	96.6%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU0299	6781	67	74%	101	99.3%	99.3%	99.3%
EU0301	9468	87	97%	109	89.3%	96.0%	98.7%
EU0303	7903	84	93%	94	92.2%	95.7%	98.4%
EU0307	8736	88	98%	99	95.0%	98.1%	99.3%
EU0310	9599	69	77%	139	100.0%	100.0%	100.0%
EU0311	6836	77	86%	89	93.9%	97.9%	99.8%
EU0312	2256	25	28%	90	99.6%	100.0%	100.0%
EU0313	6300	81	90%	78	94.2%	97.9%	99.3%
EU0316	9208	87	97%	106	84.8%	91.3%	97.3%
EU0319	9541	85	94%	112	88.7%	94.4%	97.5%
EU0321	963	33	37%	29	98.3%	100.0%	100.0%
EU0335	733	17	19%	43	72.6%	94.3%	100.0%
EU0350	1503	27	30%	56	67.3%	88.9%	96.4%
EU0354	1690	21	23%	80	100.0%	100.0%	100.0%
EU0359	6235	81	90%	77	94.1%	97.8%	99.3%
EU0367	5773	50	56%	115	100.0%	100.0%	100.0%
EU0372	7097	53	59%	134	100.0%	100.0%	100.0%
EU0373	7832	87	97%	90	92.7%	96.6%	98.1%
EU0385	2256	23	26%	98	99.2%	100.0%	100.0%
EU0394	7556	80	89%	94	93.0%	96.0%	98.0%
EU0405	1803	25	28%	72	100.0%	100.0%	100.0%
EU0413	7192	88	98%	82	93.0%	95.9%	98.7%
EU0432	5831	64	71%	91	100.0%	100.0%	100.0%
EU0442	4806	53	59%	91	95.6%	98.2%	99.0%
EU0451	1506	26	29%	58	71.0%	92.4%	99.1%
EU0453	12307	88	98%	140	99.8%	99.8%	99.8%
EU0456	5607	78	87%	72	94.5%	98.7%	99.6%
EU0457	4417	69	77%	64	99.5%	99.5%	100.0%
EU0458	4238	70	78%	61	91.9%	96.9%	99.0%
EU0476	3943	64	71%	62	93.1%	97.4%	99.0%
EU0482	2492	21	23%	119	100.0%	100.0%	100.0%
EU0511	7824	87	97%	90	92.5%	95.9%	98.8%
EU0520	1376	21	23%	66	69.4%	91.1%	97.2%
EU0558	8123	89	99%	91	91.0%	95.8%	98.2%
EU0568	6722	71	79%	95	99.3%	99.3%	100.0%
EU0575	10178	73	81%	139	99.6%	99.8%	99.8%
EU0576	1668	22	24%	76	71.7%	90.6%	97.0%
EU0583	7686	86	96%	89	91.1%	94.8%	98.9%
EU0601	6540	76	84%	86	93.2%	96.3%	98.0%
EU0620	3744	69	77%	54	100.0%	100.0%	100.0%
EU0631	1633	27	30%	60	73.2%	94.8%	99.0%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU0632	186	8	9%	23	100.0%	100.0%	100.0%
EU0676	7464	79	88%	94	92.2%	95.9%	97.9%
EU0707	6471	80	89%	81	100.0%	100.0%	100.0%
EU0711	3205	60	67%	53	94.7%	99.2%	99.9%
EU0720	6525	29	32%	225	99.7%	100.0%	100.0%
EU0723	4804	70	78%	69	97.7%	99.0%	99.2%
EU0734	1588	39	43%	41	100.0%	100.0%	100.0%
EU0745	17044	85	94%	201	99.9%	99.9%	100.0%
EU0802	6600	86	96%	77	92.8%	97.6%	99.2%
EU0807	15185	90	100%	169	99.8%	99.8%	99.8%
EU0810	8158	88	98%	93	92.8%	96.2%	97.9%
EU0826	8190	76	84%	108	98.9%	98.9%	99.5%
EU0875	6846	87	97%	79	92.4%	95.9%	98.8%
EU0921	7306	87	97%	84	93.6%	97.0%	98.9%
EU0934	10421	68	76%	153	99.7%	99.7%	99.7%
EU0942	944	20	22%	47	71.7%	91.7%	98.8%
EU0947	819	7	8%	117	100.0%	100.0%	100.0%
EU0961	1825	17	19%	107	100.0%	100.0%	100.0%
EU0985	7441	45	50%	165	100.0%	100.0%	100.0%
EU1001	3614	56	62%	65	100.0%	100.0%	100.0%
EU1002	12718	79	88%	161	99.9%	100.0%	100.0%
EU1012	2159	28	31%	77	72.9%	90.6%	96.7%
EU1035	1776	24	27%	74	75.8%	94.5%	99.3%
EU1054	1335	21	23%	64	72.0%	92.1%	98.7%
EU1056	858	20	22%	43	100.0%	100.0%	100.0%
EU1234	7372	87	97%	85	93.5%	96.2%	97.8%
EU1275	1371	15	17%	91	100.0%	100.0%	100.0%
EU1282	7242	63	70%	115	100.0%	100.0%	100.0%
EU1301	317	4	4%	79	100.0%	100.0%	100.0%
EU1312	7678	57	63%	135	99.4%	99.7%	99.7%
EU1320	1096	20	22%	55	70.0%	89.6%	96.6%
EU1334	2755	55	61%	50	100.0%	100.0%	100.0%
EU1337	5690	83	92%	69	95.8%	98.0%	99.3%
EU1346	504	5	6%	101	75.4%	92.9%	99.0%
EU1411	477	18	20%	27	100.0%	100.0%	100.0%
EU1437	1978	19	21%	104	79.1%	94.0%	98.1%
EU1456	4214	59	66%	71	100.0%	100.0%	100.0%
EU1498	8124	88	98%	92	93.2%	96.0%	98.7%
EU1532	7652	72	80%	106	100.0%	100.0%	100.0%
EU1538	832	16	18%	52	67.3%	87.1%	92.4%
EU1547	7716	84	93%	92	92.4%	96.1%	97.8%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU1567	6945	68	76%	102	100.0%	100.0%	100.0%
EU1593	8504	68	76%	125	99.8%	99.9%	99.9%
EU1599	1226	20	22%	61	74.0%	94.0%	98.2%
EU1635	1418	21	23%	68	72.1%	92.3%	98.6%
EU1666	1152	21	23%	55	67.2%	90.3%	97.3%
EU1673	12182	82	91%	149	100.0%	100.0%	100.0%
EU1688	2790	25	28%	112	100.0%	100.0%	100.0%
EU1698	7832	76	84%	103	100.0%	100.0%	100.0%
EU1700	1499	25	28%	60	74.0%	91.2%	96.8%
EU1731	1237	22	24%	56	76.3%	96.7%	100.0%
EU1789	849	15	17%	57	100.0%	100.0%	100.0%
EU1790	12092	74	82%	163	100.0%	100.0%	100.0%
EU1800	368	5	6%	74	98.4%	100.0%	100.0%
EU1863	2581	25	28%	103	95.7%	99.6%	100.0%
EU1929	2268	73	81%	31	100.0%	100.0%	100.0%
EU2017	6834	78	87%	88	93.6%	97.7%	98.8%
EU2020	2865	56	62%	51	70.4%	85.8%	96.1%
EU2043	3400	62	69%	55	99.2%	100.0%	100.0%
EU2055	7880	85	94%	93	93.2%	96.8%	99.1%
EU2120	3798	66	73%	58	67.7%	83.0%	97.5%
EU2130	6911	72	80%	96	93.9%	97.1%	98.4%
EU2165	5526	61	68%	91	91.6%	95.9%	99.7%
EU2189	7028	88	98%	80	94.5%	97.6%	99.1%
EU2200	10618	88	98%	121	99.7%	99.8%	99.8%
EU2201	7353	85	94%	87	95.2%	97.7%	99.2%
EU2247	8175	89	99%	92	94.1%	97.2%	98.7%
EU2301	9463	88	98%	108	89.0%	94.7%	98.5%
EU2327	6493	86	96%	76	76.6%	93.4%	98.1%
EU2356	3571	63	70%	57	71.9%	91.8%	98.9%
EU2360	3052	61	68%	50	75.4%	91.2%	98.1%
EU2378	4241	74	82%	57	98.8%	99.4%	100.0%
EU2389	18716	88	98%	213	99.7%	99.7%	99.9%
EU2399	864	5	6%	173	98.8%	100.0%	100.0%
EU2401	875	12	13%	73	93.7%	99.1%	100.0%
EU2405	5356	65	72%	82	87.3%	94.1%	98.4%
EU2430	5480	83	92%	66	93.5%	97.4%	98.7%
EU2495	3031	55	61%	55	75.8%	90.6%	99.1%
EU2512	4270	67	74%	64	83.3%	89.9%	96.0%
EU2530	4979	76	84%	66	91.7%	96.2%	98.6%
EU2547	7735	55	61%	141	99.4%	99.4%	99.6%
EU2559	9073	87	97%	104	87.9%	93.0%	97.7%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU2578	791	6	7%	132	100.0%	100.0%	100.0%
EU2590	104	2	2%	52	100.0%	100.0%	100.0%
EU2595	5505	59	66%	93	83.4%	93.0%	97.4%
EU2610	4731	61	68%	78	83.9%	94.7%	99.5%
EU2618	25	1	1%	25	100.0%	100.0%	100.0%
EU2622	3722	58	64%	64	87.8%	92.1%	97.5%
EU2630	4695	47	52%	100	99.3%	99.3%	99.3%
EU2634	895	5	6%	179	98.9%	100.0%	100.0%
EU2673	3004	36	40%	83	86.9%	97.0%	99.2%
EU2690	3089	60	67%	51	78.8%	90.5%	98.1%
EU2717	3623	62	69%	58	63.8%	80.5%	97.2%
EU2751	3143	41	46%	77	100.0%	100.0%	100.0%
EU2752	3038	59	66%	51	72.3%	86.6%	97.7%
EU2773	806	11	12%	73	100.0%	100.0%	100.0%
EU2792	2929	66	73%	44	71.8%	84.4%	95.9%
EU2800	3455	66	73%	52	67.7%	86.5%	98.3%
EU2829	3517	63	70%	56	79.7%	89.7%	98.3%
EU2845	11886	88	98%	135	99.8%	99.9%	100.0%
EU2846	3433	69	77%	50	78.4%	87.9%	98.5%
EU2896	4830	24	27%	201	100.0%	100.0%	100.0%
EU2897	2280	40	44%	57	77.4%	87.5%	96.9%
EU2905	2518	54	60%	47	76.4%	87.7%	97.7%
EU2912	4378	29	32%	151	99.8%	100.0%	100.0%
EU2936	1852	34	38%	54	63.3%	88.0%	99.0%
EU2979	3377	57	63%	59	91.7%	94.5%	98.9%
EU2983	2443	59	66%	41	57.4%	80.5%	96.0%
EU2984	6000	58	64%	103	100.0%	100.0%	100.0%
EU3000	7757	86	96%	90	93.7%	96.8%	98.5%
EU3042	8344	89	99%	94	94.6%	97.8%	99.4%
EU3048	5258	68	76%	77	94.6%	97.3%	99.1%
EU3075	861	25	28%	34	100.0%	100.0%	100.0%
EU3094	616	27	30%	23	100.0%	100.0%	100.0%
EU3096	3247	61	68%	53	73.3%	88.5%	98.4%
EU3114	3655	68	76%	54	65.8%	85.8%	98.9%
EU3115	2522	60	67%	42	71.5%	88.5%	98.7%
EU3147	229	13	14%	18	100.0%	100.0%	100.0%
EU3181	5166	80	89%	65	99.8%	99.8%	100.0%
EU3194	702	8	9%	88	91.7%	95.0%	95.4%
EU3201	587	9	10%	65	84.4%	91.0%	99.5%
EU3250	3385	67	74%	51	80.6%	88.7%	98.0%
EU3257	8630	84	93%	103	94.1%	97.2%	98.8%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU3260	3781	66	73%	57	79.5%	90.1%	96.6%
EU3268	5275	55	61%	96	100.0%	100.0%	100.0%
EU3270	6857	69	77%	99	100.0%	100.0%	100.0%
EU3293	6231	66	73%	94	94.4%	96.2%	98.0%
EU3311	3003	63	70%	48	85.6%	91.1%	98.1%
EU3317	2913	61	68%	48	67.5%	83.2%	97.1%
EU3321	5431	53	59%	102	99.7%	100.0%	100.0%
EU3358	7273	76	84%	96	100.0%	100.0%	100.0%
EU3362	2758	62	69%	44	69.7%	86.9%	99.0%
EU3375	2868	61	68%	47	75.4%	89.2%	98.4%
EU3400	955	18	20%	53	66.7%	86.9%	97.3%
EU3421	8619	87	97%	99	87.6%	94.5%	98.8%
EU3455	5824	76	84%	77	78.7%	90.2%	99.6%
EU3469	3345	31	34%	108	100.0%	100.0%	100.0%
EU3472	2546	51	57%	50	68.6%	86.7%	97.5%
EU3484	2556	52	58%	49	83.5%	90.2%	98.1%
EU3527	2973	62	69%	48	66.4%	87.1%	99.7%
EU3544	4711	71	79%	66	92.8%	96.4%	99.3%
EU3598	4669	77	86%	61	96.5%	98.6%	99.9%
EU3599	4468	78	87%	57	96.3%	98.1%	98.9%
EU3621	6916	77	86%	90	99.3%	99.3%	99.3%
EU3633	5471	77	86%	71	74.7%	93.3%	97.8%
EU3647	2880	59	66%	49	69.7%	82.0%	96.6%
EU3654	11385	78	87%	146	99.9%	100.0%	100.0%
EU3660	7098	83	92%	86	72.1%	88.2%	94.7%
EU3684	5203	44	49%	118	100.0%	100.0%	100.0%
EU3701	1596	25	28%	64	74.0%	93.9%	99.1%
EU3714	8113	76	84%	107	100.0%	100.0%	100.0%
EU3733	2731	28	31%	98	77.7%	94.0%	98.7%
EU3755	4154	51	57%	81	100.0%	100.0%	100.0%
EU3768	1121	26	29%	43	71.0%	94.2%	99.6%
EU3803	715	28	31%	26	100.0%	100.0%	100.0%
EU3824	1755	28	31%	63	70.4%	86.1%	92.8%
EU3845	3014	67	74%	45	72.7%	84.9%	97.4%
EU3855	2981	64	71%	47	69.5%	83.4%	95.1%
EU3874	4978	78	87%	64	99.2%	99.4%	99.4%
EU3908	15983	79	88%	202	100.0%	100.0%	100.0%
EU3953	1919	25	28%	77	77.9%	93.2%	97.9%
EU3961	1012	15	17%	67	83.5%	95.5%	99.0%
EU3972	5851	56	62%	104	99.1%	100.0%	100.0%
EU3992	1707	17	19%	100	76.9%	88.9%	94.1%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU4002	5788	51	57%	113	100.0%	100.0%	100.0%
EU4004	544	14	16%	39	66.6%	89.1%	96.1%
EU4021	6273	73	81%	86	100.0%	100.0%	100.0%
EU4035	973	20	22%	49	74.9%	95.2%	99.3%
EU4066	2024	27	30%	75	80.5%	94.6%	98.2%
EU4075	11484	81	90%	142	99.5%	99.6%	99.6%
EU4083	1636	27	30%	61	74.8%	92.8%	97.8%
EU4112	1837	26	29%	71	78.1%	94.1%	98.4%
EU4137	1613	27	30%	60	71.7%	88.7%	92.5%
EU4169	832	18	20%	46	72.1%	93.4%	98.1%
EU4172	1181	21	23%	56	74.1%	93.7%	98.4%
EU4205	1216	28	31%	43	67.2%	92.5%	99.3%
EU4235	1816	28	31%	65	76.9%	94.6%	98.8%
EU4264	1890	29	32%	65	75.2%	92.6%	97.6%
EU4278	6133	74	82%	83	99.2%	100.0%	100.0%
EU4300	1878	28	31%	67	73.7%	91.6%	97.1%
EU4316	2133	26	29%	82	74.0%	90.7%	95.3%
EU4321	2491	28	31%	89	78.5%	93.6%	98.4%
EU4333	26	1	1%	26	100.0%	100.0%	100.0%
EU4387	3600	65	72%	55	99.3%	99.3%	99.3%
EU4392	2428	27	30%	90	79.7%	92.7%	97.7%
EU4426	5518	26	29%	212	99.8%	100.0%	100.0%
EU4444	10374	76	84%	137	99.8%	99.8%	100.0%
EU4450	2231	22	24%	101	78.8%	95.0%	99.4%
EU4463	5931	69	77%	86	100.0%	100.0%	100.0%
EU4473	2319	26	29%	89	78.1%	94.5%	98.2%
EU4491	6137	68	76%	90	99.2%	99.2%	99.2%
EU4508	614	7	8%	88	85.5%	98.0%	100.0%
EU4519	10364	72	80%	144	100.0%	100.0%	100.0%
EU4527	5533	76	84%	73	94.2%	96.8%	98.6%
EU4532	4324	67	74%	65	95.2%	97.2%	98.5%
EU4540	3364	67	74%	50	62.4%	80.9%	98.1%
EU4565	4535	77	86%	59	100.0%	100.0%	100.0%
EU4573	15662	80	89%	196	99.7%	99.7%	99.7%
EU4579	3735	60	67%	62	79.8%	88.2%	98.2%
EU4582	13312	66	73%	202	99.9%	99.9%	99.9%
EU4591	17342	84	93%	206	99.3%	99.4%	99.7%
EU4593	9055	89	99%	102	90.0%	95.3%	98.7%
EU4607	16703	78	87%	214	99.9%	100.0%	100.0%
EU4611	5381	64	71%	84	93.9%	96.1%	96.7%
EU4623	3665	69	77%	53	60.4%	84.3%	96.4%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU4650	3086	64	71%	48	79.3%	86.3%	96.6%
EU4685	8697	71	79%	122	99.5%	99.5%	99.5%
EU4687	3285	62	69%	53	73.7%	86.5%	98.8%
EU4699	11350	72	80%	158	99.7%	99.7%	99.8%
EU4710	4279	69	77%	62	80.8%	87.7%	99.4%
EU4721	5307	42	47%	126	100.0%	100.0%	100.0%
EU4723	3177	63	70%	50	71.1%	86.3%	97.7%
EU4773	3335	61	68%	55	82.0%	88.7%	99.3%
EU4792	2596	38	42%	68	100.0%	100.0%	100.0%
EU4824	3457	69	77%	50	67.3%	83.7%	98.5%
EU4833	4448	70	78%	64	78.4%	89.0%	96.1%
EU4838	6102	63	70%	97	100.0%	100.0%	100.0%
EU4853	9998	70	78%	143	99.3%	99.4%	99.4%
EU4864	3158	69	77%	46	71.3%	82.9%	96.7%
EU4896	270	7	8%	39	100.0%	100.0%	100.0%
EU4950	5476	53	59%	103	100.0%	100.0%	100.0%
EU4954	3393	64	71%	53	74.9%	86.9%	96.9%
EU4976	3724	67	74%	56	67.5%	78.7%	96.6%
EU5050	2776	64	71%	43	57.6%	75.6%	98.0%
EU5073	3704	64	71%	58	70.2%	81.2%	98.5%
EU5098	5747	64	71%	90	100.0%	100.0%	100.0%
EU5129	8941	77	86%	116	99.7%	99.8%	99.9%
EU5134	577	33	37%	17	100.0%	100.0%	100.0%
EU5141	3318	60	67%	55	80.8%	86.8%	96.2%
EU5167	16705	89	99%	188	99.8%	99.8%	99.8%
EU5182	3539	25	28%	142	100.0%	100.0%	100.0%
EU5185	1689	34	38%	50	79.0%	86.9%	93.7%
EU5191	1581	25	28%	63	98.5%	98.5%	99.5%
EU5245	1847	31	34%	60	100.0%	100.0%	100.0%
EU5261	3628	67	74%	54	73.6%	86.0%	96.1%
EU5264	5678	68	76%	84	90.1%	94.7%	97.0%
EU5318	7038	84	93%	84	93.7%	97.7%	99.2%
EU5331	9593	87	97%	110	87.0%	93.4%	97.7%
EU5349	5603	46	51%	122	100.0%	100.0%	100.0%
EU5351	5587	87	97%	64	93.8%	97.7%	99.3%
EU5372	93	2	2%	47	100.0%	100.0%	100.0%
EU5387	3782	68	76%	56	80.9%	89.3%	97.5%
EU5397	1930	17	19%	114	100.0%	100.0%	100.0%
EU5429	12837	80	89%	160	99.1%	99.5%	99.5%
EU5435	7456	86	96%	87	94.8%	97.6%	98.9%
EU5441	6074	55	61%	110	99.7%	100.0%	100.0%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU5478	14976	72	80%	208	99.4%	99.6%	99.8%
EU5529	14040	71	79%	198	99.8%	99.8%	99.8%
EU5587	2750	32	36%	86	96.4%	99.0%	100.0%
EU5591	11349	65	72%	175	99.4%	99.5%	99.7%
EU5593	3277	49	54%	67	100.0%	100.0%	100.0%
EU5612	10005	72	80%	139	100.0%	100.0%	100.0%
EU5613	7314	87	97%	84	92.7%	96.7%	98.9%
EU5673	4388	28	31%	157	100.0%	100.0%	100.0%
EU5777	7809	32	36%	244	99.7%	99.9%	100.0%
EU5802	9926	36	40%	276	99.7%	100.0%	100.0%
EU5821	3651	13	14%	281	100.0%	100.0%	100.0%
EU5891	6288	81	90%	78	93.0%	96.3%	98.7%
EU6264	10095	71	79%	142	100.0%	100.0%	100.0%
EU6281	8258	53	59%	156	99.5%	99.7%	99.7%
EU6287	6543	66	73%	99	100.0%	100.0%	100.0%
EU6349	5275	50	56%	106	100.0%	100.0%	100.0%
EU6386	4053	28	31%	145	100.0%	100.0%	100.0%
EU6444	6237	51	57%	122	100.0%	100.0%	100.0%
EU6524	12677	88	98%	144	99.7%	99.8%	100.0%
EU6527	4405	51	57%	86	99.4%	99.6%	100.0%
EU6544	6827	60	67%	114	90.5%	96.2%	97.9%
EU6556	8997	85	94%	106	90.1%	95.8%	98.6%
EU6564	6085	59	66%	103	87.6%	93.2%	98.2%
EU6723	6030	65	72%	93	100.0%	100.0%	100.0%
EU6735	10032	87	97%	115	90.1%	95.0%	97.5%
EU6743	4204	56	62%	75	88.6%	93.9%	98.4%
EU6890	4930	48	53%	103	100.0%	100.0%	100.0%
EU6893	5880	68	76%	86	100.0%	100.0%	100.0%
EU6923	5845	65	72%	90	100.0%	100.0%	100.0%
EU7001	6716	80	89%	84	92.4%	96.0%	99.1%
EU7082	6431	74	82%	87	100.0%	100.0%	100.0%
EU7119	4738	79	88%	60	91.4%	95.1%	98.2%
EU7218	3410	49	54%	70	100.0%	100.0%	100.0%
EU7285	7517	69	77%	109	99.4%	99.4%	99.4%
EU7293	7828	87	97%	90	93.1%	97.0%	98.7%
EU7314	6703	80	89%	84	93.5%	97.9%	99.4%
EU7382	7913	87	97%	91	92.9%	96.4%	97.4%
EU7412	8657	89	99%	97	92.4%	97.3%	99.7%
EU7427	8296	90	100%	92	92.8%	97.6%	99.1%
EU7521	5405	63	70%	86	100.0%	100.0%	100.0%
EU7536	7061	83	92%	85	92.4%	96.8%	98.8%

<b>AIRCRAFT</b>	<b>Total No of Reports</b>	<b>Days of Reports</b>	<b>Actual/ possible</b>	<b>Average reports/ day</b>	<b>0–45 min</b>	<b>0–60 min</b>	<b>0–120 min</b>
EU7548	6424	83	92%	77	88.3%	93.3%	97.0%
EU7610	3514	60	67%	59	68.7%	86.6%	98.1%
EU7629	4162	54	60%	77	100.0%	100.0%	100.0%
EU7634	5827	68	76%	86	100.0%	100.0%	100.0%
EU7635	5230	68	76%	77	96.2%	98.3%	99.2%
EU7643	5845	57	63%	103	98.9%	99.3%	99.4%
EU7654	5115	50	56%	102	100.0%	100.0%	100.0%
EU7724	3869	42	47%	92	100.0%	100.0%	100.0%
EU7864	6450	73	81%	88	75.8%	92.9%	98.2%
EU7865	5541	67	74%	83	99.1%	100.0%	100.0%
EU7866	15429	80	89%	193	99.8%	99.9%	99.9%
EU7888	10795	75	83%	144	100.0%	100.0%	100.0%
EU7894	3945	78	87%	51	95.9%	98.8%	99.2%
EU7910	5320	52	58%	102	94.9%	97.0%	98.1%
EU8264	2499	20	22%	125	100.0%	100.0%	100.0%
EU8431	5915	66	73%	90	100.0%	100.0%	100.0%
EU8478	6170	65	72%	95	100.0%	100.0%	100.0%
EU8520	4738	39	43%	121	100.0%	100.0%	100.0%
EU8598	5468	67	74%	82	100.0%	100.0%	100.0%
EU8605	6224	74	82%	84	100.0%	100.0%	100.0%
EU8632	7671	75	83%	102	100.0%	100.0%	100.0%
EU8733	7675	75	83%	102	91.2%	95.8%	97.9%
EU8736	4611	54	60%	85	99.3%	99.3%	99.3%
EU8742	5427	56	62%	97	86.0%	92.7%	98.0%
EU8787	7154	84	93%	85	93.9%	98.0%	99.5%
EU8789	5850	69	77%	85	100.0%	100.0%	100.0%
EU8891	4606	57	63%	81	100.0%	100.0%	100.0%
EU8943	5659	51	57%	111	100.0%	100.0%	100.0%
EU8969	4875	42	47%	116	100.0%	100.0%	100.0%
EU9013	6910	86	96%	80	94.2%	98.0%	99.2%
EU9023	5898	77	86%	77	100.0%	100.0%	100.0%
EU9145	4676	45	50%	104	100.0%	100.0%	100.0%
EU9158	13275	78	87%	170	100.0%	100.0%	100.0%
EU9234	10771	73	81%	148	99.7%	99.9%	100.0%
EU9245	16024	82	91%	195	99.8%	99.9%	100.0%
EU9356	5320	76	84%	70	100.0%	100.0%	100.0%
EU9378	6078	75	83%	81	100.0%	100.0%	100.0%
EU9544	9813	82	91%	120	100.0%	100.0%	100.0%
EU9589	4940	63	70%	78	100.0%	100.0%	100.0%
EU9622	10763	73	81%	147	99.2%	99.6%	99.6%
EU9678	6406	72	80%	89	100.0%	100.0%	100.0%

AIRCRAFT	Total No of Reports	Days of Reports	Actual/possible	Average reports/day	0–45 min	0–60 min	0–120 min
EU9680	4739	61	68%	78	99.9%	100.0%	100.0%
EU9692	416	9	10%	46	100.0%	100.0%	100.0%
EU9723	7402	86	96%	86	93.4%	97.5%	99.9%
EU9729	7765	73	81%	106	99.7%	100.0%	100.0%
EU9734	6643	71	79%	94	100.0%	100.0%	100.0%
EU9743	12707	82	91%	155	100.0%	100.0%	100.0%
EU9883	7704	84	93%	92	92.5%	96.8%	99.5%
EU9967	6492	74	82%	88	100.0%	100.0%	100.0%

[432]

- *Timeliness: From six aircraft more than 5% of the received data had on average a delay after observation for more than two hours.*

Identifier	Identifier	Identifier	Identifier	Identifier	Identifier
EU1538	EU3660	EU3824	EU3992	EU4137	EU5185

*Note that a number of aircraft fly long haul routes and either “store” data until reaching a Ground Receiving Station or use Satcom – which would account for some delay. For 35 aircraft more than 3% of the data was received after a delay of 2 hours or more.*

- *No data was received from the following 30 aircraft (\*: not reporting due to budgetary constraints.)*

Identifier	Identifier	Identifier	Identifier	Identifier	Identifier
EU0078	EU0332	EU1232	EU2978	EU4756 *	EU5420
EU0154	EU0490	EU1446	EU3533	EU4865	EU5486
EU0209	EU0498	EU2235	EU3725	EU4956 *	EU5544
EU0281 *	EU0646	EU2689	EU4529	EU5175 *	EU6321 *
EU0300	EU0999	EU2795	EU4589 *	EU5360	EU6821 *

**Table 3, Description and number of errors**

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**Aircraft with parameter anomalies:**

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***Aircraft deactivated due to temperature anomalies***

- EU1301: Temperature error >3.0°C. Return from maintenance 24<sup>th</sup> Jan – error still evident, asked operator to carry out checks soonest opportunity – disabled on E-ADAS 28<sup>th</sup> Jan.
- EU3599: Temperature error >2.0°C Disabled on E-ADAS and operator informed 28<sup>th</sup> Jan. Temperature sensors changed by operator 29<sup>th</sup> Jan – aircraft enabled on E-ADAS 30<sup>th</sup> Jan 10:30
- EU1800: Temperature error >5.0°C Disabled on E-ADAS 3<sup>rd</sup> Feb. Operator looked at problem – switched back on 17<sup>th</sup> Feb. Problem still occurring – disabled again 19<sup>th</sup> Feb.
- EU3194: Temperature error similar to EU1800. Disabled 3<sup>rd</sup> Feb. Both these aircraft are using an old ACARS unit and have a constant altitude problem causing temp errors.
- EU7910: Temperature error - disabled on E-ADAS 25<sup>th</sup> 09:30. Operator informed.
- EU3201 (Also noted on EU1800, EU2235, EU3194 and EU7910): 17<sup>th</sup> March –error with mean temperature error >4.0°C. This is a problem with the ACARS unit onboard. (Units disabled on E-ADAS until problem solved by operator)

***Consistent warm bias (monthly mean diff > 1.0°C)***

- January 2003:  
EU0047, EU0120, EU0177, EU0316, EU1301, EU1334, EU3042, EU3147, EU3194, EU3421, EU3599, EU4593, EU5050, EU5331, EU6544, EU7293, EU7910, EU8742, EU9883.
- February 2003:  
EU0316, EU3803, EU4593, EU4896, EU5050, EU5331, EU6544, EU6743.
- March 2003:  
EU0041, EU0316, EU0385, EU3201, EU3421, EU3599, EU4112, EU4593, EU5050, EU5331, EU5397, EU6544, EU6743, EU7293

***Warm bias (mean diff > 1.0°C on 5 or more days)***

- January 2003:  
EU0041, EU0073, EU0086, EU0158, EU0203, EU0204, EU0301, EU0313, EU0458, EU0802, EU1337, EU1929, EU2559, EU3042, EU3544, EU5134, EU5318, EU5351, EU5435, EU5891, EU7001, EU7314, EU7382, EU7412, EU7427, EU9723
  - February 2003:  
EU0032, EU0034, EU0041, EU0047, EU0073, EU0158, EU0203, EU0301, EU0313, EU0632, EU0875, EU1337, EU2430, EU2530, EU2559, EU3042, EU3075, EU3144, EU3421, EU3599, EU4527, EU4532, EU5141, EU5435, EU5891, EU7001, EU7119, EU7293, EU7314, EU7382, EU7412, EU7427, EU7894, EU8787, EU9356
  - March 2003:  
EU0046, EU0047, EU0073, EU0134, EU0221, EU0254, EU0301, EU0313, EU0723, EU1334, EU1337, EU1929, EU2430, EU2559, EU3042, EU3362, EU3598, EU3633, EU3803, EU4083, EU4169, EU4473, EU4532, EU5134, EU5435, EU5891, EU7001, EU7314, EU7382, EU7412, EU7427, EU7894, EU8742
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**No reports received although expected:**

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- EU0006: No reports Mar 3 – 13<sup>th</sup>
  - EU0021: No reports Jan 1 – 8<sup>th</sup>
  - EU0034: No reports Jan 16 – Feb 13<sup>th</sup>
  - EU0045: No reports Jan 14 – 30<sup>th</sup>, Feb 27<sup>th</sup> – Mar 31<sup>st</sup>
  - EU0049: No reports Jan 17 – 29<sup>th</sup>
  - EU0051: No reports Jan 17 – Feb 28<sup>th</sup>
  - EU0052: No reports Feb 24 – Mar 29<sup>th</sup>
  - EU0060: No reports Jan 1 – 28<sup>th</sup>, Mar 22 – 29<sup>th</sup>
  - EU0073: No reports Jan 10 – 15<sup>th</sup>
  - EU0077: No reports Mar 3 – 31<sup>st</sup>
  - EU0078: No reports Jan 1 – 31<sup>st</sup>, Mar 4 – 31<sup>st</sup>
  - EU0080: No reports Mar 3 – 7<sup>th</sup>
  - EU0086 – no reportd Jan 26 – 31<sup>st</sup>
  - EU0106: No reports Feb 1 – Mar 9<sup>th</sup>
  - EU0110: No reports Jan 25 – Feb 7<sup>th</sup>
  - EU0120: No reports Feb 11 – 16<sup>th</sup>
  - EU0123: No reports Jan 1 – 10<sup>th</sup>, 14 – 21<sup>st</sup>, Jan 23 – Mar 31<sup>st</sup>
  - EU0124: No reports Mar 16 – 21<sup>st</sup>
  - EU0140: No reports Mar 26 – 30<sup>th</sup>
  - EU0154: No reports Jan 1 – Mar 31<sup>st</sup>
  - EU0167: No reports Jan 1 – 20<sup>th</sup>
  - EU0177: No reports Jan 14 – Feb 26<sup>th</sup>
  - EU0185: No reports Mar 25 – 29<sup>th</sup>
  - EU0201: No reports Mar 27 – 31<sup>st</sup>
  - EU0202: No reports Feb 25<sup>th</sup> – Mar 7<sup>th</sup>
  - EU0203: No reports Mar 12 – 31<sup>st</sup>
  - EU0204: No reports mar 21 – 27<sup>th</sup>
  - EU0234: No reports Feb 1 – 6<sup>th</sup>
  - EU0263: No reports Jan 1 – 16<sup>th</sup>
  - EU0281: No reports Jan 1 – 31<sup>st</sup>, Mar 4 – 31<sup>st</sup>
  - EU0290: No reports Mar 3 – 23<sup>rd</sup>
  - EU0299: No reports Mar 9 – 17<sup>th</sup>
  - EU0310: No reports Jan 4 – 23<sup>rd</sup>
  - EU0311: No reports Mar 23 – 29<sup>th</sup>
  - EU0332: No reports Mar 3 – 31<sup>st</sup>
  - EU0335: No reports Mar 24 – 31<sup>st</sup>
  - EU0367: No reports Jan 26 – Feb 12<sup>th</sup>, Mar 22 – 30<sup>th</sup>
  - EU0372: No reports Jan 17 – 23<sup>rd</sup>, 25 – 31<sup>st</sup>
  - EU0394: No reports Mar 10 – 15<sup>th</sup>
  - EU0432: No reports Jan 12 – 19<sup>th</sup>, Mar 1 – 8<sup>th</sup>
  - EU0442: No reports Feb 2 – Mar 9<sup>th</sup>
  - EU0456: No reports Jan 20 – 26<sup>th</sup>
  - EU0457: No reports Mar 14 – 19<sup>th</sup>
  - EU0458: No reports Jan 1 – 13<sup>th</sup>
  - EU0476: No reports Jan 6 – 25<sup>th</sup>
  - EU0482: No reports Mar 23 – 30<sup>th</sup>
  - EU0490: No reports Feb 1 – Mar 31<sup>st</sup>
  - EU0575: No reports Feb 10 – 23<sup>rd</sup>
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- EU0601: No reports Feb 17 – 27<sup>th</sup>
  - EU0646: No reports Mar 3 – 31<sup>st</sup>
  - EU0711: No reports Mar 2 – 19<sup>th</sup>
  - EU0723: No reports Feb 7 – 16<sup>th</sup>
  - EU0934: No reports Mar 2 – 11<sup>th</sup>, 21 – 28<sup>th</sup>
  - EU0947: No reports Jan 11 – 16<sup>th</sup>, Jan 18 – Mar 31<sup>st</sup>
  - EU0961: No reports Jan 11 – 19<sup>th</sup>, 24 – 29<sup>th</sup>, Feb 1 – 8<sup>th</sup>, Feb 10 – Mar 19<sup>th</sup>, Mar 21 – 31<sup>st</sup>
  - EU0985: No reports Jan 1 – 6<sup>th</sup>, 25 – 29<sup>th</sup>, Feb 1 – 5<sup>th</sup>, 10 – 28<sup>th</sup>
  - EU0999: No reports Jan 1 – Mar 31<sup>st</sup>
  - EU1001: No reports Jan 26 – 31<sup>st</sup>
  - EU1056: No reports Mar 21 – 25<sup>th</sup>
  - EU1232: No reports Mar 3 – 31<sup>st</sup>
  - EU1275: No reports Feb 1 – 19<sup>th</sup>, Mar 8 – 31<sup>st</sup>
  - EU1282: No reports Jan 7 – 31<sup>st</sup>
  - EU1312: No reports Jan 15 – 19<sup>th</sup>, Mar 8 – 31<sup>st</sup>
  - EU1334: No reports Feb 1 – 21<sup>st</sup>
  - EU1346: No reports Mar 3 – 26<sup>th</sup>
  - EU1411: No reports Jan 1 – Feb 20<sup>th</sup>, Mar 14 – 18<sup>th</sup>
  - EU1446: No reports Jan 1 – Mar 31<sup>st</sup>
  - EU1538: No reports Mar 22 – 29<sup>th</sup>
  - EU1567: No reports Mar 18 – 24<sup>th</sup>
  - EU1593: No reports Jan 1 – 12<sup>th</sup>, Feb 11 – 17<sup>th</sup>
  - EU1790: No reports Feb 4 – 8<sup>th</sup>
  - EU1863: No reports Jan 24 – Feb 22<sup>nd</sup>, Feb 24 – Mar 8<sup>th</sup>, Mar 10 – 31<sup>st</sup>
  - EU1929: No reports Feb 4 – 19<sup>th</sup>
  - EU2017: No reports Jan 20 – 30<sup>th</sup>
  - EU2043: No reports Jan 1 – 16<sup>th</sup>
  - EU2130: No reports Feb 3 – 16<sup>th</sup>
  - EU2165: No reports Feb 2 – 22<sup>nd</sup>, Mar 17 – 23<sup>rd</sup>
  - EU2356: No reports Mar 14 – 25<sup>th</sup>
  - EU2378: No reports Jan 1 – 9<sup>th</sup>
  - EU2399: No reports Mar 8 – 31<sup>st</sup>
  - EU2401: No reports Jan 16 – Mar 31<sup>st</sup>
  - EU2530: No reports Jan 20 – 30<sup>th</sup>
  - EU2532: No reports Mar 4 – 31<sup>st</sup>
  - EU2547: No reports Jan 1 – 13<sup>th</sup>, 16 – 22<sup>nd</sup>
  - EU2578: No reports Mar 9 – 31<sup>st</sup>
  - EU2590: No reports Jan 1 – Mar 12<sup>th</sup>, Mar 14 – 20<sup>th</sup>, 22 – 31<sup>st</sup>
  - EU2595: No reports Jan 1 – 9<sup>th</sup>, Feb 13 – 26<sup>th</sup>
  - EU2610: No reports Feb 1 – 12<sup>th</sup>
  - EU2618: No reports Feb 1 – Mar 12<sup>th</sup>, Mar 14 – 31<sup>st</sup>
  - EU2634: No reports Mar 8 – 31<sup>st</sup>
  - EU2673: No reports Jan 11 – Feb 10<sup>th</sup>, Mar 1 – 6<sup>th</sup>, 8 – 17<sup>th</sup>, 24 – 29<sup>th</sup>
  - EU2689: No reports Mar 3 – 31<sup>st</sup>
  - EU2690: No reports Mar 2 – 7<sup>th</sup>
  - EU2751: No reports Feb 17 – Mar 31<sup>st</sup>
  - EU2752: No reports Feb 17 – 28<sup>th</sup>
  - EU2773: No reports Jan 1 – Feb 11<sup>th</sup>, Feb 23 – Mar 31<sup>st</sup>
  - EU2795: No reports Feb 1 – Mar 31<sup>st</sup>
  - EU2897: No reports Feb 1 – 16<sup>th</sup>
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- EU2936: No reports Mar 2 – 31<sup>st</sup>
  - EU2978: No reports Jan 1 – Mar 31<sup>st</sup>
  - EU2979: No reports Mar 21 – 27<sup>th</sup>
  - EU2983: No reports Feb 6 – 13<sup>th</sup>
  - EU3075: No reports Feb 1 – 6<sup>th</sup>, Mar 7 – 31<sup>st</sup>
  - EU3094: No reports Feb 8 – 19<sup>th</sup>, Mar 23 – 29<sup>th</sup>
  - EU3115: No reports Mar 17 – 21<sup>st</sup>
  - EU3147: No reports Feb 9 – 17<sup>th</sup>, Mar 11 – 26<sup>th</sup>
  - EU3194: No reports Feb 4 – Mar 31<sup>st</sup>
  - EU3201: No reports Mar 3 – 10<sup>th</sup>, 20 – 31<sup>st</sup>
  - EU3268: No reports Mar 17 – 23<sup>rd</sup>
  - EU3400: No reports Feb 15 – Mar 31<sup>st</sup>
  - EU3455: No reports Feb 1 – 12<sup>th</sup>
  - EU3469: No reports Jan 1 – 11<sup>th</sup>, 13 – 21<sup>st</sup>, Jan 23 – Feb 13<sup>th</sup>, Feb 26 – Mar 12<sup>th</sup>
  - EU3472: No reports Feb 18 – 28<sup>th</sup>
  - EU3533: No reports Jan 1 – Feb 28<sup>th</sup>
  - EU3544: No reports Mar 24 – 31<sup>st</sup>
  - EU3598: No reports Mar 17 – 25<sup>th</sup>
  - EU3621: No reports Feb 17 – 23<sup>rd</sup>
  - EU3633: No reports Feb 6 – 13<sup>th</sup>
  - EU3684: No reports Jan 6 – 12<sup>th</sup>, 20 – 26<sup>th</sup>, Feb 9 – 14<sup>th</sup>
  - EU3725: No reports Jan 1 – Mar 31<sup>st</sup>
  - EU3755: No reports Mar 4 – 8<sup>th</sup>, 21 – 30<sup>th</sup>
  - EU3803: No reports Mar 23 – 31<sup>st</sup>
  - EU3961: No reports Mar 11 – 20<sup>th</sup>
  - EU3972: No reports Jan 1 – 22<sup>nd</sup>
  - EU3992: No reports Mar 22 – 31<sup>st</sup>
  - EU4002: No reports Feb 13 – 19<sup>th</sup>
  - EU4004: No reports Mar 3 – 11<sup>th</sup>
  - EU4172: No reports Mar 3 – 9<sup>th</sup>
  - EU4333: No reports Jan 1 – Mar 5<sup>th</sup>, Mar 7 – 31<sup>st</sup>
  - EU4387 – no reports Mar 2 – 14<sup>th</sup>
  - EU4450: No reports Mar 11 – 16<sup>th</sup>
  - EU4463: No reports Jan 8 – 15<sup>th</sup>
  - EU4508: No reports Mar 3 – 23<sup>rd</sup>
  - EU4527: No reports Feb 23 – 28<sup>th</sup>
  - EU4529: No reports Jan 1 – Mar 31<sup>st</sup>
  - EU4532: No reports Mar 22 – 31<sup>st</sup>
  - EU4607: No reports Mar 17 – 23<sup>rd</sup>
  - EU4685: No reports Mar 9 – 21<sup>st</sup>
  - EU4699: No reports Feb 7 – 16<sup>th</sup>
  - EU4721: No reports Jan 13 – 21<sup>st</sup>, Feb 10 – 24<sup>th</sup>
  - EU4792: No reports Jan 1 – 9<sup>th</sup>, Mar 1 – 11<sup>th</sup>
  - EU4838: No reports Feb 17 – 21<sup>st</sup>
  - EU4853: No reports Jan 1 – 6<sup>th</sup>, Mar 24 – 31<sup>st</sup>
  - EU4865: No reports Jan 1 – Mar 31<sup>st</sup>
  - EU4950: No reports Jan 1 – 8<sup>th</sup>, 25 – 31<sup>st</sup>
  - EU5098: No reports Jan 1 – 6<sup>th</sup>
  - EU5129: No reports Mar 23 – 31<sup>st</sup>
  - EU5134: No reports Jan 1 – 7<sup>th</sup>, Feb 1 – Mar 9<sup>th</sup>
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- EU5182: No reports Jan 10 – Feb 28<sup>th</sup>
  - EU5185: No reports Mar 6 – 28<sup>th</sup>
  - EU5245: No reports Mar 13 – 20<sup>th</sup>, 26 – 31<sup>st</sup>
  - EU5349: No reports Jan 7 – 16<sup>th</sup>, Jan 18 – Feb 9<sup>th</sup>
  - EU5372: No reports Jan 1 – 5<sup>th</sup>, Jan 7 – Feb 14<sup>th</sup>, Feb 16 – Mar 31<sup>st</sup>
  - EU5429: No reports Mar 23 – 29<sup>th</sup>
  - EU5478: No reports Jan 6 – 11<sup>th</sup>
  - EU5529: No reports Jan 13 – 19<sup>th</sup>
  - EU5587: No reports Feb 2 – Mar 6<sup>th</sup>, Mar 8 – 31<sup>st</sup>
  - EU5591: No reports Feb 10 – 14<sup>th</sup>, 21 – 27<sup>th</sup>, Mar 7 – 12<sup>th</sup>
  - EU5593: No reports Feb 23 – Mar 10<sup>th</sup>
  - EU5635: No reports Mar 3 – 31<sup>st</sup>
  - EU5719: No reports Mar 3 – 31<sup>st</sup>
  - EU5777: No reports Jan 1 – Feb 16<sup>th</sup>, Mar 26 – 31<sup>st</sup>
  - EU5802: No reports Jan 1 – Feb 16<sup>th</sup>, Mar 26 – 31<sup>st</sup>
  - EU5821: No reports Jan 1 – Mar 11<sup>th</sup>, Mar 25 – 31<sup>st</sup>
  - EU6281: No reports Jan 1 – 28<sup>th</sup>
  - EU6287: No reports Feb 7 – 15<sup>th</sup>
  - EU6349: No reports Jan 1 – 6<sup>th</sup>, Feb 5 – 9<sup>th</sup>
  - EU6444: No reports Jan 6 – 12<sup>th</sup>, 14 – 19<sup>th</sup>
  - EU6527: No reports Mar 12 – 22<sup>nd</sup>
  - EU6544: No reports Mar 4 – 31<sup>st</sup>
  - EU6723: No reports Feb 4 – 20<sup>th</sup>, 22 – 27<sup>th</sup>
  - EU6743: No reports Jan 2 – 31<sup>st</sup>
  - EU6890: No reports Feb 20 – 26<sup>th</sup>
  - EU7082: No reports Feb 6 – 13<sup>th</sup>
  - EU7285: No reports Jan 20 – 26<sup>th</sup>
  - EU7314: No reports Jan 18 – 26<sup>th</sup>
  - EU7521: No reports Jan 4 – 12<sup>th</sup>
  - EU7610: No reports Jan 1 – 22<sup>nd</sup>
  - EU7629: No reports Mar 3 – 16<sup>th</sup>
  - EU7634: No reports Feb 1 – 5<sup>th</sup>
  - EU7635: No reports Feb 14 – 23<sup>rd</sup>
  - EU7654: No reports Jan 1 – 7<sup>th</sup>
  - EU7724: No reports Jan 10 – 15<sup>th</sup>, Mar 12 – 18<sup>th</sup>, 21 – 28<sup>th</sup>
  - EU7864: No reports Jan 22 – 27<sup>th</sup>
  - EU7894: No reports Jan 13 – 19<sup>th</sup>
  - EU8264: No reports Jan 1 – Mar 6<sup>th</sup>
  - EU8431: No reports Feb 15 – 23<sup>rd</sup>
  - EU8478: No reports Jan 15 – 21<sup>st</sup>
  - EU8520: No reports Jan 12 – 17<sup>th</sup>, Feb 13 – 21<sup>st</sup>
  - EU8605: No reports Mar 12 – 17<sup>th</sup>
  - EU8733: No reports Jan 1 – 12<sup>th</sup>
  - EU8736: No reports Mar 26 – 31<sup>st</sup>
  - EU8742: No reports Feb 1 – 28<sup>th</sup>
  - EU8891: No reports Jan 20 – 27<sup>th</sup>, Feb 16 – 27<sup>th</sup>
  - EU8943: No reports Feb 6 – 28<sup>th</sup>
  - EU8969: No reports Jan 1 – 5<sup>th</sup>, 14 – 24<sup>th</sup>, Feb 9 – 16<sup>th</sup>
  - EU9145: No reports Jan 18 – 30<sup>th</sup>
  - EU9234: No reports Feb 16 – 23<sup>rd</sup>
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- EU9622: No reports Feb 23 – 28<sup>th</sup>
- EU9680: No reports Mar 24 – 31<sup>st</sup>
- EU9692: No reports Jan 1 – 9<sup>th</sup>, 15 – 30<sup>th</sup>, Feb 11 – 19<sup>th</sup>, Feb 21 – Mar 31<sup>st</sup>
- EU9967: No reports Jan 22 – 28<sup>th</sup>

#### Specific problems:

- EU1673: Wrong date 3<sup>rd</sup> – 4<sup>th</sup> Feb – operator reset onboard clock.
- EU7866: Wrong date being reported 18<sup>th</sup> March – onboard clock reset by operator on 18<sup>th</sup>
- EU2235, EU0290 and EU4508 deactivated by operator on March, 10<sup>th</sup>: Not responding to uplink commands. Not disabled on E-ADAS.

#### Ground stations issues and other problems:

- Lufthansa data disrupted Jan 25/08:30 to Jan 26/14:30 due to Lido network problems. No data was stored.
- 3<sup>rd</sup> March: airlines participating in the HF Trial reconfigured their fleets – increase in data from ~23k to ~45k
- 7<sup>th</sup> March: some minor configuration changes to fleets due to increase in data for HF Trial (data totals now down to ~35k)
- 20<sup>th</sup> March: airports in Africa added to E-ADOS as part of agreement with ASECNA
- 21<sup>st</sup> March: further reconfiguration to HF Trial. Routes to Middle East destinations affected by Iraq crisis.
- 31<sup>st</sup> March: SAS data totals for B737 fleet low – problem was a software bug affecting the clock change to “summertime”. Fault rectified during the morning of 3<sup>rd</sup> April..

#### Activated and deactivated aircraft:

- EU0372: aircraft activated 10<sup>th</sup> Jan
- EU0490, EU2795, EU3075, EU3094 and EU3147: Aircraft activated 29<sup>th</sup> Jan
- EU0632: aircraft activated 31<sup>st</sup> Jan
- EU1789: aircraft activated 15<sup>th</sup> Jan
- There have been a further 60 aircraft (B737) activated by Lufthansa between 20 – 31<sup>st</sup> Jan
- EU0734: activated by operator 16<sup>th</sup> Feb – testing new AAAv2 software
- EU0321: activated by operator 24<sup>th</sup> Feb – testing new AAAv2 software.
- EU3824: activated by operator 28<sup>th</sup> Feb (replacement for sold aircraft EU0177)
- 3<sup>rd</sup> March: activation of additional Lufthansa long haul aircraft (in total 32 x A340 & 28 x B747)
- 11<sup>th</sup> March: EU5397 activated – new A330 aircraft.
- 31<sup>st</sup> March: activation of additional Lufthansa long haul aircraft (2 x A340 & 5 x A330)

(problems/faults reported here are apart from routine maintenance (less than 5 days).  
Information provided by the appointed Technical Co-ordinator of the E-AMDAR Programme;  
more details to be inserted in the following Quarterly reports)

## Tables 4 to 6, Evaluation results

Presented values: Observation *minus* Reference (Model values), O–B.

All statistics are evaluated separately for two datasets:

- 1) Data from Ascent/Descent ( $i_p i_p i_p = \text{ASC}$  or  $\text{DES}$ )
- 2) Cruise level, level flight at cruising height ( $i_p i_p i_p = \text{LVR}$  or  $\text{LVW}$ )

Notes:

- Data with  $i_p i_p i_p = \text{UNS}$  is **not** evaluated.
- AMDAR aircraft produce much more reports during Ascent/Descent than during Cruise level.
- O–B values larger than the stated criterion are presented in **bold**.
- Temperatures are in °C, wind speed in m/s and wind direction in degrees.
- The total number of reported observations in the table 4 to 6 differs from the total number in table 2. The main reason is that within table two data are presented from observations world wide, whereas in the tables 4 to 6 data are presented which were evaluated with using the HIRLAM model as reference. Since this model is a limited area model, only those data were evaluated which were observed within the HIRLAM area (roughly Europe, Northern Africa and the North Atlantic, see o - Figure 4.) and within the three hours time-window around main and intermediate hours (eight times a day). Other reasons for this difference are incorrect encoding, cases with identical reports (only one is used) or in case of incomplete bulletins.
- Notice that a number of aircraft only report in ascent/descent phase.
- For wind direction (see c) table 6) the column "Observed" is not filled to avoid confusion. For the column with the mean differences (*i.e.* Obs-backgrnd, Mean), these values are calculated based on  $\langle |\Delta DD| \rangle$  ( =AVG(ABS(DD\_OBS –DD\_MOD)) ) resulting in non-negative values.

### Legends

Number of Reports	Actual number of reports used for calculation of values
Observed Mean	Average value of the parameter for relevant phase in units of °C (for temperature), m/s (wind speed) or degrees (wind direction)
Observed SD	Standard Deviation of observed parameter
Obs–Backgrnd Mean	Average value of calculated differences (observed parameter minus model output value)
Obs–Backgrnd SD	Standard Deviation of calculated differences (observed parameter minus model output value)

a) Table 4, Temperature (°C)

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
	EU0002						6583	-18.2	17.8	-0.2	1.1
	EU0006	526	-53.9	7.7	0.0	1.4	25	-5.0	6.7	-0.2	1.1
	EU0021	1121	-45.4	16.8	-0.3	1.2	7832	-5.4	10.7	0.0	1.2
	EU0022	3448	-54.3	11.8	-0.2	1.4	10507	-3.6	11.7	0.0	1.3
	EU0023	877	-53.3	10.3	-0.1	1.6	282	1.1	21.9	0.2	1.8
	EU0032	2449	-42.1	10.0	0.0	1.5	2485	7.5	10.0	0.2	1.5
	EU0034	2208	-41.3	10.8	-0.1	1.3	2109	8.4	9.9	0.2	1.6
	EU0041	2225	-52.4	11.4	1.1	1.4	6571	-17.5	21.6	0.8	1.3
	EU0043	2161	-52.4	11.8	0.8	1.4	7246	-17.6	21.6	0.4	1.3
	EU0045	3113	-53.5	8.7	-0.3	1.7	1249	-8.7	12.4	0.1	1.5
	EU0046	1015	-54.7	8.0	0.9	1.8	72	-12.1	22.8	1.3	1.4
	EU0047	2455	-51.9	12.9	1.1	1.3	7630	-16.2	21.8	0.8	1.3
	EU0049						5679	-21.8	20.0	-0.1	1.2
	EU0051	950	-50.7	14.7	-0.2	1.2	4654	-1.3	11.3	-0.3	1.2
	EU0052	881	-51.2	13.1	-0.4	1.4	4502	-17.4	19.1	-0.2	1.2
	EU0054	1774	-53.5	12.5	-0.5	1.8	6661	-2.6	11.5	-0.2	1.4
	EU0055						6767	-19.1	18.3	0.1	1.1
	EU0059	1495	-49.5	15.6	0.0	1.2	6005	-16.3	19.6	0.3	1.2
	EU0060	1458	-50.3	9.9	-0.3	1.7	814	3.1	13.1	0.1	1.3
	EU0061	1460	-49.9	15.0	-0.3	1.2	6282	-15.2	19.3	-0.1	1.2
	EU0063	689	-50.2	16.2	-0.4	1.1	3757	-0.3	10.9	0.0	1.1
	EU0072	1103	-47.8	16.4	0.2	1.3	8779	-2.5	10.9	0.2	1.4
	EU0073	4132	-52.8	8.5	1.0	1.7	5087	-2.3	18.8	0.5	1.3
	EU0080	692	-56.4	7.1	-0.2	1.7					
	EU0081	3152	-54.3	11.4	0.3	1.5	7708	-2.1	11.5	0.4	1.3
	EU0082						7204	-18.6	18.2	0.3	1.0
	EU0086	3603	-52.8	8.7	0.8	1.8	3827	-0.6	19.6	0.2	1.5
	EU0101	396	-49.5	13.4	0.2	1.2	1983	-1.2	11.2	0.0	1.5
	EU0106	820	-49.6	15.1	-0.1	1.2	3873	-14.9	19.1	0.0	1.2
	EU0109	3758	-54.8	10.7	0.3	1.7	8474	-2.7	11.5	0.3	1.3
	EU0110	8829	-53.3	14.8	-0.1	1.4					
	EU0120	3364	-53.2	12.8	0.6	3.9	3216	-2.2	19.3	0.2	1.3
	EU0121	662	-50.8	14.5	-0.1	2.5	3142	0.0	10.7	-0.1	1.2
	EU0123	72	-50.9	10.6	0.0	1.5	71	-12.8	9.0	-0.1	1.2
	EU0124						6313	-18.0	18.2	0.3	1.0
	EU0134	503	-52.9	11.0	1.0	2.9	1653	-0.5	11.9	0.6	1.3
	EU0140	818	-52.9	10.1	0.5	1.5	460	7.5	21.3	0.1	1.3
	EU0158	1495	-48.8	14.8	0.8	1.1	6138	-13.6	18.9	0.7	1.2
	EU0167	945	-48.9	13.9	0.5	1.1	3783	-14.8	20.0	0.6	1.2
	EU0177	543	-51.0	15.2	1.1	1.8	416	-2.7	18.5	0.6	1.4

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU0185	1420	-49.3	13.2	0.5	1.1	5566	-14.0	19.1	0.5	1.2	
EU0201	268	-57.7	10.7	-0.4	1.0	1007	-1.6	10.9	0.2	1.5	
EU0202	6501	-55.2	8.6	-0.1	1.6	1655	-2.2	12.5	0.0	1.3	
EU0203	2975	-53.2	8.7	0.9	1.8	2567	-1.9	19.5	0.4	2.0	
EU0204	1314	-51.9	13.9	0.6	1.3	6758	-3.1	10.9	0.6	1.4	
EU0206	1121	-53.0	7.9	0.3	1.6	307	-6.2	26.5	0.5	1.1	
EU0221	1390	-49.5	9.3	1.3	1.6	887	6.8	13.3	0.3	1.1	
EU0230	9943	-53.2	12.8	0.2	1.5	529	0.5	13.6	0.2	1.2	
EU0233	896	-51.7	8.9	0.0	1.4	446	-0.9	21.6	0.2	1.4	
EU0234						5868	-18.4	18.1	-0.2	1.0	
EU0251	1373	-49.5	16.3	-0.3	1.3	7068	-14.5	18.5	-0.2	1.2	
EU0254	1897	-52.0	8.7	0.6	1.6	888	1.0	11.6	0.5	1.1	
EU0263	4377	-53.0	8.4	0.2	1.7	3034	0.3	12.8	0.2	1.2	
EU0274	644	-57.2	8.9	0.3	1.2	964	-5.3	11.1	0.6	1.7	
EU0290	149	-49.1	9.6	0.0	1.7	19	4.6	7.8			
EU0299						5937	-19.1	18.7	-0.1	1.1	
EU0301	2481	-53.2	10.4	0.7	1.3	6987	-14.9	21.7	0.7	1.3	
EU0303	1342	-49.5	15.3	-0.3	1.2	6561	-14.9	19.6	-0.1	1.2	
EU0307	1431	-49.1	16.6	-0.3	1.2	7305	-16.3	19.5	-0.2	1.2	
EU0310	8115	-55.3	8.5	0.0	1.4	1484	-1.0	12.8	0.0	1.2	
EU0311	1345	-48.4	15.1	0.2	1.2	5491	-14.6	19.1	0.5	1.2	
EU0312	1225	-52.4	9.4	0.2	1.6	737	0.7	12.7	0.5	1.2	
EU0313	1221	-47.4	15.7	0.8	1.0	5079	-13.8	18.5	0.8	1.2	
EU0316	2229	-52.6	10.9	1.3	1.3	6979	-16.4	21.4	1.0	1.3	
EU0319	2346	-53.3	11.8	0.5	1.3	7195	-15.8	21.8	0.5	1.3	
EU0321	55	9.2	11.2	-0.3	1.4	817	3.2	13.5	0.0	1.3	
EU0335	605	-53.8	8.5	-0.1	1.5	128	-12.2	19.2	0.4	1.2	
EU0350	1305	-53.2	9.3	-0.2	1.8	198	-6.4	25.1	0.1	1.1	
EU0354	377	-58.5	9.1	-0.6	1.2	999	-0.9	12.0	-0.1	1.4	
EU0359	1142	-45.2	16.1	0.7	1.2	5093	-14.1	19.5	0.7	1.2	
EU0367						5083	-17.5	17.4	-0.3	1.0	
EU0372	3463	-52.4	8.4	0.3	1.7	2658	2.3	13.4	0.4	1.2	
EU0373	1631	-50.3	14.4	-0.1	1.2	6201	-16.4	19.1	0.0	1.2	
EU0385	1391	-51.5	9.2	1.4	1.6	651	6.9	14.1	0.6	1.1	
EU0394	1272	-50.4	15.4	0.0	1.3	6284	-15.0	19.0	0.1	1.3	
EU0405	618	-58.4	7.6	0.3	1.3	877	-1.8	12.2	0.1	1.9	
EU0413	1219	-49.9	14.7	-0.4	1.2	5973	-16.0	19.4	-0.3	1.2	
EU0432						5102	-17.3	18.1	-0.1	1.1	
EU0442	746	-47.8	14.5	0.3	1.2	4060	-16.2	19.9	0.2	1.2	
EU0451	1254	-54.6	9.8	-0.2	1.7	252	-4.2	21.0	0.0	0.8	
EU0453	10423	-54.9	8.3	0.0	1.5	1884	-2.2	12.6	-0.1	1.2	
EU0456	1059	-47.8	16.2	0.3	1.3	4548	-19.3	22.5	0.4	1.3	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU0457	2360	-53.3	8.8	0.1	1.6	1519	-1.9	13.3	0.6	1.1	
EU0458	797	-46.4	18.5	0.1	1.4	3441	-17.9	22.9	0.3	1.2	
EU0476	660	-45.2	19.2	0.1	1.3	3283	-18.4	22.2	0.2	1.3	
EU0482	1513	-54.5	8.5	-0.1	1.7	740	-0.6	10.8	0.1	1.2	
EU0511	1254	-49.9	16.1	-0.4	1.3	6570	-16.3	19.4	-0.2	1.2	
EU0520	1064	-54.1	9.5	-0.1	1.7	312	0.6	22.4	0.1	1.3	
EU0558	1726	-52.2	13.6	-0.6	1.2	6397	-16.0	19.5	-0.4	1.2	
EU0568						5897	-17.5	18.5	0.6	1.0	
EU0575	8572	-55.2	8.4	0.0	1.5	1606	-2.9	11.9	-0.1	1.2	
EU0576	1230	-51.2	9.5	0.0	1.5	438	-2.1	26.0	0.1	1.3	
EU0583	1422	-49.9	14.7	0.1	1.1	6264	-15.4	19.4	0.2	1.2	
EU0601	1080	-48.8	15.3	0.0	1.1	5460	-15.5	19.1	0.0	1.2	
EU0620						3062	-16.0	17.9	-0.1	1.2	
EU0631	1271	-52.6	10.1	0.0	1.5	362	-4.0	25.3	0.2	0.9	
EU0632	3	-2.1	5.5	-0.7	1.6	113	-0.2	5.1	0.2	1.8	
EU0676	1430	-50.6	15.1	-0.4	1.2	6034	-16.2	19.3	-0.1	1.3	
EU0707						5638	-16.0	17.1	-0.1	1.1	
EU0711	672	-46.4	17.0	0.3	1.4	2533	-19.0	22.9	0.4	1.2	
EU0720	1037	-48.5	13.0	0.4	0.9	4265	0.0	11.0	0.1	1.3	
EU0723	516	-38.7	21.7	0.4	1.3	4288	-17.9	21.5	0.4	1.3	
EU0734	245	-31.0	22.1	0.8	1.2	1144	6.6	12.5	0.2	1.3	
EU0745	2595	-50.6	12.1	-0.5	1.1	11281	-3.1	11.2	-0.2	1.3	
EU0802	1318	-48.6	15.0	0.4	1.1	5282	-15.2	20.2	0.6	1.1	
EU0807	1996	-48.8	14.4	0.2	1.1	10415	-2.4	11.1	0.2	1.3	
EU0810	1277	-49.4	14.7	0.1	1.2	6881	-16.1	19.4	0.0	1.2	
EU0826						7186	-17.3	18.1	0.0	1.0	
EU0875	1331	-47.1	15.3	0.7	1.2	5515	-13.9	19.1	0.7	1.3	
EU0921	1387	-48.5	14.6	0.3	1.2	5919	-16.5	19.5	0.1	1.3	
EU0934	6755	-54.7	8.7	-0.2	1.6	2535	-10.4	11.4	0.1	1.5	
EU0942	747	-50.6	11.2	0.2	1.6	197	2.4	20.8	0.5	1.4	
EU0947	522	-54.8	8.5	0.3	1.6	216	-8.5	9.7	0.1	1.2	
EU0961	1120	-55.6	8.9	0.1	1.7	453	-11.4	13.4	0.0	1.5	
EU0985	4749	-53.0	8.5	-0.5	1.8	1902	-6.9	11.2	-0.1	1.2	
EU1001						3061	-20.7	19.6	-0.3	1.1	
EU1002	8214	-54.1	8.3	-0.1	1.6	3162	-9.8	11.0	0.2	1.5	
EU1012	1478	-50.3	8.6	-0.2	1.6	681	-2.0	24.1	0.0	1.0	
EU1035	1228	-51.8	9.3	0.1	1.6	548	2.6	21.8			
EU1054	964	-51.6	9.7	0.2	1.6	371	-1.9	22.3	0.1	1.0	
EU1056						756	-13.0	17.5	0.0	1.1	
EU1234	1123	-45.6	20.2	-0.3	1.3	6249	-15.7	18.7	-0.1	1.1	
EU1275	1051	-48.2	10.3	0.8	1.7	234	11.7	11.6			
EU1282	4469	-51.1	9.5	0.0	1.4	2033	4.4	13.1	0.1	1.1	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU1301	182	-45.7	10.1	2.2	2.0	98	5.7	16.8			
EU1312	4988	-52.7	8.7	-0.1	1.7	2066	1.1	12.9	0.2	1.1	
EU1320	844	-53.1	9.6	0.4	1.6	252	-5.8	23.6	0.5	1.0	
EU1334	2271	-50.9	8.6	0.9	1.7	371	6.0	13.5			
EU1337	597	-37.4	22.5	0.6	1.2	5093	-18.6	21.1	0.7	1.3	
EU1346	342	-51.3	9.2	0.1	1.9	162	-5.7	23.0			
EU1411	376	-44.7	9.6	0.3	1.7	71	10.4	7.8			
EU1437	1157	-49.7	9.4	0.0	1.4	821	-3.6	24.1	0.1	1.3	
EU1456						3620	-20.0	20.9	-0.3	1.1	
EU1498	1400	-48.8	15.6	-0.2	1.2	6724	-15.8	18.9	-0.1	1.2	
EU1532						6735	-17.8	17.6	-0.3	1.0	
EU1538	646	-52.9	9.5	0.7	1.7	186	4.3	19.6	0.3	1.0	
EU1547	1531	-50.9	13.7	-0.1	1.2	6185	-16.0	19.5	0.0	1.2	
EU1567						6124	-19.1	18.5	-0.1	1.1	
EU1593	5693	-52.3	9.8	-0.3	1.5	1917	-5.0	14.7	0.1	1.4	
EU1599	869	-51.9	9.3	0.3	1.7	357	0.9	19.1	0.2	1.4	
EU1635	1095	-53.3	8.5	0.1	1.7	323	-1.2	25.5	0.2	0.9	
EU1666	999	-53.7	8.4	0.5	1.6	153	6.0	22.2			
EU1673	2001	-52.0	11.3	-0.3	1.1	7909	-2.9	11.3	-0.1	1.3	
EU1688	279	-46.1	16.4	0.0	1.0	2059	-0.4	10.2	-0.1	1.2	
EU1698						6781	-17.5	18.2	0.1	1.1	
EU1700	1020	-53.5	8.9	0.2	1.5	479	0.9	21.2	0.2	1.1	
EU1731	813	-53.8	8.3	-0.1	1.5	424	-0.8	24.3	0.2	1.3	
EU1789	384	-45.4	8.6	-0.1	1.2	327	3.9	9.3	0.0	1.4	
EU1790	741	-55.8	8.8	-0.2	1.0	11351	-14.3	15.3	-0.3	1.3	
EU1800	52	-33.1	21.8	-8.7	25.7	316	-23.8	21.6	-7.8	18.9	
EU1863	421	-51.0	13.7	-0.7	1.4	2160	-15.7	18.8	0.0	1.4	
EU1929	2076	-55.5	8.0	0.4	1.7	140	12.3	11.6	0.6	1.2	
EU2017	1233	-50.9	14.7	-0.1	1.1	5601	-16.8	19.7	0.0	1.3	
EU2020	206	-41.6	17.5	0.5	1.1	2659	-18.5	21.3	0.4	1.2	
EU2043	2068	-50.7	8.7	0.1	1.4	973	1.9	14.6	0.2	1.3	
EU2055	1309	-49.6	15.8	-0.5	1.1	6571	-16.1	18.9	-0.2	1.3	
EU2120	295	-41.5	22.1	-0.1	1.1	3503	-19.5	21.6	0.1	1.2	
EU2130	1229	-51.0	14.1	0.1	1.2	5682	-15.1	19.9	0.3	1.2	
EU2165	952	-47.5	16.2	0.0	1.2	4574	-14.5	19.4	0.0	1.2	
EU2189	1252	-47.9	15.8	0.6	1.1	5776	-13.9	19.6	0.5	1.2	
EU2200	10618	-51.7	14.8	0.0	1.5						
EU2201	1091	-47.8	16.4	-0.4	1.2	6262	-15.7	19.0	-0.1	1.2	
EU2247	1382	-49.0	16.5	0.1	1.3	6793	-15.3	19.0	0.1	1.2	
EU2301	2226	-52.5	11.4	0.8	1.3	7237	-16.4	21.7	0.5	1.2	
EU2327	4067	-53.2	11.4	0.4	1.7	2426	-2.2	18.4	0.3	1.3	
EU2356	2717	-54.1	8.5	0.0	1.6	854	-11.8	22.1	0.3	1.1	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU2360	249	-43.0	21.3	-0.1	1.2	2803	-19.7	21.5	0.0	1.1	
EU2378						3724	-19.2	17.1	0.3	1.1	
EU2389	2929	-50.9	11.9	-0.5	1.2	12159	-3.7	11.0	-0.1	1.3	
EU2399	162	-51.7	10.1	0.4	1.1	520	-1.1	11.1	0.4	1.1	
EU2401	214	-55.4	11.1	0.1	1.3	661	-19.4	22.7	0.4	1.6	
EU2405	410	-40.9	18.9	0.7	1.0	4946	-16.2	21.2	0.5	1.2	
EU2430	1132	-49.4	16.3	0.4	1.3	4348	-17.9	22.4	0.6	1.3	
EU2495	140	-37.7	18.9	0.3	0.9	2891	-18.3	21.4	0.2	1.2	
EU2512	362	-40.8	17.9	0.5	1.1	3908	-17.2	21.2	0.4	1.2	
EU2530	1117	-50.1	17.2	0.0	1.3	3862	-18.1	22.3	0.4	1.3	
EU2547	4782	-52.6	9.0	0.2	1.7	2012	-8.6	11.6	0.2	1.5	
EU2559	1922	-51.6	12.2	1.0	1.4	7151	-15.8	20.6	0.6	1.2	
EU2578	142	-50.1	13.7	0.2	1.0	477	-1.3	10.6	-0.2	1.1	
EU2590	8	-68.8	3.1	1.3	1.5	96	-12.1	10.8	0.5	1.1	
EU2595	2320	-58.1	7.0	-0.3	1.4	3185	-17.2	23.5	0.0	1.8	
EU2610	2017	-57.9	6.8	-0.3	1.4	2714	-18.9	23.4	0.1	1.6	
EU2618	2	-73.9	0.8	-0.1	0.7	23	-10.0	21.2	0.1	1.4	
EU2622	361	-43.9	19.2	0.2	1.0	3361	-15.7	20.3	0.2	1.2	
EU2630	406	-53.0	14.0	0.0	1.2	4286	-12.0	15.1	-0.3	1.4	
EU2634	69	-47.1	12.5	-0.2	0.9	629	-1.8	11.0	0.1	1.1	
EU2673	1156	-58.2	7.0	-0.4	1.4	1848	-18.9	24.0	-0.1	1.9	
EU2690	260	-42.9	19.7	-0.3	1.2	2829	-19.1	20.9	0.0	1.3	
EU2717	214	-37.7	23.2	0.0	1.3	3409	-18.5	21.0	0.1	1.1	
EU2751	2516	-49.2	9.8	-0.1	1.7	509	9.0	13.4	-0.1	1.6	
EU2752	178	-36.8	23.2	0.2	1.1	2860	-20.8	21.3	0.2	1.0	
EU2773	648	-53.2	8.5	0.0	1.7	127	-8.2	16.9			
EU2792	251	-41.0	22.3	0.0	1.0	2678	-20.6	22.4	0.0	1.3	
EU2800	248	-41.6	22.9	-0.2	1.1	3207	-19.2	21.8	-0.1	1.1	
EU2829	261	-44.0	18.1	-0.2	1.1	3256	-20.2	22.5	0.0	1.2	
EU2845	2243	-51.6	10.9	-0.1	1.1	7531	-2.9	11.6	-0.2	1.3	
EU2846	330	-43.2	18.5	0.2	1.0	3103	-20.1	22.0	0.3	1.1	
EU2896	863	-51.3	12.4	-0.4	0.9	3181	-0.4	10.7	-0.2	1.3	
EU2897	198	-44.5	17.3	-0.3	0.7	2082	-18.3	22.8	-0.1	1.2	
EU2905	243	-44.8	19.3	0.1	1.0	2275	-17.6	20.1	0.2	1.2	
EU2912	484	-46.7	15.6	-0.1	1.1	3098	-0.6	10.7	-0.1	1.3	
EU2936	114	-35.3	22.6	0.0	1.3	1738	-22.7	21.2	0.0	1.2	
EU2979	257	-41.7	20.1	0.0	1.0	3120	-18.7	20.5	0.1	1.2	
EU2983	160	-39.7	22.4	0.6	1.0	2283	-21.4	24.0	0.3	1.1	
EU2984	471	-57.9	7.9	0.0	1.2	5529	-14.5	15.5	-0.4	1.5	
EU3000	1235	-48.5	18.1	-0.4	1.3	6522	-15.5	19.2	0.0	1.7	
EU3042	1266	-46.5	16.7	1.1	1.2	7078	-15.0	19.2	0.9	1.2	
EU3048	600	-44.7	17.9	0.0	1.0	4658	-16.0	20.1	0.1	1.2	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU3075	852	-57.5	6.6	-0.4	1.8						
EU3094	605	-57.3	7.1	0.0	1.5						
EU3096	236	-39.7	20.7	0.3	1.3	3011	-18.9	20.7	0.2	1.1	
EU3114	232	-34.6	22.2	0.5	1.0	3423	-17.6	20.8	0.5	1.1	
EU3115	186	-38.5	23.6	0.4	1.2	2336	-20.1	22.1	0.3	1.5	
EU3147	227	-58.3	6.1	0.3	1.5						
EU3181	3088	-50.4	9.4	-0.1	1.4	1563	1.6	13.5	0.3	1.4	
EU3194	84	-29.6	21.8	8.9	23.3	618	-22.7	19.9	-3.7	12.8	
EU3201	193	-5.4	32.1	2.4	17.1	394	-12.2	20.8	2.9	21.3	
EU3250	290	-41.9	19.2	0.5	1.0	3095	-17.4	22.4	0.3	1.2	
EU3257	1409	-50.2	16.2	-0.5	1.2	7221	-15.8	19.1	-0.2	1.3	
EU3260	260	-40.4	20.5	0.2	1.0	3521	-18.0	21.0	0.5	1.2	
EU3268	508	-57.6	7.7	0.1	1.3	4767	-14.7	15.5	-0.1	1.5	
EU3270						5877	-15.9	18.1	0.3	1.1	
EU3293	603	-44.6	17.9	-0.1	0.9	5628	-17.3	20.3	0.0	1.2	
EU3311	313	-45.2	19.5	-0.1	1.1	2690	-14.9	19.5	0.1	1.2	
EU3317	181	-38.3	21.6	0.1	1.2	2732	-18.5	21.7	0.2	1.2	
EU3321	905	-59.3	10.6	0.5	1.5	4526	-12.7	15.6	-0.2	1.3	
EU3358						6377	-21.9	19.9	-0.2	1.1	
EU3362	181	-40.8	22.5	0.2	1.1	2577	-19.5	22.3	0.5	1.1	
EU3375	212	-41.4	19.7	-0.2	1.2	2656	-20.5	21.7	0.0	1.1	
EU3400	66	-42.9	18.8	0.4	1.3	889	-25.5	21.9	0.3	1.6	
EU3421	2265	-52.5	11.5	1.4	1.3	6354	-16.4	21.0	1.0	1.4	
EU3455	608	-47.0	17.0	0.7	1.2	5216	-17.7	21.5	0.3	1.2	
EU3469						2901	-19.9	20.2	-0.3	1.2	
EU3472	240	-45.5	19.3	-0.1	1.0	2306	-19.6	22.0	-0.1	1.1	
EU3484	286	-45.7	20.5	0.1	1.2	2270	-19.1	22.2	0.1	1.1	
EU3527	279	-42.8	20.5	-0.1	1.1	2694	-20.4	23.5	0.1	1.3	
EU3544	613	-38.5	22.6	0.6	2.2	4098	-19.1	21.3	0.5	1.3	
EU3598	578	-41.2	20.8	0.4	1.2	4091	-19.3	21.5	0.5	1.3	
EU3599	482	-37.9	22.4	1.3	1.4	3986	-18.6	21.3	1.2	1.4	
EU3621						5977	-22.5	19.2	-0.4	1.1	
EU3633	3683	-53.9	8.2	0.5	1.7	1788	-4.1	19.8	0.3	1.3	
EU3647	268	-43.9	20.4	0.2	1.2	2612	-23.5	23.0	0.3	1.2	
EU3654	631	-58.3	7.8	0.5	1.2	10754	-14.8	15.6	-0.1	1.4	
EU3660	4634	-52.9	11.4	0.0	1.7	2464	-0.8	18.6	0.1	1.3	
EU3684	578	-49.9	14.4	0.6	1.5	4625	-11.7	15.4	-0.1	1.3	
EU3701	1217	-53.5	8.7	0.4	1.6	379	-2.9	18.9	0.2	0.8	
EU3714						7080	-18.1	17.5	0.0	1.0	
EU3733	1593	-52.1	8.7	0.5	1.7	1138	-0.5	19.9	0.1	1.6	
EU3755						3597	-22.8	19.4	-0.3	1.2	
EU3768	962	-54.7	8.8	0.3	1.8	159	-6.9	11.9	0.4	1.1	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU3803	637	-52.7	6.9	0.8	1.8	55	14.4	11.0			
EU3824	1075	-51.3	10.4	0.5	1.5	680	5.9	16.0	0.3	1.1	
EU3845	275	-40.3	21.8	-0.3	1.0	2739	-19.3	21.7	0.0	1.2	
EU3855	348	-44.7	19.1	0.6	1.2	2633	-18.9	22.0	0.2	1.3	
EU3874	2867	-51.2	9.0	0.2	1.5	1553	2.1	13.6	0.2	1.4	
EU3908	587	-52.7	9.6	0.4	1.2	15396	-13.1	15.0	-0.2	1.3	
EU3953	1092	-54.7	8.8	0.2	1.5	827	-5.3	18.6	0.0	1.4	
EU3961	484	-52.6	11.3	0.3	2.0	528	5.8	19.8	0.2	0.8	
EU3972						5066	-20.9	19.9	-0.2	1.1	
EU3992	833	-53.8	10.3	0.4	1.7	874	2.0	18.6	0.2	1.3	
EU4002	780	-53.8	12.7	0.0	1.3	5008	-12.4	15.5	-0.2	1.3	
EU4004	484	-53.5	8.0	0.6	1.4	60	-5.8	16.3	0.8	1.1	
EU4021						5508	-21.6	19.1	-0.2	1.3	
EU4035	714	-56.0	8.3	0.2	1.7	259	-10.0	16.0	0.5	0.8	
EU4066	1071	-53.4	9.1	0.0	1.8	953	-1.3	18.5	0.0	1.3	
EU4075	1027	-57.5	8.2	0.1	1.2	10457	-15.7	16.1	-0.1	1.5	
EU4083	1168	-52.8	7.7	0.9	1.8	468	2.8	18.3	0.3	1.1	
EU4112	1127	-53.1	8.6	1.4	1.7	710	1.9	19.9	0.5	1.1	
EU4137	1044	-54.5	8.5	0.3	1.6	569	-5.4	19.5	0.4	1.1	
EU4169	666	-53.8	14.6	0.9	1.5	166	-8.2	15.2	0.5	0.7	
EU4172	883	-54.3	7.6	0.7	1.7	298	-3.9	19.2	0.1	1.2	
EU4205	1143	-53.5	9.2	0.1	1.5	73	-6.5	15.7	0.5	1.1	
EU4235	1225	-54.7	8.2	0.5	1.7	591	-3.7	20.4	0.4	1.4	
EU4264	1248	-52.5	9.4	0.4	1.7	642	-2.7	18.3	0.0	1.2	
EU4278						5235	-22.2	19.6	-0.4	1.2	
EU4300	1316	-52.5	10.1	0.2	1.5	562	-3.0	19.6	0.2	1.0	
EU4316	1428	-52.4	8.3	0.4	1.5	705	-1.2	18.3	0.1	1.1	
EU4321	1488	-51.8	9.9	0.4	1.5	1003	0.7	19.9	0.2	1.2	
EU4333	2	-60.4	0.6	-0.6	0.9	24	-11.7	16.7	-0.3	0.6	
EU4387						3160	-20.8	17.0	-0.3	1.1	
EU4392	1151	-53.1	9.6	0.1	1.5	1277	-2.3	20.8	0.1	1.2	
EU4426	870	-51.1	12.6	-0.2	1.0	3601	-0.6	11.0	-0.2	1.2	
EU4444	606	-58.2	8.4	0.0	1.3	9767	-14.5	15.7	-0.2	1.4	
EU4450	1162	-50.7	9.6	0.3	1.5	1069	5.0	18.6	0.1	1.2	
EU4463						5189	-18.8	19.9	-0.1	1.2	
EU4473	1384	-49.8	9.6	0.6	1.5	935	5.8	18.3	0.2	1.1	
EU4491						5374	-20.3	19.7	-0.3	1.1	
EU4508	288	-52.8	9.7	0.5	1.3	326	-2.2	20.2	0.0	1.4	
EU4519	598	-56.9	9.7	0.7	1.3	9766	-14.3	15.7	0.1	1.4	
EU4527	628	-41.7	22.7	0.2	1.5	4905	-18.8	21.5	0.4	1.3	
EU4532	470	-38.4	21.6	0.5	1.7	3854	-18.9	21.7	0.5	1.3	
EU4540	258	-43.0	22.2	-0.1	1.0	3106	-21.8	23.3	0.2	1.2	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU4565						3971	-19.2	17.3	0.3	1.1	
EU4573	585	-53.9	10.5	0.0	1.1	15077	-13.0	15.0	-0.1	1.2	
EU4579	359	-46.3	20.1	0.5	1.2	3376	-17.7	21.2	0.2	1.1	
EU4582	581	-49.6	12.8	0.6	1.1	12731	-12.3	14.9	0.5	1.3	
EU4591	1308	-50.4	11.2	0.1	1.1	16033	-14.3	15.3	-0.3	1.3	
EU4593	2072	-51.5	12.4	1.5	1.3	6983	-15.6	21.4	1.1	1.3	
EU4607	923	-49.1	9.2	0.5	1.2	15780	-14.0	15.1	0.0	1.2	
EU4611	696	-48.6	15.8	-0.2	1.1	4685	-16.0	20.4	0.0	1.2	
EU4623	268	-42.2	21.8	0.8	1.0	3397	-23.4	22.6	0.6	1.1	
EU4650	345	-44.9	18.2	0.0	1.0	2741	-16.9	22.2	0.0	1.2	
EU4685	6751	-54.5	7.9	-0.2	5.2	1946	-8.3	10.0	0.0	1.2	
EU4687	284	-44.0	20.6	0.2	1.2	3001	-20.0	22.7	0.0	1.1	
EU4699	702	-55.5	8.5	-0.1	1.1	10648	-15.5	15.4	-0.4	1.3	
EU4710	528	-49.0	15.8	0.1	1.1	3751	-18.3	21.6	0.2	1.3	
EU4721	640	-57.2	9.8	0.0	1.5	4666	-12.9	15.7	-0.2	1.3	
EU4723	292	-40.9	21.4	0.2	1.1	2885	-21.1	22.8	0.3	1.2	
EU4773	319	-45.2	20.5	-0.2	1.2	3016	-17.7	21.5	0.1	1.2	
EU4792	338	-51.3	16.8	-0.2	1.1	2258	-13.2	16.0	-0.3	1.5	
EU4824	325	-44.9	20.1	0.2	1.1	3132	-23.4	23.5	0.2	1.1	
EU4833	597	-46.9	17.8	-0.1	1.0	3851	-20.3	23.1	0.1	1.2	
EU4838						5259	-19.1	17.9	-0.3	1.0	
EU4853	615	-55.6	11.0	-0.1	1.5	9383	-15.2	15.3	-0.3	1.4	
EU4864	337	-46.2	20.4	-0.3	1.2	2821	-20.8	23.7	0.0	1.2	
EU4896	54	-40.7	9.7	0.0	0.0	155	5.3	11.1	1.1	1.7	
EU4950	575	-57.2	11.0	0.8	1.4	4901	-12.6	15.6	0.2	1.3	
EU4954	270	-43.3	22.5	-0.4	1.1	3123	-18.2	21.9	-0.1	1.3	
EU4976	311	-43.0	20.6	-0.4	1.0	3413	-19.2	22.4	0.0	1.2	
EU5050	254	-42.3	19.0	1.6	1.1	2522	-16.7	21.6	1.3	1.1	
EU5073	281	-44.9	21.3	-0.1	1.2	3423	-22.2	23.2	-0.1	1.2	
EU5098						5073	-18.4	18.6	-0.3	1.1	
EU5129	8281	-53.3	12.4	0.5	1.8	660	-11.1	9.4	0.1	1.3	
EU5134						456	7.4	8.7	-0.5	1.4	
EU5141	355	-49.1	16.0	0.2	0.9	2963	-18.7	22.7	0.3	1.2	
EU5167	2424	-50.9	12.7	-0.2	1.2	11011	-2.9	11.0	0.0	1.2	
EU5182	443	-47.7	13.1	0.5	1.1	2374	-1.4	10.6	0.3	1.2	
EU5185	170	-47.2	17.9	0.6	1.2	1519	-19.4	20.1	0.5	1.3	
EU5191	555	-43.9	8.9	0.1	1.6	779	6.5	11.0	0.6	1.3	
EU5245	772	-43.3	9.2	0.0	1.5	842	9.2	10.0	0.4	1.5	
EU5261	321	-46.4	18.5	0.1	1.1	3307	-20.9	23.1	0.0	1.1	
EU5264	1164	-51.3	13.2	0.4	1.4	4514	-15.6	20.2	0.6	1.3	
EU5318	1379	-49.0	15.5	0.4	1.3	5659	-15.8	20.0	0.7	1.3	
EU5331	2448	-52.5	11.6	1.1	1.4	7145	-17.1	21.9	0.9	1.3	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU5349						4892	-16.4	18.4	-0.1	1.0	
EU5351	1083	-46.9	15.5	0.5	1.2	4504	-13.8	18.9	0.5	1.3	
EU5372						80	-21.2	22.9	-0.2	1.5	
EU5387	405	-45.6	18.5	0.1	1.1	3377	-18.0	21.6	0.1	1.2	
EU5397	1930	-44.8	19.6	1.2	2.5						
EU5429						11657	0.2	12.6			
EU5435	1112	-46.0	15.2	0.9	1.1	6344	-14.5	19.4	0.9	1.3	
EU5441	790	-53.9	14.1	0.7	1.3	5283	-12.3	15.2	0.0	1.3	
EU5478	516	-48.9	10.3	0.0	1.0	14460	-13.6	14.7	-0.5	1.2	
EU5529	604	-49.2	13.6	-0.2	1.1	13412	-12.7	14.6	-0.3	1.2	
EU5587	379	-46.3	15.2	0.9	1.3	2371	-15.8	18.7	0.7	1.3	
EU5591	2159	-52.7	10.7	-0.1	1.2	7036	-3.6	11.4	0.1	1.2	
EU5593	1242	-42.8	10.5	0.0	1.5	1467	10.3	10.7	0.5	1.6	
EU5612	666	-55.6	8.9	-0.4	1.1	9339	-15.0	15.7	-0.4	1.4	
EU5613	1251	-47.1	15.6	0.5	1.1	6063	-15.3	19.9	0.4	1.1	
EU5673	646	-49.1	13.2	0.0	1.0	2910	-0.3	10.6	0.0	1.4	
EU5777	1193	-39.1	8.2	0.2	0.9	6616	-7.2	16.3	0.0	1.2	
EU5802	1414	-40.7	8.1	0.0	0.8	8512	-7.6	16.2	-0.1	1.2	
EU5821	528	-40.8	8.3	0.0	0.8	3123	-8.3	17.3	-0.3	1.2	
EU5891	1094	-46.1	16.0	0.9	1.2	5194	-13.5	18.9	0.9	1.2	
EU6264	656	-54.1	11.9	0.1	1.2	9439	-13.3	15.4	0.0	1.4	
EU6281	432	-59.2	7.2	0.4	1.2	7826	-13.3	15.3	-0.2	1.4	
EU6287						5694	-20.2	19.3	-0.3	1.1	
EU6349	628	-57.1	10.7	0.9	1.4	4647	-12.8	16.0	0.4	1.2	
EU6386	479	-48.8	13.9	-0.2	1.0	2928	-0.5	10.5	0.0	1.1	
EU6444	966	-55.9	12.3	0.1	1.3	5270	-12.2	15.8	0.0	1.3	
EU6524	2560	-50.7	11.4	0.3	1.1	7841	-2.2	11.4	0.2	1.4	
EU6527	722	-53.6	13.2	0.2	1.4	3681	-13.3	15.7	0.0	1.3	
EU6544	1484	-51.5	11.6	1.7	1.5	5343	-16.1	20.7	1.3	1.4	
EU6556	2054	-52.4	12.6	0.4	1.3	6943	-15.8	20.9	0.7	1.2	
EU6564	1492	-53.2	12.5	0.2	1.2	4593	-15.2	21.7	0.5	1.2	
EU6723	893	-49.9	11.7	0.2	1.2	3985	-3.1	12.0	0.2	1.2	
EU6735	2257	-52.4	10.6	0.3	1.3	7775	-17.8	22.0	0.4	1.3	
EU6743	991	-49.8	14.1	1.4	1.2	3213	-12.9	19.4	1.0	1.3	
EU6890	733	-57.0	13.5	0.3	1.4	4197	-12.1	15.6	0.1	1.4	
EU6893						5080	-21.4	19.7	-0.1	1.1	
EU6923						4996	-19.8	19.5	-0.4	1.0	
EU7001	1279	-47.2	15.6	0.8	1.2	5437	-13.9	18.9	0.7	1.2	
EU7082						5552	-21.8	20.1	0.0	1.1	
EU7119	838	-44.7	19.7	0.5	1.4	3900	-17.3	21.9	0.4	1.3	
EU7218	456	-53.8	12.8	0.3	1.4	2954	-13.2	16.0	-0.2	1.3	
EU7285						6688	-19.7	18.4	-0.1	1.1	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU7293	1438	-48.3	15.4	1.0	1.2	6390	-15.0	19.3	0.9	1.3	
EU7314	1423	-48.0	14.4	0.9	1.1	5280	-12.7	19.4	0.8	1.2	
EU7382	1375	-47.6	15.2	0.6	1.1	6538	-13.5	18.7	0.7	1.3	
EU7412	1842	-48.7	13.9	1.0	1.2	6815	-12.5	19.0	0.9	1.2	
EU7427	1818	-48.8	13.7	1.1	1.2	6478	-12.3	18.5	0.8	1.2	
EU7521						4708	-19.3	19.8	0.1	1.1	
EU7536	1377	-48.5	13.9	0.5	1.1	5684	-13.4	19.0	0.5	1.3	
EU7548	826	-48.3	16.0	0.2	1.1	5598	-17.3	20.2	0.3	1.2	
EU7610	305	-43.3	22.7	-0.2	1.1	3209	-22.6	23.7	0.0	1.1	
EU7629	660	-55.7	10.7	1.2	1.4	3502	-14.5	16.2	0.4	1.5	
EU7634						5113	-20.0	19.2	-0.2	1.1	
EU7635	558	-39.0	21.5	0.0	1.4	4672	-19.0	22.2	0.3	1.3	
EU7643	964	-56.9	11.7	-0.2	1.4	4881	-13.3	15.9	-0.3	1.4	
EU7654	821	-58.1	12.7	-0.2	1.4	4291	-12.4	16.1	-0.2	1.3	
EU7724	545	-58.6	7.6	0.2	1.5	3324	-13.5	15.4	-0.3	1.5	
EU7864	4128	-50.4	9.9	-0.1	1.7	2322	-7.1	24.0	0.1	1.5	
EU7865						4799	-19.8	19.2	-0.3	1.1	
EU7866	2274	-51.1	12.0	0.1	1.1	10351	-3.2	11.1	-0.1	1.2	
EU7888	665	-57.8	7.7	0.7	1.4	10130	-14.8	15.8	0.0	1.5	
EU7894	728	-45.3	18.0	0.1	1.3	3217	-17.7	21.7	0.4	1.3	
EU7910	534	-36.0	21.0	-0.6	14.1	4786	-18.2	19.2	0.0	8.9	
EU8264						2130	-15.9	18.9	0.0	1.0	
EU8431						5006	-17.2	19.6	-0.1	1.1	
EU8478						5347	-20.0	19.8	0.0	1.1	
EU8520	596	-49.5	14.2	0.8	1.3	4142	-11.2	14.6	0.1	1.2	
EU8598						4715	-19.6	19.2	0.0	1.1	
EU8605						5176	-19.3	18.3	-0.4	1.2	
EU8632						6771	-17.9	18.3	-0.1	1.1	
EU8733	1753	-51.5	13.0	0.6	1.2	5922	-14.8	21.0	0.6	1.3	
EU8736						3983	-22.9	19.9	-0.2	1.2	
EU8742	1357	-52.0	12.0	1.4	1.4	4070	-14.9	20.8	1.0	1.4	
EU8787	1298	-48.6	14.9	0.5	1.2	5856	-14.1	19.2	0.6	1.2	
EU8789						4963	-19.7	19.2	-0.3	1.1	
EU8891						3861	-17.5	19.2	-0.1	1.2	
EU8943						4900	-18.2	18.2	-0.2	1.0	
EU8969	568	-59.2	9.7	0.2	1.4	4307	-12.2	15.9	-0.2	1.3	
EU9013	1336	-48.3	15.6	0.2	1.1	5574	-13.9	19.2	0.5	1.1	
EU9023						5142	-21.4	20.5	-0.2	1.1	
EU9145	583	-55.8	12.0	0.9	1.4	4093	-13.6	15.2	-0.1	1.4	
EU9158	511	-52.6	9.0	-0.3	1.1	12764	-13.5	15.3	-0.1	1.2	
EU9234	979	-58.0	7.5	0.1	1.1	9792	-16.6	15.8	-0.2	1.4	
EU9245	1134	-53.8	9.5	0.0	1.1	14890	-14.3	15.5	-0.1	1.3	

2003-I T	Temperature Cruise level in °C					Temperature Ascent & Descent in °C					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
	EU9356						4676	-19.0	19.3	-0.4	1.3
	EU9378						5315	-24.1	20.1	-0.2	1.1
	EU9544	829	-58.3	7.4	-0.4	1.1	8984	-16.7	16.0	-0.4	1.5
	EU9589						4308	-20.7	19.9	-0.5	1.1
	EU9622	945	-54.0	10.1	0.3	1.1	9818	-15.9	15.8	-0.3	1.5
	EU9678						5544	-20.9	19.5	-0.4	1.1
	EU9680	446	-60.6	5.5	-0.5	1.3	4293	-16.4	15.3	-0.4	1.6
	EU9692						355	-16.5	19.4	-0.1	1.2
	EU9723	1499	-48.7	13.7	0.8	1.1	5903	-14.1	19.4	0.8	1.2
	EU9729	674	-58.5	7.4	-0.3	1.2	7091	-15.8	15.5	-0.5	1.5
	EU9734						5676	-20.8	19.4	-0.4	1.1
	EU9743	1147	-58.1	7.4	0.1	1.1	11560	-16.3	15.8	-0.3	1.5
	EU9883	1442	-48.0	15.2	0.8	2.1	6262	-14.3	19.2	0.8	1.4
	EU9967						5565	-22.8	19.3	-0.3	1.1

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b) Table 5, *Wind Speed (m/s)*

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
	EU0002						6583	14.6	10.8	0.4	2.5
	EU0006	526	28.0	13.9	0.2	2.0	25	10.8	2.2	2.1	1.7
	EU0021	1121	21.5	13.0	0.5	3.4	7832	12.1	8.4	0.3	2.2
	EU0022	3448	22.2	12.4	0.2	2.6	10507	10.5	7.1	0.5	2.2
	EU0023	877	29.4	17.2	0.0	2.6	282	15.3	11.7	-0.1	3.4
	EU0032	2449	22.2	17.5	0.0	2.7	2485	7.9	5.1	0.2	2.0
	EU0034	2208	19.8	16.1	0.0	2.6	2109	7.4	4.9	0.2	2.1
	EU0041	2225	20.2	12.9	0.1	2.5	6571	12.5	10.7	0.1	2.3
	EU0043	2161	21.7	12.7	0.1	2.7	7246	13.6	11.0	0.1	2.4
	EU0045	3113	30.5	15.5	0.1	2.6	1249	11.8	8.2	0.0	2.1
	EU0046	1015	29.0	16.0	-0.1	2.7	72	8.8	8.3	-0.7	1.9
	EU0047	2455	23.4	14.3	0.3	2.6	7630	12.9	11.0	-0.2	2.4
	EU0049						5679	15.7	12.2	0.3	2.5
	EU0051	950	23.8	17.0	0.3	2.6	4654	9.0	7.2	0.5	2.1
	EU0052	881	21.9	13.5	0.2	3.1	4502	13.6	10.9	0.1	2.6
	EU0054	1774	23.1	15.5	0.0	2.7	6661	9.5	7.2	0.4	2.2
	EU0055						6767	13.5	10.0	0.4	2.5
	EU0059	1495	22.3	13.4	0.3	3.1	6005	13.4	10.2	0.0	2.4
	EU0060	1458	24.8	17.3	0.1	3.8	814	9.1	6.5	0.3	2.3
	EU0061	1460	22.2	13.8	0.2	2.7	6282	13.2	9.6	0.2	2.5
	EU0063	689	20.5	12.6	-0.1	2.6	3757	9.8	7.2	0.5	2.2
	EU0072	1103	21.9	13.0	0.1	2.8	8779	11.0	7.4	0.7	2.2
	EU0073	4132	30.9	17.3	0.0	3.4	5087	13.7	12.8	0.2	2.4
	EU0080	692	28.4	15.9	0.1	2.3					
	EU0081	3152	22.2	13.5	0.2	2.6	7708	11.0	7.4	0.6	2.3
	EU0082						7204	15.6	11.6	0.3	2.5
	EU0086	3603	33.4	18.4	0.1	2.7	3827	15.0	14.0	0.2	2.5
	EU0101	396	24.4	14.1	0.3	2.6	1983	9.4	7.6	0.6	2.3
	EU0106	820	23.9	14.5	0.2	2.7	3873	12.8	9.4	0.0	2.3
	EU0109	3758	23.2	13.2	0.2	2.6	8474	11.0	7.5	0.7	2.3
	EU0110	8829	24.7	14.0	0.1	2.1					
	EU0120	3364	32.9	19.2	0.1	3.7	3216	15.4	13.5	0.2	2.1
	EU0121	662	19.3	13.2	0.2	2.5	3142	8.5	6.9	0.4	2.0
	EU0123	72	27.4	12.7	0.5	2.5	71	12.9	7.0	-0.2	2.8
	EU0124						6313	14.1	10.4	0.4	2.6
	EU0134	503	21.5	13.0	0.3	2.7	1653	7.4	6.7	0.4	1.9
	EU0140	818	26.4	16.0	0.2	2.3	460	11.8	10.6	0.0	2.0
	EU0158	1495	22.0	13.4	0.2	2.6	6138	12.9	9.4	0.2	2.2
	EU0167	945	20.5	12.2	0.2	2.6	3783	11.6	8.4	0.1	2.3

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU0177	543	32.4	18.6	0.3	3.2	416	9.5	7.9	0.3	2.3	
EU0185	1420	22.0	13.4	0.4	2.6	5566	13.3	10.1	0.1	2.3	
EU0201	268	25.2	13.6	0.4	2.7	1007	8.6	6.1	0.6	2.1	
EU0202	6501	25.4	13.8	0.1	2.2	1655	10.4	7.4	0.1	1.7	
EU0203	2975	33.7	18.6	0.2	3.3	2567	14.6	12.2	0.2	2.4	
EU0204	1314	23.7	14.0	0.3	2.8	6758	10.7	7.1	0.7	2.3	
EU0206	1121	28.1	14.6	0.1	2.3	307	15.5	14.8	0.1	2.0	
EU0221	1390	28.0	15.7	0.1	2.5	887	9.7	7.4	0.4	2.3	
EU0230	9943	25.2	14.3	0.0	2.0	529	10.8	7.3	0.2	2.0	
EU0233	896	24.7	14.8	0.1	2.4	446	11.0	9.2	0.3	2.9	
EU0234						5868	13.9	9.8	0.4	2.5	
EU0251	1373	21.9	13.6	0.2	2.7	7068	12.6	9.2	0.1	2.5	
EU0254	1897	27.5	14.9	0.1	2.8	888	10.5	6.9	0.4	2.2	
EU0263	4377	32.1	17.6	0.2	3.9	3034	10.8	7.9	0.4	2.3	
EU0274	644	22.2	13.1	0.1	2.5	964	10.8	7.1	0.8	2.2	
EU0290	149	22.6	14.0	0.1	1.8	19	9.9	6.7			
EU0299						5937	13.7	11.8	0.2	2.6	
EU0301	2481	24.0	14.8	0.2	2.6	6987	14.0	11.8	0.1	2.4	
EU0303	1342	20.3	12.2	0.2	2.6	6561	12.1	9.3	0.1	2.3	
EU0307	1431	21.3	12.9	0.2	2.7	7305	12.6	9.3	0.0	2.3	
EU0310	8115	24.6	13.8	0.1	1.8	1484	9.4	6.8	0.1	1.6	
EU0311	1345	20.8	12.9	0.2	2.5	5491	12.7	9.6	-0.1	2.4	
EU0312	1225	27.1	14.6	0.0	2.7	737	10.3	7.8	0.6	2.3	
EU0313	1221	20.1	12.4	0.3	2.3	5079	11.6	8.8	0.0	2.3	
EU0316	2229	22.3	13.9	0.2	2.5	6979	13.8	11.8	0.0	2.4	
EU0319	2346	21.2	13.9	0.1	2.8	7195	12.9	10.6	0.0	2.2	
EU0321	55	7.6	5.6	0.2	2.6	817	8.3	6.3	0.1	2.4	
EU0335	605	27.2	14.5	0.2	2.6	128	10.0	5.2	-0.1	2.1	
EU0350	1305	28.5	15.9	0.1	2.3	198	15.1	10.8	0.1	2.8	
EU0354	377	25.6	12.9	0.5	2.7	999	9.1	6.9	1.0	2.3	
EU0359	1142	21.4	14.1	0.2	2.6	5093	13.0	9.5	0.0	2.5	
EU0367						5083	14.6	10.1	0.4	2.7	
EU0372	3463	32.8	17.9	0.1	3.1	2658	10.5	8.0	0.5	2.4	
EU0373	1631	20.3	12.6	0.2	2.5	6201	13.0	10.0	0.1	2.3	
EU0385	1391	28.5	14.0	0.2	2.8	651	8.7	6.1	0.3	2.3	
EU0394	1272	20.7	12.8	0.1	2.7	6284	12.2	8.9	0.1	2.4	
EU0405	618	22.0	13.2	0.2	2.7	877	8.4	6.1	0.8	2.2	
EU0413	1219	20.6	13.1	0.3	2.9	5973	11.5	8.7	0.0	2.4	
EU0432						5102	13.9	9.6	0.4	2.5	
EU0442	746	19.2	11.4	0.2	2.5	4060	13.8	10.5	0.1	2.5	
EU0451	1254	29.4	16.3	0.1	2.5	252	16.7	11.6	0.1	2.2	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU0453	10423	24.9	14.6	0.1	2.1	1884	10.0	6.7	0.1	1.7	
EU0456	1059	21.9	14.2	0.1	2.7	4548	15.4	12.1	0.5	2.6	
EU0457	2360	30.4	15.3	0.2	2.6	1519	12.3	7.7	0.4	2.4	
EU0458	797	18.0	11.2	-0.1	2.5	3441	15.2	10.9	0.5	2.5	
EU0476	660	19.6	13.1	0.2	2.3	3283	14.5	10.8	0.6	2.5	
EU0482	1513	28.6	14.8	0.2	2.8	740	10.5	7.5	0.4	2.4	
EU0511	1254	20.6	12.3	0.2	2.6	6570	12.5	9.8	0.1	2.4	
EU0520	1064	26.9	14.7	0.1	2.4	312	12.1	9.6	0.0	2.4	
EU0558	1726	22.6	13.3	0.4	3.1	6397	12.9	9.7	-0.1	2.7	
EU0568						5897	13.4	10.4	0.2	2.5	
EU0575	8572	24.6	13.5	0.1	2.2	1606	10.6	6.9	0.1	1.8	
EU0576	1230	24.6	14.4	0.1	2.3	438	9.8	10.5	0.0	2.2	
EU0583	1422	21.9	13.2	0.4	2.6	6264	13.2	9.9	0.1	2.4	
EU0601	1080	20.9	12.8	0.1	2.5	5460	12.8	9.6	0.1	2.5	
EU0620						3062	14.3	10.5	0.3	2.5	
EU0631	1271	24.4	13.5	0.1	2.5	362	9.9	8.1	0.1	2.1	
EU0632	3	16.3	5.5	4.8	4.6	113	8.4	5.3	1.1	2.3	
EU0676	1430	19.5	11.1	0.2	2.4	6034	12.0	9.5	0.1	2.4	
EU0707						5638	13.5	10.7	0.2	2.6	
EU0711	672	20.7	15.6	0.1	2.9	2533	13.7	10.8	0.6	2.6	
EU0720	1037	21.5	13.6	0.2	2.4	4265	8.6	6.9	0.4	2.1	
EU0723	516	19.2	12.8	0.2	2.9	4288	13.8	9.8	0.3	2.4	
EU0734	245	15.9	13.7	-0.2	2.0	1144	7.6	5.9	0.1	1.9	
EU0745	2595	23.9	15.2	0.3	2.9	11281	10.6	7.3	0.4	2.3	
EU0802	1318	19.0	11.6	0.3	2.6	5282	12.3	9.6	0.0	2.3	
EU0807	1996	23.9	15.3	0.3	2.9	10415	10.8	7.2	0.4	2.2	
EU0810	1277	22.5	14.1	0.3	2.8	6881	13.4	10.5	0.0	2.5	
EU0826						7186	13.6	9.6	0.4	2.5	
EU0875	1331	21.8	14.3	0.3	2.6	5515	13.1	10.1	0.0	2.4	
EU0921	1387	21.1	13.6	0.1	2.8	5919	11.8	9.0	0.1	2.5	
EU0934	6755	26.1	15.7	0.1	2.5	2535	12.5	8.6	0.1	2.2	
EU0942	747	28.1	16.7	0.1	2.3	197	10.8	7.1	-0.3	2.3	
EU0947	522	26.6	16.3	0.2	3.1	216	13.9	10.3	0.0	2.2	
EU0961	1120	27.0	15.4	0.2	2.9	453	12.8	9.7	0.2	2.2	
EU0985	4749	28.9	15.8	0.1	2.8	1902	12.9	9.5	-0.1	1.8	
EU1001						3061	16.1	12.7	0.2	2.3	
EU1002	8214	26.4	15.8	0.1	3.2	3162	13.1	8.9	0.2	2.3	
EU1012	1478	24.2	14.4	0.0	2.5	681	10.7	10.1	0.0	1.8	
EU1035	1228	27.9	16.5	0.0	2.4	548	12.4	10.6			
EU1054	964	27.4	18.1	0.1	2.4	371	13.7	11.8	-0.1	2.2	
EU1056						756	12.2	8.1	0.4	2.4	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU1234	1123	18.3	12.3	0.1	2.7	6249	12.0	9.3	0.0	2.5	
EU1275	1051	22.6	16.2	0.1	2.1	234	6.6	4.3			
EU1282	4469	24.9	15.6	0.1	2.6	2033	9.5	6.8	0.3	2.1	
EU1301	182	29.6	22.3	0.1	3.1	98	7.9	5.4			
EU1312	4988	29.8	17.5	0.2	2.5	2066	10.7	6.9	0.4	2.3	
EU1320	844	28.9	16.3	0.1	2.6	252	8.7	5.4	0.0	1.7	
EU1334	2271	25.1	16.0	0.1	2.3	371	9.6	6.9			
EU1337	597	19.9	13.7	0.0	2.5	5093	14.1	10.5	0.4	2.5	
EU1346	342	21.2	12.7	0.0	2.7	162	16.4	15.7			
EU1411	376	22.4	18.5	0.0	2.8	71	6.3	3.8			
EU1437	1157	24.6	15.0	0.1	2.5	821	10.6	8.8	0.0	3.5	
EU1456						3620	14.1	11.6	0.6	2.6	
EU1498	1400	20.2	12.6	0.2	2.7	6724	12.4	9.6	-0.1	2.6	
EU1532						6735	14.8	10.9	0.4	2.5	
EU1538	646	27.6	15.7	0.1	2.3	186	14.0	11.9	0.2	1.9	
EU1547	1531	20.2	12.4	0.3	2.7	6185	12.6	9.6	0.1	2.5	
EU1567						6124	15.4	11.4	0.3	2.8	
EU1593	5693	27.9	15.8	0.1	2.4	1917	10.8	8.2	0.2	2.3	
EU1599	869	27.6	15.3	0.0	2.1	357	14.8	11.0	0.1	1.6	
EU1635	1095	29.0	15.5	0.1	2.3	323	9.8	8.5	0.1	2.3	
EU1666	999	28.2	16.0	0.1	2.4	153	18.6	10.7			
EU1673	2001	22.2	13.8	0.2	2.7	7909	9.6	7.2	0.4	2.2	
EU1688	279	17.1	12.2	0.2	2.7	2059	9.1	6.9	0.3	2.0	
EU1698						6781	12.9	9.8	0.3	2.5	
EU1700	1020	29.9	18.5	0.1	2.5	479	13.3	11.0	-0.3	2.9	
EU1731	813	25.9	16.3	0.1	2.5	424	11.7	8.9	0.3	2.2	
EU1789	384	20.5	13.1	0.2	3.8	327	11.4	5.7	0.7	2.4	
EU1790	741	21.6	12.3	0.1	2.5	11351	12.0	8.5	0.3	2.3	
EU1800	52	19.3	9.9	3.5	8.6	316	18.1	10.1	3.7	8.4	
EU1863	421	24.5	15.9	0.4	3.1	2160	15.0	11.1	0.1	2.9	
EU1929	2076	29.1	16.0	0.1	4.6	140	6.6	4.3	0.3	1.9	
EU2017	1233	20.4	12.4	0.2	2.4	5601	12.3	9.3	0.1	2.4	
EU2020	206	20.5	13.8	0.6	2.7	2659	14.4	11.7	0.3	2.7	
EU2043	2068	24.5	16.5	0.2	2.5	973	10.1	6.8	0.3	2.3	
EU2055	1309	21.4	13.8	0.2	2.6	6571	12.6	9.4	0.0	2.4	
EU2120	295	18.9	13.2	0.7	2.6	3503	13.2	10.5	0.0	2.4	
EU2130	1229	20.0	11.9	0.3	2.6	5682	12.8	9.4	0.1	2.4	
EU2165	952	20.5	12.8	0.2	2.6	4574	12.1	9.6	0.0	2.4	
EU2189	1252	23.1	14.2	0.4	2.9	5776	12.6	9.5	0.1	2.5	
EU2200	10618	24.6	14.9	0.1	2.1						
EU2201	1091	20.5	12.5	0.2	2.9	6262	13.0	9.6	0.0	2.5	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU2247	1382	21.6	14.3	0.2	2.7	6793	12.9	9.8	0.1	2.5	
EU2301	2226	21.3	12.7	0.3	2.5	7237	13.1	10.5	0.1	2.4	
EU2327	4067	31.9	18.1	0.1	3.0	2426	14.6	12.2	0.2	2.2	
EU2356	2717	28.6	17.0	0.1	2.4	854	13.3	10.0	0.2	2.3	
EU2360	249	19.9	13.8	0.3	2.6	2803	12.9	9.9	0.4	2.4	
EU2378						3724	13.6	10.4	0.2	2.7	
EU2389	2929	23.2	14.8	0.2	2.9	12159	10.9	7.6	0.5	2.3	
EU2399	162	35.2	13.4	0.8	3.5	520	12.4	7.3	0.8	2.6	
EU2401	214	26.6	15.2	0.1	2.8	661	14.5	10.7	0.3	2.6	
EU2405	410	18.9	12.6	0.3	2.3	4946	13.2	11.3	0.3	2.2	
EU2430	1132	21.1	12.5	0.2	2.5	4348	14.2	10.9	0.6	2.6	
EU2495	140	19.8	12.2	0.5	2.7	2891	12.4	9.3	0.1	2.2	
EU2512	362	19.5	12.8	0.5	2.8	3908	13.9	10.5	0.4	2.3	
EU2530	1117	20.2	12.9	0.2	2.5	3862	14.3	10.6	0.5	2.7	
EU2547	4782	27.9	15.9	0.1	2.6	2012	11.5	9.6	0.0	1.9	
EU2559	1922	20.8	13.0	0.2	2.7	7151	13.2	10.4	-0.1	2.4	
EU2578	142	32.5	14.7	0.4	2.7	477	13.1	6.9	0.4	2.9	
EU2590	8	25.2	16.5	1.2	2.8	96	9.4	4.1	0.4	1.9	
EU2595	2320	21.8	13.3	0.3	2.9	3185	13.6	10.9	0.5	2.7	
EU2610	2017	20.8	11.8	0.2	2.2	2714	14.5	11.9	0.5	2.8	
EU2618	2	12.6	2.5	-2.0	0.6	23	4.9	3.8	0.3	1.0	
EU2622	361	19.2	11.8	0.1	2.5	3361	12.4	9.4	0.3	2.2	
EU2630	406	19.3	12.9	0.2	2.2	4286	10.2	8.2	0.2	2.3	
EU2634	69	31.8	8.7	0.0	2.6	629	13.1	6.2	0.7	2.6	
EU2673	1156	23.4	11.2	0.2	2.1	1848	14.8	11.2	0.5	3.0	
EU2690	260	19.3	12.3	0.3	2.5	2829	14.5	10.5	0.3	2.4	
EU2717	214	19.0	15.1	0.2	2.6	3409	13.1	10.0	0.4	2.3	
EU2751	2516	24.9	17.9	0.1	2.6	509	8.6	6.4	-0.1	2.0	
EU2752	178	17.3	13.4	0.3	2.5	2860	14.3	11.2	0.2	2.5	
EU2773	648	26.4	17.5	0.1	2.3	127	10.8	9.8			
EU2792	251	17.4	12.1	0.2	2.3	2678	13.5	10.1	0.5	2.4	
EU2800	248	17.7	10.9	0.4	2.3	3207	12.3	8.1	0.3	2.2	
EU2829	261	18.7	11.3	0.3	2.6	3256	13.3	10.4	0.4	2.3	
EU2845	2243	25.0	15.1	0.4	3.1	7531	10.4	8.0	0.4	2.4	
EU2846	330	18.7	11.6	0.3	3.0	3103	14.1	10.5	0.4	2.3	
EU2896	863	23.1	14.3	0.4	3.0	3181	9.7	7.2	0.4	2.3	
EU2897	198	17.6	12.7	0.1	2.6	2082	10.7	8.8	0.2	1.8	
EU2905	243	17.7	11.8	0.3	2.7	2275	12.3	10.0	0.0	2.5	
EU2912	484	23.2	15.9	0.2	2.8	3098	9.4	7.9	0.5	2.3	
EU2936	114	18.3	13.7	0.4	2.6	1738	14.1	10.8	0.2	2.3	
EU2979	257	18.6	10.2	0.4	2.7	3120	12.9	9.5	0.2	2.3	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU2983	160	18.1	12.8	0.4	2.3	2283	13.4	9.5	0.2	2.2	
EU2984	471	21.7	12.6	0.0	2.3	5529	12.3	8.4	0.4	2.5	
EU3000	1235	20.4	13.7	0.4	2.8	6522	12.3	9.9	0.2	2.5	
EU3042	1266	20.0	12.6	0.2	2.6	7078	11.9	8.9	-0.2	2.2	
EU3048	600	19.1	11.6	0.3	2.5	4658	12.4	9.4	0.4	2.3	
EU3075	852	22.0	12.2	-0.1	2.3						
EU3094	605	24.9	15.1	0.2	2.4						
EU3096	236	20.4	12.5	0.2	2.5	3011	13.4	10.5	0.1	2.3	
EU3114	232	15.9	11.4	0.1	2.1	3423	13.8	10.5	0.3	2.3	
EU3115	186	19.2	13.7	0.2	3.0	2336	14.8	11.2	0.1	2.3	
EU3147	227	29.0	16.9	0.4	2.3						
EU3181	3088	24.5	15.2	0.1	2.4	1563	10.9	7.7	0.3	2.3	
EU3194	84	17.9	9.7	-1.6	7.9	618	13.0	7.4	1.9	5.1	
EU3201	193	9.6	11.2	-0.4	5.8	394	15.5	11.4	1.2	10.4	
EU3250	290	18.2	12.5	0.6	2.5	3095	12.0	9.3	0.4	2.4	
EU3257	1409	21.8	13.5	0.1	2.7	7221	13.3	9.5	0.2	2.7	
EU3260	260	16.9	11.1	0.3	2.9	3521	14.3	11.1	0.5	2.7	
EU3268	508	26.2	13.2	0.2	2.8	4767	13.5	8.8	0.5	2.6	
EU3270						5877	13.5	10.8	0.3	2.9	
EU3293	603	19.4	12.4	0.5	2.6	5628	13.1	9.6	0.2	2.3	
EU3311	313	17.8	12.3	0.6	2.6	2690	12.0	8.8	0.3	2.4	
EU3317	181	17.3	11.3	0.2	2.3	2732	13.1	10.0	0.2	2.4	
EU3321	905	18.9	10.6	0.1	2.5	4526	11.0	8.1	0.2	2.2	
EU3358						6377	14.1	9.7	0.5	2.3	
EU3362	181	18.3	13.3	0.3	2.5	2577	12.5	9.5	0.1	2.3	
EU3375	212	17.7	12.0	0.5	2.6	2656	13.3	10.4	0.2	2.2	
EU3400	66	27.1	16.4	-0.2	3.5	889	17.3	10.8	0.2	3.0	
EU3421	2265	23.3	12.9	0.3	2.7	6354	13.6	10.6	0.0	2.3	
EU3455	608	20.4	13.8	0.2	2.6	5216	12.6	8.8	0.3	2.3	
EU3469						2901	13.4	10.0	0.5	2.4	
EU3472	240	19.8	11.5	0.6	2.8	2306	14.8	11.4	0.2	2.4	
EU3484	286	19.3	12.8	0.2	2.5	2270	12.6	10.1	0.3	2.2	
EU3527	279	18.9	12.1	0.5	2.5	2694	13.9	10.8	0.4	2.5	
EU3544	613	20.5	13.8	0.3	2.8	4098	12.9	9.4	0.3	2.3	
EU3598	578	20.1	12.5	0.3	2.6	4091	15.6	10.8	0.6	2.4	
EU3599	482	19.9	12.7	0.4	2.7	3986	14.2	9.8	0.7	2.7	
EU3621						5977	15.5	11.4	0.4	2.5	
EU3633	3683	28.0	16.8	0.2	2.5	1788	12.6	11.5	0.3	2.4	
EU3647	268	21.4	12.9	0.3	2.5	2612	13.0	9.4	0.1	2.2	
EU3654	631	23.7	12.3	0.1	2.7	10754	12.8	9.0	0.3	2.6	
EU3660	4634	26.7	16.4	0.2	2.7	2464	11.3	10.7	0.2	2.3	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU3684	578	17.2	10.8	0.2	2.4	4625	11.0	8.0	0.2	2.2	
EU3701	1217	26.3	14.9	0.2	2.3	379	11.0	10.1	-0.1	1.7	
EU3714						7080	14.5	10.7	0.3	2.8	
EU3733	1593	26.1	15.4	0.2	2.6	1138	13.3	12.9	0.2	2.4	
EU3755						3597	16.7	11.9	0.5	2.6	
EU3768	962	27.7	13.7	0.3	2.6	159	13.3	12.8	0.8	1.7	
EU3803	637	30.2	14.5	0.0	2.4	55	5.7	2.3			
EU3824	1075	23.8	15.4	0.1	2.5	680	7.5	4.5	0.2	1.7	
EU3845	275	16.1	10.1	0.0	2.5	2739	12.5	9.2	0.2	2.2	
EU3855	348	20.4	14.4	0.5	2.4	2633	12.7	10.0	0.3	2.4	
EU3874	2867	25.9	15.5	0.1	2.5	1553	11.2	7.7	0.3	2.4	
EU3908	587	22.9	12.9	0.1	2.2	15396	11.9	9.3	0.2	2.5	
EU3953	1092	30.4	16.5	0.3	2.3	827	14.4	11.2	0.6	2.3	
EU3961	484	28.8	17.7	-0.1	2.7	528	10.2	8.5	0.2	1.7	
EU3972						5066	15.2	11.3	0.3	2.6	
EU3992	833	29.6	16.8	0.1	2.7	874	13.7	13.0	0.2	1.8	
EU4002	780	22.9	12.0	0.1	2.7	5008	12.5	8.6	0.2	2.2	
EU4004	484	24.1	13.3	0.2	2.1	60	9.6	7.0	1.0	1.5	
EU4021						5508	16.0	10.9	0.5	2.5	
EU4035	714	28.7	15.6	0.4	2.5	259	13.8	10.4	0.6	1.9	
EU4066	1071	30.2	16.8	0.2	2.6	953	13.1	10.9	0.2	2.2	
EU4075	1027	25.1	13.4	0.1	2.5	10457	13.2	9.6	0.3	2.5	
EU4083	1168	29.0	16.0	0.2	2.5	468	9.5	8.7	0.3	2.2	
EU4112	1127	27.3	15.2	0.1	2.5	710	11.4	9.2	0.1	2.2	
EU4137	1044	29.2	15.2	0.2	2.5	569	12.5	11.6	0.1	1.9	
EU4169	666	26.8	13.9	0.1	2.5	166	9.8	6.9	0.4	1.6	
EU4172	883	27.2	15.1	0.0	2.6	298	13.3	11.7	-0.2	1.8	
EU4205	1143	26.4	16.0	0.1	2.4	73	6.8	3.4	0.3	1.5	
EU4235	1225	26.1	13.5	0.2	2.4	591	13.9	11.6	0.2	2.2	
EU4264	1248	27.2	16.0	0.3	2.6	642	10.9	8.7	0.2	1.8	
EU4278						5235	14.9	10.9	0.5	2.5	
EU4300	1316	26.4	13.9	0.2	2.5	562	15.2	14.5	0.3	2.1	
EU4316	1428	25.5	15.1	0.2	2.3	705	10.3	9.4	0.1	1.9	
EU4321	1488	27.1	15.5	0.2	2.4	1003	12.9	13.8	0.1	2.3	
EU4333	2	21.3	1.8	1.2	1.1	24	14.5	9.7	0.0	2.7	
EU4387						3160	13.5	9.3	0.0	2.4	
EU4392	1151	30.1	15.6	0.1	2.3	1277	14.7	12.9	0.2	2.2	
EU4426	870	20.8	12.9	0.1	2.5	3601	8.7	6.9	0.3	2.1	
EU4444	606	26.8	14.8	0.2	2.8	9767	12.8	9.2	0.4	2.4	
EU4450	1162	27.1	16.1	0.3	2.5	1069	8.6	9.6	0.1	1.8	
EU4463						5189	14.6	10.9	0.7	2.7	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU4473	1384	23.6	14.6	0.2	2.5	935	8.7	7.6	0.1	2.0	
EU4491						5374	14.8	11.4	0.4	2.6	
EU4508	288	24.8	11.9	0.0	2.0	326	16.1	11.0	0.2	2.0	
EU4519	598	24.6	12.9	0.2	2.7	9766	13.1	9.2	0.4	2.5	
EU4527	628	19.5	12.6	0.1	2.6	4905	14.9	10.2	0.4	2.6	
EU4532	470	19.9	13.3	0.1	2.6	3854	13.7	9.6	0.4	2.3	
EU4540	258	20.0	14.0	0.6	3.0	3106	13.3	10.1	0.3	2.4	
EU4565						3971	14.2	10.6	0.1	2.5	
EU4573	585	25.3	16.8	0.3	2.8	15077	11.9	9.0	0.3	2.3	
EU4579	359	20.7	13.6	0.3	2.6	3376	14.1	11.4	0.4	2.7	
EU4582	581	26.8	14.4	0.4	3.2	12731	11.9	8.6	0.2	2.4	
EU4591	1308	25.3	13.2	-0.1	3.0	16033	13.2	10.1	0.2	2.5	
EU4593	2072	21.3	12.4	0.2	2.6	6983	13.0	10.5	-0.1	2.4	
EU4607	923	23.1	14.4	0.3	3.1	15780	11.9	9.6	0.2	2.5	
EU4611	696	20.6	12.9	0.3	2.6	4685	13.4	10.2	0.4	2.3	
EU4623	268	19.6	13.5	0.7	2.6	3397	15.4	11.6	0.3	2.4	
EU4650	345	18.4	13.6	0.4	3.0	2741	11.6	9.6	0.2	2.5	
EU4685	6751	26.4	14.4	0.2	3.2	1946	13.6	8.7	0.1	1.7	
EU4687	284	19.1	12.4	0.4	2.5	3001	12.8	9.9	0.3	2.3	
EU4699	702	21.5	13.6	0.3	2.4	10648	11.6	8.4	0.2	2.4	
EU4710	528	20.0	12.2	0.3	2.6	3751	12.6	9.8	0.3	2.4	
EU4721	640	21.2	11.8	0.0	2.8	4666	11.6	8.7	0.0	2.4	
EU4723	292	18.2	12.4	0.2	2.4	2885	12.9	9.6	0.0	2.4	
EU4773	319	20.4	14.4	0.3	2.6	3016	13.6	11.6	0.3	2.4	
EU4792	338	21.1	12.2	0.1	2.2	2258	12.4	8.9	0.4	2.4	
EU4824	325	19.7	12.4	0.4	3.0	3132	14.3	10.8	0.2	2.6	
EU4833	597	21.4	12.8	0.5	2.5	3851	13.4	9.8	0.2	2.4	
EU4838						5259	14.7	10.9	0.2	2.4	
EU4853	615	23.9	13.1	-0.2	3.4	9383	12.7	9.2	0.3	2.5	
EU4864	337	19.5	12.8	0.4	2.8	2821	13.4	10.0	0.3	2.5	
EU4896	54	9.7	5.4	0.0	0.0	155	8.8	4.9	0.2	2.2	
EU4950	575	20.8	11.7	0.0	2.6	4901	12.8	9.6	0.1	2.4	
EU4954	270	19.7	12.7	0.2	2.6	3123	12.5	9.6	0.3	2.3	
EU4976	311	18.2	12.8	0.2	2.4	3413	12.7	9.6	0.2	2.2	
EU5050	254	19.6	11.3	0.4	2.6	2522	13.8	10.3	0.2	2.3	
EU5073	281	19.2	13.2	0.4	2.4	3423	14.1	11.3	0.3	2.3	
EU5098						5073	15.5	10.9	0.5	2.6	
EU5129	8281	26.3	15.0	0.0	2.6	660	14.9	8.6	0.2	2.2	
EU5134						456	5.3	4.0	0.6	2.2	
EU5141	355	22.7	15.4	0.3	2.6	2963	13.0	9.8	0.4	2.4	
EU5167	2424	24.4	15.8	0.2	2.7	11011	10.6	7.5	0.6	2.2	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU5182	443	26.0	16.3	0.5	3.1	2374	10.5	7.6	0.5	2.2	
EU5185	170	17.7	11.8	0.1	2.2	1519	11.3	9.6	0.2	2.4	
EU5191	555	21.6	16.1	0.2	2.5	779	8.8	5.2	0.4	2.7	
EU5245	772	26.7	17.8	-0.1	4.1	842	9.2	5.9	0.4	2.7	
EU5261	321	19.9	12.7	0.4	2.6	3307	14.4	11.3	0.3	2.5	
EU5264	1164	20.7	12.6	0.1	3.0	4514	12.5	9.9	-0.1	2.3	
EU5318	1379	20.8	12.5	0.0	2.8	5659	13.0	9.8	0.1	2.6	
EU5331	2448	22.1	13.7	0.2	2.5	7145	13.3	10.6	0.0	2.3	
EU5349						4892	12.6	9.6	0.5	2.3	
EU5351	1083	20.2	13.1	0.2	2.6	4504	13.7	10.5	0.0	2.5	
EU5372						80	22.2	11.4	0.4	2.5	
EU5387	405	19.3	11.9	0.2	2.3	3377	12.5	10.4	0.3	2.3	
EU5397	1930	22.7	13.8	-0.2	2.3						
EU5429						11657	7.9	4.5			
EU5435	1112	20.3	11.8	0.2	2.6	6344	12.4	9.4	0.0	2.4	
EU5441	790	20.4	11.6	0.0	2.6	5283	11.9	9.0	0.2	2.4	
EU5478	516	24.9	13.3	0.1	2.8	14460	11.8	9.0	0.2	2.4	
EU5529	604	20.3	12.8	-0.3	2.5	13412	11.8	8.5	0.2	2.4	
EU5587	379	22.8	14.4	0.5	3.1	2371	13.7	8.6	0.0	2.5	
EU5591	2159	26.6	15.3	0.4	3.2	7036	11.1	7.5	0.6	2.4	
EU5593	1242	21.5	16.1	0.1	4.5	1467	7.7	4.9	0.4	2.4	
EU5612	666	24.6	14.3	0.2	2.9	9339	13.0	8.6	0.2	2.5	
EU5613	1251	19.9	12.1	0.3	2.5	6063	12.8	9.6	0.1	2.4	
EU5673	646	21.9	14.2	0.2	2.5	2910	9.0	7.0	0.5	2.2	
EU5777	1193	18.4	11.9	0.2	2.4	6616	8.9	7.6	0.7	2.5	
EU5802	1414	18.4	10.7	0.2	2.8	8512	8.5	7.0	0.5	2.4	
EU5821	528	17.9	10.3	0.0	2.9	3123	9.2	7.3	0.4	2.5	
EU5891	1094	20.6	14.8	0.2	2.6	5194	12.5	10.1	0.0	2.3	
EU6264	656	21.8	13.5	0.4	3.1	9439	12.5	8.8	0.4	2.6	
EU6281	432	22.8	13.2	0.0	2.3	7826	11.4	8.1	0.4	2.4	
EU6287						5694	16.1	12.3	0.2	2.5	
EU6349	628	20.7	10.9	0.1	2.8	4647	11.8	8.6	0.1	2.3	
EU6386	479	22.2	14.5	0.2	2.6	2928	9.7	7.4	0.4	2.2	
EU6444	966	19.3	11.9	-0.1	2.5	5270	11.1	7.9	0.3	2.3	
EU6524	2560	24.3	16.6	0.4	3.0	7841	9.4	7.5	0.4	2.4	
EU6527	722	18.5	11.6	0.0	2.3	3681	11.8	8.4	0.2	2.4	
EU6544	1484	23.5	14.7	0.2	2.7	5343	13.9	10.9	0.0	2.5	
EU6556	2054	20.0	11.9	0.2	2.4	6943	14.1	11.2	0.2	2.5	
EU6564	1492	22.0	14.1	0.1	2.4	4593	12.9	10.8	0.1	2.3	
EU6723	893	23.6	15.2	0.3	2.9	3985	9.7	7.0	0.4	2.2	
EU6735	2257	22.6	13.3	0.3	2.6	7775	14.0	11.7	0.1	2.4	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU6743	991	22.1	12.6	0.2	2.3	3213	13.0	11.1	0.0	2.2	
EU6890	733	19.3	10.8	0.0	2.4	4197	10.9	8.2	0.2	2.2	
EU6893						5080	14.9	11.8	0.2	2.3	
EU6923						4996	13.3	9.4	0.3	2.7	
EU7001	1279	20.5	12.3	0.2	2.6	5437	12.5	8.9	0.1	2.3	
EU7082						5552	15.3	11.6	0.2	2.4	
EU7119	838	21.4	14.7	-0.1	2.8	3900	13.6	10.5	0.3	2.6	
EU7218	456	26.0	16.4	0.6	2.5	2954	14.3	11.2	0.4	2.7	
EU7285						6688	15.2	11.6	0.2	2.7	
EU7293	1438	22.7	13.3	0.3	2.6	6390	13.7	10.5	0.0	2.3	
EU7314	1423	22.3	13.6	0.3	2.5	5280	11.8	9.3	0.0	2.1	
EU7382	1375	21.4	14.2	0.2	2.6	6538	12.1	9.4	0.1	2.2	
EU7412	1842	22.1	13.7	0.2	2.6	6815	13.6	10.5	0.1	2.4	
EU7427	1818	22.8	14.4	0.4	2.6	6478	12.6	9.4	0.3	2.5	
EU7521						4708	14.8	11.3	0.4	2.5	
EU7536	1377	21.6	13.4	0.4	2.7	5684	12.0	8.9	0.2	2.3	
EU7548	826	21.5	12.7	0.5	2.6	5598	12.1	10.4	0.1	2.3	
EU7610	305	19.7	12.7	0.2	2.3	3209	14.8	11.0	0.4	2.4	
EU7629	660	20.9	11.0	0.0	2.2	3502	12.2	8.7	0.3	2.3	
EU7634						5113	16.9	11.9	0.4	2.5	
EU7635	558	19.5	13.1	0.3	2.8	4672	14.1	10.6	0.4	2.6	
EU7643	964	21.1	11.8	0.1	2.6	4881	11.7	8.8	0.1	2.3	
EU7654	821	24.3	13.0	0.1	2.7	4291	12.9	9.2	0.2	2.3	
EU7724	545	24.4	12.3	0.3	2.6	3324	12.5	8.7	0.4	2.3	
EU7864	4128	26.7	16.4	0.0	2.5	2322	11.7	11.4	0.0	2.3	
EU7865						4799	14.5	10.8	0.4	2.5	
EU7866	2274	24.2	14.6	0.4	2.8	10351	10.4	6.9	0.5	2.3	
EU7888	665	24.6	12.9	0.1	2.5	10130	12.4	9.0	0.3	2.3	
EU7894	728	20.8	13.6	0.2	2.6	3217	13.4	10.7	0.4	2.4	
EU7910	534	19.4	13.3	0.8	5.9	4786	13.7	9.1	0.4	4.1	
EU8264						2130	11.5	8.7	0.5	2.2	
EU8431						5006	14.7	11.3	0.6	2.7	
EU8478						5347	14.9	11.2	0.3	2.4	
EU8520	596	21.0	12.0	0.1	2.5	4142	11.6	8.9	0.2	2.5	
EU8598						4715	14.8	11.2	0.6	2.8	
EU8605						5176	18.0	13.0	0.5	2.6	
EU8632						6771	15.4	11.5	0.2	2.6	
EU8733	1753	21.7	13.4	0.1	2.5	5922	12.8	10.7	0.0	2.3	
EU8736						3983	15.7	11.2	0.4	2.8	
EU8742	1357	23.1	14.8	0.4	2.7	4070	12.3	10.7	0.0	2.3	
EU8787	1298	19.5	12.0	0.2	2.6	5856	11.4	9.1	-0.1	2.4	

2003I FF	Wind Speed Cruise level in m/s					Wind Speed Ascent & Descent in m/s					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
	EU8789						4963	13.5	9.9	0.4	2.6
	EU8891						3861	17.0	12.3	0.4	2.4
	EU8943						4900	13.2	9.0	0.4	2.4
	EU8969	568	19.8	10.8	-0.1	2.6	4307	11.1	8.1	0.2	2.2
	EU9013	1336	22.0	12.9	0.2	2.4	5574	12.0	9.4	0.0	2.2
	EU9023						5142	15.2	11.3	0.6	2.7
	EU9145	583	19.3	10.7	0.0	2.6	4093	11.5	7.8	0.2	2.3
	EU9158	511	22.8	12.2	-0.5	3.8	12764	11.7	8.9	0.1	2.4
	EU9234	979	26.6	15.0	0.2	2.6	9792	13.0	9.4	0.3	2.5
	EU9245	1134	26.2	14.8	-0.2	3.3	14890	14.2	10.3	0.3	2.6
	EU9356						4676	15.7	11.9	0.2	2.8
	EU9378						5315	16.1	12.5	0.5	2.5
	EU9544	829	24.4	12.6	0.0	2.3	8984	13.2	9.2	0.3	2.5
	EU9589						4308	15.3	11.1	0.2	2.7
	EU9622	945	24.3	14.1	0.1	2.6	9818	12.6	9.4	0.2	2.4
	EU9678						5544	15.7	11.4	0.4	3.4
	EU9680	446	29.3	14.7	0.3	3.0	4293	14.2	9.7	0.3	2.6
	EU9692						355	14.6	9.8	1.9	2.9
	EU9723	1499	22.0	13.0	0.3	2.9	5903	13.0	9.4	0.3	2.4
	EU9729	674	22.9	12.9	-0.2	2.6	7091	12.1	8.9	0.3	2.5
	EU9734						5676	14.5	10.7	0.4	2.6
	EU9743	1147	24.8	13.3	0.1	2.6	11560	13.2	9.3	0.3	2.6
	EU9883	1442	22.9	14.1	0.4	2.7	6262	12.8	9.7	0.1	2.4
	EU9967						5565	15.2	11.1	0.5	2.6

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c) Table 6, *Wind direction (deg)*

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
	EU0002					6583			14	21	
	EU0006	526			3 6	25			7	6	
	EU0021	1121			8 12	7832			13	21	
	EU0022	3448			7 10	10507			14	20	
	EU0023	877			4 14	282			1	11	
	EU0032	2449			1 5	2485			7	20	
	EU0034	2208			1 6	2109			6	18	
	EU0041	2225			8 14	6571			15	23	
	EU0043	2161			7 11	7246			14	22	
	EU0045	3113			4 8	1249			7	16	
	EU0046	1015			6 12	72			25	23	
	EU0047	2455			7 11	7630			16	25	
	EU0049					5679			13	21	
	EU0051	950			8 15	4654			19	27	
	EU0052	881			10 15	4502			17	24	
	EU0054	1774			8 12	6661			18	26	
	EU0055					6767			15	23	
	EU0059	1495			7 10	6005			13	20	
	EU0060	1458			3 8	814			4	12	
	EU0061	1460			8 11	6282			14	21	
	EU0063	689			8 14	3757			14	20	
	EU0072	1103			8 11	8779			14	20	
	EU0073	4132			4 8	5087			8	19	
	EU0080	692			3 6						
	EU0081	3152			7 12	7708			15	22	
	EU0082					7204			14	22	
	EU0086	3603			4 8	3827			7	16	
	EU0101	396			7 11	1983			19	31	
	EU0106	820			7 10	3873			13	21	
	EU0109	3758			7 12	8474			14	20	
	EU0110	8829			3 8						
	EU0120	3364			5 15	3216			7	17	
	EU0121	662			8 13	3142			18	25	
	EU0123	72			4 5	71			3	8	
	EU0124					6313			16	25	
	EU0134	503			9 15	1653			23	29	
	EU0140	818			3 9	460			3	27	
	EU0158	1495			7 11	6138			14	22	
	EU0167	945			7 11	3783			14	20	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU0177	543			4	8	416			8	16	
EU0185	1420			8	11	5566			13	20	
EU0201	268			6	10	1007			22	30	
EU0202	6501			3	7	1655			4	16	
EU0203	2975			4	10	2567			7	17	
EU0204	1314			7	12	6758			14	21	
EU0206	1121			4	8	307			8	14	
EU0221	1390			5	12	887			6	19	
EU0230	9943			3	9	529			4	10	
EU0233	896			4	11	446			6	11	
EU0234						5868			16	24	
EU0251	1373			8	13	7068			16	23	
EU0254	1897			5	9	888			13	23	
EU0263	4377			5	9	3034			10	22	
EU0274	644			7	9	964			11	13	
EU0290	149			3	5	19					
EU0299						5937			18	27	
EU0301	2481			6	9	6987			13	20	
EU0303	1342			8	13	6561			15	21	
EU0307	1431			8	14	7305			15	22	
EU0310	8115			3	8	1484			5	13	
EU0311	1345			8	14	5491			14	20	
EU0312	1225			6	10	737			12	22	
EU0313	1221			7	11	5079			14	21	
EU0316	2229			7	10	6979			15	23	
EU0319	2346			9	14	7195			14	24	
EU0321	55			9	44	817			6	19	
EU0335	605			4	9	128			14	22	
EU0350	1305			3	8	198			2	7	
EU0354	377			7	11	999			18	24	
EU0359	1142			7	12	5093			14	22	
EU0367						5083			14	21	
EU0372	3463			4	9	2658			8	18	
EU0373	1631			9	14	6201			15	23	
EU0385	1391			5	10	651			9	31	
EU0394	1272			10	17	6284			17	24	
EU0405	618			8	14	877			18	26	
EU0413	1219			9	13	5973			17	23	
EU0432						5102			14	22	
EU0442	746			9	16	4060			15	24	
EU0451	1254			3	10	252			1	9	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU0453	10423			3	9	1884			4	14	
EU0456	1059			8	13	4548			13	19	
EU0457	2360			4	8	1519			7	17	
EU0458	797			8	13	3441			12	21	
EU0476	660			8	12	3283			14	22	
EU0482	1513			6	9	740			15	19	
EU0511	1254			8	14	6570			15	22	
EU0520	1064			4	12	312			2	16	
EU0558	1726			9	13	6397			16	23	
EU0568						5897			16	24	
EU0575	8572			3	8	1606			5	14	
EU0576	1230			4	16	438			1	15	
EU0583	1422			7	11	6264			15	23	
EU0601	1080			8	11	5460			14	23	
EU0620						3062			14	24	
EU0631	1271			3	10	362			7	33	
EU0632	3			11	8	113			18	22	
EU0676	1430			8	13	6034			17	25	
EU0707						5638			15	22	
EU0711	672			10	17	2533			17	25	
EU0720	1037			8	11	4265			21	30	
EU0723	516			8	11	4288			13	20	
EU0734	245			2	11	1144			6	21	
EU0745	2595			8	14	11281			16	23	
EU0802	1318			8	13	5282			15	23	
EU0807	1996			8	13	10415			14	21	
EU0810	1277			8	11	6881			15	22	
EU0826						7186			15	22	
EU0875	1331			8	14	5515			12	19	
EU0921	1387			9	15	5919			14	21	
EU0934	6755			5	10	2535			7	20	
EU0942	747			3	10	197			5	12	
EU0947	522			6	9	216			8	13	
EU0961	1120			5	11	453			8	16	
EU0985	4749			5	11	1902			7	18	
EU1001						3061			13	20	
EU1002	8214			5	11	3162			7	19	
EU1012	1478			3	10	681			1	12	
EU1035	1228			3	12	548					
EU1054	964			4	10	371			8	32	
EU1056						756			13	16	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU1234	1123			10	15	6249			16	24	
EU1275	1051			2	5	234					
EU1282	4469			3	12	2033			6	19	
EU1301	182			3	8	98					
EU1312	4988			3	8	2066			5	15	
EU1320	844			3	9	252			10	28	
EU1334	2271			4	11	371					
EU1337	597			9	16	5093			14	21	
EU1346	342			4	7	162					
EU1411	376			3	8	71					
EU1437	1157			3	9	821			1	12	
EU1456						3620			16	24	
EU1498	1400			9	14	6724			17	25	
EU1532						6735			14	21	
EU1538	646			3	7	186			5	22	
EU1547	1531			9	14	6185			16	23	
EU1567						6124			15	23	
EU1593	5693			4	12	1917			7	19	
EU1599	869			3	5	357			6	28	
EU1635	1095			3	11	323			3	15	
EU1666	999			3	7	153					
EU1673	2001			8	12	7909			17	26	
EU1688	279			10	13	2059			17	25	
EU1698						6781			15	22	
EU1700	1020			4	8	479			4	21	
EU1731	813			4	13	424			5	12	
EU1789	384			1	7	327			8	8	
EU1790	741			7	10	11351			14	22	
EU1800	52			17	38	316			10	16	
EU1863	421			8	11	2160			14	23	
EU1929	2076			4	9	140			18	46	
EU2017	1233			8	12	5601			14	21	
EU2020	206			9	15	2659			12	16	
EU2043	2068			3	10	973			4	9	
EU2055	1309			8	12	6571			15	22	
EU2120	295			10	14	3503			15	23	
EU2130	1229			8	13	5682			15	22	
EU2165	952			8	14	4574			17	26	
EU2189	1252			9	12	5776			16	25	
EU2200	10618			3	9						
EU2201	1091			9	13	6262			14	20	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU2247	1382			9	15	6793			14	22	
EU2301	2226			7	12	7237			14	22	
EU2327	4067			4	9	2426			7	16	
EU2356	2717			3	8	854			9	20	
EU2360	249			12	23	2803			15	23	
EU2378						3724			14	22	
EU2389	2929			8	12	12159			16	23	
EU2399	162			5	7	520			12	13	
EU2401	214			7	11	661			14	19	
EU2405	410			9	15	4946			15	24	
EU2430	1132			8	13	4348			14	22	
EU2495	140			9	13	2891			12	19	
EU2512	362			10	16	3908			14	21	
EU2530	1117			9	14	3862			16	26	
EU2547	4782			5	10	2012			9	23	
EU2559	1922			8	11	7151			14	21	
EU2578	142			4	9	477			12	16	
EU2590	8			12	10	96			10	16	
EU2595	2320			7	14	3185			8	21	
EU2610	2017			6	11	2714			7	21	
EU2618	2			1	0	23			29	22	
EU2622	361			7	12	3361			16	27	
EU2630	406			8	11	4286			18	28	
EU2634	69			4	3	629			10	14	
EU2673	1156			5	8	1848			7	17	
EU2690	260			10	17	2829			11	15	
EU2717	214			10	19	3409			13	19	
EU2751	2516			3	10	509			1	14	
EU2752	178			11	16	2860			13	19	
EU2773	648			5	13	127					
EU2792	251			8	9	2678			13	20	
EU2800	248			9	13	3207			14	22	
EU2829	261			9	12	3256			12	17	
EU2845	2243			8	12	7531			18	27	
EU2846	330			9	15	3103			12	19	
EU2896	863			9	14	3181			17	25	
EU2897	198			11	20	2082			15	23	
EU2905	243			10	18	2275			15	23	
EU2912	484			10	14	3098			20	29	
EU2936	114			12	18	1738			12	19	
EU2979	257			9	16	3120			12	17	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU2983	160			9	15	2283			13	20	
EU2984	471			7	14	5529			14	21	
EU3000	1235			9	15	6522			17	25	
EU3042	1266			7	11	7078			14	21	
EU3048	600			9	16	4658			16	25	
EU3075	852			4	7						
EU3094	605			5	11						
EU3096	236			9	14	3011			13	20	
EU3114	232			10	19	3423			13	20	
EU3115	186			10	19	2336			11	17	
EU3147	227			6	10						
EU3181	3088			3	8	1563			6	18	
EU3194	84			17	30	618			15	24	
EU3201	193			6	21	394			14	23	
EU3250	290			10	15	3095			15	24	
EU3257	1409			8	11	7221			15	22	
EU3260	260			11	16	3521			13	18	
EU3268	508			5	6	4767			13	20	
EU3270						5877			17	27	
EU3293	603			10	15	5628			13	20	
EU3311	313			11	18	2690			14	21	
EU3317	181			9	16	2732			13	18	
EU3321	905			8	12	4526			14	20	
EU3358						6377			13	21	
EU3362	181			10	19	2577			14	23	
EU3375	212			11	16	2656			13	19	
EU3400	66			7	9	889			13	19	
EU3421	2265			6	9	6354			13	19	
EU3455	608			8	11	5216			15	23	
EU3469						2901			17	27	
EU3472	240			8	13	2306			14	22	
EU3484	286			9	17	2270			14	18	
EU3527	279			9	17	2694			14	22	
EU3544	613			10	19	4098			14	21	
EU3598	578			9	15	4091			12	18	
EU3599	482			10	17	3986			14	20	
EU3621						5977			14	22	
EU3633	3683			4	9	1788			7	22	
EU3647	268			8	15	2612			14	21	
EU3654	631			6	9	10754			15	23	
EU3660	4634			4	10	2464			6	17	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU3684	578			9	13	4625			16	23	
EU3701	1217			4	7	379			8	44	
EU3714						7080			16	26	
EU3733	1593			4	8	1138			6	19	
EU3755						3597			12	20	
EU3768	962			3	6	159			15	20	
EU3803	637			4	12	55					
EU3824	1075			3	8	680			4	11	
EU3845	275			10	15	2739			13	20	
EU3855	348			10	18	2633			15	22	
EU3874	2867			3	9	1553			4	9	
EU3908	587			6	9	15396			17	27	
EU3953	1092			4	9	827			5	13	
EU3961	484			5	8	528			2	6	
EU3972						5066			15	25	
EU3992	833			5	8	874			6	21	
EU4002	780			7	9	5008			14	23	
EU4004	484			4	11	60			13	17	
EU4021						5508			12	19	
EU4035	714			5	10	259			15	21	
EU4066	1071			4	9	953			9	17	
EU4075	1027			6	8	10457			14	23	
EU4083	1168			4	8	468			9	28	
EU4112	1127			4	7	710			7	24	
EU4137	1044			3	5	569			10	18	
EU4169	666			4	10	166			14	26	
EU4172	883			4	7	298			4	27	
EU4205	1143			3	10	73			16	15	
EU4235	1225			4	9	591			8	18	
EU4264	1248			3	7	642			7	20	
EU4278						5235			15	24	
EU4300	1316			4	7	562			6	16	
EU4316	1428			4	10	705			5	14	
EU4321	1488			4	10	1003			4	19	
EU4333	2			3	1	24			11	10	
EU4387						3160			14	23	
EU4392	1151			4	7	1277			7	20	
EU4426	870			8	15	3601			20	29	
EU4444	606			6	7	9767			14	21	
EU4450	1162			3	10	1069			9	33	
EU4463						5189			16	24	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU4473	1384			4	12	935			3	10	
EU4491						5374			15	22	
EU4508	288			4	7	326			6	11	
EU4519	598			6	10	9766			14	21	
EU4527	628			10	16	4905			13	19	
EU4532	470			8	14	3854			12	16	
EU4540	258			9	13	3106			14	20	
EU4565						3971			14	22	
EU4573	585			5	9	15077			15	25	
EU4579	359			8	14	3376			13	23	
EU4582	581			6	11	12731			14	23	
EU4591	1308			6	8	16033			15	24	
EU4593	2072			7	11	6983			14	22	
EU4607	923			7	10	15780			17	26	
EU4611	696			9	16	4685			13	20	
EU4623	268			8	11	3397			13	20	
EU4650	345			12	20	2741			17	24	
EU4685	6751			5	11	1946			4	14	
EU4687	284			11	20	3001			15	24	
EU4699	702			7	10	10648			14	22	
EU4710	528			9	14	3751			14	22	
EU4721	640			9	15	4666			15	24	
EU4723	292			10	20	2885			13	17	
EU4773	319			10	18	3016			15	23	
EU4792	338			7	11	2258			14	19	
EU4824	325			9	17	3132			14	22	
EU4833	597			7	15	3851			13	20	
EU4838						5259			14	21	
EU4853	615			7	11	9383			15	21	
EU4864	337			9	14	2821			14	20	
EU4896	54			0	0	155			10	15	
EU4950	575			7	8	4901			15	22	
EU4954	270			7	12	3123			14	21	
EU4976	311			9	15	3413			13	19	
EU5050	254			9	14	2522			13	20	
EU5073	281			9	16	3423			13	21	
EU5098						5073			13	19	
EU5129	8281			5	10	660			3	14	
EU5134						456			28	37	
EU5141	355			9	12	2963			13	20	
EU5167	2424			7	13	11011			16	23	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU5182	443			8	11	2374			16	24	
EU5185	170			9	14	1519			16	21	
EU5191	555			1	7	779			9	17	
EU5245	772			2	5	842			7	15	
EU5261	321			8	12	3307			13	19	
EU5264	1164			9	15	4514			14	22	
EU5318	1379			9	14	5659			14	21	
EU5331	2448			7	11	7145			14	22	
EU5349						4892			16	23	
EU5351	1083			9	16	4504			14	22	
EU5372						80			8	11	
EU5387	405			7	10	3377			13	22	
EU5397	1930			4	6						
EU5429						11657					
EU5435	1112			8	12	6344			15	22	
EU5441	790			7	9	5283			16	24	
EU5478	516			5	6	14460			16	25	
EU5529	604			7	12	13412			15	25	
EU5587	379			9	15	2371			13	19	
EU5591	2159			7	11	7036			14	21	
EU5593	1242			1	11	1467			7	23	
EU5612	666			7	14	9339			13	21	
EU5613	1251			8	13	6063			14	21	
EU5673	646			10	15	2910			20	28	
EU5777	1193			7	9	6616			27	36	
EU5802	1414			8	14	8512			26	35	
EU5821	528			9	13	3123			26	36	
EU5891	1094			8	11	5194			14	22	
EU6264	656			8	9	9439			16	24	
EU6281	432			6	11	7826			16	25	
EU6287						5694			13	21	
EU6349	628			7	10	4647			13	19	
EU6386	479			8	12	2928			17	25	
EU6444	966			9	15	5270			16	22	
EU6524	2560			8	12	7841			20	29	
EU6527	722			8	12	3681			15	23	
EU6544	1484			7	9	5343			14	21	
EU6556	2054			7	10	6943			12	21	
EU6564	1492			7	10	4593			14	22	
EU6723	893			8	13	3985			18	25	
EU6735	2257			7	12	7775			14	23	

2003I DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU6743	991			6	9	3213			15	23	
EU6890	733			8	12	4197			17	25	
EU6893						5080			14	22	
EU6923						4996			15	23	
EU7001	1279			9	16	5437			13	20	
EU7082						5552			13	23	
EU7119	838			9	15	3900			14	20	
EU7218	456			6	10	2954			13	19	
EU7285						6688			15	23	
EU7293	1438			8	14	6390			13	21	
EU7314	1423			7	12	5280			15	22	
EU7382	1375			7	11	6538			14	21	
EU7412	1842			8	14	6815			13	19	
EU7427	1818			7	13	6478			14	22	
EU7521						4708			14	23	
EU7536	1377			8	13	5684			15	23	
EU7548	826			9	15	5598			15	21	
EU7610	305			9	14	3209			13	19	
EU7629	660			6	9	3502			17	25	
EU7634						5113			12	19	
EU7635	558			9	13	4672			14	19	
EU7643	964			8	16	4881			16	24	
EU7654	821			7	16	4291			14	21	
EU7724	545			6	6	3324			13	20	
EU7864	4128			3	12	2322			4	22	
EU7865						4799			15	23	
EU7866	2274			8	13	10351			16	24	
EU7888	665			5	7	10130			14	22	
EU7894	728			9	16	3217			13	20	
EU7910	534			14	26	4786			14	21	
EU8264						2130			19	26	
EU8431						5006			17	25	
EU8478						5347			14	22	
EU8520	596			8	10	4142			17	24	
EU8598						4715			15	23	
EU8605						5176			13	21	
EU8632						6771			13	20	
EU8733	1753			7	10	5922			15	24	
EU8736						3983			12	20	
EU8742	1357			7	11	4070			17	27	
EU8787	1298			8	13	5856			16	23	

AIRCRAFT	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in deg.				
	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
		Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU8789						4963			19	29
EU8891						3861			11	18
EU8943						4900			14	20
EU8969	568			8	8	4307			17	25
EU9013	1336			7	10	5574			14	20
EU9023						5142			16	25
EU9145	583			8	12	4093			14	21
EU9158	511			6	11	12764			17	27
EU9234	979			6	7	9792			13	20
EU9245	1134			6	10	14890			13	21
EU9356						4676			14	21
EU9378						5315			13	20
EU9544	829			5	7	8984			14	21
EU9589						4308			14	20
EU9622	945			6	9	9818			16	26
EU9678						5544			15	26
EU9680	446			5	8	4293			14	22
EU9692						355			23	41
EU9723	1499			7	10	5903			15	23
EU9729	674			7	11	7091			16	24
EU9734						5676			14	22
EU9743	1147			6	7	11560			14	22
EU9883	1442			9	17	6262			14	20
EU9967						5565			15	24

[432

## Annex I. EU Amdar Observations from 10 – 12 March 2003.

In order to have a brief impression of the distribution of the locations of observations, three maps are presented. In fig. 3. Europe is presented with all EU Amdar observations for 10-12 March 2003. Note that most data is acquired during ascending or descending (ASC/DES: 78%, LVR/LVW: 22%). In figure 4. (next page), data from and around the Atlantic is displayed. AMDAR data is evaluated using HIRLAM numerical model data as background. This background reference is restricted by a limited area, shown in fig. 4. An impression of the global coverage of E-AMDAR observations is given by fig 5. In this figure also ASDAR and other AMDAR observations are presented (mainly Australia and New Zealand).

### AMDAR COVERAGE 10–12 MARCH 2003

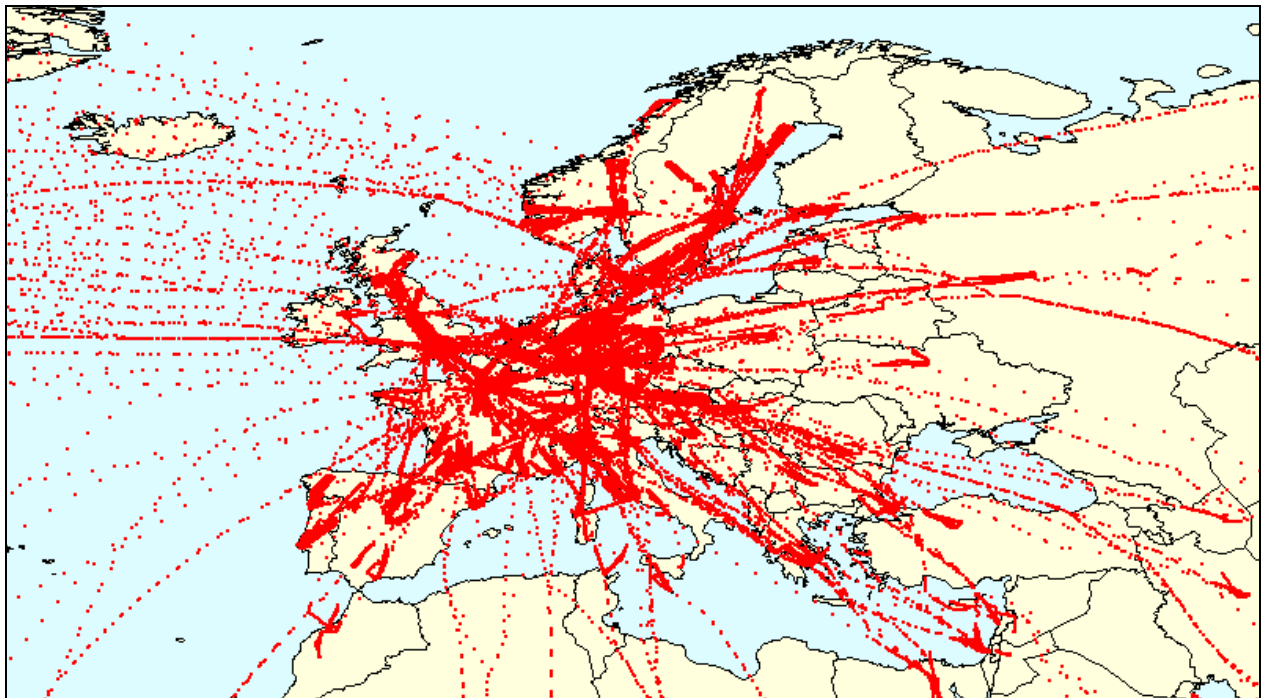


Fig. 3. All EU AMDAR observation locations, for the period 10 – 12 March 2003 and zoomed in over Europe.

## AMDAR COVERAGE 10–12 MARCH 2003

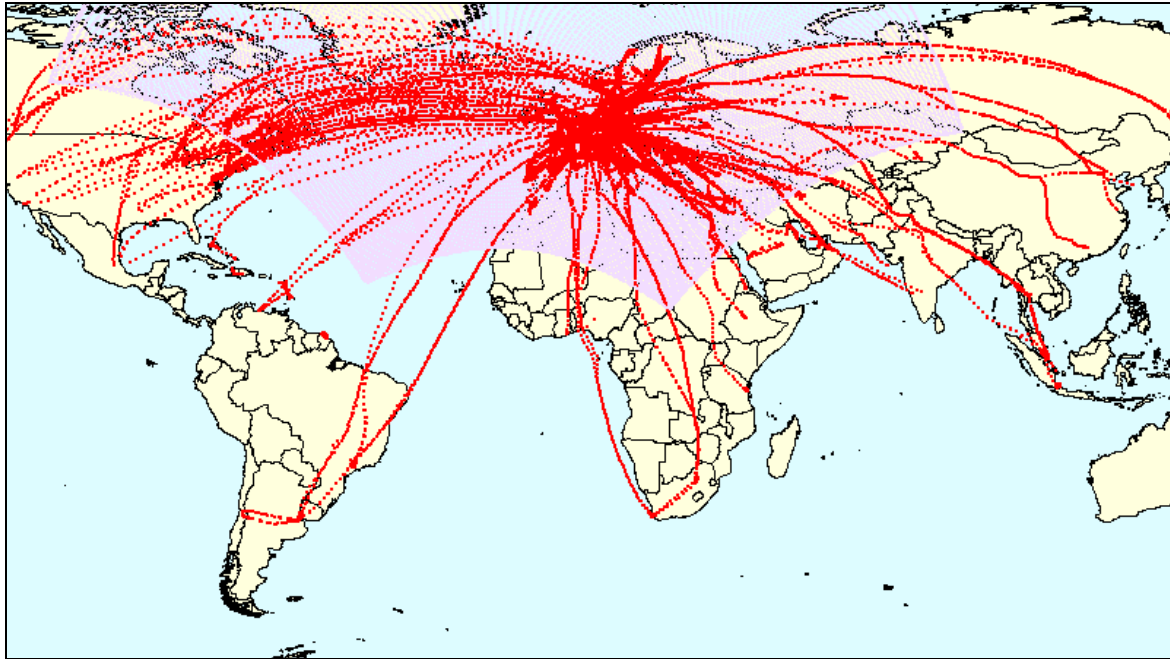


Fig. 4. All EU-AMDAR observations locations for 10-12 March 2003. In this figure the Hirlam area used for the evaluation purposes is indicated ( [shaded area] )<sup>1</sup>[see footnote]

### E-AMDAR 2003Q1 2003-03-10 – 2003-03-12 global coverage

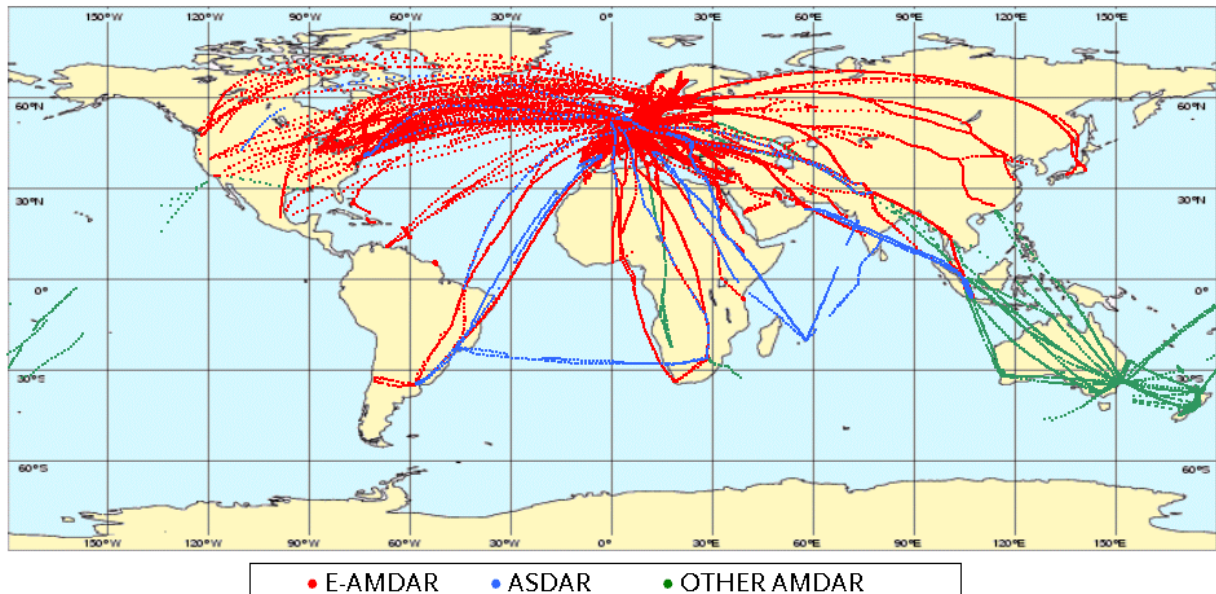


Fig. 5. Global coverage of E-AMDAR (●), ASDAR (●) and other AMDAR (●) observations. Period: 10 – 12 March 2003.

<sup>1</sup> Aircraft outside the HIRLAM area are evaluated by the E-AMDAR Technical Co-ordinator using other data sources.

**Annex II. Frequency distribution of mean temperature, mean wind speed and wind direction differences.**

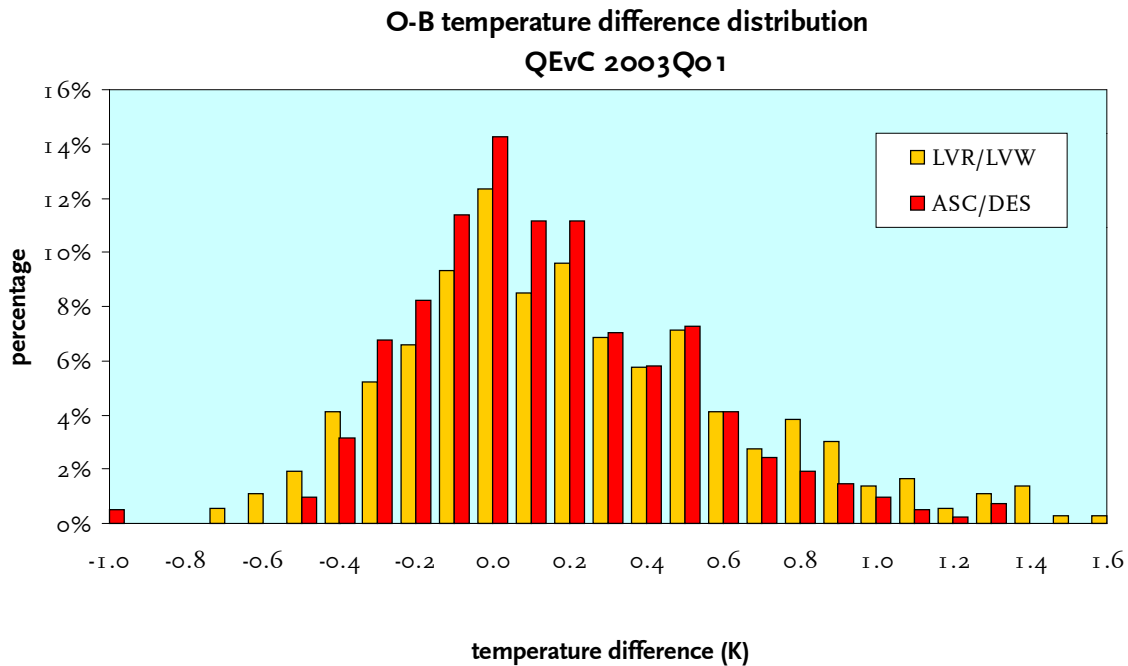


Fig. 6. Frequency distribution of the mean temperature difference (OBS-Background) for the number of aircraft reporting AMDAR reports (N=432). Distinction is made between the Flight Level (LVR/LVW) and the Ascending or Descending phase (ASC/DES). Clearly, there is only a slight difference between the distributions of both phases.

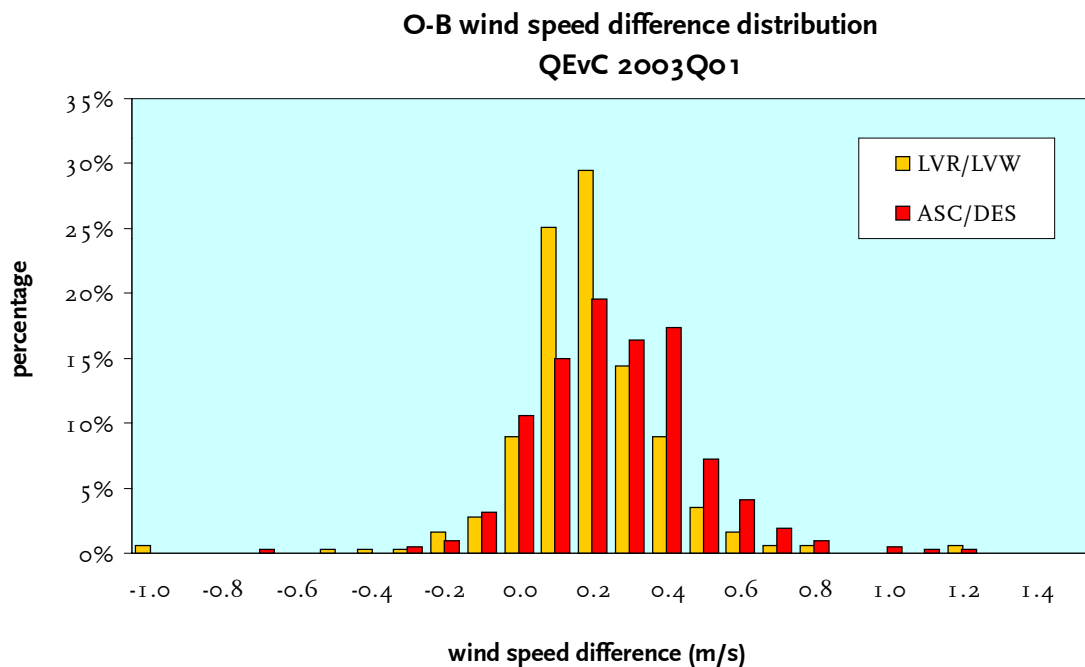


Fig. 7. Frequency distribution of the mean wind speed difference (OBS-Background) for the number of aircraft reporting AMDAR reports (N=432). Distinction is made between the Flight Level (LVR/LVW) and the Ascending or Descending phase (ASC/DES). Clearly, there is no significant difference between the distributions of both phases

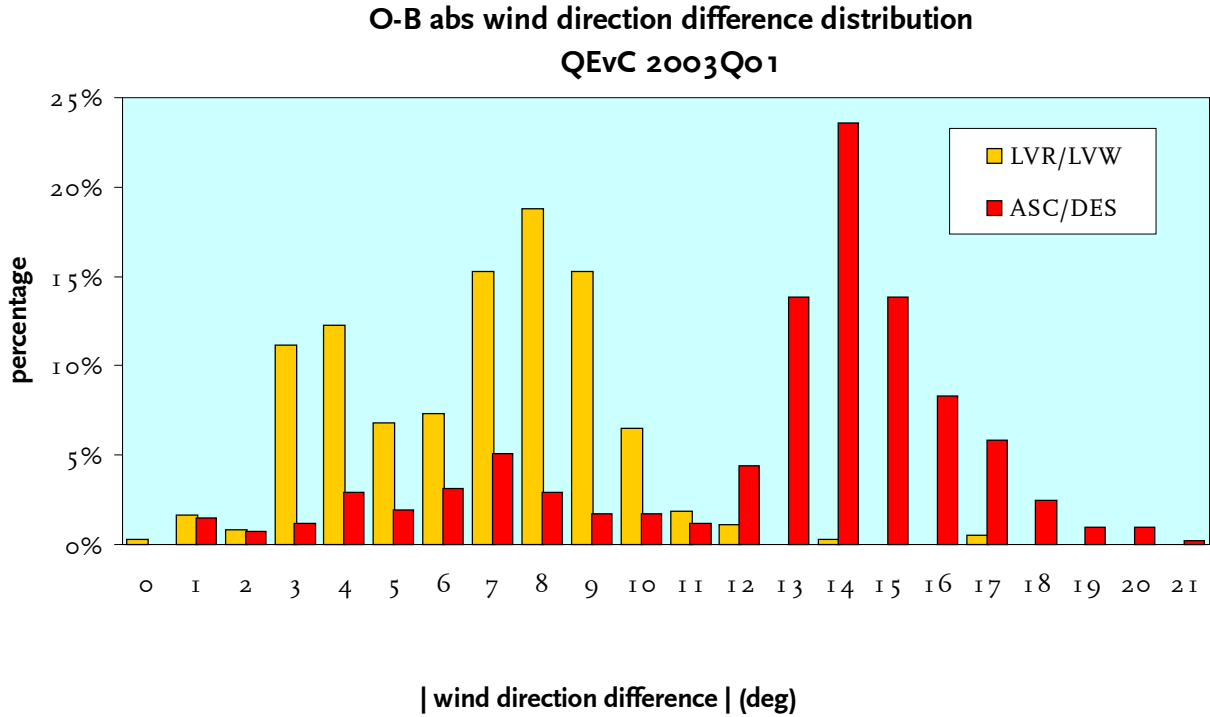


Fig. 8. Frequency distribution of the mean of the absolute wind direction difference ( $|OBS - Background|$ ) for the number of aircraft reporting AMDAR reports ( $N=432$ ). Distinction is made between the Flight Level (LVR/LVW) and the Ascending or Descending phase (ASC/DES). Clearly, in this case there is a significant difference between the distributions of both phases.

### Annex III. Trend in the daily amount of observations.

The number of observations, received every day can be presented as a function of time (see fig. 9.). Such a figure will demonstrate the trend in this daily amount. The figure shows a stable pattern (the dips are caused by system break-downs at QEvC).

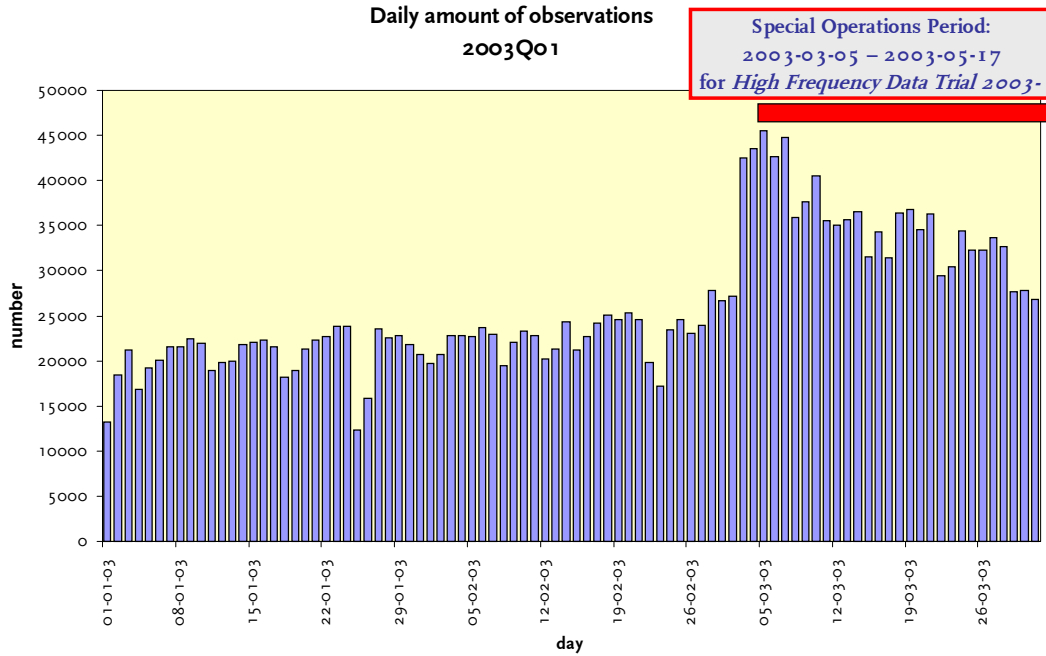
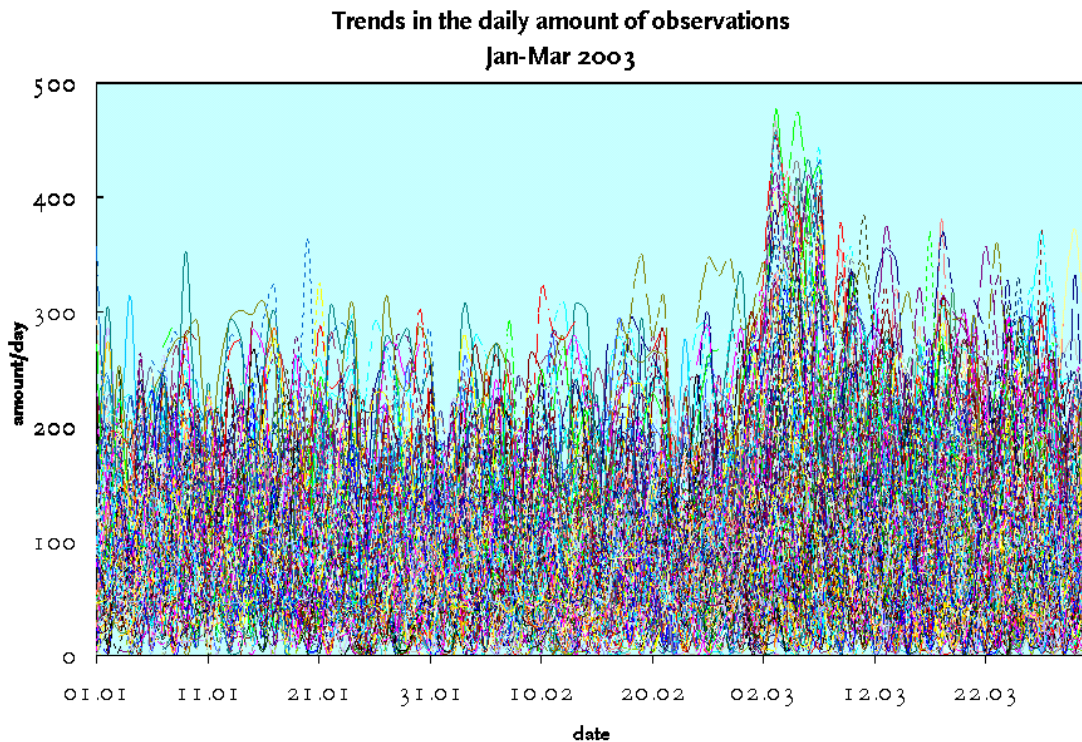


Fig. 9. The daily amount of EU-Amdar observation, evaluated at De Bilt. The start of the first 2003 High Frequency Trial is well recognized.

Moreover, the trend in the daily amount of observations from each aircraft can be evaluated. In fig. 10. such a trend is clearly demonstrated.



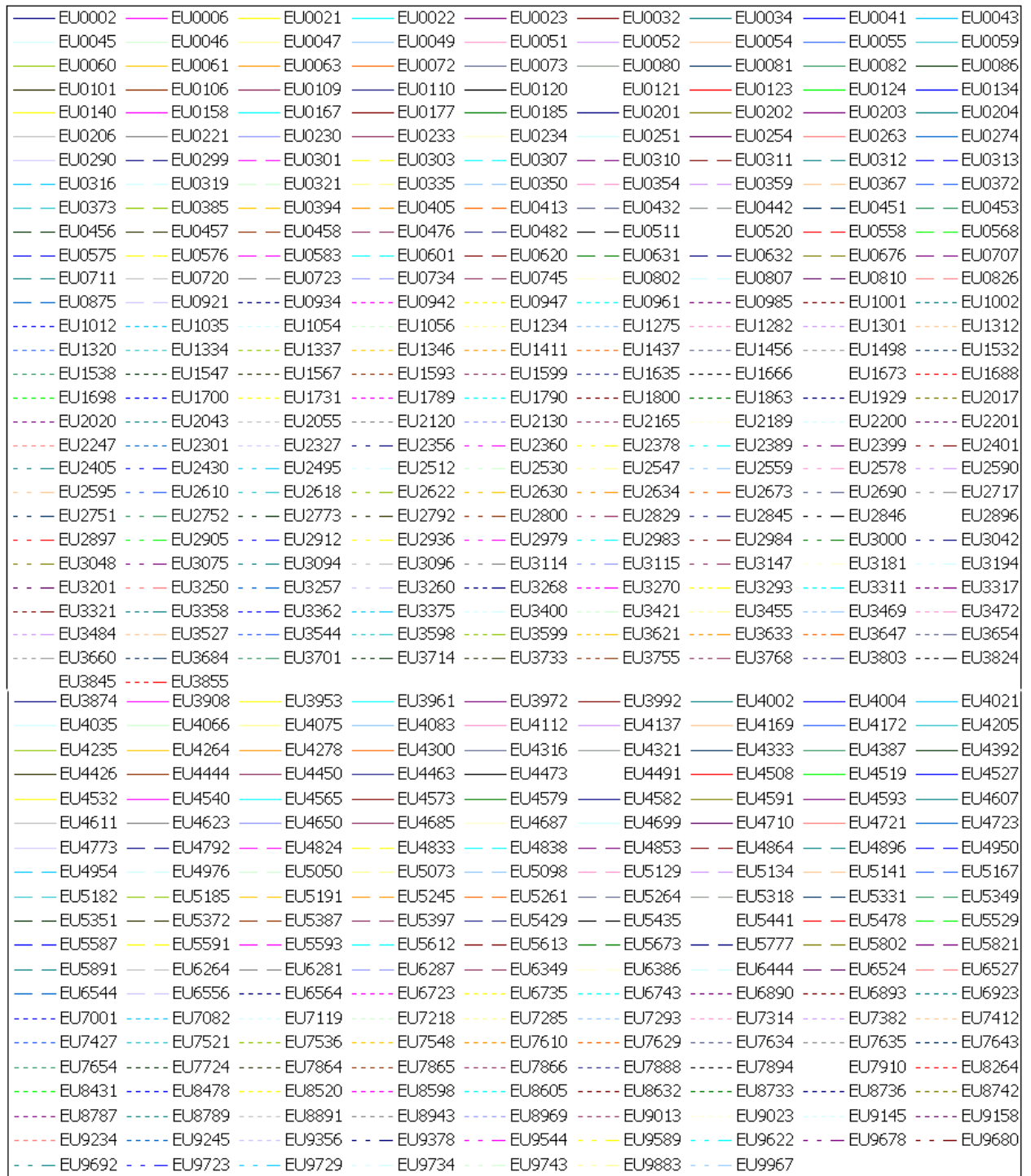


Fig. 1 o. Daily amount of observations, evaluated by QEvC. Notice the significant increase of data begin of March, due to the SOP.

## Annex IV. Trends in the mean O–B differences.

In fig 11, an overview is presented of the mean O–B air temperature differences  $\Delta TA$  for each aircraft apart. This figure shows some typical outliers, but in general the overall differences show a random behaviour, which is stable during the period.

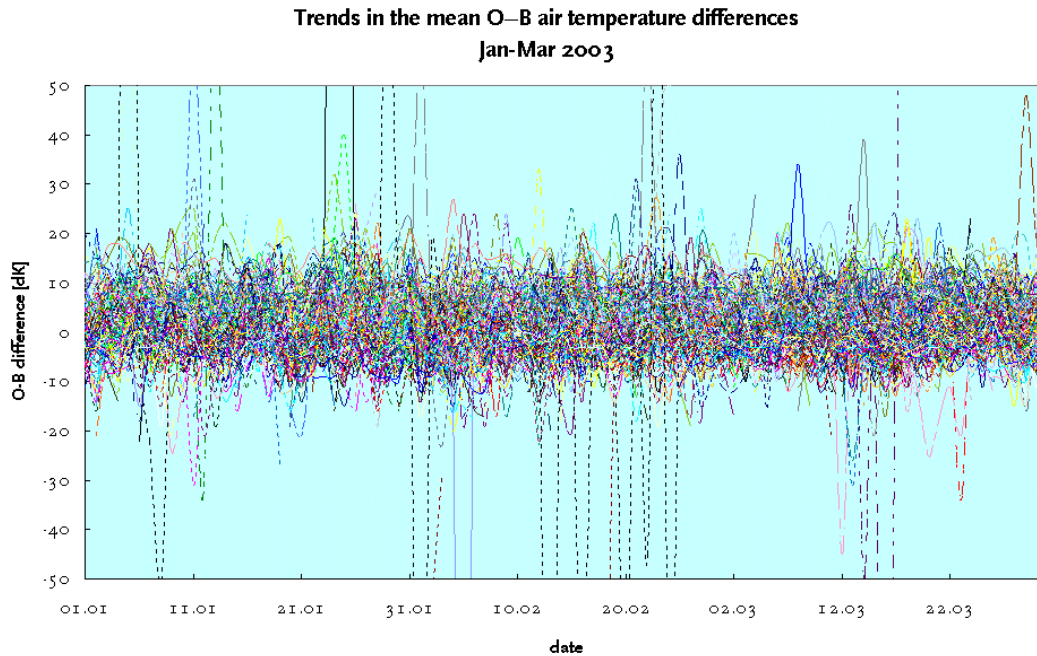


Fig. 11. Trends in the mean O–B air temperature differences (note: temperature-scale is in deci-Kelvin, /0.1 K). In general the differences demonstrate a rather random behaviour, as expected. Notice the typical outliers.

In fig. 12, a similar overview is presented for the wind speed differences  $\Delta FF$ :

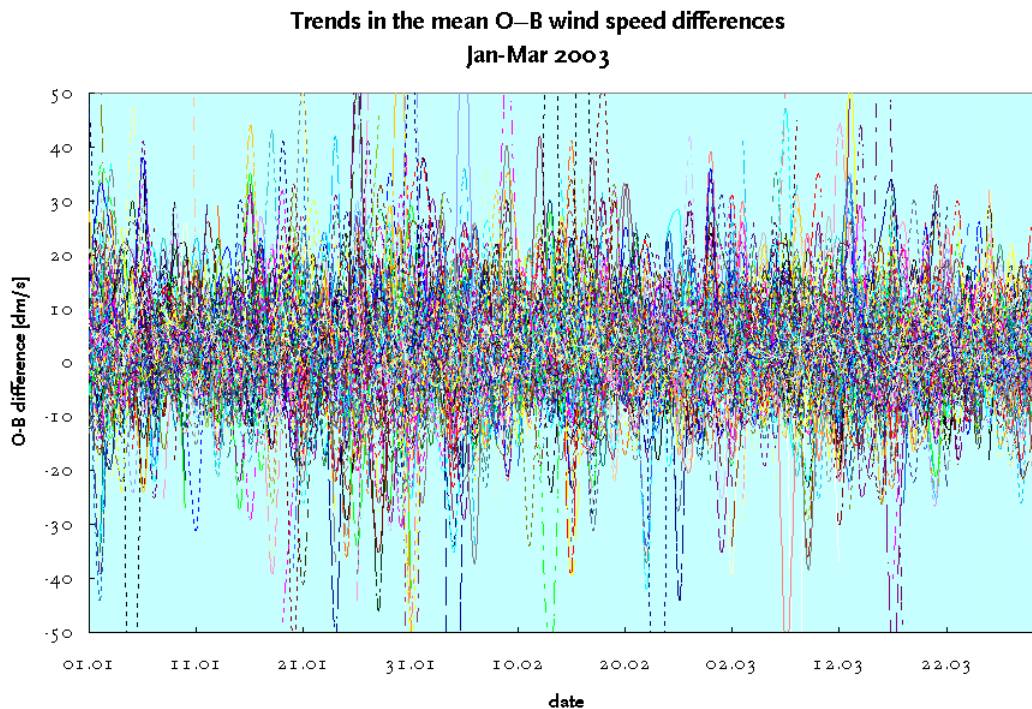


Fig. 12. Trends in the mean O–B wind speed differences (note: velocity-scale is in deci-metres per second, /dm.s<sup>-1</sup>). In general the differences demonstrate a rather random behaviour, as expected.

In fig. 13.a similar overview is presented for the wind direction differences (based on absolute values, *i.e.*  $|\Delta DD|$ ):

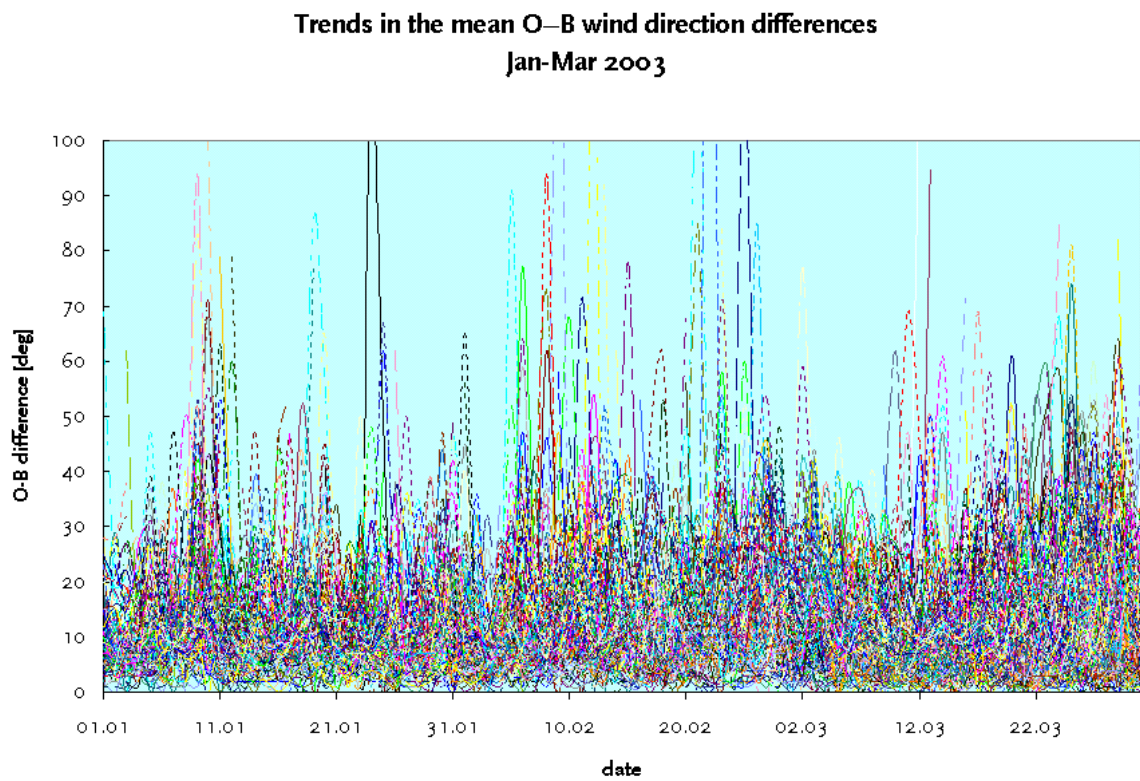


Fig. 13. Trends in the mean O-B wind direction differences. Like with the previous figures, in general the differences demonstrate a rather random behaviour.

## Annex V. The daily cycle and observation times.

In the figures 14. to 17. the 'aircraft -number of observations' is presented for 11 to 12 December 2002 (for observations from aircraft: AIREP [•], AMDAR [•] and ACARS [•]). The figures give an impression of the trend in the availability of aircraft observations for use in the ECMWF models runs at 06, 12, 18 and 24 (00) UTC.

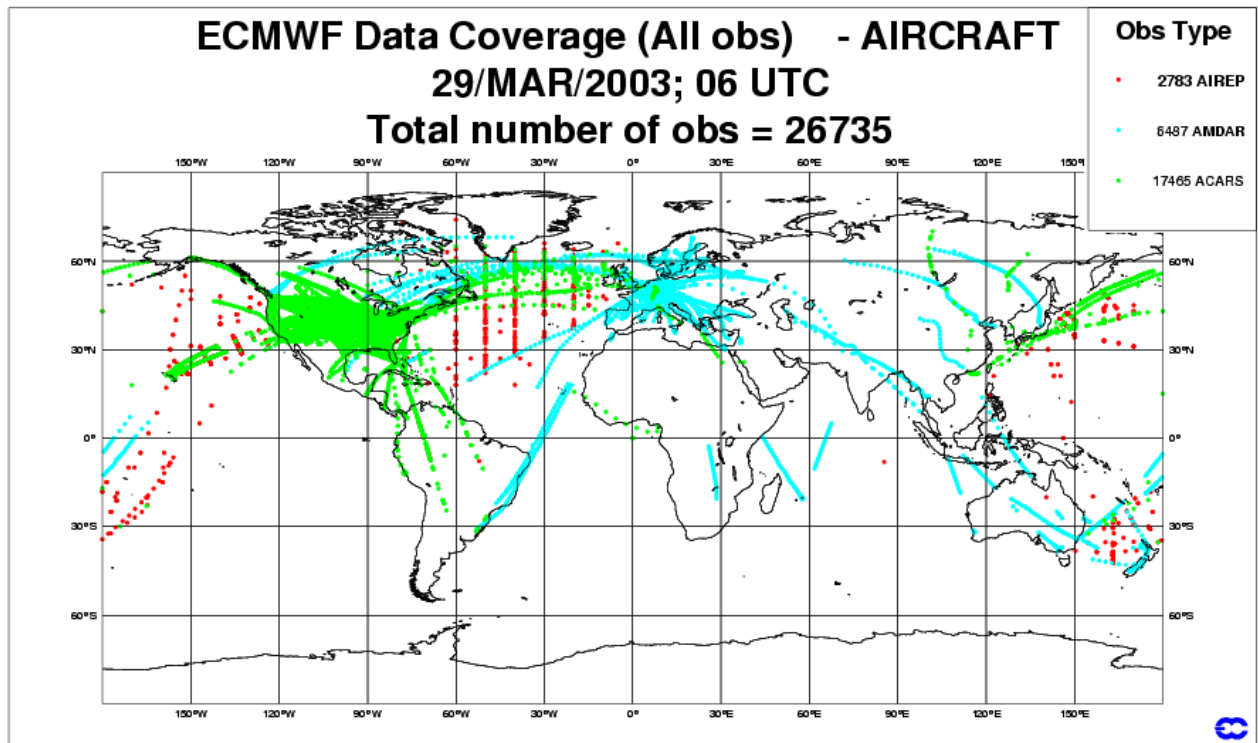


Fig. 14.

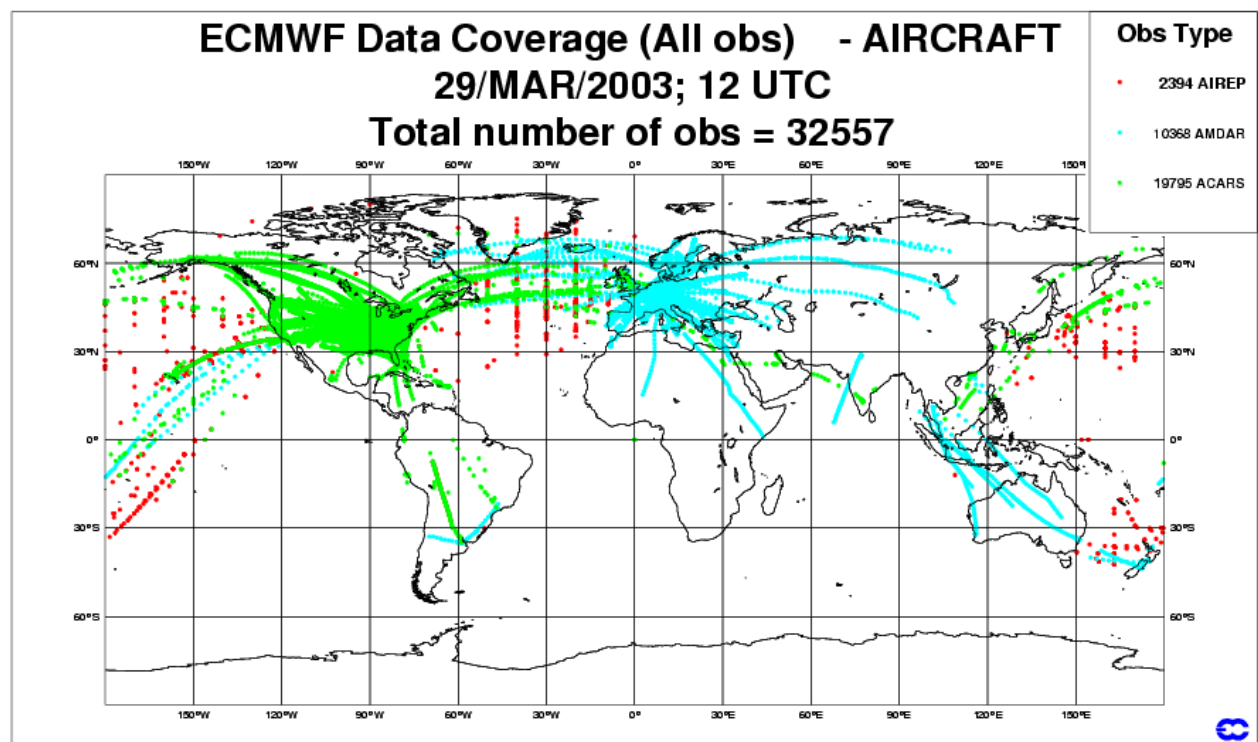


Fig. 15.

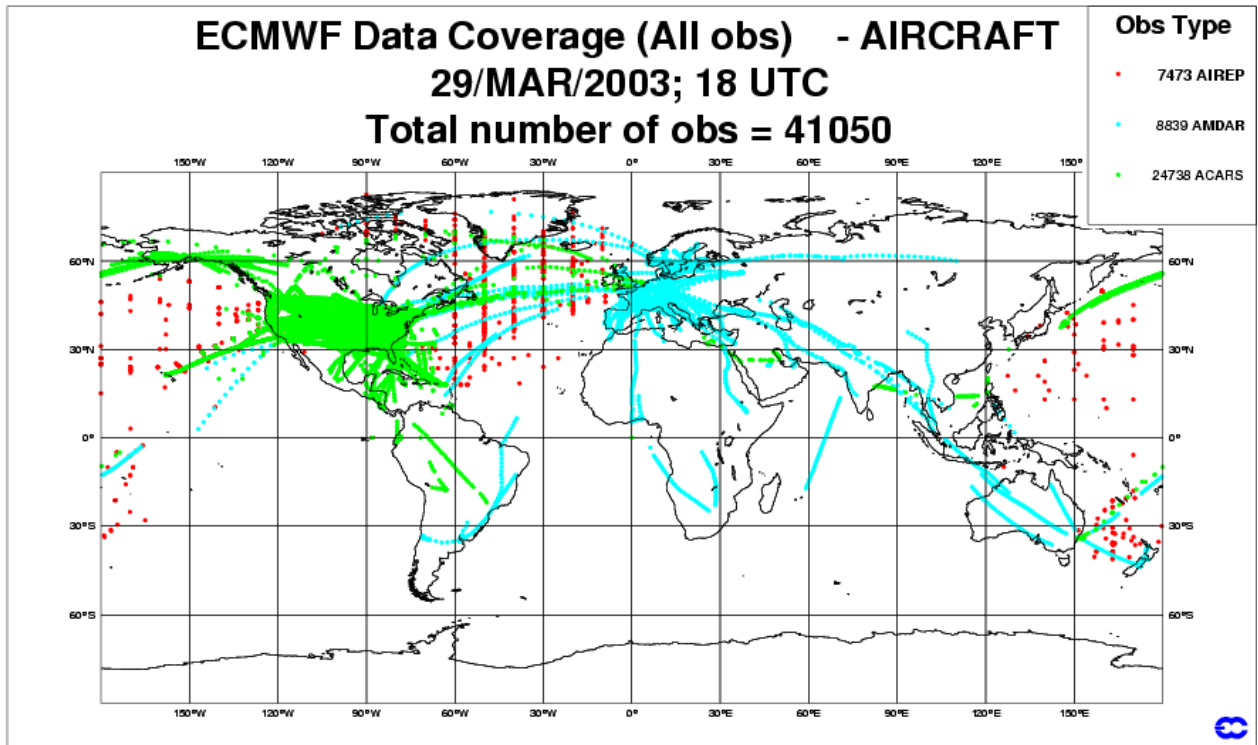


Fig. 16.

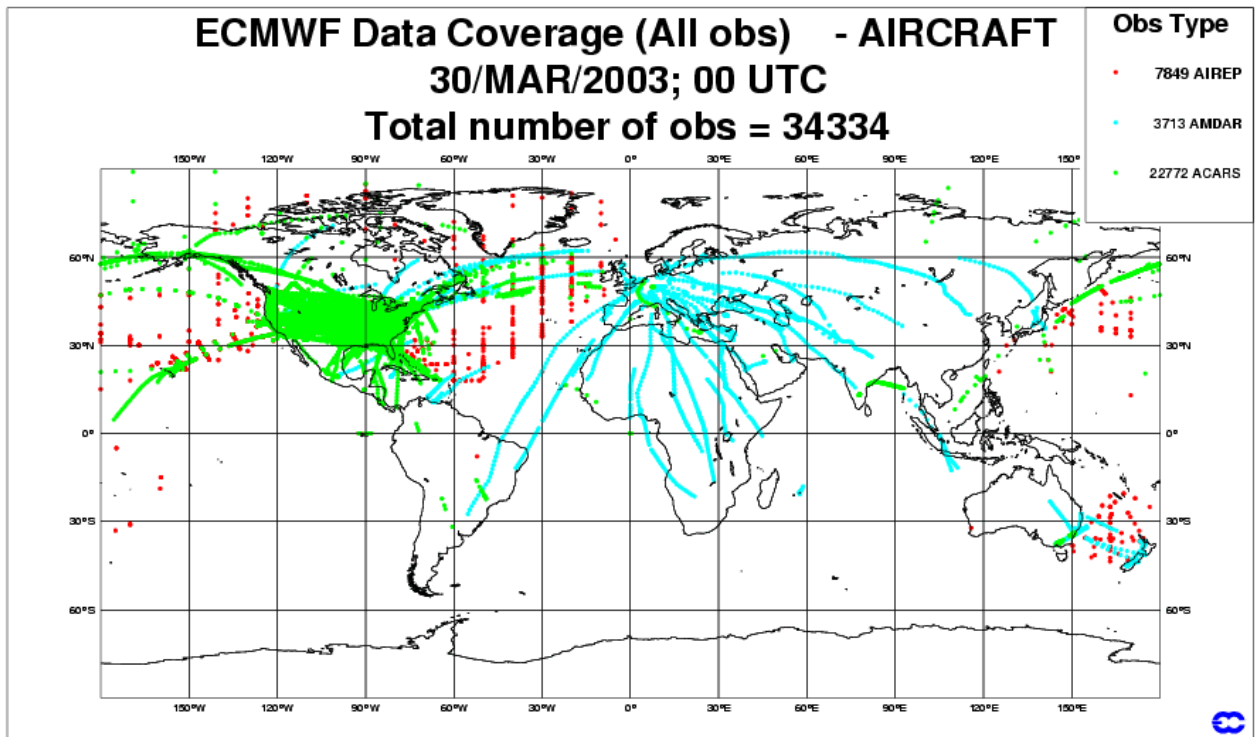


Fig. 17.

Obviously the European region is well covered with AMDAR data for the 06, 12 18 UTC runs, but rather limited for 00 UTC (midnight, local European Time  $\approx$  UTC). Note that the long haul intercontinental flights give a global coverage, independent of time.



**Annex VI. Case study: Differences between *ascending* and *descending* temperatures.**

In table 4, *Temperature*, (see page 31) no discrimination is made between differences in temperature for observations in the ascending and descending phase (ASC and DES resp.). It might be expected that because of any delay or slow response of the temperature sensors mutual differences may exist between  $\langle \Delta T[\text{ASC}] \rangle$  and  $\langle \Delta T[\text{DES}] \rangle$  for any aircraft. In case of a slow response, during ascent  $\langle \Delta T[\text{ASC}] \rangle$  is expected to be  $> 0$  ( $\Delta T \equiv T[\text{observation}] - T[\text{reference}]$ ) since temperature decreases with altitude. For the same reason,  $\langle \Delta T[\text{DES}] \rangle$  is expected to be  $< 0$ . As a result we might expect that  $\langle \Delta T[\text{ASC}] \rangle > \langle \Delta T[\text{DES}] \rangle$ , or  $\langle \Delta T[\text{ASC}] \rangle - \langle \Delta T[\text{DES}] \rangle > 0$ . To obtain any impression of this statement  $\langle \Delta T[\text{ASC}] \rangle$  and  $\langle \Delta T[\text{DES}] \rangle$  are analysed separately but on the same manner as  $\langle \Delta T[\text{ASC+DES}] \rangle$  in table 4. Based on these results, a number of figures are generated similar to those presented in Annex II, page 66. In fig. 18 a pie chart is presented with the ratio between the number of observations during the ascending phase and descending phase. Clearly,  $N[\text{ASC}] : N[\text{DES}] = 2:1$ .

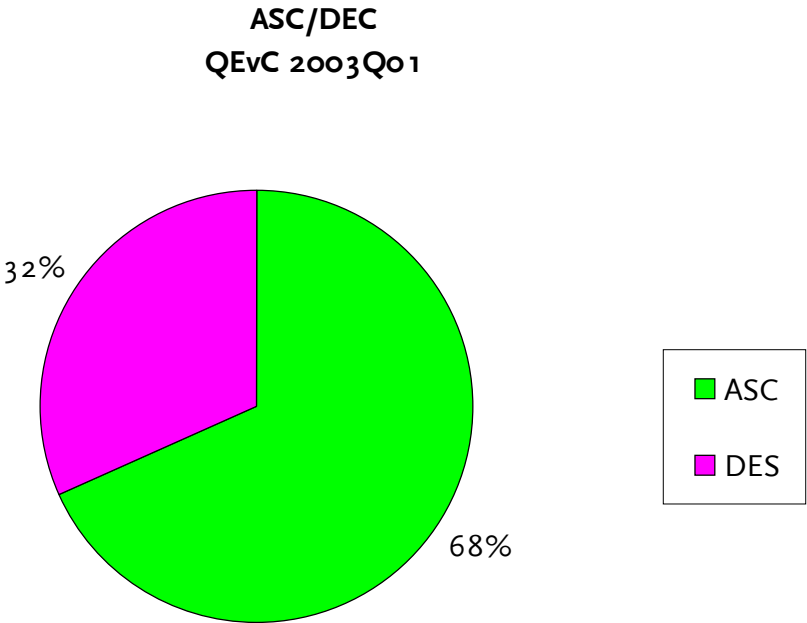


Fig. 18. The ratio between the number of observations during the ascending phase and descending phase is approx. 2:1

To get any idea if there is any difference between  $\langle \Delta T[\text{ASC}] \rangle$  and  $\langle \Delta T[\text{DES}] \rangle$ , both  $\langle \Delta T[\text{ASC}] \rangle$  and  $\langle \Delta T[\text{DES}] \rangle$  are determined for each aircraft and for the whole quarter. Fig. 19. presents such differences, *i.e.*  $\Delta \equiv \langle \Delta T[\text{ASC}] \rangle - \langle \Delta T[\text{DES}] \rangle$ , for the whole set of reporting aircraft. In this figure "error bars" are presented as well, based on the determined standard deviation  $\sigma(\text{OBS}, \text{MOD})$  (as explained for table 4) to give some impression of the uncertainty in this  $\Delta$ .

Another method to determine a significant  $\Delta$  is by statistical analysis of  $\langle \Delta T[\text{ASC}] \rangle$  and  $\langle \Delta T[\text{DES}] \rangle$  similar to the method presented in Annex II on page 66. This method results in a distribution for  $\langle \Delta T[\text{ASC}] \rangle$  and  $\langle \Delta T[\text{DES}] \rangle$  as a function of  $\Delta T = T[\text{OBS}] - T[\text{background}]$ . Such distribution is presented in fig. 20. and fig. 21., both as a simple distribution, similar to fig. 6. and as a cumulative distribution to investigate the median value (at 50%).

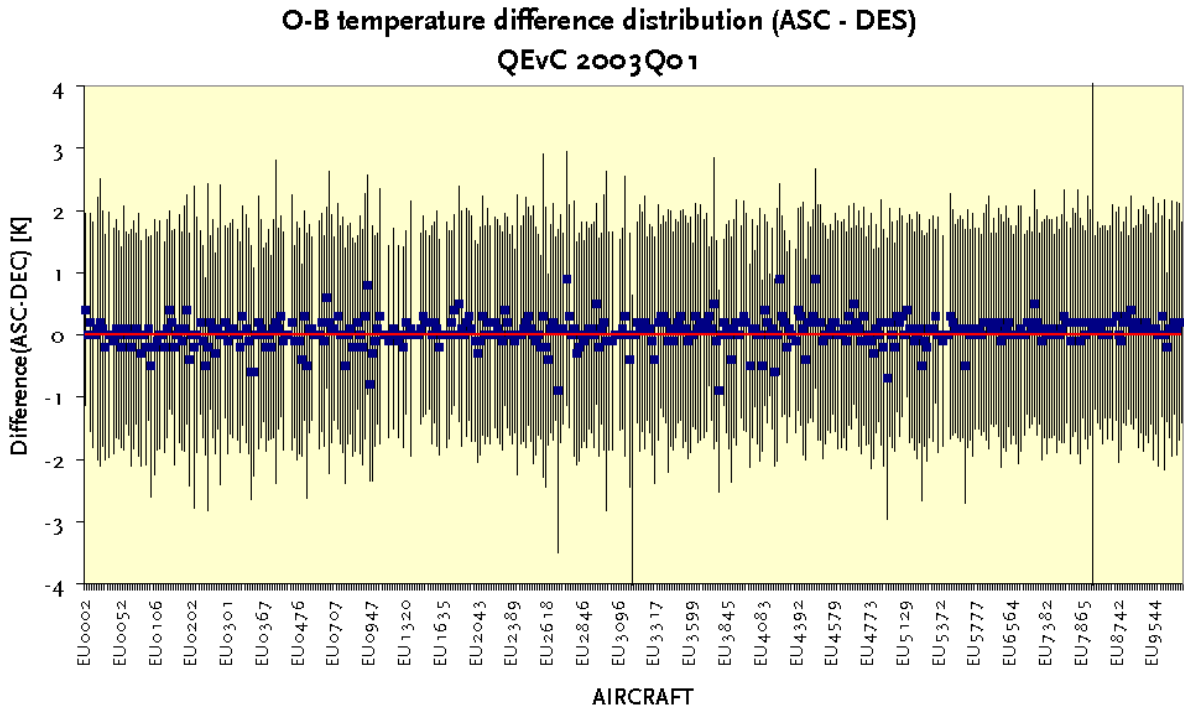


Fig. 19. The mutual differences  $\Delta (\equiv \langle \Delta T[\text{ASC}] \rangle - \langle \Delta T[\text{DES}] \rangle)$  for the set of reporting aircraft. The "error bars" are indicative for the standard deviation  $\sigma$  related to  $\langle \Delta T[\text{ASC}] \rangle$  and  $\langle \Delta T[\text{DES}] \rangle$ , and give an impression of the uncertainty in  $\Delta$ .

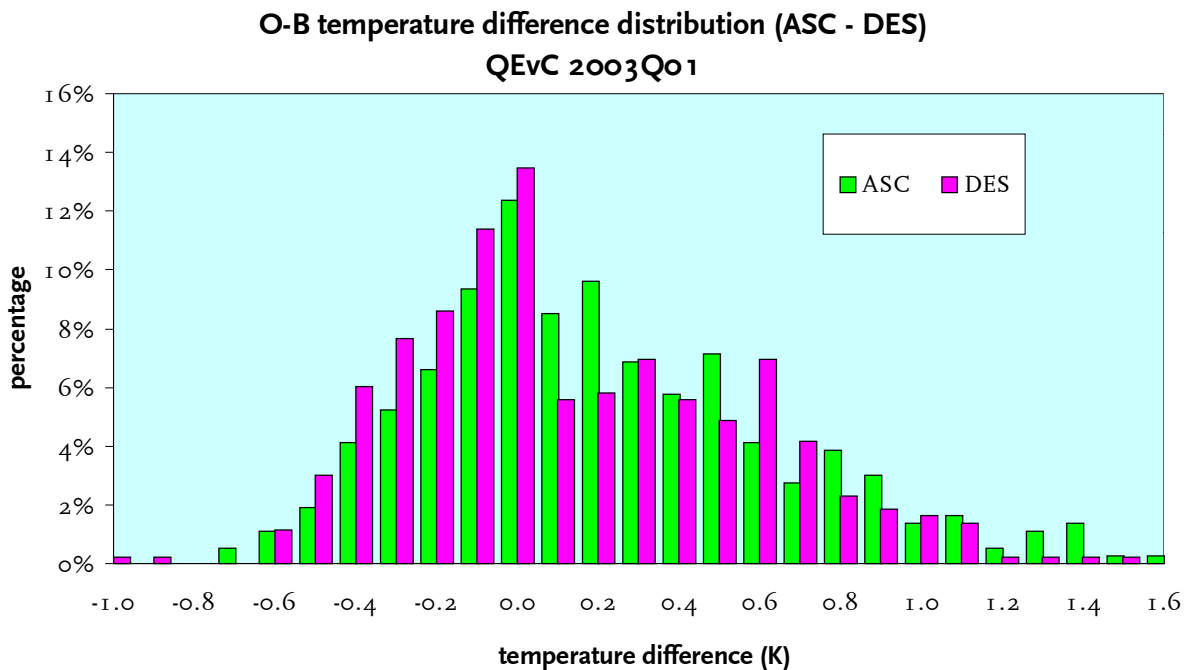


Fig. 20. Frequency distribution of the mean temperature difference (OBS–Background) for the number of aircraft reporting AMDAR reports ( $N=432$ ). Distinction is made between the Ascending (ASC) and Descending phase (DES). Clearly, there is only a very slight difference between the distributions of both phases.

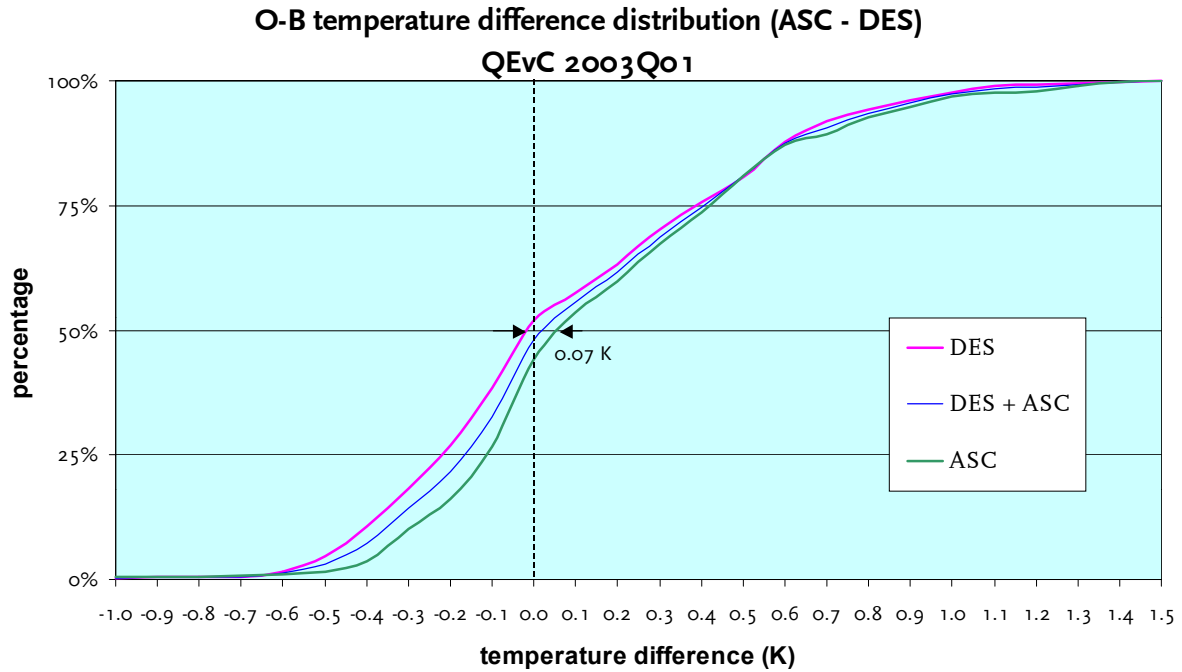


Fig. 21. Frequency distribution similar to the previous figure but presented cumulatively to focus on the 50% level (median). Although the previous figure does not show any significant difference, this figure shows that on average,  $\Delta T[ASC] > \Delta T[DES]$ . Around the 50% value,  $\Delta T[ASC] - \Delta T[DES] \approx 0,07$  K.

Although fig. 20. does not demonstrate any significant difference between  $\Delta T[ASC]$  and  $\Delta T[DES]$ , fig. 21. shows a slight difference, typically around the median values, *i.e.* at 50%, and with a mutual positive difference  $\Delta_{50\%} = \Delta T[ASC]_{50\%} - \Delta T[DES]_{50\%} \approx 0,07$  K, which might prove the statement that observations are affected by delay (due to sensor response time) introducing a systematic error in the altitude data in case of ascending or descending.

**Annex VII. Case study: E-AMDAR observations over Europe (continued).**

In quarterly report 2002Q3 a case study is presented (see Annex VI) based on a analysis of the spatial altitude distributions of all E-AMDAR observations over Europe. Clearly, the international airfields, where most of the E-AMDAR aircraft descent or ascent, form a kind of an upper air observational network (to generate profile information). In this Annex this 'network' is investigated for two periods: (1): 5–19 February 2003 (14 days) and (2): 5–19 March 2003. Note that the second period is just after the start of the *high frequency trial* (SOP), the first period is typical for nominal observations. For this purpose a subset of the E-AMDAR observations is selected using the following constraints: (1) Area within +30° and +80° NL and within -20° and +40° EL and (2) Altitude < 3000 m. For further analysis the following procedure is followed. First a grid of 201 × 241 points is defined, representative for the area, stated above. Secondly all observations are counted from positions within a distance of 50 km from any grid point. The density of this grid is so, that sufficient overlap exist. As a result, the amount of observations determined for each grid point give information of spatial density of observations performed at an altitude below 3000 m. Based on this 2D set a contour plot is designed presenting this density. Such a contour plot may be based on both a linear or a logarithmic scale.

In the figs. 22. to 25. these contour plots are presented. The network of E-AMDAR ASC/DES profiling areas is very clearly demonstrated and with a strong concentration of observations around London, Frankfurt (Main) and München. The plots generated on a linear distribution base demonstrate the significant increase of the amount of observations during the SOP (started March 5<sup>th</sup>). Note that areas with a minor number of observations are not indicated by any colour. Since during the *high frequency trial* for the SOP, an increase of "only" 50% more data is found, the plots based on a logarithmic base are not so much affected as with linear based plots. Nevertheless an increase of the observations around Stockholm is significant (see fig. 25.).

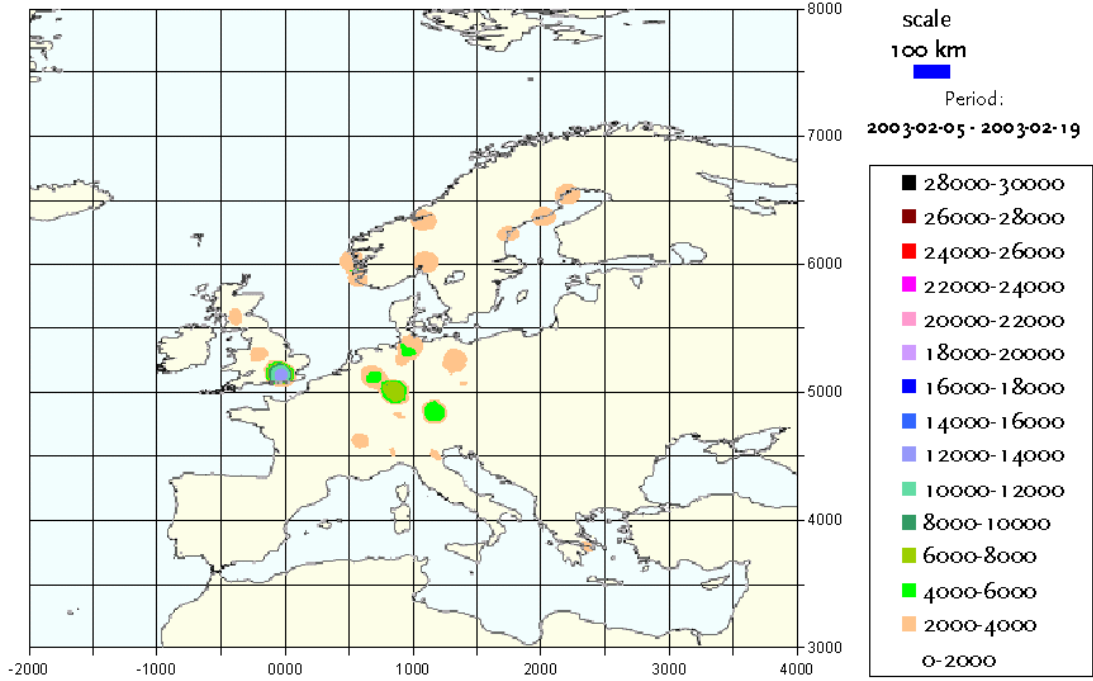


Fig. 22. Contour plot of the density of E-AMDAR observations (altitude < 3000 m) generated in the period 5 February 2003 00:00 UTC to 19 February 00:00 UTC and based on a linear scale. The numbers, indicated in the legend represent the amount of observations counted with a radius of 50 km around the grid points used for this plot. Clearly most observations are from the area of London, Frankfurt (Main) and München. (Longitude and Latitude are expressed in centidegrees)

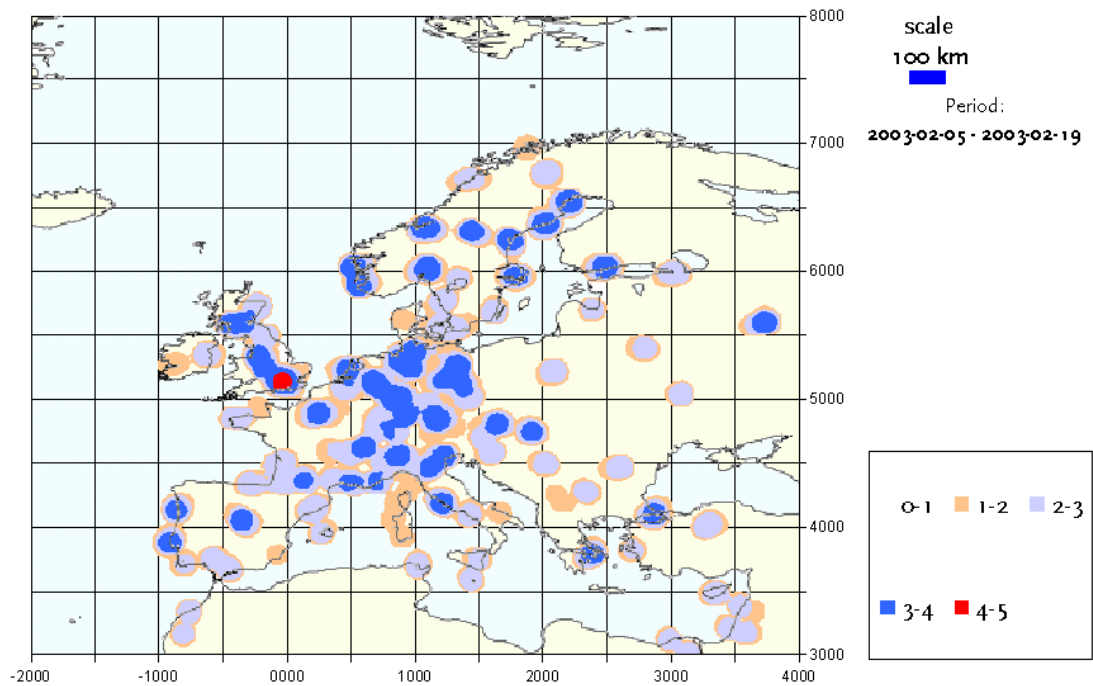


Fig. 23. Contour plot of the density of E-AMDAR observations (altitude < 3000 m) generated in the period 5 February 2003 00:00 UTC to 19 February 00:00 UTC (similar to fig.22.) but based on a  $10^{\log}$  scale. The values indicated in the legend represent decades based on  $10^{\log}(N)$ , with  $N$  similar to the numbers in fig. 22.). Such a plot based on a logarithmic scale gives an impression of the spatial density of observations in a more relative way (Longitude and Latitude are expressed in centidegrees).

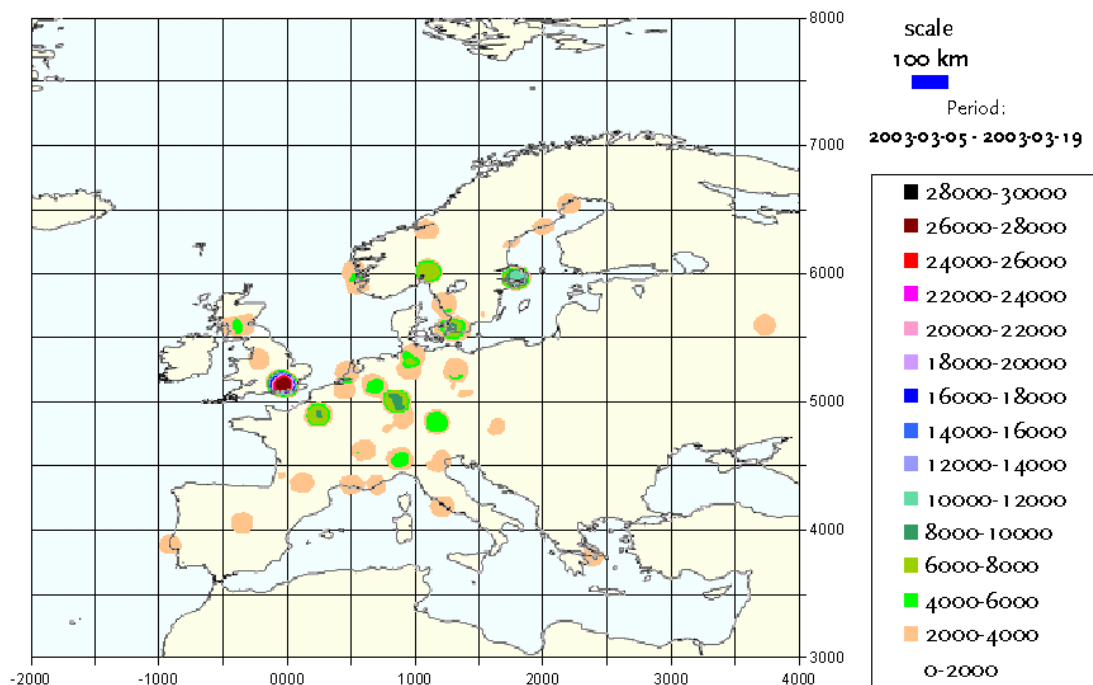


Fig. 24. Contour plot of the density of E-AMDAR observations (altitude < 3000 m) generated in the period 5 March 2003 00:00 UTC to 19 March 00:00 UTC and based on a linear scale. The numbers, indicated in the legend represent the amount of observations counted with a radius of 50 km around the grid points used for this plot. The increase of the amount of observations caused by the 'high frequency trial' is significant. Note the increase of observations in the Stockholm area. (Longitude and Latitude are expressed in centidegrees)

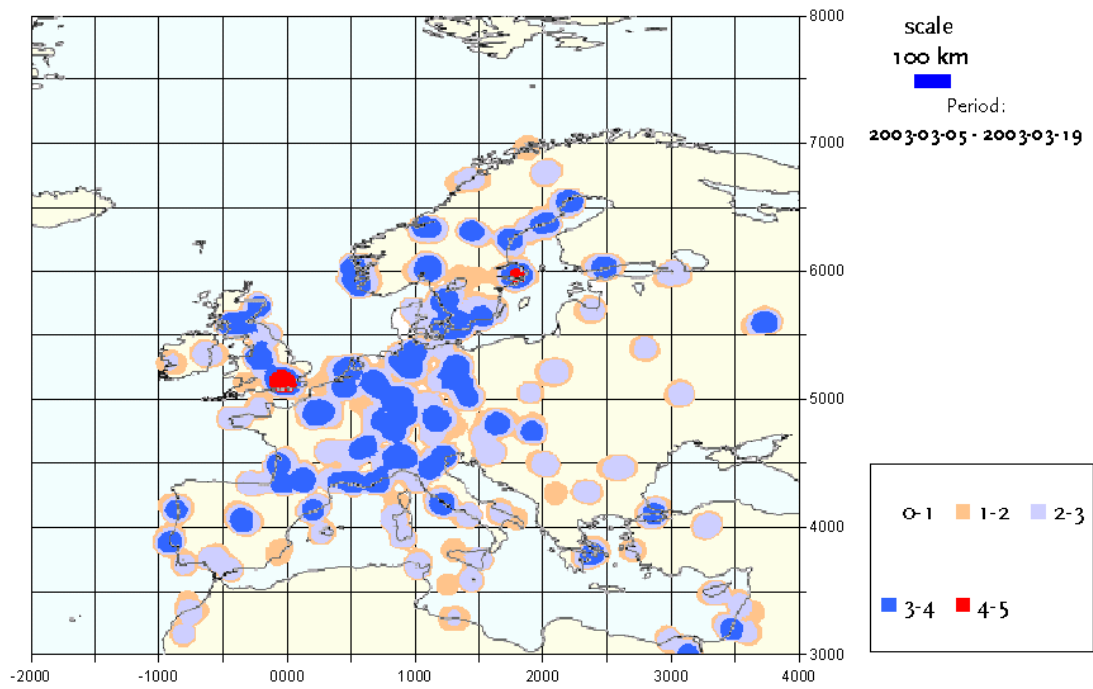


Fig. 25. Contour plot of the density of E-AMDAR observations (altitude < 3000 m) generated in the period 5 March 2003 00:00 UTC to 19 March 00:00 UTC (similar to fig.22.) but based on a  $10^{\log}$  scale. The values indicated in the legend represent decades based on  $10^{\log}(N)$ , with  $N$  similar the numbers in fig. 24. (Longitude and Latitude are expressed in centidegrees)