

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

2001-IV

Report number 9 25 April 2002

Period: 1 OCTOBER 2001 – 31 DECEMBER 2001

KNMI
Wilhelminalaan 10
NL-3732 GK De Bilt
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Report produced by the E-AMDAR Quality Evaluation Centre (KNMI, De Bilt, the Netherlands).
 This document is intended for internal circulation within the framework of the Eumetnet
 AMDAR Programme (E-AMDAR)

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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 528 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 January, 1st, 2002: 257).

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 17th 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. The Programme Manager Mr Paul Arthur (Mr Bruce Truscott has moved to the EUCOS Programme). The appointed Technical Co-ordinator, Mr Stewart Taylor, 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 October 1st, 2001, 00:00 UTC to December 31st, 2001, 24:00 UTC (2001Q4).

2) Operational AMDAR units

Data from the 259 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. From 12 activated aircraft no data was received. 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 not find erroneous bulletins (even no $i_p j_p j_p = / / /$), which is very remarkable with respect to all other WMO bulletins, disseminated through the GTS. Many of the 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.

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 1876943. Because of a change in the BUFR encoded bulletins, which confused the KNMI decoding software, a large number of BUFR encoded bulletins were not evaluated in December (starting Dec, 12th)¹ [see footnote]. As a consequence the number of evaluated observations is lower than the number for the third quarter of 2001. The ten aircraft which produced the highest number of observations, evaluated at QEvC, are presented in the following table:

no.	aircraft	amount
1	EU0568	38192
2	EU4573	15214
3	EU0002	14680
4	EU5478	14612
5	EU0088	14527
6	EU9158	14438
7	EU0307	14251
8	EU1863	14081
9	EU0082	14057
10	EU0052	13854

Special issues

- As part of data targeting request over the Middle East regions, 5 aircraft were activated on 22 and 23 October.
- As part of a national data requirement, 21 aircraft were activated in the period from 8, to 15 November
- On Dec. 14th, 40 observations were received from a 'ghost' aircraft, identified by EU0000.

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, 98.4% of all reports was received within one hour of observation time and 99.1% within 2 hours from observation. Overall, the data timeliness is very good. This is

¹ During the period Dec 12th 2001 to Jan 10th 2002, quality checks on BUFR data were carried out by the Technical Co-ordinator using other available data sources.

demonstrated by figure 1 below, where from the cumulative frequency distribution it follows that 50% of all recorded observations is received within 13 minutes:

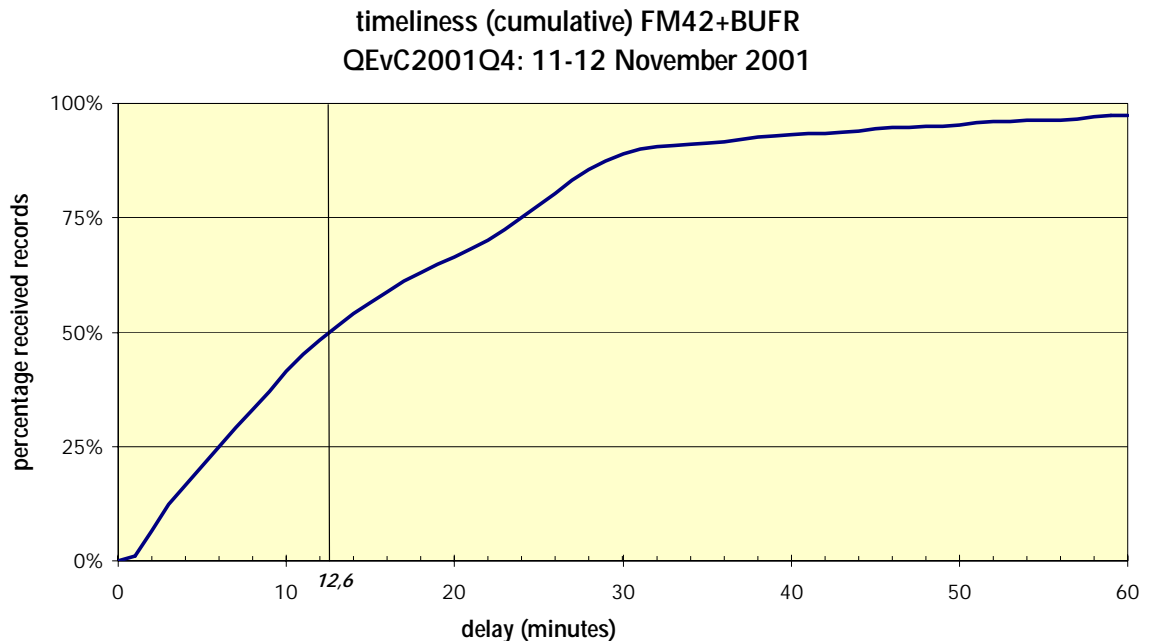


Fig. 1. Cumulative frequency distribution for all FM42 and BUFR encoded EU-Amdar observations during the period 11 - 12 November 2001 as a function of the interval between observation and time of reception. (median value: 12,6 minutes).

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. As a consequence data obtained from E-AMDAR reports at cruising heights is significant less than e.g. for data from ASDAR units during Atlantic flights.

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-31-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 evaluated¹ [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 -0.6°C and $+1.2^\circ\text{C}$ (50% within -0.3 and $+0.3^\circ\text{C}$). Aircraft with a mean difference, typically significant larger than expected are: **EU0008, EU0088, EU0203**, EU0316, EU0456, EU2559, EU3421, EU4582, EU5331, EU5435, EU5441, EU5613, **EU6544**, EU6743, EU8520 and EU8742. Typically, no aircraft exceeded the wind speed or wind direction tolerances. 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 ($^\circ\text{C}$)
EU0051	2001.10.17	12.56	53.60	-1.90	2520	219.5	272.2	-52.7
EU0120	2001.11.10	05.33	49.99	8.32	11890	269.0	218.7	50.3
EU0054	2001.12.20	10.14	53.80	-2.00	2520	212.7	261.8	-49.1
EU8632	2001.10.19	12.39	39.30	-4.19	10020	242.0	222.4	19.6
EU0921	2001.10.13	11.05	50.03	8.36	860	274.9	293.7	-18.8
EU0456	2001.11.22	03.34	50.04	8.57	130	291.9	274.3	17.6
EU0568	2001.10.20	14.35	44.90	6.10	10050	235.5	220.5	15.0
EU0711	2001.11.20	02.30	52.39	13.52	20	289.7	275.8	13.9
EU4529	2001.12.11	19.35	53.40	-2.20	120	271.0	284.7	-13.7
EU0086	2001.11.09	23.34	50.06	8.57	310	284.9	271.4	13.5

Aircraft with occasionally extreme temperature differences are: EU0008, EU0051, EU0203, and EU0307.

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

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)
EU4532	2001.10.05	16.57	44.83	-0.72	100	52.0	3.2	48.8
EU0120	2001.11.10	05.23	50.13	8.57	11890	1.5	46.3	-44.8
EU0921	2001.10.13	11.23	50.03	8.36	10030	45.8	11.1	34.7
EU0032	2001.10.02	12.54	52.60	4.80	790	39.0	17.6	21.4
EU3268	2001.10.31	07.20	52.20	-0.50	6400	26.7	47.5	-20.8
EU0049	2001.11.09	07.29	47.90	-0.60	9840	61.7	41.1	20.6
EU3755	2001.12.24	01.18	33.20	-7.50	1060	29.3	8.7	20.6
EU9734	2001.11.12	16.17	37.10	10.10	2040	24.1	6.2	17.9
EU0313	2001.11.22	16.26	52.48	10.78	8380	24.7	42.3	-17.6
EU0158	2001.12.06	08.00	52.58	10.11	9450	44.2	59.9	-15.7
EU0456	2001.11.14	19.02	51.57	11.02	8690	57.1	41.5	15.6

Aircraft with occasionally extreme wind speed differences are: EU0032, EU0041, EU0049, EU0456, EU0921, EU1234, EU2978, EU3755, EU5134 and EU9734.

Occasionally wind direction difference of 90° or more are observed, even up to 180°, e.g.:

AIRCRAFT	Day	Time (UTC)	Latitude	Longitude	Altitude (m)	Wind direction [observed] (°)	Wind direction [background] (°)	Wind direction difference (°)
EU0002	2001.11.03	10.29	48.20	2.40	6520	265	87	178
EU0008	2001.12.06	10.20	56.00	12.00	4200	67	246	179
EU0021	2001.11.17	11.34	51.60	0.10	4170	216	36	180
EU0022	2001.11.11	17.25	37.90	23.90	360	243	65	178
EU0032	2001.10.13	10.19	52.20	4.70	30	87	202	115
EU0041	2001.11.05	18.48	45.93	8.90	4990	60	241	179
EU0043	2001.11.09	16.45	48.09	12.50	4090	25	203	178
EU0047	2001.10.21	04.51	31.18	29.95	420	114	290	176
EU0049	2001.11.07	20.28	45.70	8.60	1760	94	278	176
EU0088	2001.10.29	08.15	51.40	-0.40	30	79	252	173
EU0123	2001.12.28	19.30	55.80	11.80	1950	260	58	158

Aircraft with occasionally extreme wind direction differences are EU0002, EU0021, EU0022, EU0041 and EU0043. An impression of the distribution of the individual wind direction differences is given in figure 2, where a frequency distribution is presented of $\langle |\Delta DD| \rangle$ ($= \text{AVG}(\text{ABS}(\text{DD_OBS} - \text{DD_MOD}))$):

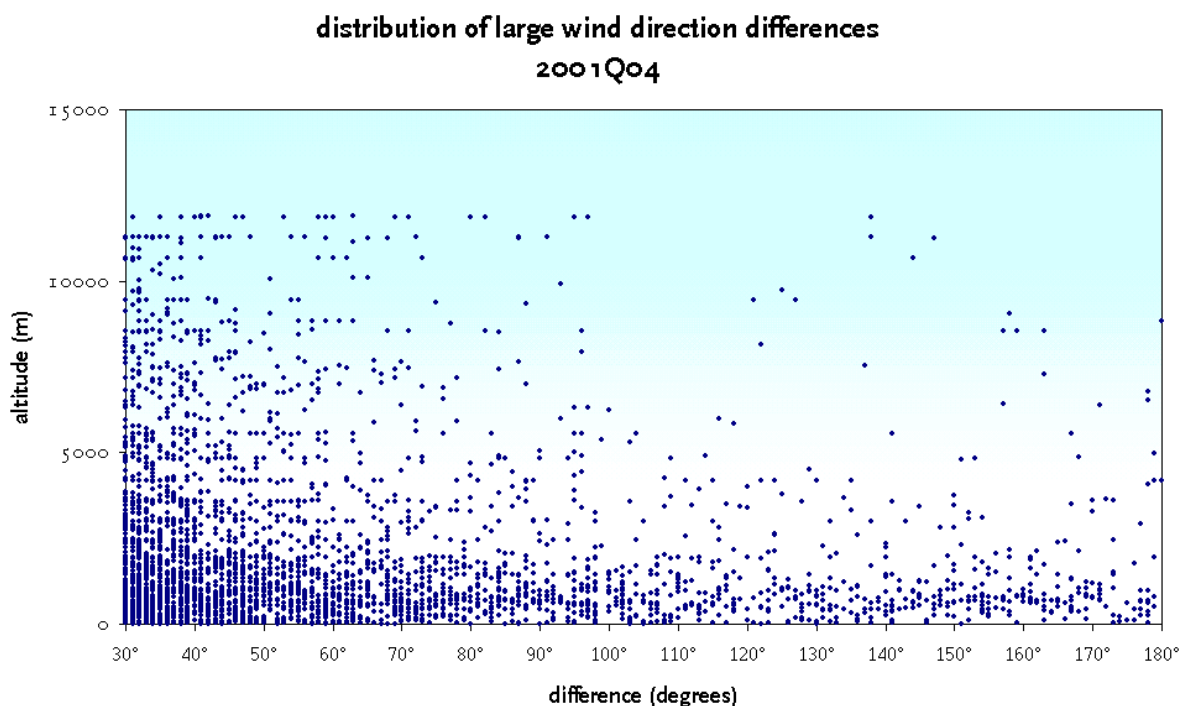


Fig. 2. Distribution for the individual O-B obs wind direction differences, $\langle |\Delta DD| \rangle$ as a function of altitude. Note that for most of the observations it holds that $\langle |\Delta DD| \rangle < 30^\circ$, so this figure presents only a **very small subset** of the total amount 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 (98.1% within 45 min).

1. The number of aircraft reporting (EU-)AMDAR was 249. The number of evaluated observations was 1876943.

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 $\pm 0,3^{\circ}\text{C}$, $0,0$ to $+0,15$ m/s, $\pm 6^{\circ}$ (for LVR/LVW) and $\pm 13^{\circ}$ (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=249). 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. $-0,6$ to $+1,5^{\circ}\text{C}$, $-0,4$ to $+0,5$ m/s and $\pm 10^{\circ}$ (for LVR/LVW) to $\pm 18^{\circ}$ (for ASC/DES) (to be considered as the *uncertainty* of observation).

b) Trends in the daily amount of observations

From October, 1st to December, 31st 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. 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) Ratio of numbers of observations from LVR/LVW and from ASC/DES.

In [Annex V](#) of this report a figure are presented, demonstrating the ratio between the number of flight level observations and observations during ascending and descending (i.e. 16 : 84).

Table 1, List of operational AMDAR units

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

Identifier	Identifier	Identifier	Identifier	Identifier	Identifier	Identifier
EU0002	EU0251 A	EU0961	EU2630	EU4532	EU5613	EU8520
EU0003	EU0263	EU0985	EU2751	EU4573	EU5777	EU8598
EU0008	EU0281	EU1001	EU2773	EU4582	EU5802	EU8605
EU0021	EU0299	EU1002	EU2845	EU4587	EU5821	EU8632
EU0022	EU0301	EU1222	EU2978	EU4589	EU5891	EU8733
EU0032	EU0303	EU1234	EU2984	EU4591	EU6264	EU8736
EU0041	EU0307	EU1282	EU3000	EU4593	EU6281	EU8742
EU0043	EU0311	EU1301	EU3181	EU4607	EU6287	EU8787
EU0045	EU0313	EU1312	EU3257	EU4699	EU6321	EU8789
EU0047	EU0316	EU1334	EU3268	EU4721	EU6349	EU8891
EU0049	EU0319	EU1337 A	EU3270	EU4756	EU6444	EU8943
EU0050	EU0359	EU1411	EU3321	EU4792	EU6524	EU8969
EU0051	EU0367	EU1446 A	EU3358	EU4838	EU6527	EU9013
EU0052	EU0373 A	EU1456	EU3421	EU4853	EU6544	EU9023
EU0054	EU0394 A	EU1495	EU3469	EU4865	EU6556	EU9145
EU0055	EU0413 A	EU1498 A	EU3533	EU4896	EU6743	EU9158
EU0059	EU0432	EU1532	EU3544	EU4950	EU6821	EU9234
EU0060	EU0442 A	EU1547	EU3598	EU4956	EU6890	EU9245
EU0061	EU0456	EU1567	EU3621	EU5098	EU6893	EU9356
EU0072	EU0457	EU1593	EU3654	EU5134	EU6923	EU9378
EU0073 A	EU0458	EU1692	EU3684	EU5175	EU7001	EU9544
EU0081	EU0476	EU1698	EU3714	EU5191	EU7082	EU9589
EU0082	EU0511 A	EU1863	EU3725	EU5218 D	EU7119	EU9622 A
EU0086 A	EU0558 A	EU1929	EU3755	EU5245	EU7218	EU9678
EU0088	EU0568	EU2017 A	EU3874	EU5331	EU7285	EU9680
EU0106	EU0583 A	EU2043	EU3908	EU5349	EU7521	EU9692
EU0109	EU0601 A	EU2055 A	EU3972	EU5351	EU7629	EU9723
EU0120 A	EU0676 A	EU2130 A	EU4002	EU5360	EU7634	EU9729
EU0123	EU0711	EU2165 A	EU4021	EU5372	EU7635	EU9734
EU0124	EU0723 A	EU2189	EU4278	EU5429	EU7643	EU9883
EU0154	EU0802	EU2201 A	EU4333	EU5435	EU7654	EU9967
EU0158	EU0807	EU2247 A	EU4426	EU5441	EU7724	[259]
EU0167	EU0810 A	EU2301	EU4444	EU5478	EU7865	
EU0177 A	EU0826	EU2389	EU4463	EU5529	EU7888	
EU0185	EU0875	EU2547	EU4491	EU5587	EU7894	
EU0203 A	EU0921	EU2559	EU4519	EU5591	EU8264	
EU0204 D	EU0934	EU2590	EU4527	EU5593	EU8431	
EU0234	EU0947	EU2618	EU4529	EU5612	EU8478	

Table 2, Quantity and Timeliness of AMDAR Reports

Summary	
Number of days in this period	92
Number of aircraft reporting AMDAR	249
Number of E-AMDAR activated aircraft	259
Total number of observations evaluated during the period	1876943
Average daily number of aircraft reporting AMDAR	165 (64% of activated aircraft)
Percentage of data available within 60 minutes is	98.4%
Percentage of data available within 120 minutes is	99.1%
Average reports per day, per reporting aircraft is	123

Legend	
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

AIRCRAFT	Total No of Reports	Days of Reports	Actual/possible	Average reports/day	0–45 min	0–60 min	0–120 min
EU0000	40	1	1%	40	100.0%	100.0%	100.0%
EU0002	14680	88	96%	167	99.2%	99.5%	99.7%
EU0003	10279	80	87%	128	95.8%	96.0%	96.8%
EU0008	9220	61	66%	151	95.4%	95.8%	96.7%
EU0021	12094	90	98%	134	99.1%	99.4%	99.9%
EU0022	11309	76	83%	149	98.5%	98.7%	99.1%
EU0032	3488	72	78%	48	93.2%	93.8%	95.2%
EU0041	11203	75	82%	149	97.8%	97.8%	99.1%
EU0043	10938	72	78%	152	97.3%	97.3%	98.6%
EU0045	12482	86	93%	145	96.1%	96.2%	97.0%
EU0047	10794	77	84%	140	98.0%	98.5%	99.6%
EU0049	5837	50	54%	117	100.0%	100.0%	100.0%
EU0050	8745	45	49%	194	96.6%	97.5%	98.3%
EU0051	7350	76	83%	97	98.7%	98.9%	100.0%
EU0052	13854	74	80%	187	98.4%	99.0%	99.5%

AIRCRAFT	Total No of Reports	Days of Reports	Actual/ possible	Average reports/ day	0–45 min	0–60 min	0–120 min
EU0054	6571	64	70%	103	99.2%	99.2%	100.0%
EU0055	12182	79	86%	154	99.0%	99.0%	99.0%
EU0059	10049	66	72%	152	97.1%	97.8%	98.2%
EU0060	10074	65	71%	155	95.4%	95.7%	96.6%
EU0061	12733	76	83%	168	98.6%	99.2%	99.5%
EU0072	12197	87	95%	140	98.8%	98.9%	99.8%
EU0073	5443	42	46%	130	99.9%	99.9%	100.0%
EU0081	12237	83	90%	147	99.4%	99.6%	100.0%
EU0082	14057	90	98%	156	99.0%	99.2%	99.5%
EU0086	6498	53	58%	123	99.5%	99.5%	99.5%
EU0088	14527	88	96%	165	99.0%	99.3%	99.9%
EU0106	13757	76	83%	181	98.7%	99.0%	99.2%
EU0109	10080	74	80%	136	99.3%	99.6%	100.0%
EU0120	7148	52	57%	137	99.2%	99.3%	99.4%
EU0123	11777	83	90%	142	95.5%	95.7%	96.7%
EU0124	3592	25	27%	144	96.2%	96.9%	97.9%
EU0154	6486	36	39%	180	97.9%	98.1%	99.2%
EU0158	11532	76	83%	152	98.0%	99.1%	99.3%
EU0167	11137	74	80%	151	97.7%	98.2%	98.7%
EU0177	6398	49	53%	131	99.9%	100.0%	100.0%
EU0185	10985	66	72%	166	97.9%	98.1%	99.5%
EU0203	6583	49	53%	134	99.8%	99.9%	100.0%
EU0204	2950	22	24%	134	94.2%	95.8%	98.1%
EU0234	13155	84	91%	157	99.2%	99.2%	99.4%
EU0251	5779	36	39%	161	100.0%	100.0%	100.0%
EU0263	10869	85	92%	128	96.0%	96.2%	97.4%
EU0281	1604	47	51%	34	94.7%	94.7%	95.5%
EU0299	10901	79	86%	138	98.2%	98.7%	99.1%
EU0301	11835	77	84%	154	97.2%	98.0%	99.3%
EU0303	13021	77	84%	169	98.3%	98.3%	99.2%
EU0307	14251	76	83%	188	97.9%	98.0%	99.2%
EU0311	10151	67	73%	152	96.8%	97.4%	98.2%
EU0313	10957	72	78%	152	98.2%	98.5%	99.2%
EU0316	10815	71	77%	152	98.2%	98.3%	99.5%
EU0319	10631	73	79%	146	98.5%	99.2%	100.0%
EU0359	12502	75	82%	167	97.9%	98.2%	98.7%
EU0367	10092	68	74%	148	99.5%	99.5%	99.8%
EU0373	4751	36	39%	132	100.0%	100.0%	100.0%
EU0394	6455	37	40%	174	100.0%	100.0%	100.0%
EU0413	6374	39	42%	163	98.9%	98.9%	100.0%
EU0432	13374	90	98%	149	98.7%	98.7%	99.1%
EU0442	5172	36	39%	144	99.3%	99.3%	100.0%
EU0456	5328	39	42%	137	98.6%	98.9%	99.4%

AIRCRAFT	Total No of Reports	Days of Reports	Actual/ possible	Average reports/ day	0–45 min	0–60 min	0–120 min
EU0457	4297	54	59%	80	94.2%	94.8%	95.8%
EU0458	3631	28	30%	130	97.6%	97.8%	98.9%
EU0476	5171	41	45%	126	98.3%	98.5%	99.3%
EU0511	4984	33	36%	151	98.6%	98.6%	99.3%
EU0558	6722	39	42%	172	98.8%	98.9%	99.5%
EU0568	38192	88	96%	434	96.9%	97.7%	98.1%
EU0583	5789	35	38%	165	100.0%	100.0%	100.0%
EU0601	6201	38	41%	163	98.9%	98.9%	99.4%
EU0676	6146	38	41%	162	98.9%	98.9%	98.9%
EU0711	8621	73	79%	118	98.7%	99.5%	99.6%
EU0723	3340	33	36%	101	100.0%	100.0%	100.0%
EU0802	11499	74	80%	155	99.4%	99.6%	99.6%
EU0807	7431	79	86%	94	98.4%	98.8%	99.7%
EU0810	6265	37	40%	169	98.2%	98.9%	99.4%
EU0826	13693	88	96%	156	98.7%	98.9%	99.5%
EU0875	12069	74	80%	163	97.3%	97.9%	98.6%
EU0921	13067	73	79%	179	99.3%	99.4%	99.7%
EU0934	13194	87	95%	152	97.2%	97.5%	97.9%
EU0947	4914	35	38%	140	94.7%	94.9%	96.4%
EU0961	9423	66	72%	143	96.7%	97.0%	97.6%
EU0985	10879	70	76%	155	96.1%	96.4%	96.8%
EU1001	9556	74	80%	129	98.5%	98.7%	99.2%
EU1002	9890	66	72%	150	96.6%	97.1%	97.6%
EU1222	134	3	3%	45	100.0%	100.0%	100.0%
EU1234	6651	42	46%	158	98.4%	98.4%	99.5%
EU1282	2765	74	80%	37	90.8%	91.2%	91.5%
EU1301	2431	64	70%	38	94.9%	94.9%	94.9%
EU1312	4341	63	68%	69	91.8%	92.7%	94.2%
EU1334	2381	67	73%	36	95.9%	95.9%	96.4%
EU1337	3979	34	37%	117	99.1%	99.1%	100.0%
EU1411	4714	82	89%	57	95.9%	96.2%	96.6%
EU1446	5112	34	37%	150	99.3%	99.3%	100.0%
EU1456	10539	81	88%	130	98.7%	99.0%	99.5%
EU1495	8652	63	68%	137	96.0%	96.3%	96.9%
EU1498	5075	33	36%	154	99.2%	99.3%	100.0%
EU1532	12838	91	99%	141	99.2%	99.2%	99.5%
EU1547	13389	72	78%	186	98.7%	99.1%	99.4%
EU1567	11726	81	88%	145	99.4%	99.6%	100.0%
EU1593	11384	84	91%	136	95.2%	95.2%	96.2%
EU1692	2596	62	67%	42	100.0%	100.0%	100.0%
EU1698	6974	53	58%	132	96.5%	98.3%	98.6%
EU1863	14081	76	83%	185	98.5%	99.0%	99.8%
EU1929	4873	84	91%	58	97.0%	97.2%	98.1%

AIRCRAFT	Total No of Reports	Days of Reports	Actual/ possible	Average reports/ day	0–45 min	0–60 min	0–120 min
EU2017	4322	25	27%	173	100.0%	100.0%	100.0%
EU2043	3159	84	91%	38	97.3%	97.5%	97.8%
EU2055	4444	33	36%	135	100.0%	100.0%	100.0%
EU2130	5895	35	38%	168	98.0%	98.8%	100.0%
EU2165	5265	29	32%	182	100.0%	100.0%	100.0%
EU2189	12449	74	80%	168	98.2%	98.9%	99.3%
EU2201	3860	20	22%	193	100.0%	100.0%	100.0%
EU2247	5317	34	37%	156	98.7%	98.7%	98.7%
EU2301	12049	77	84%	156	97.5%	98.0%	98.6%
EU2389	11269	82	89%	137	99.1%	99.5%	99.8%
EU2547	13795	87	95%	159	97.6%	97.8%	98.3%
EU2559	11846	73	79%	162	98.5%	98.9%	99.3%
EU2590	8158	72	78%	113	97.5%	98.4%	99.3%
EU2618	10813	80	87%	135	98.7%	99.0%	99.6%
EU2630	4759	64	70%	74	98.1%	98.4%	99.2%
EU2751	3987	77	84%	52	95.2%	95.2%	96.5%
EU2773	3136	65	71%	48	95.3%	95.6%	97.0%
EU2845	13415	82	89%	164	98.8%	99.1%	99.6%
EU2978	2849	43	47%	66	98.5%	98.5%	98.5%
EU2984	3218	47	51%	68	99.1%	99.1%	99.1%
EU3000	11985	75	82%	160	98.7%	99.6%	100.0%
EU3181	1951	35	38%	56	98.3%	98.8%	98.8%
EU3257	10784	63	68%	171	98.1%	98.4%	99.0%
EU3268	4401	63	68%	70	97.6%	98.7%	99.3%
EU3270	1497	13	14%	115	93.8%	93.8%	93.8%
EU3321	6474	79	86%	82	98.3%	98.7%	99.4%
EU3358	5576	68	74%	82	99.1%	99.1%	99.1%
EU3421	12243	75	82%	163	97.3%	99.0%	99.7%
EU3469	6513	77	84%	85	99.2%	100.0%	100.0%
EU3533	6055	72	78%	84	98.6%	99.2%	99.2%
EU3544	9237	64	70%	144	97.3%	97.6%	98.5%
EU3598	8481	67	73%	127	95.9%	96.8%	97.8%
EU3621	3062	41	45%	75	97.0%	97.0%	97.0%
EU3654	4071	42	46%	97	98.1%	98.8%	100.0%
EU3684	6420	73	79%	88	99.2%	99.4%	99.6%
EU3714	503	9	10%	56	92.9%	100.0%	100.0%
EU3725	4164	79	86%	53	95.2%	95.4%	96.2%
EU3755	5161	67	73%	77	100.0%	100.0%	100.0%
EU3874	3158	74	80%	43	97.3%	97.3%	97.3%
EU3908	11557	76	83%	152	98.9%	99.4%	99.6%
EU3972	4929	66	72%	75	99.2%	99.2%	99.2%
EU4002	5609	69	75%	81	97.1%	97.1%	98.5%
EU4021	4840	56	61%	86	97.2%	98.1%	98.1%

AIRCRAFT	Total No of Reports	Days of Reports	Actual/ possible	Average reports/ day	0–45 min	0–60 min	0–120 min
EU4278	3471	43	47%	81	98.8%	98.8%	98.8%
EU4333	9781	78	85%	125	97.7%	97.9%	99.3%
EU4426	2955	34	37%	87	100.0%	100.0%	100.0%
EU4444	7424	79	86%	94	99.1%	99.1%	99.6%
EU4519	7893	72	78%	110	98.0%	98.2%	99.1%
EU4527	9343	76	83%	123	98.2%	98.3%	98.9%
EU4529	12965	76	83%	171	98.3%	98.6%	99.6%
EU4532	9322	71	77%	131	97.8%	98.3%	99.4%
EU4573	15214	85	92%	179	98.4%	99.0%	99.5%
EU4582	13281	85	92%	156	97.9%	98.6%	99.7%
EU4587	2452	55	60%	45	96.9%	97.2%	99.0%
EU4591	7050	79	86%	89	97.0%	97.7%	97.8%
EU4593	9868	62	67%	159	98.1%	98.6%	99.0%
EU4607	7008	73	79%	96	97.5%	97.8%	98.6%
EU4699	7037	69	75%	102	98.9%	99.3%	99.6%
EU4721	5855	64	70%	91	97.7%	97.9%	99.0%
EU4756	1976	46	50%	43	99.2%	100.0%	100.0%
EU4792	7695	78	85%	99	98.8%	98.9%	99.3%
EU4838	471	7	8%	67	100.0%	100.0%	100.0%
EU4853	6239	69	75%	90	96.7%	97.2%	97.6%
EU4865	7459	80	87%	93	98.6%	98.6%	99.5%
EU4950	6151	73	79%	84	97.6%	97.9%	99.4%
EU5098	487	9	10%	54	100.0%	100.0%	100.0%
EU5134	6683	75	82%	89	98.3%	98.3%	98.9%
EU5182	1114	10	11%	111	98.3%	99.2%	100.0%
EU5218	3546	47	51%	75	97.3%	97.9%	99.7%
EU5331	11627	75	82%	155	97.3%	97.5%	99.4%
EU5349	76	2	2%	38	100.0%	100.0%	100.0%
EU5351	12069	72	78%	168	98.3%	98.7%	99.4%
EU5372	3534	42	46%	84	97.4%	97.4%	97.4%
EU5435	10859	71	77%	153	98.6%	99.0%	99.6%
EU5441	4128	49	53%	84	98.7%	99.6%	100.0%
EU5478	14612	88	96%	166	98.3%	98.8%	99.2%
EU5529	13201	83	90%	159	98.7%	99.2%	99.5%
EU5587	9908	64	70%	155	98.6%	98.6%	99.7%
EU5591	11200	67	73%	167	98.9%	99.4%	100.0%
EU5612	5861	65	71%	90	98.6%	98.7%	99.4%
EU5613	13402	75	82%	179	97.7%	98.1%	98.9%
EU5777	8508	85	92%	100	98.7%	98.8%	99.4%
EU5802	7445	77	84%	97	98.5%	98.9%	99.1%
EU5821	7662	78	85%	98	97.8%	98.1%	98.5%
EU5891	13562	78	85%	174	97.7%	98.2%	99.2%
EU6264	6727	67	73%	100	97.8%	98.2%	99.0%

AIRCRAFT	Total No of Reports	Days of Reports	Actual/ possible	Average reports/ day	0–45 min	0–60 min	0–120 min
EU6281	6970	70	76%	100	100.0%	100.0%	100.0%
EU6287	6248	69	75%	91	100.0%	100.0%	100.0%
EU6349	6181	72	78%	86	98.2%	98.6%	99.5%
EU6444	4805	64	70%	75	99.4%	99.4%	100.0%
EU6524	3794	44	48%	86	99.0%	99.3%	100.0%
EU6527	5238	68	74%	77	98.6%	98.8%	99.3%
EU6544	9825	71	77%	138	98.2%	98.9%	99.2%
EU6556	11163	73	79%	153	98.2%	98.6%	99.7%
EU6743	11988	75	82%	160	97.9%	98.8%	99.4%
EU6821	2065	40	43%	52	97.5%	97.5%	97.7%
EU6890	6008	69	75%	87	98.0%	98.2%	99.6%
EU6893	41	1	1%	41	100.0%	100.0%	100.0%
EU6923	6746	75	82%	90	100.0%	100.0%	100.0%
EU7001	13466	78	85%	173	97.6%	98.7%	99.0%
EU7082	5758	66	72%	87	99.1%	99.1%	100.0%
EU7119	9839	75	82%	131	98.3%	98.6%	99.0%
EU7218	6650	69	75%	96	98.5%	99.0%	99.6%
EU7285	525	9	10%	58	100.0%	100.0%	100.0%
EU7521	6195	77	84%	80	98.1%	98.1%	98.7%
EU7629	1527	41	45%	37	99.4%	99.4%	100.0%
EU7634	2742	42	46%	65	98.4%	98.4%	100.0%
EU7635	10431	76	83%	137	97.6%	98.3%	98.3%
EU7643	5988	68	74%	88	98.8%	98.8%	100.0%
EU7654	5951	68	74%	88	98.8%	99.2%	99.7%
EU7724	7468	78	85%	96	98.8%	98.9%	99.8%
EU7865	5884	69	75%	85	100.0%	100.0%	100.0%
EU7888	6765	77	84%	88	99.1%	99.1%	99.7%
EU7894	5522	53	58%	104	98.0%	98.3%	99.5%
EU8264	4383	55	60%	80	98.3%	98.3%	98.3%
EU8431	343	6	7%	57	100.0%	100.0%	100.0%
EU8478	6903	75	82%	92	100.0%	100.0%	100.0%
EU8520	6910	79	86%	87	98.9%	98.9%	99.9%
EU8598	6096	73	79%	84	98.5%	98.5%	99.3%
EU8605	2607	35	38%	74	100.0%	100.0%	100.0%
EU8632	1765	24	26%	74	94.9%	94.9%	97.4%
EU8733	11187	75	82%	149	97.4%	97.4%	99.4%
EU8736	3939	44	48%	90	100.0%	100.0%	100.0%
EU8742	9838	69	75%	143	97.7%	97.8%	98.8%
EU8787	8816	62	67%	142	98.2%	98.8%	100.0%
EU8789	262	5	5%	52	78.7%	78.7%	78.7%
EU8891	3791	50	54%	76	98.9%	98.9%	100.0%
EU8943	180	4	4%	45	100.0%	100.0%	100.0%
EU8969	6243	69	75%	90	97.5%	98.7%	99.1%

AIRCRAFT	Total No of Reports	Days of Reports	Actual/possible	Average reports/day	0–45 min	0–60 min	0–120 min
EU9013	8574	45	49%	191	98.3%	98.6%	98.7%
EU9023	5704	62	67%	92	99.1%	99.1%	100.0%
EU9145	6750	73	79%	92	99.5%	99.5%	99.5%
EU9158	14438	86	93%	168	98.8%	99.1%	99.7%
EU9234	7313	73	79%	100	98.5%	99.1%	99.9%
EU9245	8182	73	79%	112	99.1%	99.5%	99.9%
EU9356	5145	62	67%	83	96.7%	96.7%	98.4%
EU9378	1089	15	16%	73	89.8%	89.8%	89.8%
EU9544	8096	83	90%	98	98.7%	99.3%	99.9%
EU9589	3270	43	47%	76	98.0%	98.0%	99.3%
EU9622	2445	15	16%	163	97.8%	97.8%	98.9%
EU9678	885	19	21%	47	100.0%	100.0%	100.0%
EU9680	6576	82	89%	80	98.9%	99.5%	100.0%
EU9692	4543	66	72%	69	99.0%	99.0%	100.0%
EU9723	10882	73	79%	149	97.3%	97.8%	98.7%
EU9729	5775	72	78%	80	98.7%	99.1%	99.6%
EU9734	3232	45	49%	72	100.0%	100.0%	100.0%
EU9883	12695	75	82%	169	98.0%	98.2%	99.1%
EU9967	3574	48	52%	74	100.0%	100.0%	100.0%

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- *Timeliness: From 20 aircraft more than 3% of the received data had on average a delay after observation for more than two hours. 17 of these aircraft fly long haul routes and either “store” data until reaching a Ground Receiving Station or use Satcom – which would account for some delay.*

Identifier	Identifier	Identifier	Identifier
EU0003	EU0457	EU1312	EU2773
EU0008	EU0947	EU1411	EU3270
EU0045	EU0985	EU1495	EU3725
EU0060	EU1282	EU1593	EU8264
EU0123	EU1301	EU2751	EU8789

- *No data was received from the following 12 aircraft (*: not reporting due to budgetary constraints)*

Identifier	Identifier	Identifier	Identifier
EU4463	EU4896 *	EU5191 *	EU5429
EU4491	EU4956 *	EU5245 *	EU5593 *
EU4589 *	EU5175 *	EU5360	EU6321 *

Table 3, Description and number of errors

Aircraft with parameter anomalies:

Aircraft deactivated due to temperature anomalies

- EU0008: Error greater than 2.0° Aircraft was disabled by E-AMDAR Technical Co-ordinator on the E-ADAS Nov 2nd Aircraft enabled again Nov 28th to assess data quality - still showing consistent error greater than 2.0°. Aircraft disabled by E-AMDAR Technical Co-ordinator on the E-ADAS Jan 2nd 2002. Operator will inform when sensor has been replaced.
- EU0456: Error greater than 3.0°. Operator deactivated unit Nov 5th .Sensor changed Nov 9th aircraft now reporting.
- EU2984: Error greater than 3.0° Aircraft was disabled by E-AMDAR Technical Co-ordinator on the E-ADAS 5th Oct. Sensor changed 19th Oct - aircraft reactivated for reporting.
- EU9378: Error greater than 3.0°. Operator deactivated unit Oct 16th.

Frequent or occasionally warm temperature biases were noted on the following aircraft

October 2002:

- 1 to 2°C: EU0073, EU0316, EU1301, EU1929, EU2984, EU5331, EU5613, EU6566, EU6743, EU8742.
- > 2°C: EU0456 (operator contacted).

November 2002:

- 1 to 2°C: EU0316, EU0723, EU1301, EU1344, EU2043, EU3874, EU4527, EU4582, EU4756, EU5331, EU5587, EU5613, EU6444, EU6566, EU6743, EU7894, EU9723.
- > 2°C: (none)

December 2002:

- 1 to 2°C: EU0073, EU0086, EU0177, EU0457, EU0711, EU1334, EU1337, EU3544, EU4527, EU4756, EU5331, EU5613, EU6444, EU6566, EU6743, EU8787, EU9723, EU0167, EU0723, EU4532.
- > 2°C: (none)

Consistent warm temperature biases were noted on the following aircraft

- 1 to 2°C EU0073, EU0088, EU0177, EU0316, EU3421, EU4593, EU5435, EU6544, EU8742.
 - >2°C EU0008 – (reported to operator). Error consistent during December. Disabled again on E-ADAS 15:30UTC 2nd Jan 2002. Operator will inform when sensor replaced.
EU0203 – (reported to operator 3rd Jan). Aircraft activated Oct 23rd , data being monitored
EU9378 – aircraft deactivated by operator Oct 16th
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No reports received although expected:

- EU0003: No reports Nov 26th - 30th (maintenance).
 - EU0022: No reports Oct 14th - 23rd (maintenance).
 - EU0034: No reports (deactivated by operator July 2001)
 - EU0049: No reports Dec 27th – 31st (maintenance).
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- EU0049: No reports (maintenance).
 - EU0049: No reports Oct 1st - Nov 1st - 5th (major maintenance)
 - EU0050: No reports Nov 16th – Dec 31st (maintenance).
 - EU0051: No reports Nov 3rd - 11th (maintenance).
 - EU0054: No reports Oct 18th 27th, Nov 8th - 13th, 26th - 30th (maintenance).
 - EU0055: No reports Dec 10th – 19th (maintenance).
 - EU0060: No reports Dec 13th – 31st (maintenance).
 - EU0061: No reports Dec 25th – 31st (maintenance).
 - EU0073: No reports Dec 10th – 19th (maintenance).
 - EU0109: No reports Oct 24th - 31st (maintenance).
 - EU0124: No reports Oct 27th - 31st (maintenance).
 - EU0154: No reports Nov 7th - Dec 31st (maintenance).
 - EU0185: No reports Oct 5th - 10th (maintenance).
 - EU0203: No reports Nov 6th - 10th (maintenance).
 - EU0209: No reports (deactivated by operator July 2001).
 - EU0281: No reports Oct 17th - 22nd, Nov 3rd - 10th, 25th - 29th (maintenance).
 - EU0299: No reports Dec 12th – 19th (maintenance).
 - EU0316: No reports Dec 16th – 29th (maintenance).
 - EU0367: No reports Oct 8th - 27th aircraft being repaired.
 - EU0456: No reports Oct 7th - 15th, 27th - 31st Dec 2nd – 31st (maintenance).
 - EU0457: No reports Nov 14th - Dec – 19th (maintenance).
 - EU0458: No reports Nov 8th - Dec 31st (maintenance).
 - EU0476: No reports Nov 1st - 30th (major maintenance).
 - EU0498: No reports (deactivated by operator April 2001).
 - EU0689: No reports (deactivated by operator April 2001).
 - EU0807: No reports Nov 1st - 8th (maintenance).
 - EU0947: No reports Oct 12th - Dec 5th (maintenance).
 - EU0961: No reports Dec 9th – 31st (maintenance).
 - EU0985: No reports Dec 1st – 14th (maintenance).
 - EU1001: No reports Dec 19th – 31st (maintenance).
 - EU1002: No reports Nov 11th - 29th (maintenance).
 - EU1222: No reports Oct 1st - Dec 31st (informed by operator, aircraft no longer in service since Sep 24th)
 - EU1234: No reports Oct 13th - Nov 17th (maintenance).
 - EU1301: No reports Oct 15th - 31st (maintenance).
 - EU1312: No reports Nov 6th - 24th (maintenance).
 - EU1334: No reports Dec 25th – 31st (maintenance).
 - EU1446: No reports Dec 26th – 31st (maintenance).
 - EU1456: No reports Dec 19th – 27th (maintenance).
 - EU1495: No reports Nov 2nd - 6th, Dec 12th – 31st (maintenance).
 - EU1567: No reports Oct 1st - 11th (maintenance).
 - EU1692: No reports Oct 1st - 9th, Nov 16th - 20th (maintenance).
 - EU1698: No reports Nov 25th - Dec 20th, 22nd – 31st (maintenance).
 - EU2017: No reports Dec 12th – 31st (maintenance).
 - EU2201: No reports Dec 5th – 31st
 - EU2389: No reports Dec 21st – 27th (maintenance).
 - EU2397: No reports (deactivated by operator August 2001).
 - EU2590: No reports Nov 23rd - 28th (maintenance).
 - EU2630: No reports Oct 3rd - 13th (maintenance)
 - EU2773: No reports Nov 1st - 18th (maintenance).
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- EU2978*: No reports Oct 9th - 18th, 23rd - 31st, Nov 19th - 25th
 - EU2984: No reports Oct 6th - 18th, Nov 21st - 26th, Dec 27th - 31st (maintenance).
 - EU3181: No reports Oct 3rd - Nov 19th (maintenance).
 - EU3257: No reports Nov 19th - 26th (maintenance).
 - EU3268: No reports Nov 3rd - 7th (maintenance).
 - EU3270*: No reports Oct 10th - 16th, 23rd - Nov 30th, Dec 3rd - 28th
 - EU3544: No reports Dec 6th - 31st (maintenance).
 - EU3598: No reports Nov 12th - 16th, Dec 24th - 31st (maintenance).
 - EU3621*: No reports Oct 18th - 22nd, Nov 19th - 29th
 - EU3654: No reports Oct 7th - Nov 17th (maintenance)
 - EU3714*: No reports Dec 2nd - 25th
 - EU3714*: No reports Oct 1st - 16th, 27th - Nov 23rd, 26th - 30th
 - EU3725: No reports Dec 3rd - 11th (maintenance).
 - EU3755*: No reports Oct 18th - 24th
 - EU3908: No reports Nov 6th - 11th (maintenance).
 - EU3972*: No reports Dec 14th - 21st
 - EU4002: No reports Oct 12th - 22nd
 - EU4021*: No reports Nov 2nd - 7th
 - EU4278*: No reports Oct 8th - 12th, Nov 13th - 30th, Dec 1st - 6th.
 - EU4426: No reports Oct 1st - 7th, 18th - Nov 30th (major maintenance).
 - EU4463*: No reports Dec 1st - 31st
 - EU4463*: No reports Oct 1st - Nov 30th
 - EU4491*: No reports Oct 1st - Dec 31st
 - EU4519: No reports Oct 21st - 30th (maintenance)
 - EU4529: No reports Dec 16th - 26th (maintenance).
 - EU4587: No reports Oct 1st - 28th (maintenance)
 - EU4607: No reports Dec 1st - 8th (maintenance).
 - EU4699: No reports Nov 1st - 13th (maintenance).
 - EU4721: No reports Dec 9th - 17th
 - EU4838*: No reports Oct 12th - 20th, 22nd - Nov 10th, 12th - Dec 15th, 18th - 31st.
 - EU5098*: No reports Oct 1st - 9th, 20th - 26th, Nov 1st - 17th, 19th - 30th Dec 8th, 10th - 28th
 - EU5218: No reports Nov 18th - 30th (maintenance).
 - EU5349*: No reports Oct 1st - 13th, 17th - Dec 31st
 - EU5372*: No reports Nov 1st - 5th, Dec 5th - 13th, 22nd - 31st
 - EU5429*: No reports (Oct - Dec)
 - EU5441: No reports Dec 5th - 31st
 - EU5587: No reports Dec 4th - 9th (maintenance).
 - EU5591: No reports Oct 1st - 16th (maintenance).
 - EU5612: No reports Oct 10th - 18th (maintenance)
 - EU6264: No reports Oct 19th - 30th (maintenance)
 - EU6281: No reports Oct 23rd - 31st (maintenance)
 - EU6287: No reports Oct 5th - 11th (maintenance).
 - EU6444: No reports Oct 1st - 10th (maintenance).
 - EU6524: No reports Oct 10th - 24th, Dec 3rd - 31st (major maintenance).
 - EU6527: No reports Dec 13th - 17th
 - EU6890: No reports Dec 22nd - 31st
 - EU6893*: No reports Oct 1st - 9th, 11th - Dec 31st
 - EU7218: No reports Dec 18th - 31st
 - EU7285*: No reports Oct 9th - 18th, 20th - Dec 14th, 16th - 21st, 24th - 31st
 - EU7629: No reports Nov 8th - 12th, 22nd - 27th (maintenance).
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- EU7634*: No reports Oct 5th - 9th, 26th - 31st, Nov 7th - 13th
 - EU7894: No reports Nov 9th - 13th, Dec 2nd - 31st
 - EU8264: No reports Dec 25th - 31st.
 - EU8431*: No reports Oct 8th - 27th, Nov 1st - Dec 23rd, 25th - 29th
 - EU8605*: No reports Dec 10th - 23rd
 - EU8605*: No reports Oct 19th - 27th, Nov 8th - 13th, 19th - 28th
 - EU8632*: No reports Nov 3rd - 8th, 12th - 28th, Dec 1st - 6th
 - EU8736*: No reports Nov 12th - Dec 19th
 - EU8787: No reports Oct 1st - 10th (maintenance).
 - EU8789*: No reports Oct 9th - Nov - 9th, 11th - 29th, Dec 1st - 21st, 23rd - 31st
 - EU8891*: No reports Oct 5th - 17th, Dec 3rd - 8th
 - EU8943*: No reports Oct 1st - 6th, 8th - 15th, 21st - 27th, Nov 1st - Dec 31st
 - EU9013: No reports Nov 19th - Dec 20th (maintenance).
 - EU9023: No reports Dec 20th - 31st
 - EU9234: No reports Nov 14th - 22nd (maintenance).
 - EU9245: No reports Nov 22nd - 30th (maintenance).
 - EU9356*: No reports Nov 13th - 18th
 - EU9378*: No reports Nov 1st - 30th
 - EU9589*: No reports Oct 13th - Nov 13th
 - EU9678*: No reports Oct 1st - 10th, 18th - 23rd, Nov 1st - 9th, 17th - 21st, 24th - Dec 7th.
 - EU9692*: No reports Nov 8th - 12th
 - EU9723: No reports Dec 21st - 31st
 - EU9734*: No reports Oct 1st - 10th, 19th - 24th, 26th - 31st.
 - EU9967*: No reports Nov 26th - 30th.

* All aircraft marked with * are using an optimisation system which only transmits data from airports designated by the E-AMDAR Programme - this is the main reason for periods of non-reporting.

Specific problems:

- EU0081: clock error Oct 1st - 3rd
 - EU0124: no reports in November and December due to error with onboard data processing – operator-investigating problem.
 - EU0204: November: informed by operator that aircraft has been "retired" from service (awaiting date of retirement)
 - EU0947, EU1222: November: operator to confirm if these units have been "retired" from service - some reports being received during the period.
 - EU4426: no data Oct 3rd - 7th Compressed data format re-installed on this aircraft. Problems with receiving and processing data - problem resolved Oct 8th.
 - EU4593: no reports Oct 20th - 29th due to rescheduling of aircraft flying by operator.
 - EU5218: December: informed by operator that aircraft has been sold - awaiting confirmation of date aircraft sold.
 - Nov 8th: The following aircraft were deactivated for a short period from Nov 8th due to a software bug discovered in the ACARS Management Unit. Problem was resolved within 3-5 days: EU0167(Nov 8-11th), EU0311 and EU6544(Nov 9-13th), EU0313(Nov 9-11th), EU0711(Nov 8-10th), EU3257, EU8742 and EU9723(Nov 9-12th)
 - Dec 12th: KNMI QEv daily reports not evaluating Lufthansa BUFR data. Alternative data sources available to E-AMDAR Technical Co-ordinator are being used for QC of BUFR data.
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- Dec 28th : KNMI QEv daily reports have no data. Informed KNMI QEv Centre 31st (other data sources being used for monitoring whilst problem being resolved). Problem resolved 2nd Jan 2002, data 28th – 31st Dec reproduced by QEv Centre.
 - Dec 6th: Air Traffic industrial action affected totals from Air France - only 15% of scheduled short haul flights flown.
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Ground stations issues and other problems:

- SAS: SAS ground based production problems Oct 12th - 14th. Problem resolved Oct 14th 09:00UTC (previous 24hr data re-sent at this time - data processing loss was approx. 2000 obs.)
 - AF AF data production problems Oct 29th 08:35UTC to 30th 07:53UTC. Problem resolved and data processed during the 30th.
 - Lufthansa Dec 9-10th - problems with DWD data transmission output system caused reduction in Lufthansa totals.
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Activated and deactivated aircraft:

- EU5182: De-activated by operator Oct 8th (had been activated in error).
 - The following aircraft were activated as part of data targeting request over the Middle East regions:
 - EU0073, EU0086, EU0120 - activated by operator Oct 22nd,
 - EU0177, EU0203 - activated by operator Oct 23rd.
 - The following aircraft were activated as part of national data requirement:
 - EU0251, EU0373, EU0394, EU0413, EU0442, EU0511, EU0558, EU0583, EU0601, EU0676 - activated by operator Nov 8th;
 - EU0723, EU0810 - activated by operator Nov 9th;
 - EU1337, EU1446, EU1498, EU2017, EU2055, EU2130, EU2247 - activated by operator Nov 13th;
 - EU2165 - activated by operator Nov 14th; EU2201 - activated by operator Nov 15th
 - EU5182: Activated by operator 7th – 9th Dec – testing purposes.
 - EU9622: Activated by operator 14th Dec.
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(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/Decent ($i_p i_p i_p = \text{ASC or DES}$)
- 2) Cruise level, level flight at cruising height ($i_p i_p i_p = \text{LVR or LVW}$)

Notes:

- Data with $i_p i_p i_p = \text{UNS}$ is not evaluated.
- AMDAR aircraft produce much more reports during Ascent/Decent 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 Annex 1 - Figure 3) 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 during the ascending phase.
- For wind direction (tabel 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 $\langle |\Delta DD| \rangle (= \text{AVG}(\text{ABS}(DD_OBS - DD_MOD)))$ 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)*

AIRCRAFT	Temperature Cruise level in °C					Temperature Ascent & Descent in °C				
	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
		Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU0000						40	-4.5	0.0	-1.1	5.2
EU0002						12177	-15.6	18.3	-0.2	1.2
EU0003	6877	-53.2	9.0	-0.2	1.5	2528	-0.6	13.9	-0.1	1.2
EU0008	5815	-48.9	8.9	2.2	1.8	2226	-3.4	11.9	1.0	1.5
EU0021	1492	-46.3	14.8	-0.4	1.2	8090	-3.9	10.8	-0.1	1.2
EU0022	2088	-52.7	11.9	0.2	1.7	7080	-0.7	11.6	-0.1	1.4
EU0032	762	-46.9	13.0	0.0	1.2	2087	9.2	8.7	0.3	1.2
EU0041	1368	-45.7	15.7	1.0	1.4	6450	-8.3	19.6	0.5	1.2
EU0043	1600	-48.2	14.2	0.8	1.3	5678	-9.9	20.1	0.3	1.2
EU0045	7817	-51.0	10.2	-0.2	1.5	3368	0.3	14.2	-0.1	1.2
EU0047	1651	-47.7	14.5	0.7	1.2	6173	-8.3	19.5	0.3	1.2
EU0049						4999	-22.1	19.2	-0.3	1.2
EU0050	697	-42.7	17.3	-0.5	1.0	6954	-8.0	19.3	-0.4	1.1
EU0051	1512	-52.7	10.7	-0.5	2.7	4597	-0.3	11.8	-0.4	1.6
EU0052	1186	-44.3	17.0	-0.6	1.1	8739	-9.1	19.0	-0.6	1.2
EU0054	1371	-51.9	10.8	-0.5	1.9	4182	-1.0	11.8	-0.3	1.5
EU0055						10395	-15.3	18.0	0.0	1.1
EU0059	803	-44.0	17.5	0.0	1.0	6193	-8.6	19.7	-0.1	1.1
EU0060	5758	-49.0	9.8	-0.3	1.3	3095	7.9	12.1	-0.1	1.2
EU0061	851	-41.6	17.8	-0.4	1.0	8608	-9.4	19.6	-0.5	1.1
EU0072	1138	-44.8	16.7	-0.1	1.2	8660	0.6	10.8	0.0	1.2
EU0073	2646	-52.8	9.8	0.9	1.7	1016	-3.6	16.7	0.6	1.3
EU0081	2419	-53.2	11.7	0.4	1.6	7453	-0.3	11.3	0.2	1.4
EU0082						11994	-16.2	17.9	0.2	1.1
EU0086	3189	-50.3	17.4	0.7	1.8	1193	-5.1	17.3	0.5	1.3
EU0088	1932	-47.9	13.3	1.9	1.4	9919	2.0	11.0	1.1	1.4
EU0106	1073	-44.1	17.2	-0.3	1.2	9039	-8.1	18.9	-0.4	1.2
EU0109	1987	-52.3	12.1	0.3	1.5	6234	-0.1	11.6	0.2	1.3
EU0120	3045	-48.1	21.4	0.3	2.3	1379	-5.8	16.3	0.3	1.2
EU0123	7345	-51.1	8.6	0.2	1.7	2978	-5.0	11.7	0.1	1.2
EU0124						3041	-8.1	17.3	0.5	1.0
EU0154	681	-43.8	16.5	-0.2	1.1	5543	-6.0	18.8	-0.5	1.2
EU0158	1146	-41.8	17.3	0.8	1.1	7418	-7.3	18.3	0.4	1.2
EU0167	1078	-42.0	15.6	1.0	1.1	6512	-5.9	18.1	0.5	1.1
EU0177	2825	-52.7	8.8	1.0	1.7	892	-3.5	15.4	0.6	1.5
EU0185	1080	-44.5	16.1	0.4	1.2	6532	-7.6	19.0	0.3	1.1
EU0203	2924	-52.5	7.2	1.9	1.8	716	-2.8	16.8	1.5	1.4
EU0204	520	-50.8	13.0	0.4	1.1	1821	6.6	11.4	0.0	1.2
EU0234						11291	-16.2	17.8	-0.2	1.1
EU0251	561	-48.0	15.4	-0.5	1.3	2206	-11.5	16.7	-0.4	1.2
EU0263	4869	-50.6	8.6	0.1	1.6	4653	5.0	11.9	0.1	1.2

2001-IV 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
EU0281	196	-48.2	14.3	0.0	0.9	1007	5.5	8.5	0.1	1.3	
EU0299						9240	-14.7	17.5	-0.2	1.1	
EU0301	1489	-47.3	14.3	0.6	1.1	6759	-8.8	20.2	0.5	1.1	
EU0303	1395	-45.7	16.1	-0.5	1.1	7379	-8.0	18.9	-0.4	1.1	
EU0307	1131	-44.0	16.5	-0.5	1.0	8809	-8.8	19.2	-0.5	1.1	
EU0311	903	-42.8	16.2	0.3	1.1	6317	-6.8	18.9	0.2	1.2	
EU0313	953	-41.4	17.3	0.6	1.1	6856	-6.6	18.4	0.4	1.1	
EU0316	1563	-46.6	14.7	1.4	1.3	7033	-7.3	19.6	0.7	1.2	
EU0319	1385	-47.1	16.2	0.0	1.2	6512	-8.9	19.6	0.2	1.1	
EU0359	1035	-40.7	17.9	0.6	1.1	7495	-6.5	17.5	0.4	1.1	
EU0367						8658	-17.5	17.6	-0.3	1.1	
EU0373	408	-46.5	15.8	-0.4	1.3	1962	-14.8	18.3	-0.1	1.2	
EU0394	577	-46.7	15.1	-0.2	1.3	2447	-12.4	18.7	-0.3	1.3	
EU0413	576	-47.3	15.2	-0.6	1.3	2078	-14.1	17.9	-0.5	1.2	
EU0432						11428	-17.1	18.1	-0.2	1.1	
EU0442	387	-46.4	16.3	0.2	1.3	1825	-14.7	18.4	-0.1	1.3	
EU0456	685	-41.3	18.7	1.0	2.3	2481	-6.8	20.0	1.5	1.8	
EU0457	3006	-48.3	8.1	0.2	1.5	958	15.6	10.5			
EU0458	373	-38.0	18.5	0.0	0.9	2969	-7.1	20.5	0.2	1.1	
EU0476	565	-40.3	18.6	0.2	1.5	3814	-8.4	20.8	0.2	1.1	
EU0511	492	-49.5	12.5	-0.4	1.4	1813	-15.9	19.2	-0.4	1.3	
EU0558	394	-43.8	14.0	0.6	1.1	2953	-13.3	18.0	0.6	1.3	
EU0568						34238	-17.6	20.0	0.3	1.1	
EU0583	522	-46.8	14.8	0.0	1.3	2093	-11.5	18.0	-0.1	1.2	
EU0601	561	-47.6	15.3	-0.1	1.3	2349	-12.5	17.1	-0.3	1.3	
EU0676	597	-48.4	14.9	-0.4	1.3	2351	-11.6	17.0	-0.3	1.1	
EU0711	718	-33.9	23.6	0.5	2.7	5459	-10.1	19.7	0.1	1.2	
EU0723	171	-25.1	23.0	0.5	1.4	1097	-13.0	18.3	0.8	1.3	
EU0802	1046	-43.4	17.7	0.5	1.1	7203	-7.3	18.4	0.3	1.1	
EU0807	1938	-49.8	10.1	-0.3	1.1	4267	0.0	12.8	-0.2	1.4	
EU0810	684	-49.7	12.8	-0.1	1.5	2239	-11.9	18.8	-0.3	1.3	
EU0826						11654	-15.9	18.1	0.0	1.1	
EU0875	976	-41.0	16.2	0.6	1.1	7979	-6.8	19.1	0.4	1.1	
EU0921	1092	-43.7	15.6	0.2	1.2	8204	-8.8	19.3	-0.3	1.5	
EU0934	8479	-52.3	9.0	-0.2	1.6	3400	-1.3	13.3	-0.1	1.2	
EU0947	3228	-51.5	10.1	-0.4	1.6	1200	-3.0	14.4	-0.2	1.1	
EU0961	5797	-49.8	9.5	-0.1	1.5	2657	3.2	13.7	0.0	1.0	
EU0985	7129	-52.3	7.1	-0.5	1.7	2636	-3.7	12.0	-0.2	1.1	
EU1001						8045	-17.7	19.0	-0.2	1.0	
EU1002	6694	-53.7	6.6	-0.2	1.6	2345	-4.3	11.7	-0.2	1.2	
EU1222	57	-52.2	12.2	-0.2	1.2	52	1.2	9.6	-0.1	1.3	

2001-IV 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
EU1234	488	-43.7	17.3	-0.6	1.2	3794	-8.3	19.0	-0.5	1.3	
EU1282	2520	-50.6	7.4	-0.2	1.6	159	5.2	11.2			
EU1301	1528	-44.1	8.7	0.0	1.2	684	9.0	11.1			
EU1312	2589	-46.9	9.2	0.1	1.1	1358	6.5	12.0	0.0	1.1	
EU1334	1718	-47.3	7.8	0.3	1.3	532	13.8	9.9			
EU1337	245	-32.1	23.8	0.6	1.3	1329	-14.8	18.4	0.6	1.4	
EU1411	3883	-51.7	8.0	0.1	1.5	609	5.6	10.9			
EU1446	446	-48.4	14.5	-0.3	1.3	1412	-13.0	18.3	-0.6	1.3	
EU1456						8856	-17.3	19.2	0.5	1.2	
EU1495	5360	-50.6	8.5	-0.2	1.7	2236	-4.2	11.7	0.0	1.2	
EU1498	368	-46.3	14.8	-0.4	1.1	1429	-11.8	16.9	-0.4	1.3	
EU1532						10956	-13.8	16.8	-0.2	1.2	
EU1547	1011	-43.1	15.3	-0.1	1.1	8452	-9.1	19.8	-0.3	1.2	
EU1567						10092	-17.6	18.0	-0.1	1.1	
EU1593	7398	-52.0	8.1	-0.3	1.7	2797	-5.7	11.9	0.0	1.5	
EU1692	655	-48.0	10.6	-0.3	1.1	1528	-4.0	12.1	-0.1	1.4	
EU1698						5917	-11.2	17.0	0.1	1.1	
EU1863	1358	-45.5	15.8	-0.4	1.1	8884	-8.6	18.9	-0.4	1.2	
EU1929	4371	-54.0	6.6	0.1	1.8	372	3.3	11.5			
EU2017	296	-43.7	18.0	-0.3	1.1	2065	-12.8	18.0	-0.4	1.4	
EU2043	2743	-50.6	7.9	0.5	1.6	296	6.0	9.3			
EU2055	380	-46.8	15.1	-0.6	1.1	1625	-12.1	17.2	-0.4	1.3	
EU2130	518	-45.8	16.1	0.0	1.3	1684	-11.4	17.1	-0.1	1.3	
EU2165	502	-48.0	14.3	-0.1	1.2	1713	-13.4	17.4	-0.2	1.2	
EU2189	962	-40.9	17.3	0.5	1.1	7916	-7.6	18.6	0.3	1.1	
EU2201	356	-47.4	14.5	0.0	1.3	630	-10.7	17.5	-0.4	1.0	
EU2247	391	-43.9	20.4	0.1	1.3	1763	-12.2	17.5	-0.2	1.2	
EU2301	1472	-47.6	13.8	0.7	1.3	7402	-9.8	20.2	0.2	1.2	
EU2389	1409	-48.1	14.5	-0.5	1.3	7613	0.1	10.6	-0.3	1.4	
EU2547	8733	-50.7	9.8	0.0	1.5	3647	0.8	14.0	0.1	1.2	
EU2559	1264	-46.9	13.8	1.0	1.3	7460	-10.5	20.3	0.4	1.2	
EU2590	628	-42.9	10.5	0.0	1.3	7530	-9.9	16.3	0.1	1.3	
EU2618	843	-45.6	11.2	0.2	1.5	9970	-11.1	16.3	-0.2	1.3	
EU2630	633	-52.9	11.8	0.3	1.5	4125	-12.0	17.0	-0.2	1.3	
EU2751	3468	-51.0	8.3	-0.3	1.7	396	5.0	10.7	-0.1	1.3	
EU2773	2828	-51.8	7.3	-0.1	1.6	232	8.4	11.6			
EU2845	1541	-45.5	13.9	-0.1	1.2	9091	0.8	10.8	-0.2	1.3	
EU2978						2541	-23.6	21.6	-0.4	1.3	
EU2984	312	-49.4	10.7	0.5	2.2	2906	-13.4	16.8	0.0	1.8	
EU3000	1037	-45.3	16.3	-0.1	1.1	7186	-8.9	19.7	-0.3	1.1	
EU3181	1761	-49.2	9.1	0.1	1.5	135	10.4	8.6			

2001-IV 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
EU3257	1047	-44.2	16.2	-0.4	1.1	7661	-6.9	18.6	-0.5	1.2	
EU3268	409	-49.5	9.7	-0.4	1.6	3992	-12.2	16.5	-0.2	1.3	
EU3270						1268	-9.2	18.0	0.3	1.2	
EU3321	1046	-54.9	10.5	0.1	1.4	5428	-10.4	16.9	-0.3	1.3	
EU3358						4951	-22.0	23.0	-0.3	1.2	
EU3421	1401	-47.0	13.8	1.4	1.2	7907	-8.8	19.7	0.8	1.2	
EU3469						5763	-21.9	22.8	-0.5	1.2	
EU3533						5367	-21.4	22.4	0.1	1.2	
EU3544	692	-32.2	25.4	0.6	2.1	6486	-9.8	20.1	0.2	1.2	
EU3598	668	-29.8	24.9	0.0	1.3	5812	-9.3	19.0	0.1	1.3	
EU3621						2743	-23.3	22.8	-0.4	1.1	
EU3654	474	-49.5	11.6	0.2	1.4	3596	-14.3	16.7	-0.1	1.3	
EU3684	953	-52.6	10.6	0.9	1.7	5466	-10.8	17.5	0.0	1.3	
EU3714						437	-20.7	24.9	-0.3	1.4	
EU3725	3742	-51.0	6.9	-0.1	1.6	314	5.2	10.0			
EU3755						4570	-23.8	22.0	-0.4	1.2	
EU3874	2800	-51.0	9.2	0.2	1.6	265	5.3	10.2			
EU3908	1072	-49.3	10.7	0.5	1.4	10468	-11.7	16.4	-0.1	1.3	
EU3972						4414	-23.6	23.2	-0.3	1.2	
EU4002	949	-51.3	11.6	0.6	1.6	4660	-12.4	17.3	-0.1	1.2	
EU4021						4332	-23.0	22.8	-0.4	1.2	
EU4278						3103	-22.2	21.6	-0.5	1.1	
EU4333	673	-46.5	9.9	0.2	1.1	9108	-10.9	16.4	0.1	1.2	
EU4426	537	-51.4	10.3	-0.5	1.1	1818	-5.4	12.3	-0.2	1.3	
EU4444	846	-48.4	10.5	-0.1	1.0	6577	-14.3	16.4	-0.3	1.3	
EU4519	912	-47.2	11.2	0.1	1.1	6980	-12.7	16.5	-0.1	1.4	
EU4527	664	-33.0	21.3	0.5	1.1	6125	-11.4	19.6	0.3	1.2	
EU4529	1929	-47.5	12.5	-0.3	1.1	8773	1.5	11.0	-0.2	1.3	
EU4532	576	-29.3	25.1	0.3	1.3	5531	-11.2	19.9	0.3	1.2	
EU4573	1467	-48.2	10.9	0.3	1.3	13747	-12.1	16.6	-0.1	1.3	
EU4582	1413	-47.7	10.3	1.0	1.5	11868	-12.2	16.7	0.5	1.4	
EU4587	588	-48.9	11.6	0.0	1.1	1480	-5.1	11.3	0.2	1.3	
EU4591	858	-50.8	10.1	0.3	1.3	6162	-14.8	17.2	-0.2	1.3	
EU4593	1062	-46.5	11.9	1.5	1.4	5716	-10.6	20.2	0.9	1.2	
EU4607	730	-52.0	9.2	0.6	1.4	6278	-15.4	17.2	0.0	1.3	
EU4699	825	-51.0	10.5	-0.2	1.1	6153	-13.2	16.4	-0.4	1.3	
EU4721	1035	-52.8	10.6	0.3	1.5	4812	-10.8	17.4	-0.1	1.4	
EU4756	457	-41.5	11.0	0.0	1.2	1057	10.4	10.4	0.2	1.2	
EU4792	1257	-55.0	12.2	-0.2	1.3	6434	-9.9	17.1	-0.3	1.2	
EU4838						404	-19.4	22.9	-0.2	1.3	
EU4853	681	-47.3	10.6	0.0	1.2	5538	-13.4	16.0	-0.3	1.3	
EU4865	957	-50.5	9.4	0.2	1.3	6502	-14.7	16.8	-0.1	1.3	

2001-IV 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
EU4950	1081	-52.9	12.2	0.8	1.4	5070	-10.3	17.2	0.2	1.3	
EU5098						437	-22.5	24.2	-0.5	1.0	
EU5134						5894	-23.4	22.6	-0.5	1.2	
EU5182	198	-43.7	12.9	0.4	0.9	733	4.7	10.6	0.1	1.2	
EU5218	695	-45.6	11.2	0.1	1.2	2188	1.6	11.3	-0.1	1.4	
EU5331	1414	-46.7	15.3	1.0	1.2	6709	-7.8	19.4	0.6	1.2	
EU5349						67	-10.2	24.9	-0.3	1.0	
EU5351	982	-42.5	16.8	0.5	1.1	8119	-7.8	19.0	0.3	1.2	
EU5372						3137	-22.1	22.5	-0.2	1.3	
EU5435	1101	-43.6	15.6	1.5	1.4	7228	-6.0	18.4	0.8	1.2	
EU5441	683	-52.1	11.6	1.1	1.6	3444	-10.4	17.5	0.0	1.4	
EU5478	1364	-48.6	11.3	-0.1	1.5	13248	-12.0	16.3	-0.4	1.3	
EU5529	1264	-49.0	11.0	0.5	1.4	11915	-12.2	16.3	-0.1	1.3	
EU5587	1193	-44.0	13.7	1.1	1.1	5871	-7.9	19.5	0.5	1.2	
EU5591	1943	-48.8	11.8	-0.3	1.0	7145	-1.0	10.8	-0.1	1.3	
EU5612	662	-53.5	7.9	-0.6	1.1	4965	-16.3	17.1	-0.4	1.3	
EU5613	1150	-40.8	17.2	1.1	1.0	8627	-6.8	18.8	0.7	1.2	
EU5777	987	-50.7	9.8	0.5	1.2	7521	-15.2	16.9	-0.1	1.4	
EU5802	894	-50.8	10.8	-0.2	1.1	6551	-15.5	17.1	-0.3	1.3	
EU5821	880	-51.3	9.5	0.3	1.3	6782	-14.8	16.7	-0.2	1.3	
EU5891	1049	-41.4	16.3	0.6	1.0	8549	-6.8	18.1	0.6	1.1	
EU6264	696	-50.0	10.3	-0.5	1.3	6031	-13.4	17.0	-0.4	1.3	
EU6281	827	-47.6	11.6	0.4	1.3	6143	-13.2	16.7	-0.2	1.3	
EU6287						5596	-22.5	22.8	-0.6	1.2	
EU6349	846	-51.7	11.0	0.9	1.5	5185	-11.8	16.6	0.3	1.3	
EU6444	764	-55.0	10.7	-0.2	2.1	4041	-11.8	17.4	-0.2	1.5	
EU6524	918	-48.8	10.3	-0.3	1.1	2171	-0.4	11.7	0.0	1.6	
EU6527	846	-52.6	11.9	0.5	1.5	4391	-10.7	16.7	-0.1	1.3	
EU6544	1353	-46.8	14.1	1.5	1.3	5971	-7.8	19.9	1.0	1.2	
EU6556	1378	-47.6	13.2	0.7	1.3	7258	-8.9	20.2	0.7	1.1	
EU6743	1204	-42.3	16.4	1.2	1.1	7396	-6.9	18.4	0.7	1.2	
EU6821	556	-43.9	11.1	0.0	2.1	1103	11.5	10.0	0.3	1.2	
EU6890	851	-53.9	11.3	0.3	1.4	5157	-10.2	16.8	-0.1	1.4	
EU6893						36	-2.0	12.8	-0.2	1.0	
EU6923						5955	-24.9	22.3	-0.5	1.2	
EU7001	1198	-43.2	15.1	0.5	1.0	8664	-6.5	18.7	0.5	1.2	
EU7082						5130	-22.4	23.4	-0.1	1.3	
EU7119	958	-37.8	19.9	0.3	1.3	6002	-9.6	20.1	0.2	1.2	
EU7218	1166	-53.9	11.5	-0.1	1.3	5484	-10.2	17.0	-0.2	1.2	
EU7285						465	-16.5	22.3	-0.4	1.0	
EU7521						5550	-23.6	23.2	-0.2	1.1	
EU7629	256	-52.9	10.5	0.6	1.5	1271	-10.1	16.8	0.2	1.4	
EU7634						2469	-25.9	22.7	-0.2	1.3	

2001-IV 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
EU7635	521	-27.5	24.7	0.0	1.2	7146	-10.5	19.8	0.0	1.2	
EU7643	967	-52.8	12.3	-0.2	1.3	5020	-11.7	16.8	-0.5	1.4	
EU7654	865	-53.1	10.6	-0.3	1.4	5086	-10.4	16.9	-0.3	1.2	
EU7724	1286	-54.3	10.1	0.2	1.3	6182	-10.9	17.4	-0.3	1.3	
EU7865						5156	-24.1	21.9	-0.4	1.2	
EU7888	777	-49.0	10.8	0.3	1.3	5986	-12.4	17.0	0.0	1.3	
EU7894	554	-36.3	20.4	0.6	1.6	3365	-7.8	19.1	0.4	1.1	
EU8264						3909	-23.7	21.9	-0.1	1.2	
EU8431						303	-17.7	22.3	0.0	1.3	
EU8478						6167	-23.3	22.7	0.0	1.2	
EU8520	1168	-52.7	10.5	1.2	1.6	5742	-10.9	17.1	0.2	1.3	
EU8598						5377	-23.3	22.1	-0.2	1.2	
EU8605						2264	-20.7	23.2	-0.4	1.2	
EU8632						1583	-20.6	23.3	-0.1	1.9	
EU8733	1374	-47.2	14.9	0.6	1.2	6558	-9.0	19.5	0.4	1.2	
EU8736						3546	-22.8	23.3	-0.5	1.3	
EU8742	1346	-47.0	14.5	1.5	1.5	6360	-7.6	20.1	0.8	1.2	
EU8787	1054	-45.9	15.1	0.6	1.2	4973	-7.1	17.9	0.6	1.2	
EU8789						235	-17.4	24.4	-0.4	1.0	
EU8891						3371	-23.0	22.2	-0.4	1.3	
EU8943						157	-10.5	26.1	-0.3	1.4	
EU8969	1000	-52.5	11.6	0.3	1.4	5240	-10.2	16.6	-0.4	1.3	
EU9013	938	-45.8	14.4	0.4	1.2	6871	-6.3	19.3	0.4	1.1	
EU9023						5081	-22.3	22.8	-0.4	1.1	
EU9145	917	-52.1	10.6	0.8	1.5	5833	-10.8	17.1	-0.2	1.3	
EU9158	1451	-48.9	11.2	0.0	1.6	12987	-12.3	16.4	-0.1	1.3	
EU9234	871	-52.0	9.5	-0.1	1.3	6442	-15.4	17.1	-0.2	1.4	
EU9245	957	-50.5	10.3	0.0	1.3	7225	-14.3	16.9	-0.2	1.3	
EU9356						4529	-21.7	21.7	-0.4	1.2	
EU9378						952	-14.4	23.9	1.6	1.3	
EU9544	920	-51.8	9.8	-0.4	1.2	7129	-15.8	17.1	-0.3	1.3	
EU9589						2929	-24.5	22.0	-0.6	1.2	
EU9622	365	-51.3	8.0	-0.1	1.1	2080	-19.0	16.8	-0.3	1.3	
EU9678						786	-16.2	21.1	-0.3	1.3	
EU9680	628	-53.4	9.7	-0.3	1.2	5948	-10.9	16.6	-0.3	1.2	
EU9692						4089	-23.1	22.4	-0.3	1.1	
EU9723	1241	-43.6	15.9	0.8	1.1	6309	-6.5	18.8	0.6	1.2	
EU9729	443	-52.9	10.5	-0.3	1.3	5332	-10.4	16.3	-0.4	1.3	
EU9734						2921	-26.5	21.6	-0.5	1.3	
EU9883	1175	-42.6	16.0	0.6	1.1	8867	-6.8	18.4	0.6	1.1	
EU9967						3189	-23.0	22.6	-0.4	1.2	

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

2001-IV 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
	EU0000						40	16.4	2.8	0.3	2.3
	EU0002						12177	16.5	11.0	0.1	2.5
	EU0003	6877	25.5	14.5	0.0	2.3	2528	11.0	7.8	-0.1	2.1
	EU0008	5815	29.3	16.8	0.1	2.7	2226	13.6	8.3	-0.2	2.1
	EU0021	1492	27.1	14.7	0.2	2.8	8090	14.4	8.3	0.0	2.5
	EU0022	2088	25.7	13.9	0.1	2.9	7080	11.4	7.2	-0.2	2.2
	EU0032	762	22.3	13.1	0.0	3.2	2087	8.6	5.9	-0.1	2.5
	EU0041	1368	23.9	13.3	0.2	2.9	9835	13.5	10.2	-0.3	2.5
	EU0043	1600	22.3	13.2	0.2	2.8	9338	13.6	10.7	0.0	2.6
	EU0045	7817	25.6	15.5	0.0	2.5	3368	10.6	8.0	-0.1	2.3
	EU0047	1651	22.0	12.9	0.2	2.4	9143	13.6	10.7	-0.3	2.5
	EU0049						4999	17.3	12.0	0.2	2.8
	EU0050	697	22.8	13.6	0.4	3.1	8048	14.1	10.7	-0.1	2.8
	EU0051	1512	25.1	13.0	0.2	2.9	4597	10.3	7.9	0.0	2.4
	EU0052	1186	19.1	11.0	0.2	2.8	12668	13.7	10.4	0.0	2.8
	EU0054	1371	25.1	14.8	0.2	3.1	4182	13.0	8.3	0.1	2.7
	EU0055						10395	16.4	10.6	0.1	2.5
	EU0059	803	20.7	12.7	0.2	2.5	9246	12.4	9.3	-0.2	2.6
	EU0060	5758	23.6	14.0	0.1	2.4	3095	8.6	6.4	0.1	2.4
	EU0061	851	20.2	12.5	0.2	2.7	11882	13.0	9.8	-0.2	2.5
	EU0072	1138	27.0	13.5	0.1	2.6	8660	11.5	7.3	-0.2	2.2
	EU0073	2646	29.5	15.0	0.2	2.6	2797	11.3	9.7	0.1	2.1
	EU0081	2419	24.8	12.1	0.1	2.7	7453	11.4	7.0	-0.1	2.4
	EU0082						11994	16.8	10.9	-0.1	2.6
	EU0086	3189	26.9	15.8	0.1	2.4	3309	11.7	9.9	0.1	2.2
	EU0088	1932	26.0	14.5	0.3	2.9	9919	11.4	7.4	-0.1	2.4
	EU0106	1073	21.9	12.8	0.4	2.7	12684	13.0	10.5	-0.1	2.7
	EU0109	1987	29.0	14.7	0.2	2.6	6234	11.3	7.0	-0.1	2.3
	EU0120	3045	27.0	16.2	0.2	2.7	4103	11.2	9.3	0.1	2.2
	EU0123	7345	28.9	15.9	0.1	2.6	2978	13.7	8.0	-0.2	2.2
	EU0124						3041	15.1	9.4	0.0	2.6
	EU0154	681	22.4	13.2	0.1	2.7	5805	12.8	9.5	0.0	2.6
	EU0158	1146	22.2	13.3	0.1	2.5	10386	11.9	9.2	-0.1	2.4
	EU0167	1078	22.1	12.9	0.3	2.8	10059	11.8	9.6	-0.2	2.3
	EU0177	2825	29.8	15.6	0.2	2.5	3573	11.3	8.8	0.0	2.5
	EU0185	1080	22.6	12.9	0.1	2.7	9905	14.1	10.8	-0.2	2.6
	EU0203	2924	28.8	14.9	0.2	2.5	3659	12.2	9.8	0.1	2.3
	EU0204	520	22.4	13.3	0.0	2.5	1821	9.8	6.4	0.1	2.1
	EU0234						11291	16.2	10.4	0.2	2.4
	EU0251	561	22.2	13.0	0.1	3.1	5218	12.9	10.8	-0.1	2.8

2001-IV 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
EU0263	4869	29.9	15.4	0.2	2.8	4653	10.4	7.1	0.0	2.3	
EU0281	196	23.3	15.2	0.1	2.9	1007	9.5	5.6	-0.5	2.4	
EU0299						9240	16.1	10.3	0.1	2.7	
EU0301	1489	22.5	12.5	0.1	2.6	10346	13.6	11.2	-0.2	2.6	
EU0303	1395	20.3	13.3	0.2	2.7	11626	12.2	9.5	-0.2	2.6	
EU0307	1131	22.5	13.8	0.3	2.8	13120	13.3	10.1	0.0	2.6	
EU0311	903	21.2	12.2	0.1	2.5	9248	13.2	10.5	-0.1	2.3	
EU0313	953	22.2	13.9	0.2	2.6	10004	12.8	10.3	-0.4	2.5	
EU0316	1563	22.5	13.0	0.1	2.7	9252	12.9	10.0	-0.1	2.8	
EU0319	1385	21.9	13.4	0.3	2.6	9246	13.5	10.7	-0.3	2.5	
EU0359	1035	21.3	12.5	0.1	2.5	11467	12.5	9.8	-0.3	2.5	
EU0367						8658	16.8	10.7	0.1	2.5	
EU0373	408	21.6	14.4	0.0	3.0	4343	13.9	11.2	-0.3	3.0	
EU0394	577	23.4	14.9	0.3	3.0	5878	13.3	10.5	-0.1	3.0	
EU0413	576	20.3	11.7	0.1	2.7	5798	12.9	10.2	-0.3	2.9	
EU0432						11428	16.8	10.6	0.0	2.6	
EU0442	387	20.9	13.9	0.3	2.7	4785	13.6	11.4	-0.3	3.0	
EU0456	685	21.0	11.8	0.0	2.5	4643	12.6	8.9	0.3	2.5	
EU0457	3006	22.0	14.4	0.0	2.5	958	5.4	3.4			
EU0458	373	20.7	13.2	-0.3	2.7	3258	12.1	9.2	0.1	2.5	
EU0476	565	20.5	12.3	0.1	3.0	4606	14.9	10.7	0.4	2.7	
EU0511	492	25.1	14.0	0.4	3.5	4492	14.9	11.9	-0.4	2.7	
EU0558	394	23.5	14.0	0.3	3.2	6328	13.9	11.5	-0.2	3.1	
EU0568						34238	16.7	10.6	0.2	2.7	
EU0583	522	21.7	12.8	0.1	2.6	5267	13.8	12.0	-0.2	2.9	
EU0601	561	22.0	16.3	0.2	2.7	5640	13.3	11.4	-0.4	2.8	
EU0676	597	21.5	13.4	0.0	2.9	5549	14.2	10.8	-0.2	3.0	
EU0711	718	17.9	11.6	0.0	2.3	7903	15.5	11.4	0.2	2.5	
EU0723	171	15.7	10.0	0.2	2.4	3169	15.0	11.5	-0.1	2.4	
EU0802	1046	22.6	14.4	0.2	2.6	10453	13.0	10.5	-0.3	2.5	
EU0807	1938	25.4	13.8	0.2	2.8	4267	10.2	7.5	-0.1	2.5	
EU0810	684	23.4	14.3	0.3	2.9	5581	12.9	10.9	-0.1	2.9	
EU0826						11654	15.8	10.4	0.0	2.7	
EU0875	976	21.8	11.6	0.3	2.5	11093	13.3	9.4	-0.1	2.3	
EU0921	1092	24.2	13.1	0.8	3.8	11975	13.4	10.6	-0.1	2.9	
EU0934	8479	27.6	15.5	0.0	2.5	3400	11.5	8.0	0.0	2.3	
EU0947	3228	24.7	14.8	0.1	2.6	1200	11.8	8.8	-0.2	2.2	
EU0961	5797	26.2	15.6	0.1	2.4	2657	10.4	7.9	0.0	2.1	
EU0985	7129	27.6	16.2	0.1	2.5	2636	12.7	7.9	-0.2	2.1	
EU1001						8045	16.6	11.1	0.2	2.7	
EU1002	6694	24.7	15.5	0.1	2.4	2345	12.8	8.3	0.0	2.1	
EU1222	57	29.3	13.0	0.2	2.0	52	17.1	5.8	1.1	2.0	

2001-IV 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	488	21.9	12.5	0.0	2.9	6163	14.7	11.2	0.4	6.2	
EU1282	2520	24.4	14.7	0.2	2.3	159	10.3	6.2			
EU1301	1528	18.6	14.0	0.1	2.4	684	6.9	4.9			
EU1312	2589	19.5	12.8	0.1	2.2	1358	7.7	5.1	0.1	2.2	
EU1334	1718	19.6	13.5	0.0	2.6	532	5.7	2.6			
EU1337	245	18.8	12.1	0.2	2.6	3734	16.5	12.3	0.1	2.8	
EU1411	3883	24.2	15.5	0.1	2.4	609	8.6	7.5			
EU1446	446	21.9	12.9	0.0	2.6	4666	13.6	10.6	-0.2	2.9	
EU1456						8856	16.9	11.2	0.3	2.7	
EU1495	5360	31.4	16.3	0.1	2.9	2236	13.8	8.2	0.0	2.0	
EU1498	368	23.7	13.6	0.4	3.0	4707	13.4	10.7	-0.4	2.7	
EU1532						10956	15.9	10.4	0.1	2.5	
EU1547	1011	22.3	13.6	0.3	3.0	12378	13.1	11.2	-0.1	2.8	
EU1567						10092	16.6	10.4	0.2	2.5	
EU1593	7398	28.6	16.4	0.1	2.6	2797	13.7	8.5	-0.1	2.6	
EU1692	655	29.6	15.5	0.0	2.8	1528	14.9	8.0	-0.2	2.8	
EU1698						5917	15.0	9.6	0.0	2.4	
EU1863	1358	22.6	12.6	0.4	2.8	12723	13.7	10.5	-0.2	2.8	
EU1929	4371	25.8	15.0	0.0	2.3	372	9.4	8.0			
EU2017	296	21.4	12.0	0.1	2.8	4026	13.1	10.8	-0.1	2.9	
EU2043	2743	24.9	15.3	0.1	2.4	296	7.3	6.7			
EU2055	380	22.0	14.5	0.2	3.3	4064	13.7	11.1	-0.3	2.6	
EU2130	518	22.1	12.0	0.2	2.7	5377	13.6	10.5	-0.2	2.7	
EU2165	502	22.0	12.9	0.3	2.7	4763	13.2	11.0	-0.2	2.6	
EU2189	962	20.2	11.6	0.1	2.5	11487	12.6	9.6	-0.2	2.5	
EU2201	356	20.7	11.6	0.2	2.6	3504	13.1	10.2	0.0	2.6	
EU2247	391	20.9	13.2	0.4	2.6	4926	13.7	11.7	-0.3	2.6	
EU2301	1472	23.8	13.5	0.2	2.8	10577	13.8	10.3	-0.2	2.6	
EU2389	1409	23.4	13.7	0.2	2.6	7613	11.0	7.2	-0.1	2.3	
EU2547	8733	25.5	15.5	0.0	2.5	3647	11.3	8.4	-0.1	2.2	
EU2559	1264	21.8	13.0	0.3	2.7	10582	13.3	10.7	-0.2	2.6	
EU2590	628	27.4	14.8	0.1	3.3	7530	13.3	9.1	-0.1	2.9	
EU2618	843	26.2	15.9	0.2	2.9	9970	14.3	10.2	-0.2	3.1	
EU2630	633	28.1	12.4	-0.2	2.8	4125	14.9	10.6	0.0	2.7	
EU2751	3468	23.9	14.6	0.1	2.4	396	8.7	6.1	0.0	1.5	
EU2773	2828	26.7	16.5	0.1	2.4	232	10.1	7.3			
EU2845	1541	23.6	14.1	0.1	2.8	9091	11.1	7.4	-0.2	2.4	
EU2978						2541	17.4	13.4	0.6	3.1	
EU2984	312	26.0	12.0	0.2	2.5	2906	14.3	9.7	0.2	2.5	
EU3000	1037	23.1	12.8	0.2	2.7	10948	13.9	11.1	-0.1	2.7	
EU3181	1761	23.7	15.0	0.1	2.2	135	8.1	4.2			
EU3257	1047	20.9	13.0	0.4	2.6	9737	11.8	9.9	0.0	2.6	

2001-IV 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
EU3268	409	29.8	18.0	-0.3	2.9	3992	14.9	11.0	0.0	2.8	
EU3270						1268	18.0	10.1	0.1	2.8	
EU3321	1046	25.1	13.5	0.2	2.6	5428	13.3	9.2	-0.1	2.6	
EU3358						4951	15.8	10.3	0.3	2.9	
EU3421	1401	22.4	12.7	0.3	2.5	10842	13.0	10.3	-0.3	2.4	
EU3469						5763	15.8	11.7	0.2	2.7	
EU3533						5367	15.9	11.7	0.0	2.7	
EU3544	692	17.2	11.0	-0.1	2.4	8545	13.9	10.1	0.2	2.4	
EU3598	668	20.0	14.7	0.1	2.8	7813	16.4	11.7	0.2	2.6	
EU3621						2743	14.3	10.4	0.3	2.5	
EU3654	474	22.9	11.5	-0.1	3.4	3596	13.9	8.8	-0.1	2.9	
EU3684	953	26.8	13.9	0.2	3.0	5466	14.2	9.9	-0.1	2.8	
EU3714						437	18.8	12.3	0.1	2.7	
EU3725	3742	25.0	14.6	0.2	2.5	314	10.0	8.2			
EU3755						4570	17.4	12.5	0.5	3.1	
EU3874	2800	23.6	14.9	0.1	2.3	265	11.8	8.9			
EU3908	1072	22.5	12.4	0.3	2.8	10468	13.4	9.5	-0.1	2.9	
EU3972						4414	16.2	10.9	0.0	2.6	
EU4002	949	26.5	13.6	0.0	2.6	4660	14.8	10.5	0.2	2.7	
EU4021						4332	16.4	11.6	0.4	3.0	
EU4278						3103	16.8	12.0	0.2	2.6	
EU4333	673	22.4	11.7	-0.1	2.8	9108	12.5	8.9	-0.2	2.9	
EU4426	537	28.6	15.0	0.4	2.7	1818	12.2	7.6	-0.1	2.4	
EU4444	846	26.4	14.8	0.3	2.8	6577	14.0	10.5	0.0	2.8	
EU4519	912	24.7	15.4	0.3	2.7	6980	14.1	10.0	-0.1	2.8	
EU4527	664	18.2	12.5	0.2	2.7	8679	15.8	11.2	0.2	2.5	
EU4529	1929	24.8	13.1	0.3	2.7	8773	11.1	7.6	-0.3	2.4	
EU4532	576	20.3	14.6	0.3	4.8	8746	15.1	11.1	0.1	2.4	
EU4573	1467	24.5	13.0	-0.2	2.9	13747	13.9	10.4	0.0	2.9	
EU4582	1413	23.7	13.6	0.0	2.7	11868	13.9	10.5	0.1	2.9	
EU4587	588	29.6	14.6	0.5	3.2	1480	14.5	8.9	0.0	2.6	
EU4591	858	23.8	12.6	-0.1	2.3	6162	13.2	9.1	0.0	2.4	
EU4593	1062	24.6	14.4	0.1	3.1	8806	14.4	11.8	-0.3	2.6	
EU4607	730	22.5	13.8	0.0	2.8	6278	12.6	9.1	0.1	2.6	
EU4699	825	26.2	13.7	-0.1	2.9	6153	13.2	9.3	0.1	2.5	
EU4721	1035	24.9	12.9	-0.1	2.6	4812	13.1	9.9	0.1	2.7	
EU4756	457	16.2	10.3	0.1	2.8	1057	7.3	5.5	-0.3	2.6	
EU4792	1257	25.0	13.5	-0.1	2.9	6434	12.7	9.8	-0.2	2.6	
EU4838						404	21.9	16.1	-0.3	2.9	
EU4853	681	26.7	14.5	0.4	2.5	5538	14.2	10.0	0.0	2.8	
EU4865	957	25.0	13.3	0.3	2.6	6502	13.6	9.7	0.0	2.5	
EU4950	1081	27.9	14.5	0.3	2.6	5070	13.7	10.1	-0.1	2.8	
EU5098						437	12.2	8.1	0.3	2.8	

2001-IV 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
EU5134						5894	15.8	11.6	0.4	2.8	
EU5182	198	34.6	19.6	0.1	2.8	733	12.2	8.9	-0.4	2.5	
EU5218	695	24.6	16.0	0.1	2.8	2188	10.7	7.5	-0.2	2.6	
EU5331	1414	23.0	14.5	0.2	2.4	10213	12.9	10.5	-0.2	2.4	
EU5349						67	7.4	5.4	0.0	1.7	
EU5351	982	22.4	13.7	0.4	2.8	11087	12.8	9.8	-0.2	2.4	
EU5372						3137	16.3	11.4	0.2	2.8	
EU5435	1101	20.0	11.6	0.3	2.6	9758	12.6	10.2	-0.3	2.5	
EU5441	683	26.8	15.4	0.1	2.8	3444	14.7	11.6	0.0	2.8	
EU5478	1364	25.0	13.8	0.0	2.9	13248	13.6	9.7	0.0	2.9	
EU5529	1264	27.1	15.9	0.2	4.2	11915	13.0	9.9	0.0	2.9	
EU5587	1193	22.0	11.7	0.2	2.4	8715	14.3	11.1	-0.3	2.4	
EU5591	1943	25.9	15.0	0.2	2.9	7145	10.8	6.8	-0.1	2.3	
EU5612	662	23.7	13.2	0.0	2.9	4965	13.1	9.4	0.0	2.7	
EU5613	1150	19.9	11.5	0.1	2.5	12252	12.6	10.2	-0.2	2.4	
EU5777	987	23.6	15.1	0.2	2.5	7521	13.4	9.3	0.0	2.7	
EU5802	894	24.4	14.1	0.0	2.5	6551	13.3	9.8	0.0	2.7	
EU5821	880	26.0	15.5	0.1	2.5	6782	12.9	10.1	0.0	2.5	
EU5891	1049	21.2	11.8	0.3	2.7	12513	13.3	10.4	-0.2	2.4	
EU6264	696	25.1	14.3	0.2	3.2	6031	14.7	9.9	0.0	3.0	
EU6281	827	20.5	11.2	0.2	2.4	6143	13.2	8.7	0.1	2.7	
EU6287						5596	14.0	10.2	0.3	2.5	
EU6349	846	23.5	14.1	-0.1	2.6	5185	13.9	10.4	0.1	2.8	
EU6444	764	25.2	10.8	0.0	2.7	4041	13.5	9.8	-0.1	2.8	
EU6524	918	27.4	13.4	0.4	3.2	2171	11.6	8.2	0.0	2.8	
EU6527	846	25.5	13.7	0.4	2.7	4391	14.3	10.5	0.1	2.8	
EU6544	1353	24.8	14.3	0.2	2.7	8472	13.4	10.6	-0.1	2.4	
EU6556	1378	23.7	13.5	0.1	2.6	9785	14.5	11.3	-0.1	2.4	
EU6743	1204	20.6	12.3	0.2	2.5	10784	12.7	9.7	-0.2	2.4	
EU6821	556	12.1	9.1	0.0	3.2	1103	8.2	5.2	-0.4	2.4	
EU6890	851	23.8	12.4	0.0	2.6	5157	12.7	9.1	0.0	2.8	
EU6893						36	8.3	5.6	-1.0	2.2	
EU6923						5955	16.1	10.8	0.2	2.8	
EU7001	1198	21.8	11.7	0.2	2.6	12268	13.9	11.1	-0.1	2.6	
EU7082						5130	16.3	11.3	0.4	2.7	
EU7119	958	20.6	12.9	0.0	2.8	8881	15.1	10.7	0.2	2.6	
EU7218	1166	26.1	14.4	0.1	2.6	5484	14.9	10.8	0.0	2.7	
EU7285						465	13.4	8.7	-0.1	2.5	
EU7521						5550	15.9	11.2	0.2	2.7	
EU7629	256	23.9	11.1	-0.2	2.4	1271	13.4	9.7	0.2	2.6	
EU7634						2469	17.1	11.2	0.2	2.8	
EU7635	521	18.1	12.4	0.3	2.6	9910	15.2	11.1	0.4	2.6	

2001-IV 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
EU7643	967	26.2	15.0	0.1	2.6	5020	14.1	10.1	0.0	2.7	
EU7654	865	24.9	15.0	-0.1	2.7	5086	13.8	10.3	0.0	2.8	
EU7724	1286	22.2	11.7	0.1	2.7	6182	12.3	9.0	0.0	2.5	
EU7865						5156	15.2	10.4	0.0	2.7	
EU7888	777	24.2	13.6	0.4	2.8	5986	13.4	9.3	0.2	2.7	
EU7894	554	21.9	13.1	0.0	3.4	4968	13.2	9.5	0.1	2.5	
EU8264						3909	15.7	11.4	0.3	2.6	
EU8431						303	15.7	11.4	-0.1	2.4	
EU8478						6167	17.5	13.0	0.4	3.0	
EU8520	1168	27.5	13.4	0.1	2.7	5742	14.2	9.9	0.0	2.8	
EU8598						5377	15.8	10.7	0.2	2.8	
EU8605						2264	16.0	10.3	0.5	3.0	
EU8632						1583	19.2	14.3	0.3	3.6	
EU8733	1374	23.4	13.9	0.0	2.6	9813	13.2	11.0	-0.3	2.7	
EU8736						3546	16.3	10.5	0.3	2.8	
EU8742	1346	22.4	13.5	0.1	2.8	8492	13.1	10.1	-0.1	2.5	
EU8787	1054	21.0	12.3	0.1	2.5	7762	12.2	9.9	-0.2	2.4	
EU8789						235	16.1	9.4	-0.1	3.2	
EU8891						3371	15.9	10.8	0.3	2.7	
EU8943						157	10.4	7.4	0.0	2.2	
EU8969	1000	23.4	11.7	0.0	2.6	5240	14.0	9.8	0.0	2.7	
EU9013	938	20.4	11.3	0.0	3.1	7636	12.5	9.9	-0.1	2.2	
EU9023						5081	17.1	12.7	0.5	2.6	
EU9145	917	25.2	14.3	0.4	2.7	5833	13.3	9.9	-0.1	2.8	
EU9158	1451	25.9	13.5	0.4	3.0	12987	13.5	10.1	0.0	2.9	
EU9234	871	22.3	12.6	0.1	2.7	6442	12.7	9.2	0.0	2.6	
EU9245	957	27.3	14.7	0.1	2.6	7225	14.6	9.8	0.0	2.7	
EU9356						4529	15.6	10.8	0.2	2.7	
EU9378						952	12.0	8.1	0.2	2.5	
EU9544	920	23.2	15.2	0.0	2.4	7129	13.6	9.7	-0.1	2.5	
EU9589						2929	16.5	11.7	0.1	2.9	
EU9622	365	16.7	10.2	-0.3	2.5	2080	11.3	8.5	-0.1	2.7	
EU9678						786	13.6	12.7	0.4	2.5	
EU9680	628	26.3	14.6	-0.1	2.8	5948	13.1	9.9	0.1	2.5	
EU9692						4089	16.1	10.2	0.3	2.7	
EU9723	1241	22.7	12.7	0.2	2.7	9641	13.8	10.8	-0.2	2.4	
EU9729	443	29.4	15.9	-0.1	3.0	5332	13.6	9.8	-0.1	2.8	
EU9734						2921	17.6	11.8	0.5	3.1	
EU9883	1175	23.2	13.7	0.2	2.8	11520	12.4	10.0	-0.1	2.4	
EU9967						3189	16.3	12.3	0.1	2.7	

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

2001-IV DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in degrees					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
	EU0000						40			8	8
	EU0002						12177			10	15
	EU0003	6877		3	10		2528			6	17
	EU0008	5815		5	10		2226			7	19
	EU0021	1492		7	11		8090			11	18
	EU0022	2088		6	9		7080			12	19
	EU0032	762		1	6		2087			5	14
	EU0041	1368		7	12		9835			15	25
	EU0043	1600		8	13		9338			13	21
	EU0045	7817		3	9		3368			6	20
	EU0047	1651		7	12		9143			14	22
	EU0049						4999			12	18
	EU0050	697		8	12		8048			16	25
	EU0051	1512		6	9		4597			17	26
	EU0052	1186		9	14		12668			14	20
	EU0054	1371		7	11		4182			13	23
	EU0055						10395			11	17
	EU0059	803		8	13		9246			15	21
	EU0060	5758		4	10		3095			5	17
	EU0061	851		9	14		11882			15	22
	EU0072	1138		6	9		8660			12	18
	EU0073	2646		4	9		2797			6	18
	EU0081	2419		6	9		7453			13	19
	EU0082						11994			11	16
	EU0086	3189		4	10		3309			7	20
	EU0088	1932		7	11		9919			13	20
	EU0106	1073		8	13		12684			17	25
	EU0109	1987		5	8		6234			12	19
	EU0120	3045		4	8		4103			6	16
	EU0123	7345		5	9		2978			7	17
	EU0124						3041			12	17
	EU0154	681		8	14		5805			16	23
	EU0158	1146		7	10		10386			15	22
	EU0167	1078		8	12		10059			15	23
	EU0177	2825		4	8		3573			5	14
	EU0185	1080		7	12		9905			13	21
	EU0203	2924		4	10		3659			5	18
	EU0204	520		7	10		1821			16	28
	EU0234						11291			11	16
	EU0251	561		8	13		5218			15	21
	EU0263	4869		4	9		4653			6	18

2001-IV DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in degrees					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU0281	196			1	6	1007			10	18	
EU0299						9240			11	16	
EU0301	1489			7	12	10346			15	24	
EU0303	1395			9	14	11626			16	24	
EU0307	1131			8	12	13120			15	22	
EU0311	903			7	10	9248			14	22	
EU0313	953			8	14	10004			14	21	
EU0316	1563			8	12	9252			15	24	
EU0319	1385			8	15	9246			13	21	
EU0359	1035			7	11	11467			14	22	
EU0367						8658			11	17	
EU0373	408			9	14	4343			14	21	
EU0394	577			9	12	5878			16	22	
EU0413	576			8	11	5798			15	22	
EU0432						11428			11	16	
EU0442	387			10	17	4785			16	24	
EU0456	685			7	9	4643			13	18	
EU0457	3006			3	9	958					
EU0458	373			10	19	3258			14	20	
EU0476	565			8	14	4606			11	15	
EU0511	492			7	11	4492			14	20	
EU0558	394			9	13	6328			15	21	
EU0568						34238			11	17	
EU0583	522			8	12	5267			15	22	
EU0601	561			9	14	5640			15	24	
EU0676	597			7	12	5549			14	21	
EU0711	718			10	16	7903			12	18	
EU0723	171			11	19	3169			13	20	
EU0802	1046			7	12	10453			14	21	
EU0807	1938			6	10	4267			18	29	
EU0810	684			9	16	5581			16	23	
EU0826						11654			11	17	
EU0875	976			6	7	11093			13	19	
EU0921	1092			8	13	11975			16	24	
EU0934	8479			3	8	3400			6	16	
EU0947	3228			3	8	1200			6	18	
EU0961	5797			3	10	2657			5	19	
EU0985	7129			5	10	2636			7	20	
EU1001						8045			12	20	
EU1002	6694			5	10	2345			6	14	
EU1222	57			2	4	52			5	5	
EU1234	488			8	15	6163			15	23	
EU1282	2520			5	15	159					

2001-IV DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in degrees					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU1301	1528			1	4	684					
EU1312	2589			3	11	1358			2	21	
EU1334	1718			3	10	532					
EU1337	245			7	14	3734			10	16	
EU1411	3883			3	8	609					
EU1446	446			8	14	4666			16	24	
EU1456						8856			12	18	
EU1495	5360			4	8	2236			7	18	
EU1498	368			8	10	4707			15	23	
EU1532						10956			11	18	
EU1547	1011			9	15	12378			15	22	
EU1567						10092			10	16	
EU1593	7398			5	10	2797			6	16	
EU1692	655			6	10	1528			11	19	
EU1698						5917			11	16	
EU1863	1358			7	11	12723			14	20	
EU1929	4371			4	8	372					
EU2017	296			8	15	4026			16	24	
EU2043	2743			3	10	296					
EU2055	380			8	10	4064			14	20	
EU2130	518			7	10	5377			15	23	
EU2165	502			8	14	4763			14	22	
EU2189	962			8	10	11487			14	20	
EU2201	356			7	8	3504			15	22	
EU2247	391			8	12	4926			16	24	
EU2301	1472			7	10	10577			13	20	
EU2389	1409			6	8	7613			14	21	
EU2547	8733			4	10	3647			6	19	
EU2559	1264			8	12	10582			14	22	
EU2590	628			5	6	7530			14	23	
EU2618	843			7	10	9970			13	22	
EU2630	633			5	9	4125			13	21	
EU2751	3468			4	8	396			1	8	
EU2773	2828			4	9	232					
EU2845	1541			8	11	9091			14	22	
EU2978						2541			16	25	
EU2984	312			5	5	2906			12	17	
EU3000	1037			7	11	10948			14	21	
EU3181	1761			3	11	135					
EU3257	1047			9	14	9737			18	26	
EU3268	409			6	11	3992			11	19	
EU3270						1268			11	17	
EU3321	1046			6	9	5428			14	24	

2001-IV DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in degrees					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU3358						4951				13	20
EU3421	1401			8	12	10842				14	22
EU3469						5763				15	23
EU3533						5367				13	21
EU3544	692			10	19	8545				13	19
EU3598	668			10	22	7813				12	20
EU3621						2743				16	25
EU3654	474			7	12	3596				13	21
EU3684	953			6	7	5466				14	22
EU3714						437				11	20
EU3725	3742			4	11	314					
EU3755						4570				14	23
EU3874	2800			3	9	265					
EU3908	1072			9	18	10468				14	23
EU3972						4414				14	22
EU4002	949			7	12	4660				12	21
EU4021						4332				13	24
EU4278						3103				12	18
EU4333	673			7	8	9108				16	26
EU4426	537			5	8	1818				13	20
EU4444	846			6	10	6577				13	20
EU4519	912			8	15	6980				13	20
EU4527	664			9	15	8679				11	17
EU4529	1929			6	8	8773				15	24
EU4532	576			11	22	8746				12	17
EU4573	1467			5	8	13747				13	21
EU4582	1413			7	11	11868				13	21
EU4587	588			6	8	1480				11	18
EU4591	858			6	9	6162				12	18
EU4593	1062			8	14	8806				14	23
EU4607	730			7	11	6278				14	22
EU4699	825			7	11	6153				13	21
EU4721	1035			7	10	4812				15	23
EU4756	457			1	4	1057				8	25
EU4792	1257			7	12	6434				17	27
EU4838						404				9	15
EU4853	681			6	8	5538				12	19
EU4865	957			6	8	6502				12	18
EU4950	1081			6	14	5070				15	24
EU5098						437				17	25
EU5134						5894				14	23
EU5182	198			5	11	733				15	22
EU5218	695			8	16	2188				15	25

2001-IV DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in degrees					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU5331	1414			7	14	10213			14	22	
EU5349						67			37	53	
EU5351	982			7	11	11087			14	21	
EU5372						3137			14	23	
EU5435	1101			8	12	9758			15	23	
EU5441	683			7	14	3444			15	26	
EU5478	1364			6	11	13248			13	22	
EU5529	1264			7	11	11915			14	22	
EU5587	1193			7	11	8715			12	18	
EU5591	1943			6	8	7145			13	19	
EU5612	662			7	10	4965			13	20	
EU5613	1150			7	13	12252			14	21	
EU5777	987			7	13	7521			12	18	
EU5802	894			6	7	6551			13	21	
EU5821	880			7	11	6782			14	21	
EU5891	1049			7	10	12513			14	20	
EU6264	696			8	12	6031			14	21	
EU6281	827			7	10	6143			14	21	
EU6287						5596			14	22	
EU6349	846			8	12	5185			13	21	
EU6444	764			6	6	4041			17	27	
EU6524	918			7	13	2171			18	26	
EU6527	846			7	13	4391			14	22	
EU6544	1353			6	10	8472			15	23	
EU6556	1378			7	11	9785			13	20	
EU6743	1204			7	11	10784			14	21	
EU6821	556			1	25	1103			6	19	
EU6890	851			6	8	5157			17	28	
EU6893						36			32	25	
EU6923						5955			14	22	
EU7001	1198			7	11	12268			14	22	
EU7082						5130			12	21	
EU7119	958			9	14	8881			12	19	
EU7218	1166			6	12	5484			12	20	
EU7285						465			15	24	
EU7521						5550			13	20	
EU7629	256			6	12	1271			16	27	
EU7634						2469			11	19	
EU7635	521			10	18	9910			12	18	
EU7643	967			6	8	5020			14	23	
EU7654	865			6	9	5086			15	25	
EU7724	1286			8	14	6182			15	24	
EU7865						5156			14	23	

2001-IV DD	Wind Direction Cruise level in degrees					Wind Direction Ascent & Descent in degrees					
	AIRCRAFT	Number of Reports	Observed		Obs-backgrnd		Number of Reports	Observed		Obs-backgrnd	
			Mean	SD	Mean	SD		Mean	SD	Mean	SD
EU7888	777			6	10	5986			14	20	
EU7894	554			7	13	4968			14	22	
EU8264						3909			14	23	
EU8431						303			16	26	
EU8478						6167			13	21	
EU8520	1168			5	6	5742			14	23	
EU8598						5377			15	24	
EU8605						2264			17	26	
EU8632						1583			13	20	
EU8733	1374			8	14	9813			15	22	
EU8736						3546			12	20	
EU8742	1346			8	12	8492			14	23	
EU8787	1054			7	10	7762			16	24	
EU8789						235			13	21	
EU8891						3371			14	23	
EU8943						157			24	34	
EU8969	1000			8	12	5240			15	24	
EU9013	938			8	13	7636			15	23	
EU9023						5081			13	21	
EU9145	917			6	7	5833			14	24	
EU9158	1451			7	10	12987			14	23	
EU9234	871			6	8	6442			13	20	
EU9245	957			5	7	7225			12	18	
EU9356						4529			13	21	
EU9378						952			16	25	
EU9544	920			6	9	7129			13	19	
EU9589						2929			12	18	
EU9622	365			8	8	2080			18	29	
EU9678						786			16	26	
EU9680	628			6	7	5948			13	22	
EU9692						4089			12	19	
EU9723	1241			7	10	9641			13	20	
EU9729	443			6	10	5332			13	21	
EU9734						2921			15	25	
EU9883	1175			7	12	11520			15	22	
EU9967						3189			14	24	

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Annex I. EU Amdar Observations from 12 - 14 November, 2001.

In order to have a brief impression of the distribution of the locations of observations, two maps are presented. In fig. 3 Europe is presented with all EU Amdar observations for the period 21 – 23 September 2001. Note that most data is acquired during ascending or descending (ASC: 54%, DES: 28%, LVR: 17%, LVW: 0%). In figure 4 (next page), data from the North Atlantic is displayed. AMDAR data is evaluated using HIRLAM numerical model data as background. This background reference is restricted by a limited area, as shown in fig. 4.

AMDAR COVERAGE 12 – 14 NOVEMBER 2001

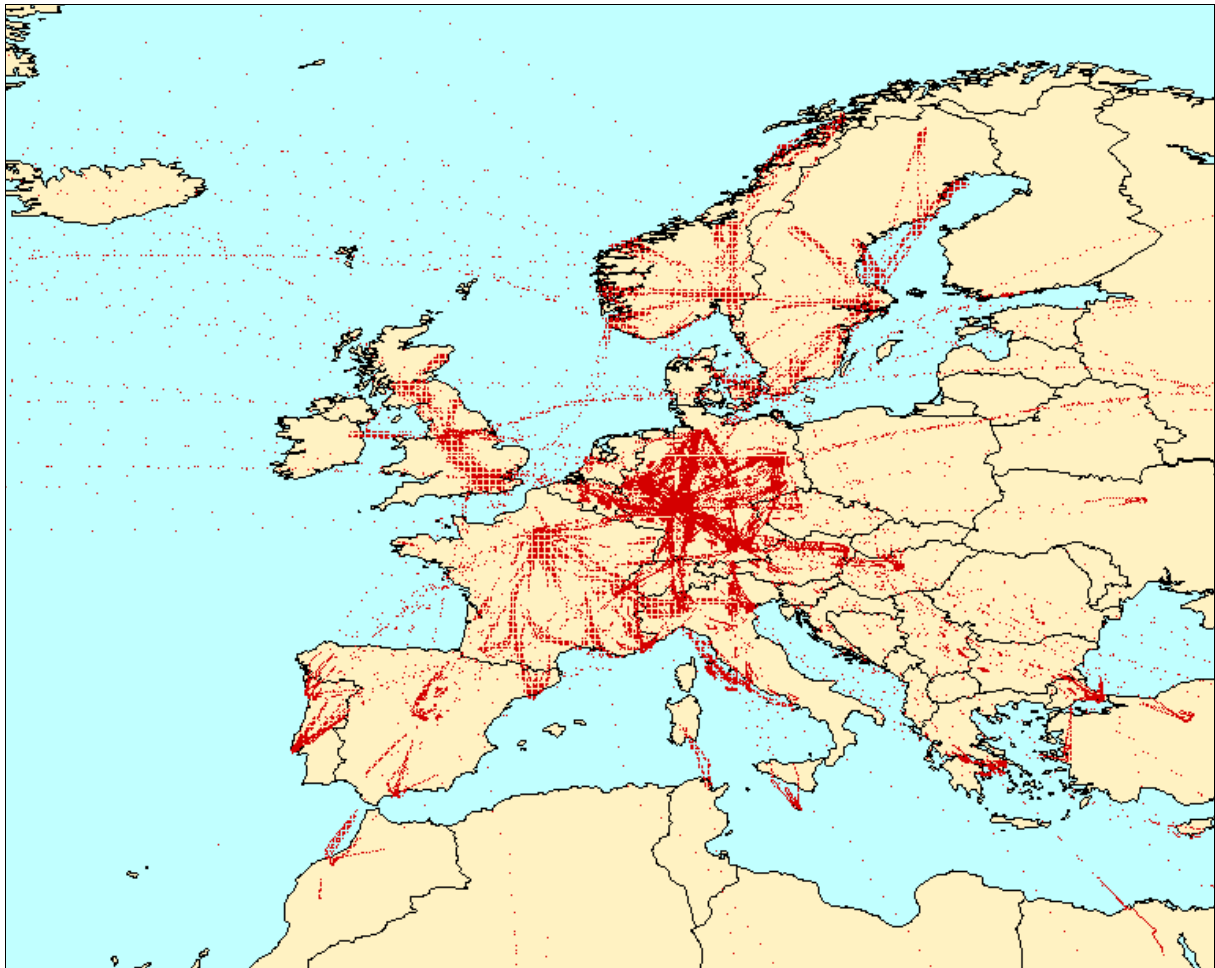


Fig. 3. All EU AMDAR observation locations, for the period 12 – 14 November 2001 and zoomed in over Europe.

AMDAR COVERAGE 12 – 14 NOVEMBER 2001

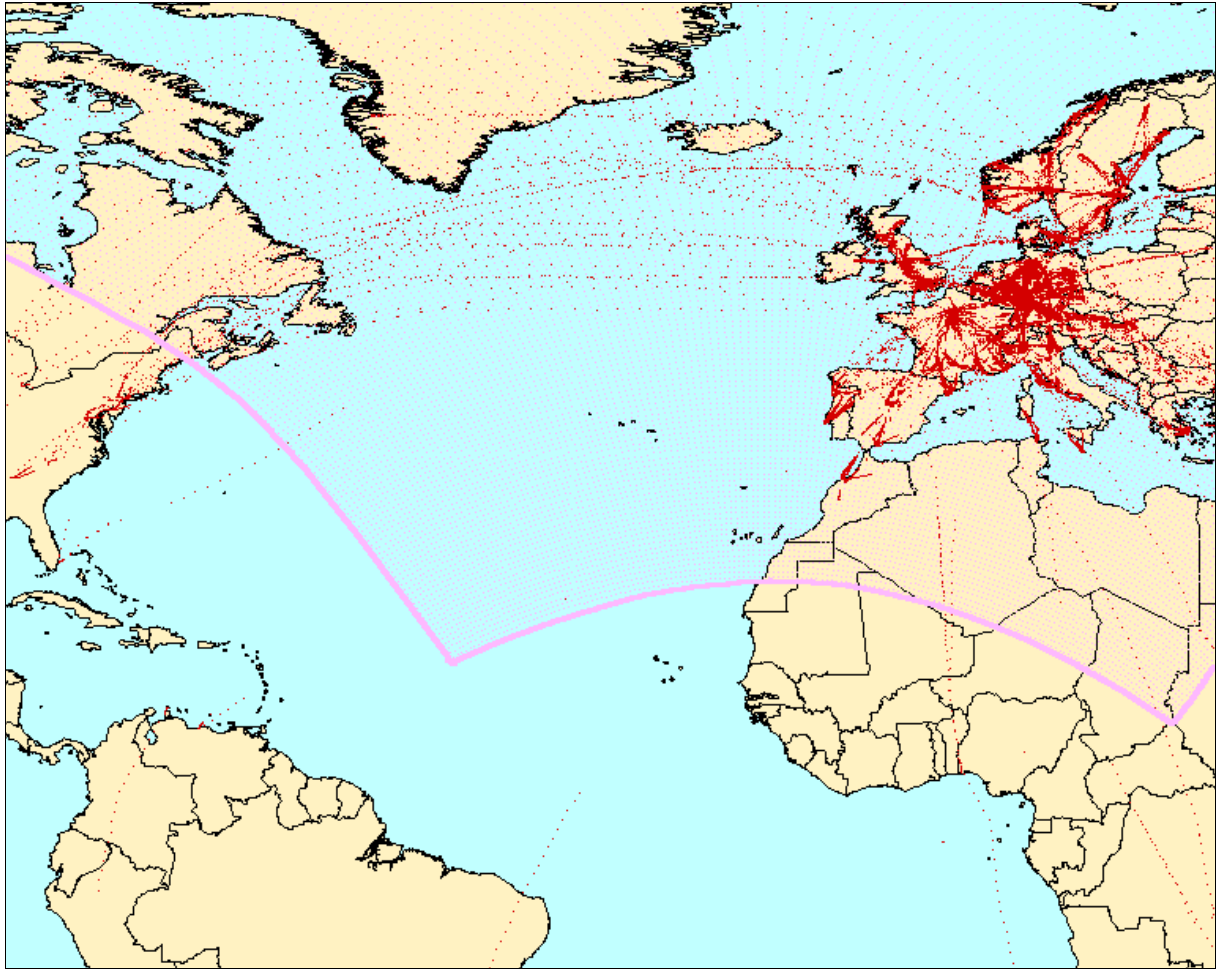



Fig. 4. All EU-AMDAR observations locations for 12 – 14 November 2001. In this figure the Hirlam area used for the evaluation purposes is indicated ()

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

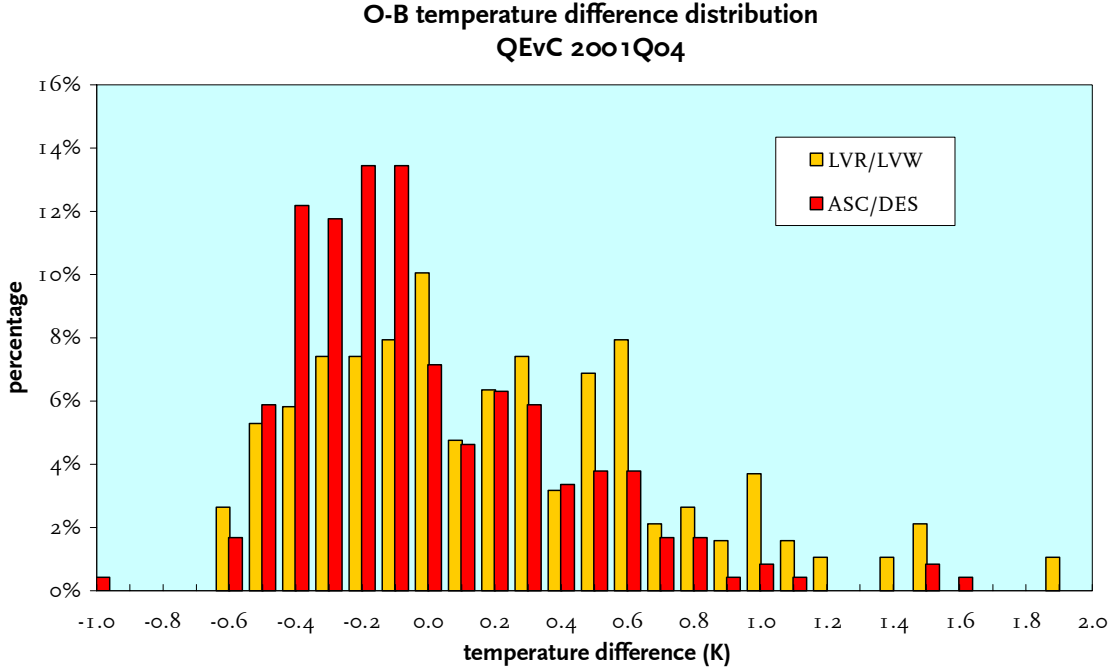


Fig. 5. Frequency distribution of the mean temperature difference (OBS–Background) for the number of aircraft reporting AMDAR reports (N=249). Distinction is made between the Flight Level (LVR/LVW) and the Ascending or Descending phase (ASC/DES). Clearly, there is no significant difference between the distributions of both phases.

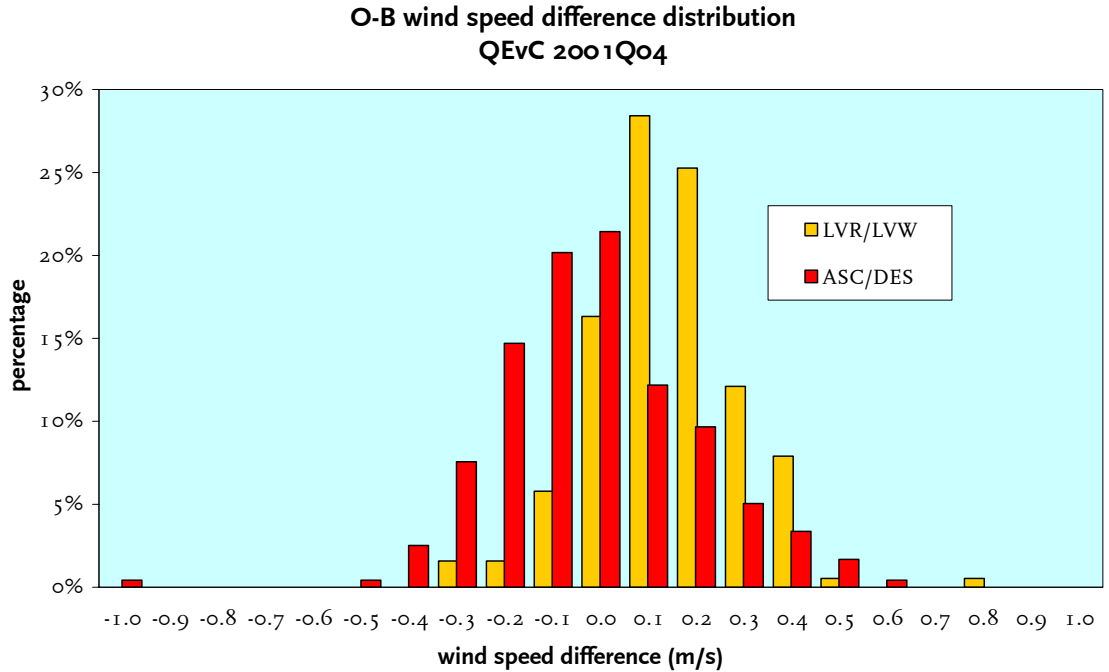


Fig. 6. Frequency distribution of the mean wind speed difference (OBS–Background) for the number of aircraft reporting AMDAR reports (N=249). Distinction is made between the Flight Level (LVR/LVW) and the Ascending or Descending phase (ASC/DES). Clearly, there is no significant difference between the distributions of both phases

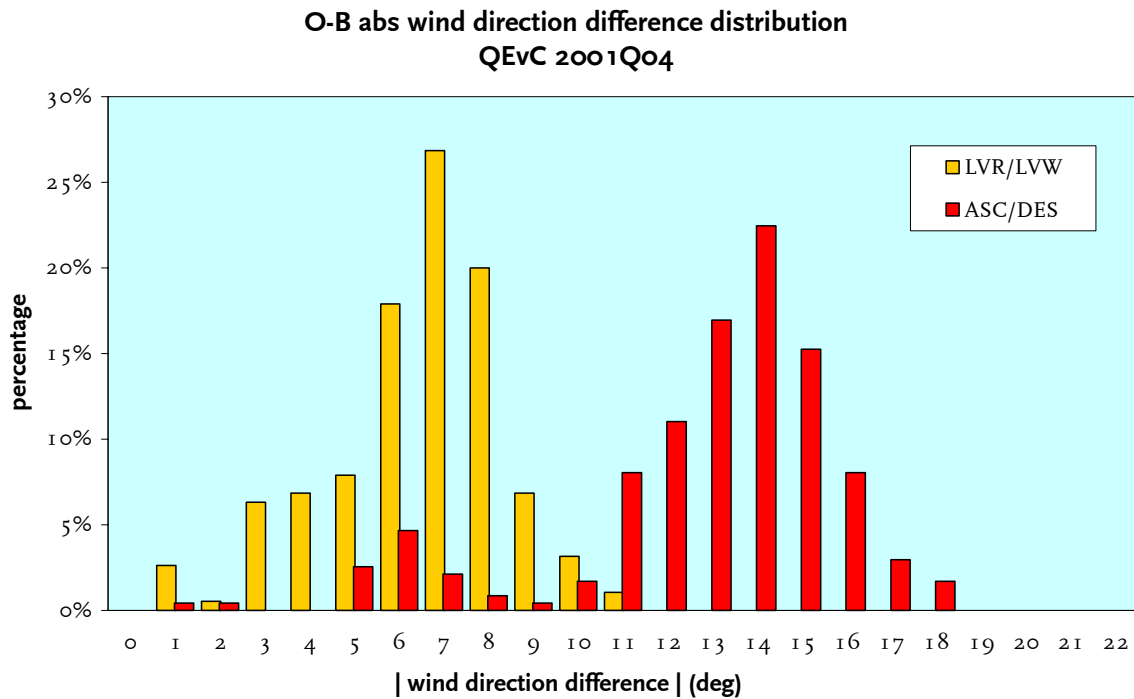


Fig. 7. Frequency distribution of the mean of the absolute wind direction difference ($|OBS-Background|$) for the number of aircraft reporting AMDAR reports ($N=249$). Distinction is made between the Flight Level (LVR/LVW) and the Ascending or Descending phase (ASC/DES). Clearly, in this case there is 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. 8). Such a figure will demonstrate the trend in this daily amount. The figure shows a stable pattern (the significant decrease at the end of December is caused by a failure in the BUFR decoding system at QEvC).

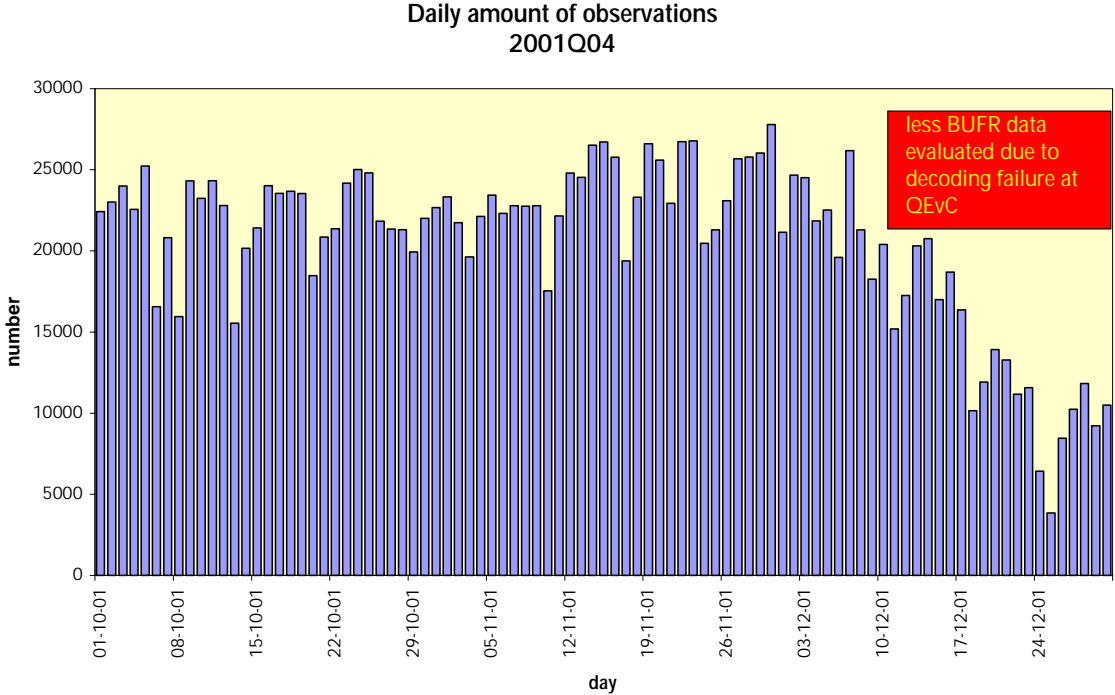
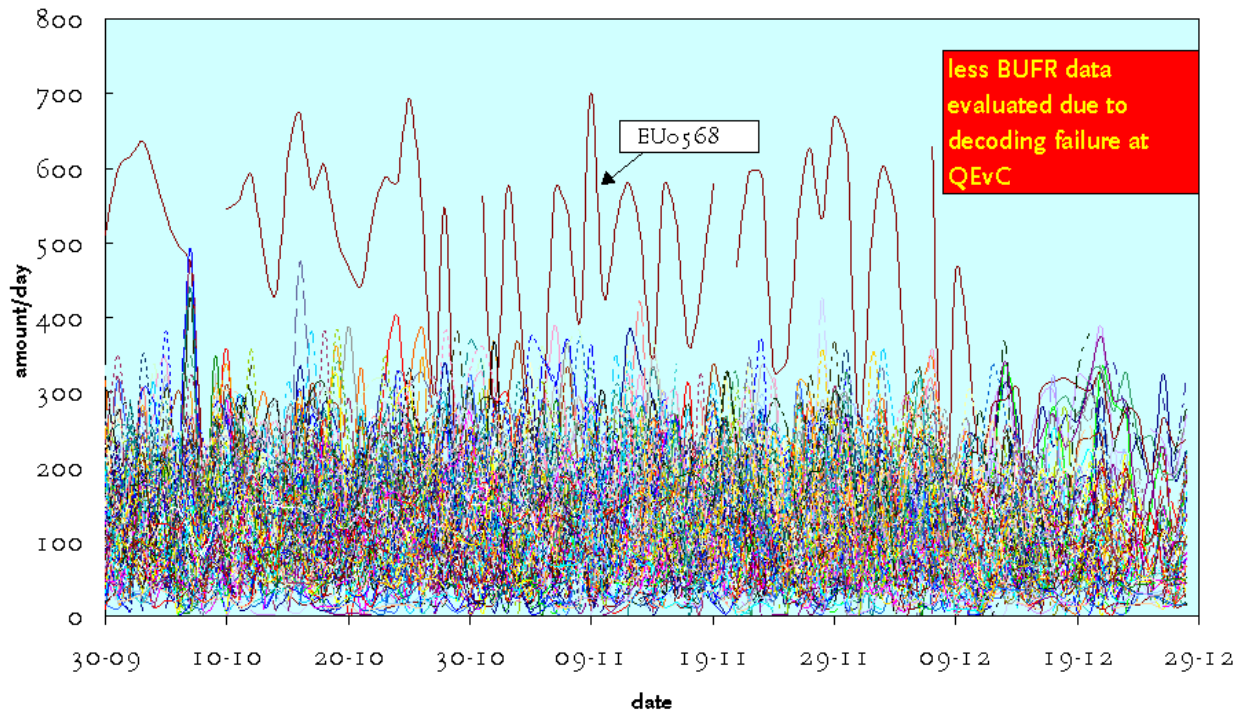


Fig. 8. The daily amount of EU-Amdar observation, evaluated at De Bilt. Due to a BUFR decoding failure at QEvC, an increasing number of BUFR encoded bulletins was not evaluated after December 12th (see red box).

Moreover, the trend in the daily amount of observations from each aircraft can be evaluated. In fig. 9. such a trend is clearly demonstrated. Overall the daily amounts are found to be very stable during this period. Note the very high production of EU0568 (see par. 4.a)

Trends in the daily amount of observations
sep-dec 2001



EU0002	EU0003	EU0008	EU0021	EU0022	EU0032	EU0041	EU0043	EU0047
EU0050	EU0051	EU0054	EU0060	EU0061	EU0082	EU0088	EU0106	EU0109
EU0123	EU0124	EU0154	EU0158	EU0167	EU0185	EU0204	EU0234	EU0263
EU0303	EU0307	EU0311	EU0313	EU0316	EU0319	EU0359	EU0432	EU0456
EU0457	EU0458	EU0476	EU0568	EU0711	EU0802	EU0807	EU0826	EU0875
EU0921	EU0934	EU0947	EU0961	EU0985	EU1001	EU1002	EU1234	EU1282
EU1312	EU1334	EU1411	EU1456	EU1495	EU1532	EU1593	EU1698	EU1863
EU1929	EU2189	EU2301	EU2389	EU2547	EU2559	EU2590	EU2618	EU2751
EU2773	EU2845	EU2984	EU3000	EU3181	EU3257	EU3268	EU3270	EU3321
EU3421	EU3533	EU3544	EU3598	EU3621	EU3654	EU3684	EU3725	EU3755
EU3874	EU3908	EU3972	EU4002	EU4021	EU4278	EU4333	EU4444	EU4519
EU4529	EU4532	EU4573	EU4582	EU4591	EU4593	EU4607	EU4699	EU4721
EU4756	EU4792	EU4853	EU4865	EU4950	EU5134	EU5182	EU5218	EU5331
EU5351	EU5372	EU5435	EU5441	EU5478	EU5529	EU5587	EU5612	EU5613
EU5777	EU5802	EU5891	EU6264	EU6281	EU6444	EU6527	EU6544	EU6556
EU6743	EU6821	EU6890	EU6923	EU7001	EU7082	EU7119	EU7218	EU7521
EU7629	EU7635	EU7643	EU7654	EU7724	EU7865	EU7888	EU7894	EU8478
EU8598	EU8733	EU8736	EU8742	EU8789	EU8891	EU8969	EU9013	EU9023
EU9145	EU9158	EU9234	EU9245	EU9356	EU9378	EU9544	EU9589	EU9680
EU9723	EU9729	EU9883	EU0045	EU0052	EU0072	EU0281	EU0301	EU1301
EU2043	EU2630	EU3469	EU4527	EU5821	EU6287	EU6524	EU8264	EU8520
EU9692	EU0059	EU0367	EU1547	EU3358	EU7285	EU0055	EU8431	EU0081
EU0299	EU7634	EU8632	EU9967	EU2978	EU4838	EU6349	EU8605	EU8943
EU4426	EU1692	EU5098	EU6893	EU1567	EU8787	EU9678	EU9734	EU5349
EU3714	EU5591	EU0073	EU0086	EU0120	EU0177	EU0203	EU4587	EU1222
EU0049	EU0251	EU0373	EU0394	EU0413	EU0511	EU0558	EU0583	EU0676
EU0442	EU0601	EU0723	EU0810	EU1337	EU1446	EU1498	EU2017	EU2055
EU2130	EU2247	EU2165	EU2201	EU0000	EU9622			

Fig. 9. Daily amount of observations, evaluated by QEvC. Clearly the daily amount is stable during this period (the decrease at the end of the period is due to a software failure in the BUFR decoding system)

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

In fig 10. an overview is presented of the mean O–B air temperature differences ΔTA 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.

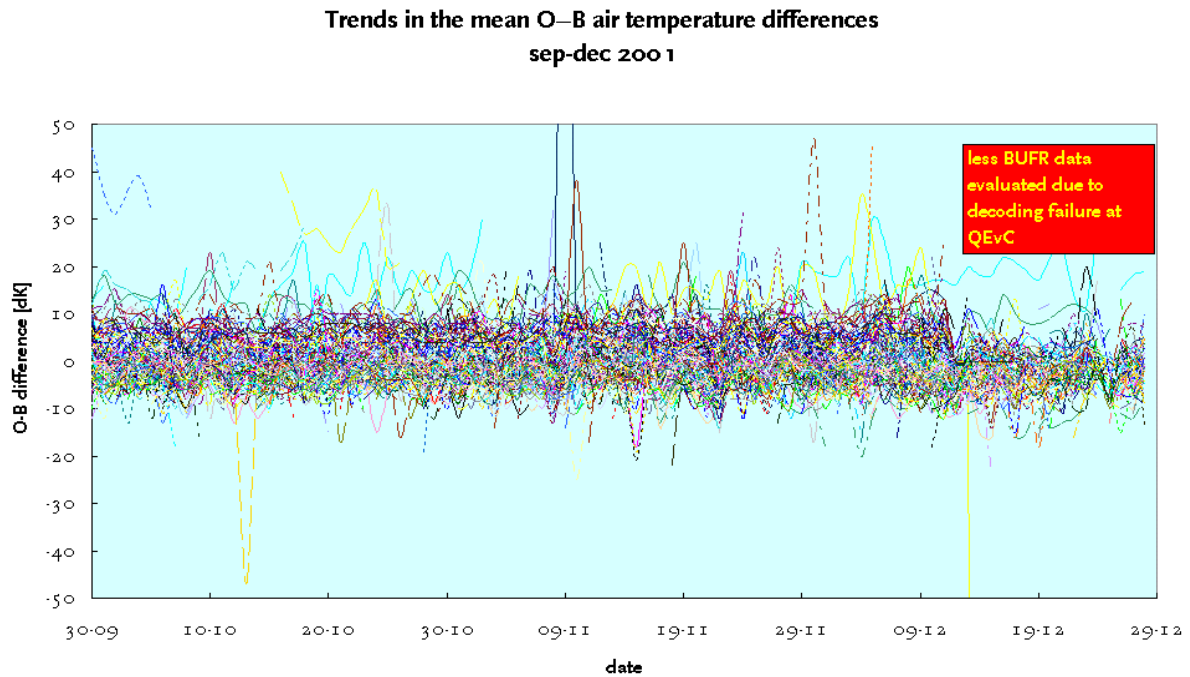


Fig. 10. Trends in the mean O–B air temperature differences (note: temperature-scale is in deci-Kelvin, /0.1 K). In general the differences demonstrate a rather random behaviour, as expected. Notice the typical outliers.

In fig. 11. a similar overview is presented for the wind speed differences ΔFF :

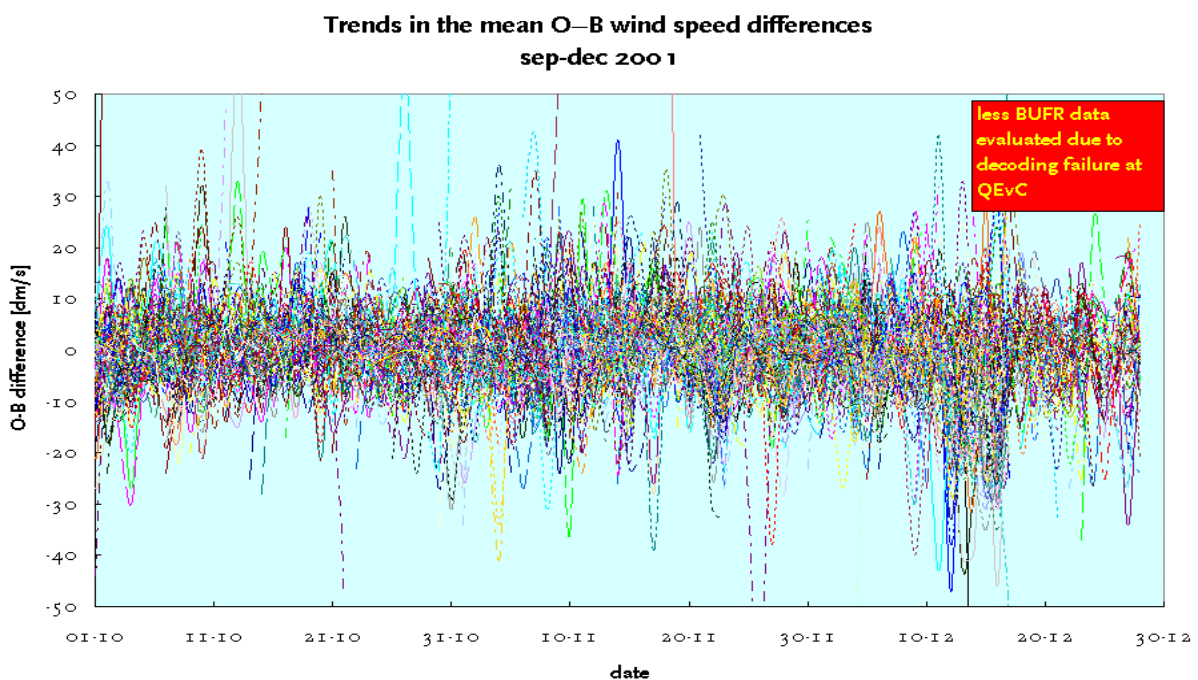


Fig. 11. Trends in the mean O–B wind speed differences (note: velocity-scale is in deci-metres per second, /dm.s⁻¹). In general the differences demonstrate a rather random behaviour, as expected.

In fig. 12, a similar overview is presented for the wind direction differences (based on absolute values, i.e. $|\Delta DD|$):

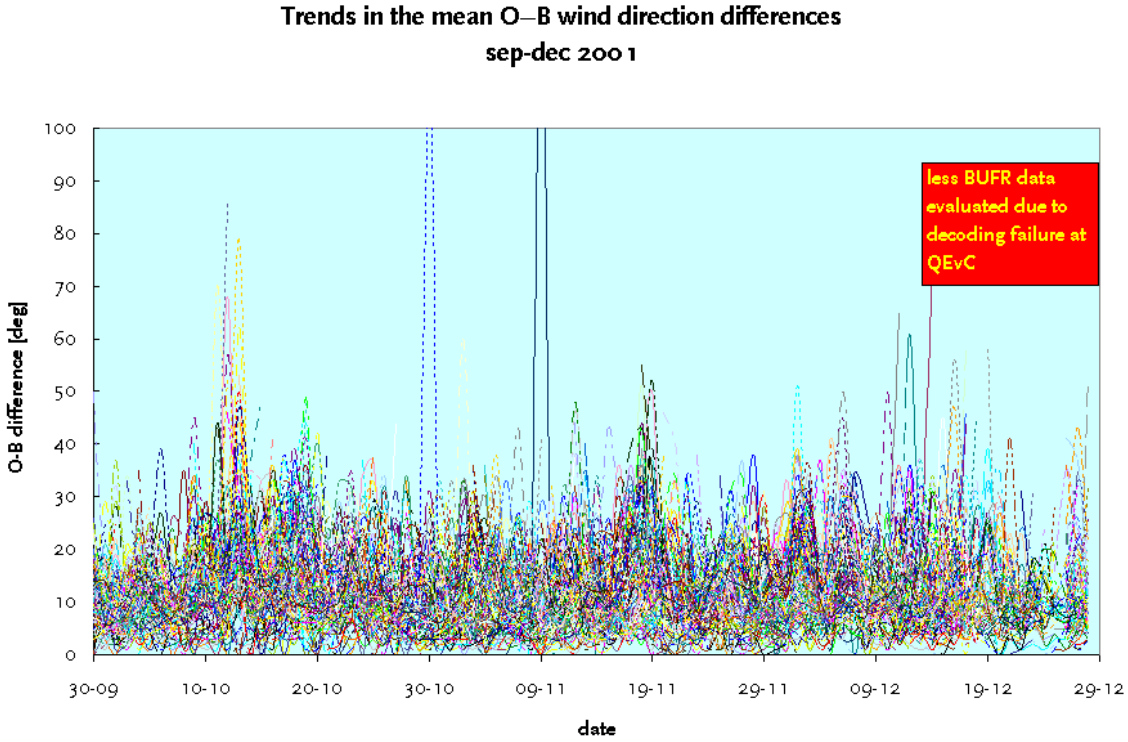


Fig. 12. Trends in the mean O-B wind direction differences. Like with the previous figures, in general the differences demonstrate a rather random behaviour.

Annex V. Ratio of numbers of observations from LVR/LVW and from ASC/DES.

In the figure 13, a 'pie chart' is shown presenting the ratio between the number of LVR/LVW measurements (flight level) and ASC/DES measurements (ascending/descending). Obviously this ratio 16 : 84 is slightly changed compared to the third quarter of 2000 (i.e. 13 : 87, see 2000Q03, Annex III).

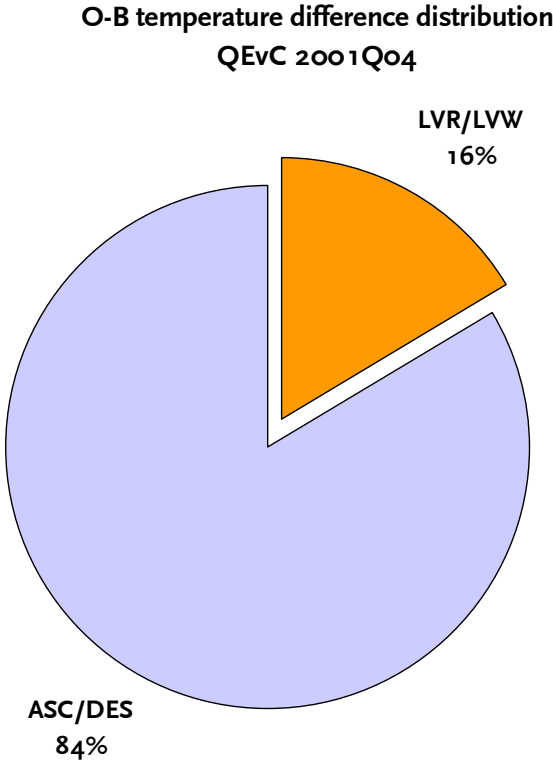


Fig. 13. Relative contribution of the number of observations during Flight Level (LVR/LVW) and during the Ascending or Descending phase (ASC/DES). The ratio of (LVR/LVW) versus (ASC/DES) turns out to be $\approx 1:5$