

European Centre for Medium-Range Weather Forecasts

SUMMARY REPORT ON THE MONITORING OF ASAP SHIP DATA

January-December 2012

1. Summary

The number of ASAP reports received at ECMWF were reduced in 2012 compared to the numbers received in 2011, despite a slight increase in the number of reporting platform identifiers. The percentage of ascents reaching the level of 100 hPa was reduced to values between 65 and 70% in the summer of 2012 at 06/18UTC observation window. Problems related to wrongly located reports are still there. The quality of the data has continued to be good and highly valuable.

2. Data reception

Figures 1 to 3 show time series from January 1994 to December 2012 with monthly counts of ASAP reports at different levels. In previous years we have been looking at the percentage of launches reaching the lower Stratosphere (namely 100 hPa). The percentage came down in 2012 to the lowest values since 1994. Figure 2 clearly shows that the observations made at 06 and 18 UTC contributed to this drop. Table 2 and Table 3 show annual counts for each ship.

**Monthly counts of ASAP received at ECMWF
Temperature 500 hPa - GLOBAL**

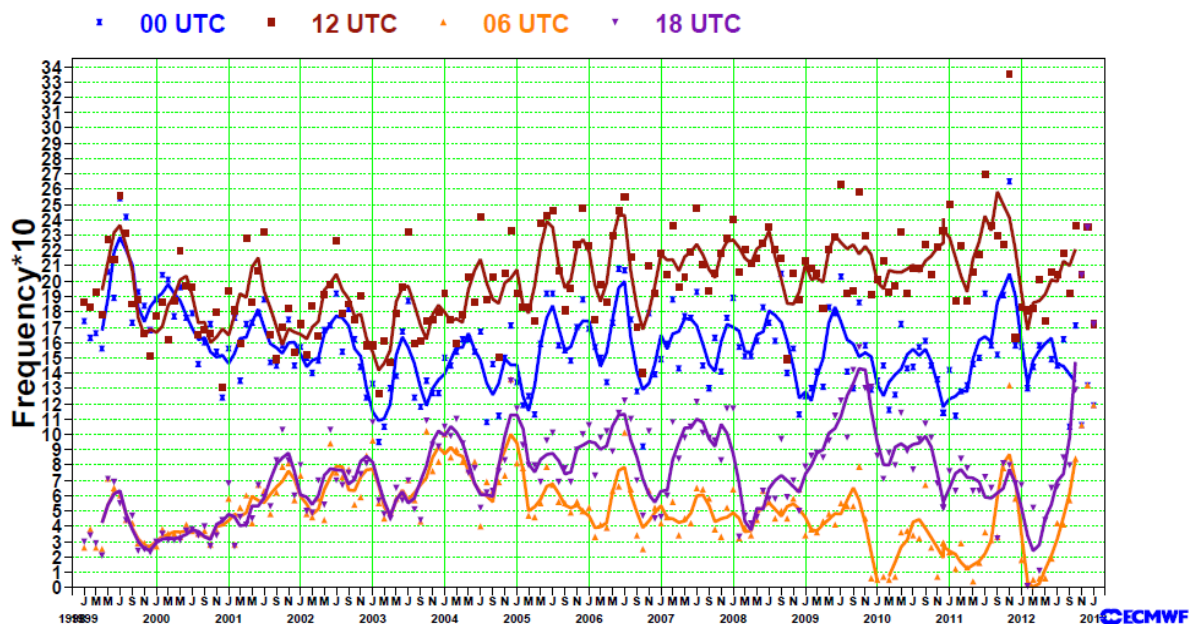


Figure 1: ASAP temperature data received at ECMWF 500 hPa (Jan 1994 to December 2012). Symbols show monthly totals and lines show moving averages.

Monthly counts of ASAP received at ECMWF Temperature reports reaching 100 hPa - GLOBAL

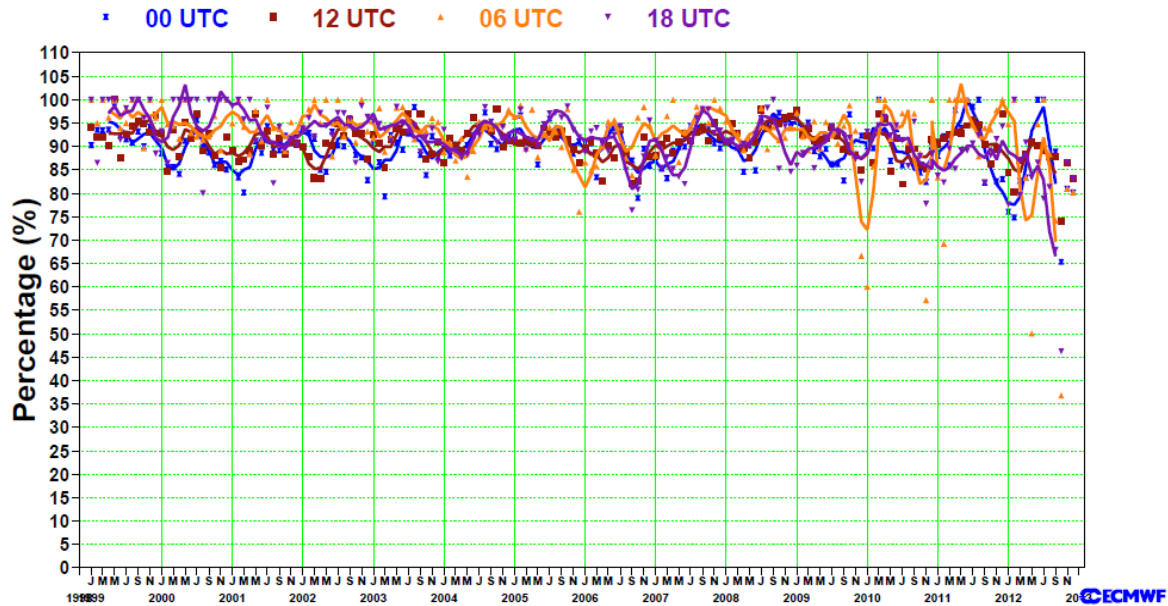


Figure 2: Percentage of ASAP reports reaching the 100 hPa level (Jan 1994 to Dec 2012)
Symbols show monthly totals and lines show moving averages.

Monthly counts of ASAP received at ECMWF Wind 250 hPa - GLOBAL

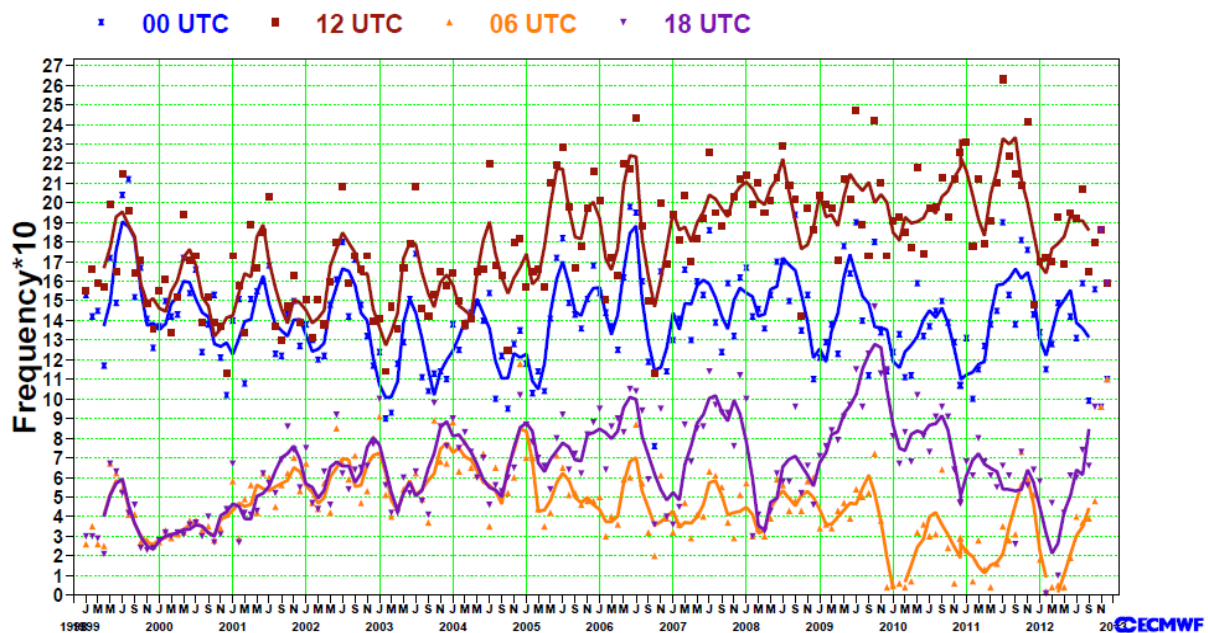


Figure 3: ASAP wind data received at ECMWF 250 hPa (Jan 1994 to December 2012). Symbols show monthly totals and lines show moving averages.

As in previous years most of the ASAP units were operating in the North Atlantic and very few on the South Atlantic and Indian Ocean. We can also see in figure 4 the Japanese ASAP operating close to Japan.

ASAP tracks 1 Jan-31 Dec 2012

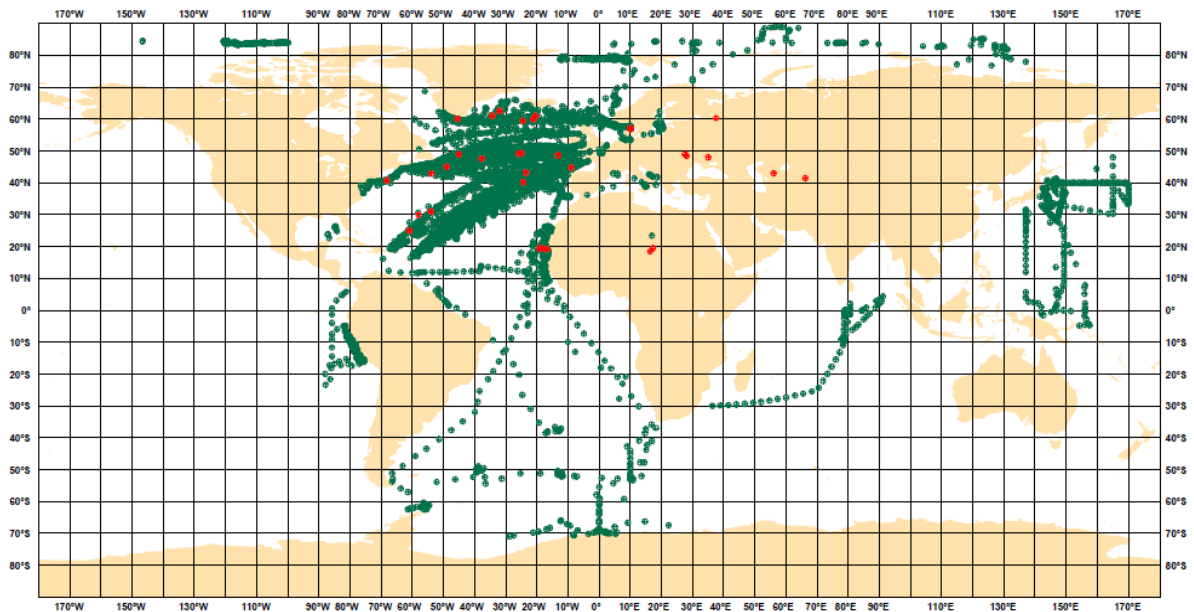


Figure 4: ASAP tracks January to December 2012

3. Troubleshooting

The main problem related to ASAP reports continue to be misplaced reports. Figure 5 shows the tracks of ASAP units with some suspect positions in January to December 2012 period. A number of misplaced reports are evident on the chart.

Figures 6 and 7 show one of these cases. Here our tracker checks consecutive positions and derived speeds. We could see from the tracker output that the report on 29 October 2012 17UTC from DBLK had a stuck position. Having a look at the tephigrams plotted for this suspicious report and the consecutive one as shown in figure 6, we can see how different both profiles are. The observation departure from model background is larger in the suspected observation (see tephigram on the left hand side). The time series shown in figure 7 confirms the suspicious observation mentioned before and also the overall good quality of the observations from this unit.

The question is whether these platforms deserve to be blacklisted. To answer this we look at monthly statistics and time series. Only when the bad positions are systematic we proceed to

blacklist an ASAP. This was not the case, the time series shown in Figure 7 and Figure 8 show good performance of DBLK, so one or two isolated cases is not enough to blacklist this unit.

We have seen several other platforms where longitude is occasionally reported with wrong sign, hence reporting far from its actual position. Our position tracker has flagged these cases. (See Table 1 for all such cases in 2012). In such cases where an odd report had its latitude or longitude signs flipped, looking at previous/next reports in the tracker output allows us to easily spot the erroneous observation.

In previous years we have seen a few reports reporting missing values for latitude/longitude. In those cases the assimilation system assumes a position $lat=0/lon=0$. This particular position is dynamically blacklisted in the assimilation. However we have not seen such a case in 2012.

Table 1: Suspicious position errors. The tracker identifies suspect observations based on excessive speed (>40km/h). Manual inspection shows cases are linked to wrongly reported sign of longitude (as marked in the table).

# Id: ASEU6				
Date	Time	Lat	Lon	Speed
2012-02-15	11:00:00	48.2	-33.5	23.8 km/hr
2012-02-15	17:00:00	48.0	35.0	847.8 km/hr <*> Longitude sign flipped
2012-02-15	23:00:00	47.6	-37.7	905.0 km/hr <*>
2012-03-02	11:00:00	47.4	-39.8	29.5 km/hr
2012-03-03	17:00:00	49.0	27.6	166.6 km/hr <*> Longitude sign flipped
2012-03-03	23:00:00	49.3	-25.0	637.6 km/hr <*>
2012-07-04	23:00:00	49.5	-21.0	28.4 km/hr
2012-07-05	17:00:00	48.4	28.1	199.3 km/hr <*> Longitude sign flipped
2012-07-05	11:00:00	49.1	-25.7	657.5 km/hr <*>
# Id: ASES1				
Date	Time	Lat	Lon	Speed
2012-03-14	11:00:00	18.6	-16.5	0.6 km/hr
2012-03-16	11:00:00	19.5	17.3	74.0 km/hr <*> Longitude sign flipped
2012-03-17	11:00:00	19.2	-16.8	149.1 km/hr <*>
2012-09-13	11:00:00	19.6	-18.3	1.5 km/hr
2012-09-14	11:00:00	18.5	16.4	152.1 km/hr <*> Longitude sign flipped
2012-09-15	11:00:00	19.5	-19.2	156.0 km/hr <*>
2012-09-28	11:00:00	23.8	-18.3	8.4 km/hr
2012-11-06	11:00:00	23.4	17.0	3.8 km/hr <*> Longitude sign flipped
2012-11-07	11:00:00	19.4	-18.0	152.1 km/hr <*>
# Id: ASDE3				
Date	Time	Lat	Lon	Speed
2012-06-08	23:00:00	42.8	-49.4	29.5 km/hr
2012-06-09	17:00:00	43.0	56.0	477.0 km/hr <*> Longitude sign flipped
2012-06-09	11:00:00	42.9	-53.8	1489.4 km/hr <*>
2012-09-21	23:00:00	44.9	-56.0	27.6 km/hr
2012-09-23	17:00:00	41.5	66.2	236.0 km/hr <*> Longitude sign flipped
2012-09-23	23:00:00	40.8	-68.2	1875.6 km/hr <*>
# Id: ASDK1				
Date	Time	Lat	Lon	Speed
2012-06-22	11:00:00	60.4	-7.9	29.1 km/hr
2012-06-22	23:00:00	57.0	10.1	92.2 km/hr <*> Longitude sign flipped
2012-06-23	11:00:00	61.0	-20.4	150.2 km/hr <*>
2012-07-14	23:00:00	59.4	-30.6	20.3 km/hr
2012-07-25	11:00:00	57.0	10.1	9.5 km/hr <*> Longitude sign flipped
2012-07-25	23:00:00	59.4	-24.5	170.4 km/hr <*>
2012-09-17	11:00:00	62.4	-21.2	27.1 km/hr
2012-09-17	23:00:00	57.0	10.1	154.6 km/hr <*> Longitude sign flipped
2012-09-18	11:00:00	61.1	-34.3	215.0 km/hr <*>
2012-11-18	10:00:00	61.2	-31.5	27.7 km/hr
2012-11-18	23:00:00	60.3	37.6	288.9 km/hr <*> Longitude sign flipped
2012-11-19	17:00:00	60.1	-45.5	255.1 km/hr <*>

ASAP tracks 1 Jan-31 Dec 2012

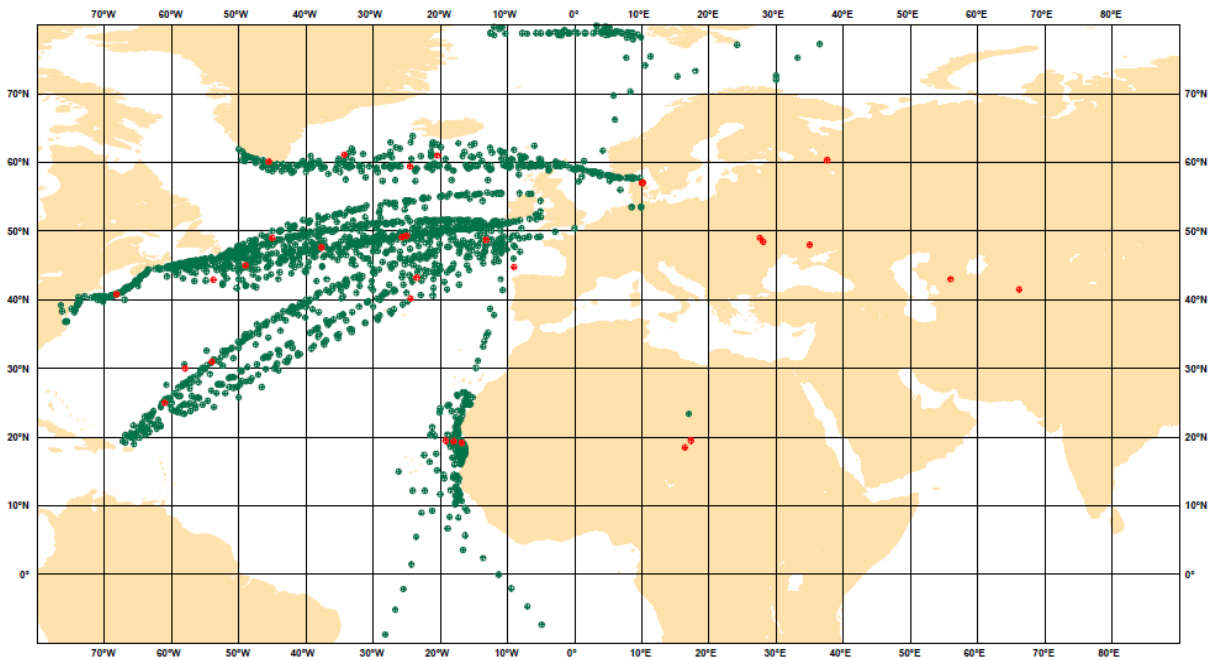


Figure 5: ASEU2, DBLK, ASDE1, ASEU6, ASDE4, ASES1, ASDE3 and ASK1 tracks January to December 2012. Red dots show erroneous positions.

Stuck Position

Id no 6 DBLK

2012-10-27 15:00:00	53.5	8.5	3.3 km/hr
2012-10-29 17:00:00	53.5	8.5	0.0 km/hr <*> Stuck position?
2012-10-30 11:00:00	44.8	-9.0	88.8 km/hr <*>
2012-10-31 11:00:00	41.4	-10.7	16.8 km/hr
2012-11-01 11:00:00	37.8	-12.0	17.3 km/hr

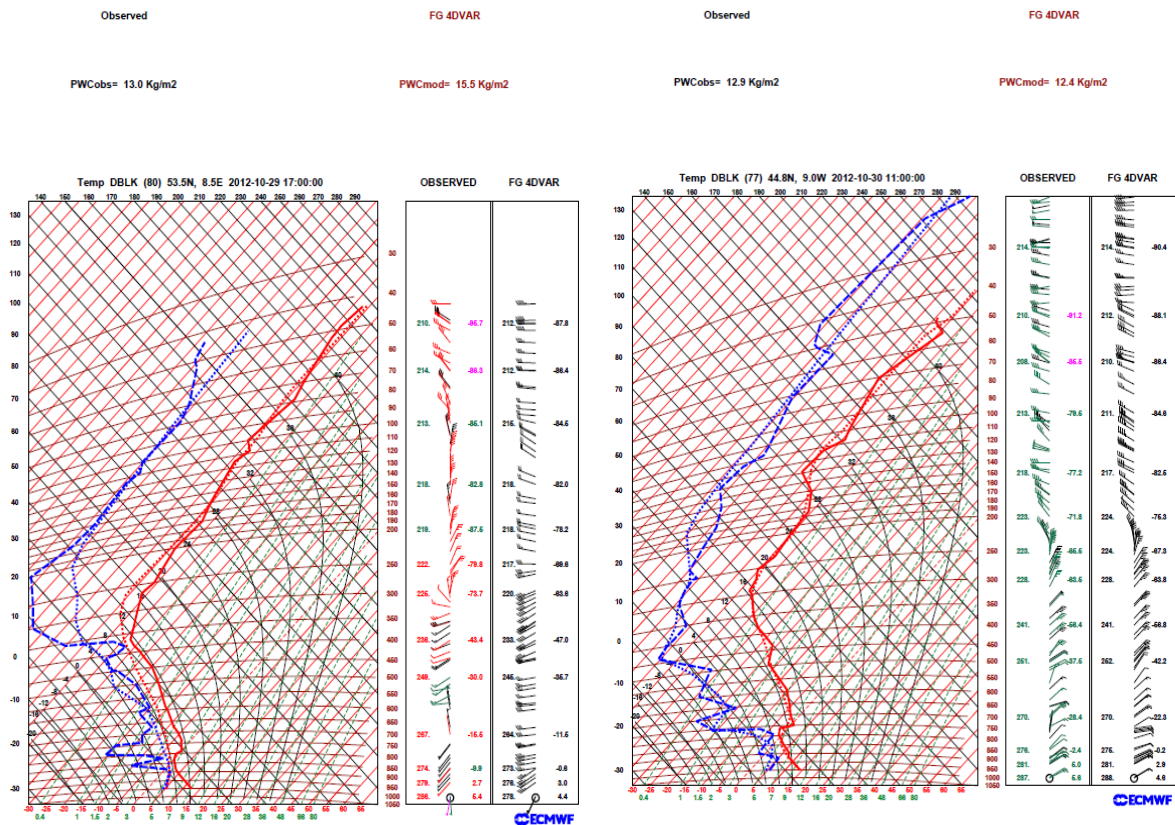


Figure 6: Tephigrams of two consecutive reports from DBLK. Full red: Observed t, dotted red: FG t, dashed blue: Observed dew point, dotted blue: FG dew point profiles. Departures from FG is larger in the first observation (left hand side) than the next observation (right hand side). This comparison confirms our suspicion of position error at 2012-10-29 17:00:00.

Temp DBLK temperature 0-1030 hPa bias/std

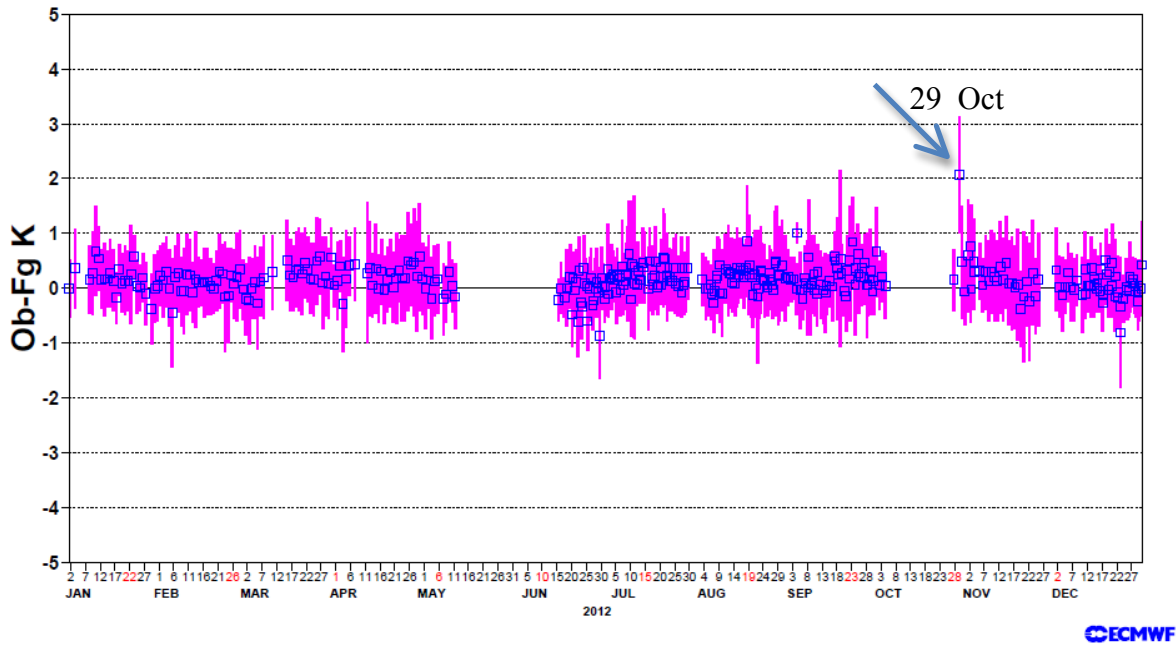
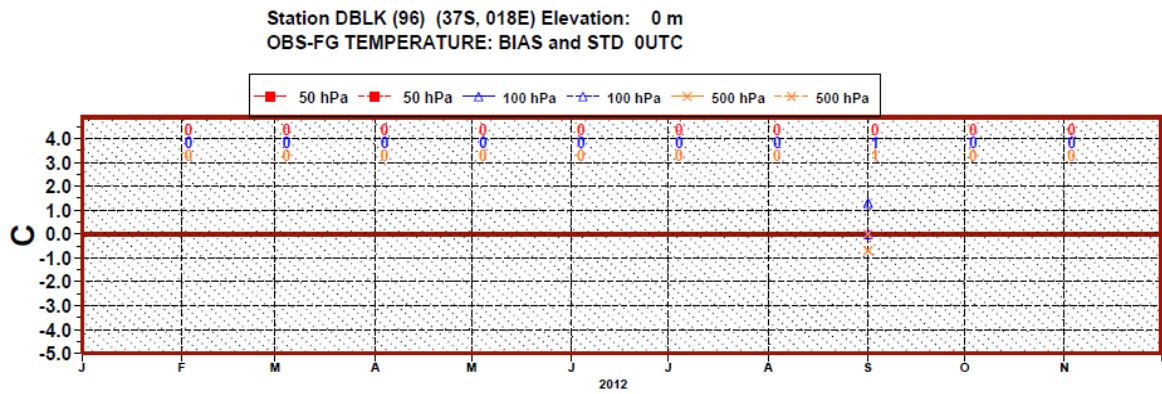
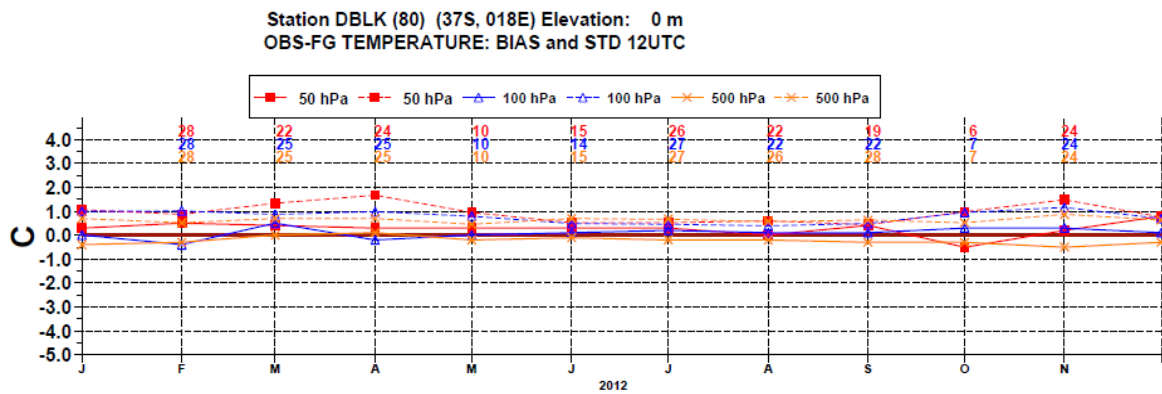


Figure 7: Time series for DBLK: Temperature. Notice the jump in Obs-First Guess value on 29 October 2012.



ECMWF



ECMWF

Figure 8: Time series based on monthly averages January-December 2012: DBLK

4. Quality Control.

We run on a monthly basis vertical statistics of all units. The results are included in the ECMWF Monthly Monitoring Report, which is freely available at the ECMWF web site:

<http://www.ecmwf.int/products/forecasts/monitoring/mmr/>

Large background error seen in Figure 9 at 10hPa for temperature is due to the suspect reports from platform DBLK (Figure 11).

Compared to 2011, in 2012 we see a larger standard deviation below 850hPa and better bias between 150hPa-10hPa for temperature. A slight improvement of standard deviation for relative humidity at 100hPa is also noticeable in 2012 (See Figure 9).

Particular problems as those related with wrong positions are detected in the Daily Monitoring carried out by the Met Analyst on duty in the MetOps room.

The quality of the ASAP data has continued to be good and is highly valuable over the oceans where data with high quality and high vertical resolution are needed.

Figures 9 and 10 show composite vertical statistics January to December 2012 of all ASAP data. The profiles show high quality standards fully comparable to land-based radiosondes.

Sondes AREA AVERAGE JAN - DEC 2012

00/06/12/18 UTC DATA COMBINED

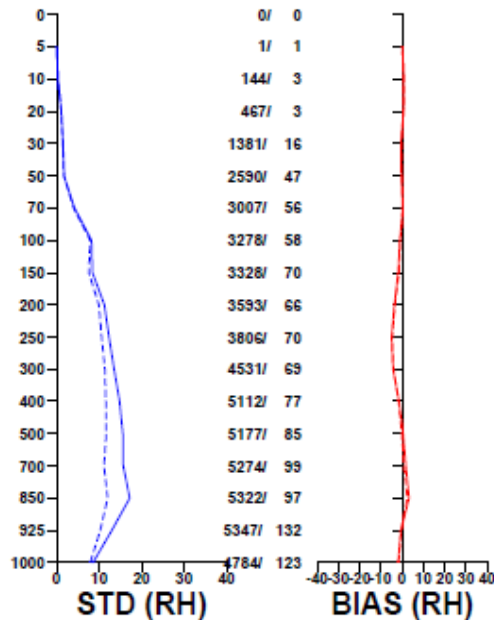
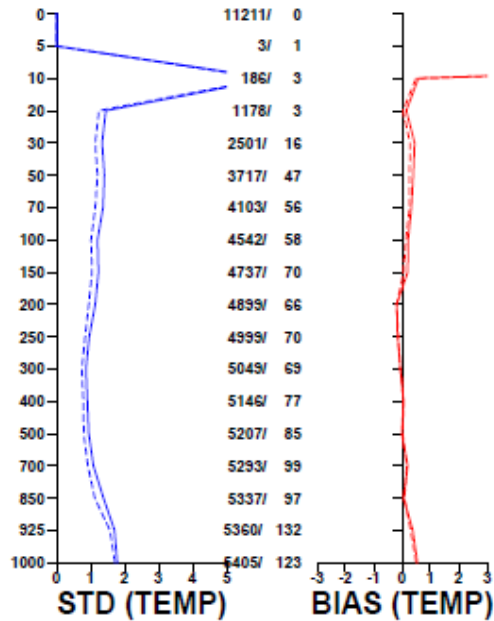


Figure 9: Vertical statistics ASAP Global (temperature and relative humidity) January to December 2012
 Solid lines : Obs-First guess (background)
 Dashed lines : Obs-Analysis
 Middle scale : Number of reports for each level/Number of rejected reports for each level

**Sondes AREA AVERAGE
JAN - DEC 2012**

00/06/12/18 UTC DATA COMBINED

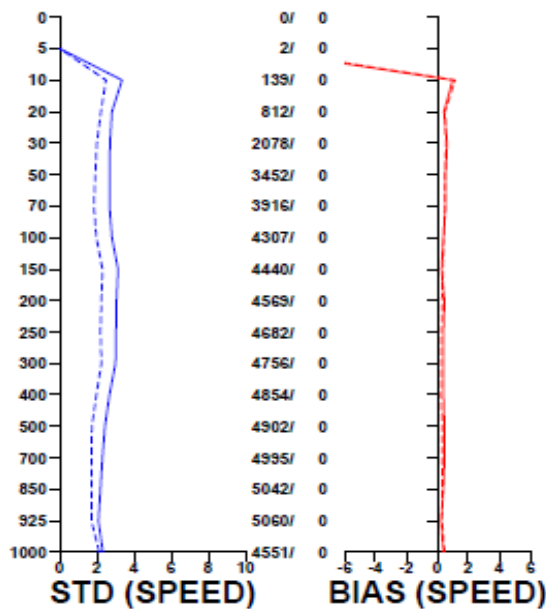
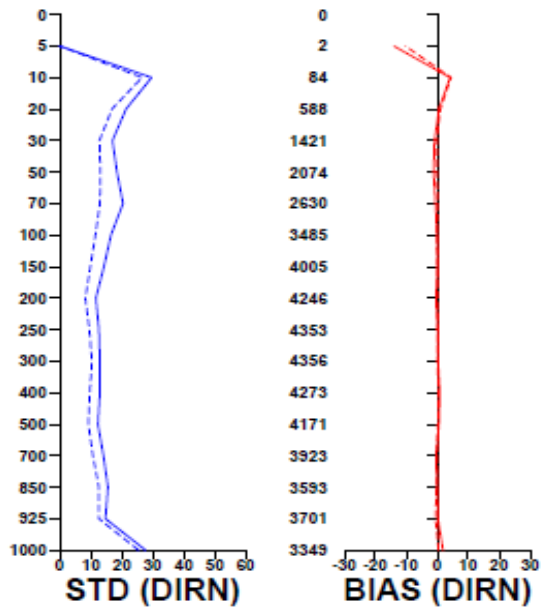


Figure 10: Vertical statistics ASAP Global (wind direction and speed) January to December 2012

Solid lines : Obs-First guess (background)

Dashed lines : Obs-Analysis

Middle scale : Number of reports for each level/Number of rejected reports for each level

DBLK
JAN - DEC 2012
 POSITION: 59.00S 0.10E HEIGHT: 0M
 00/06/12/18 UTC DATA COMBINED

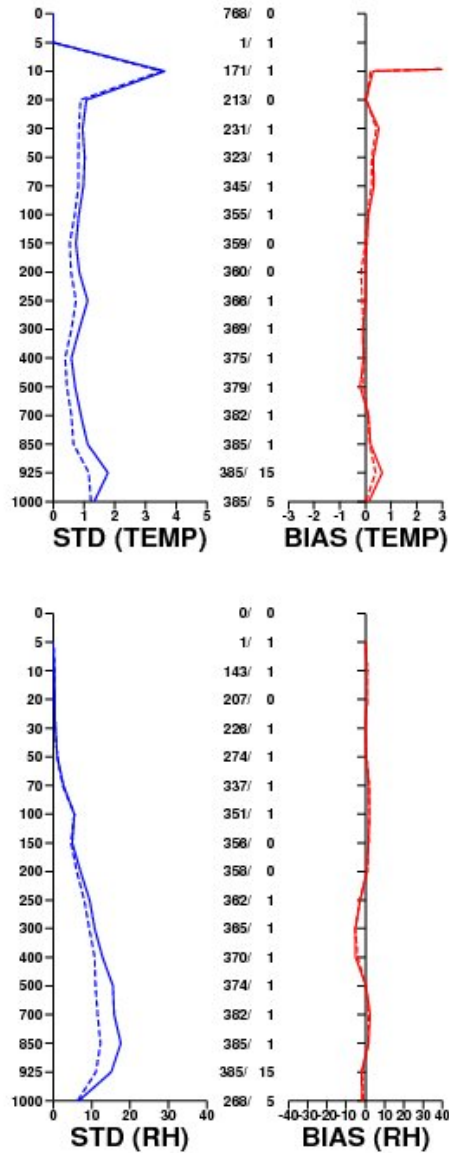


Figure 11: Vertical statistics ASAP platform DBLK (temperature and relative humidity) January to December 2012. Notice the error at 10hPa.

Solid lines : Obs-First guess (background)

Dashed lines : Obs-Analysis

Middle scale : Number of reports for each level/Number of rejected reports for each level

TABLE 2: ASAP reports received at ECMWF January-December 2011 at 500 hPa

ID	TEMPERATURE					WIND				
	00	06	12	18	TOTAL	00	06	12	18	TOTAL
ASDE1	125	0	136	113	374	123	0	136	112	371
ASDE2	62	0	157	78	297	59	0	156	78	293
ASDE3	84	0	85	57	226	84	0	83	57	224
ASDE4	114	0	116	75	305	112	0	113	72	297
ASDE9	0	7	27	0	34	0	7	27	0	34
ASDK1	141	25	134	37	337	133	24	128	32	317
ASDK2	137	39	134	41	351	125	33	114	38	310
ASDK3	134	25	140	30	329	132	25	140	30	327
ASES1	2	0	233	0	235	2	0	221	0	223
ASEU1	1	0	160	10	171	1	0	158	10	169
ASEU2	49	0	46	43	138	47	0	41	38	126
ASEU3	49	3	61	52	165	43	3	58	50	154
ASEU4	38	0	53	39	130	38	0	53	38	129
ASEU5	74	0	93	53	220	71	0	93	52	216
ASEU6	20	1	18	5	44	20	1	18	4	43
ASFR1	134	0	110	0	244	134	0	110	0	244
ASFR2	127	1	134	0	262	127	1	133	0	261
ASFR3	99	0	97	1	197	99	0	97	1	197
ASFR4	137	0	133	0	270	136	0	133	0	269
ASGB1	24	0	26	24	74	24	0	25	24	73
DBLK	0	112	246	1	359	0	112	242	1	355
DRG	25	28	28	29	110	21	24	26	27	98
JGQH	113	0	121	0	234	113	0	121	0	234
JNSR	126	144	117	94	481	67	68	64	51	250
KAOU	106	114	129	84	433	79	69	89	55	292
UFTA	4	0	0	0	4	7	0	0	0	7
VTJR	10	13	11	13	47	9	13	11	13	46
XXX	0	0	1	0	1	0	0	1	0	1
	1935	512	2746	879	6072	1806	380	2591	783	5560

TOTAL NUMBER OF STATION IDENTIFIERS 28

TABLE 3: ASAP reports received at ECMWF January-December 2012 at 500 hPa

ID	TEMPERATURE					WIND				
	00	06	12	18	TOTAL	00	06	12	18	TOTAL
ASDE1	130	0	134	106	370	128	0	132	105	365
ASDE2	114	25	158	49	346	108	20	149	42	319
ASDE3	94	0	85	85	264	90	0	84	85	259
ASDE4	91	0	92	68	251	85	0	87	67	239
ASDE5	3	0	6	3	12	3	0	6	3	12
ASDE9	0	4	20	1	25	0	4	20	1	25
ASDK1	120	13	111	29	273	118	12	110	27	267
ASDK2	47	7	60	5	119	38	6	53	3	100
ASDK3	27	13	38	13	91	27	13	38	13	91
ASES1	0	0	242	0	242	0	0	242	0	242
ASEU1	79	0	90	4	173	78	0	90	4	172
ASEU2	58	0	56	40	154	55	0	56	40	151
ASEU3	38	1	50	32	121	37	1	50	32	120
ASEU4	26	3	33	28	90	26	2	32	28	88
ASEU5	58	0	79	55	192	58	0	79	55	192
ASEU6	92	0	88	68	248	89	0	85	68	242
ASFR1	146	1	127	0	274	145	1	127	0	273
ASFR2	89	0	109	0	198	88	0	109	0	197
ASFR3	121	0	124	2	247	120	0	124	2	246
ASFR4	117	1	128	0	246	116	1	127	0	244
DBLK	1	104	269	5	379	1	97	263	5	366
DRG	12	11	14	13	50	12	11	14	12	49
FRCOR	6	35	40	29	110	5	21	22	19	67
FRSGU	10	52	66	46	174	10	32	36	31	109
HYME1	11	10	14	17	52	10	7	9	10	36
HYME2	24	22	21	22	89	15	12	8	11	46
HYME3	3	4	7	6	20	3	2	3	3	11
JGQH	109	0	103	0	212	108	0	103	0	211
JNSR	28	27	24	25	104	26	25	22	23	96
KAOU	32	5	30	1	68	29	5	30	1	65
PACDG	2	1	0	1	4	0	0	0	0	0
UFTA	9	0	0	0	9	4	0	0	0	4
	1697	339	2418	753	5207	1632	272	2310	690	4904

TOTAL NUMBER OF STATION IDENTIFIERS 32