European Centre for Medium-Range Weather Forecasts

SUMMARY REPORT ON THE MONITORING OF ASAP SHIP DATA January-December 2010

1. Summary:

The number of ASAP reports received at ECMWF, slightly increased compared to 2009. The percentage of ascents reaching 100 hPa went down to values around 85%. Still some problems related to wrongly located reports although with a reduced number of cases compared to the previous years. Again no Japanese ASAP were involved in this particular problem. The quality of ASAP profiles has continued to be good and extremely valuable.

2. Data reception:

The number of ASAP reports received at ECMWF in 2010 increased at 00 and 12 UTC and show a reduction at 06 and 18 UTC. Adding all reports we had around 100 more reports in 2010 compared to 2009. Detailed summaries regarding the number of received reports can be found in tables 1 and 2 at the end of this report. Figure 1 shows time series for the temperature reception at 500 hPa. Figure 2

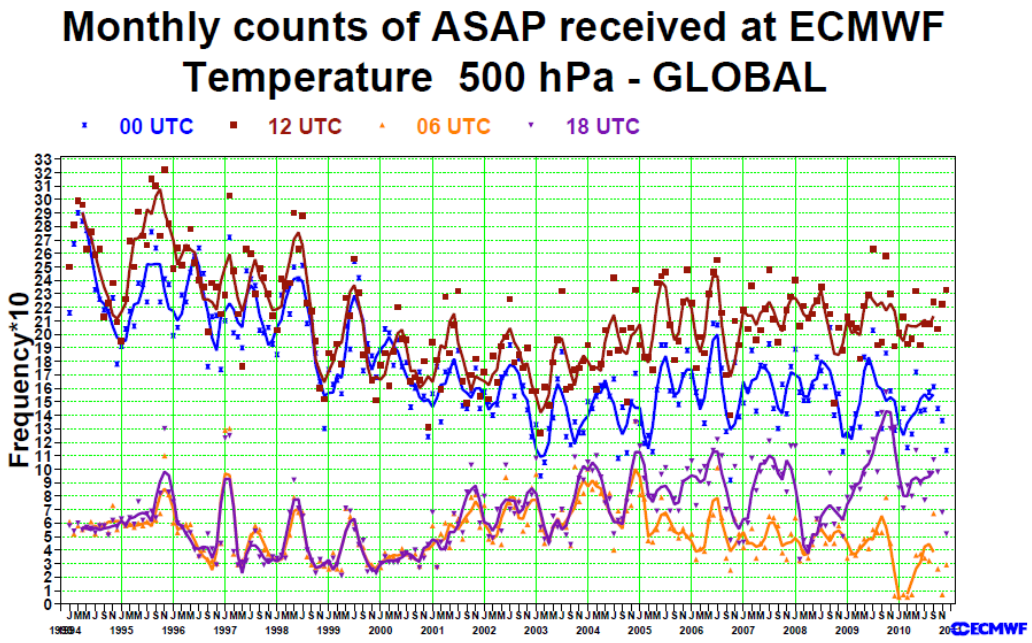


Figure 1
ASAP temperature data received at ECMWF 500 hPa (January 1994 to December 2010)

shows time series with the percentage of ascents reaching 100 hPa. Those values are down to 85% since mid 2010 compared to values of around 90% in the second half of 2009. A reduction in the number of reports reaching the upper stratosphere in 2010 can be noticed in figure 3.

As in previous years the area covered by operating ASAP units is mostly the Atlantic Ocean and areas close to Japan (see figure 4). Several ASAP units covered areas in the Southern Hemisphere as well as the Artic and the Antarctic.

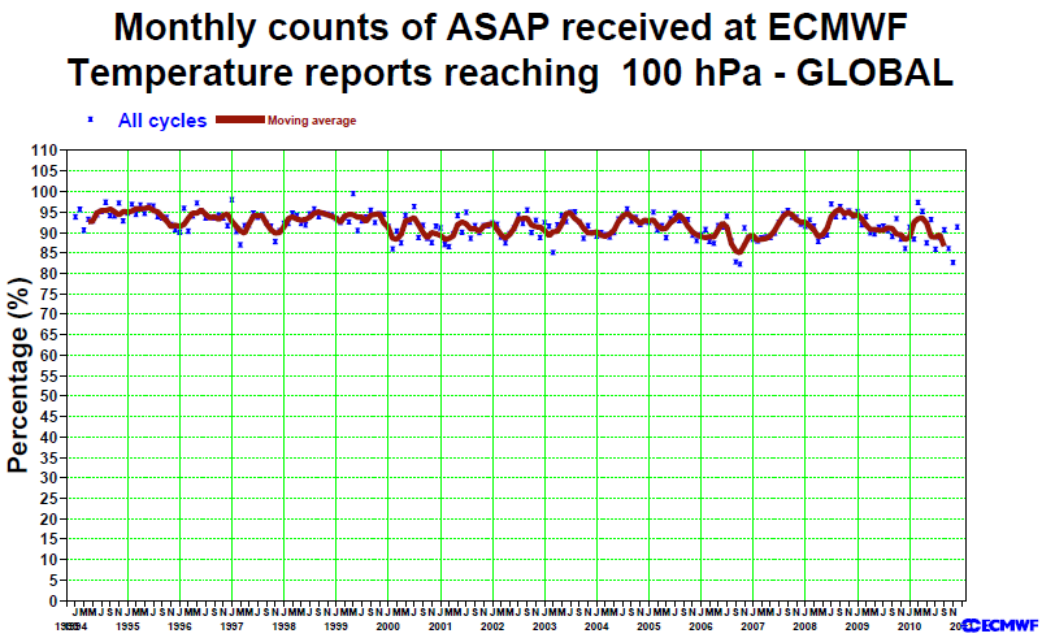


Figure 2
Percentage of ASAP reports reaching the 100 hPa level Jan 1994 to December 2010

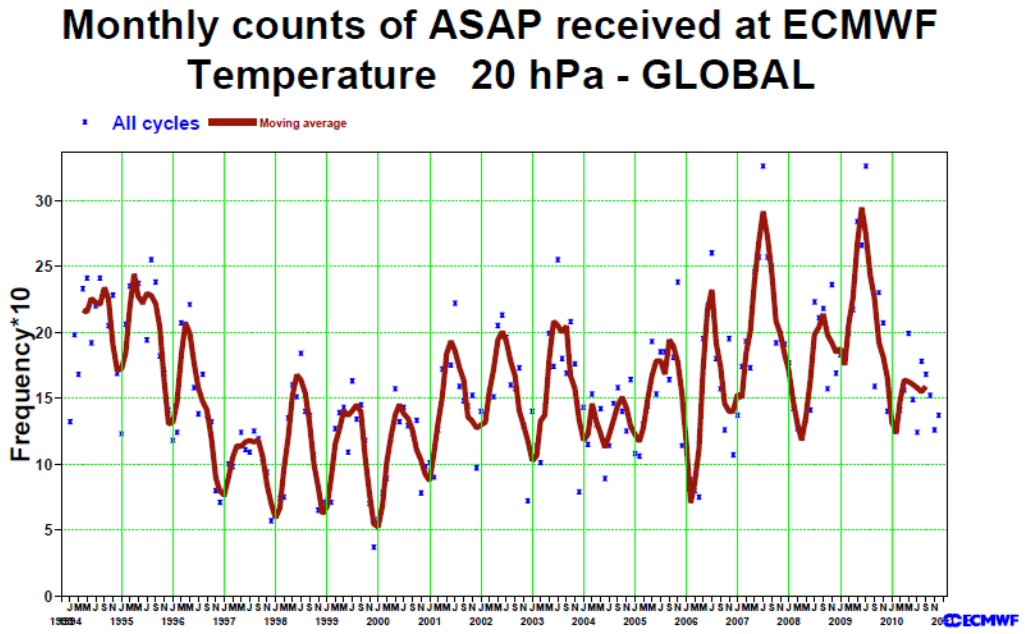


Figure 3
ASAP temperature data received at 20 hPa Jan 1994 to Feb 2010 (all cycles together)

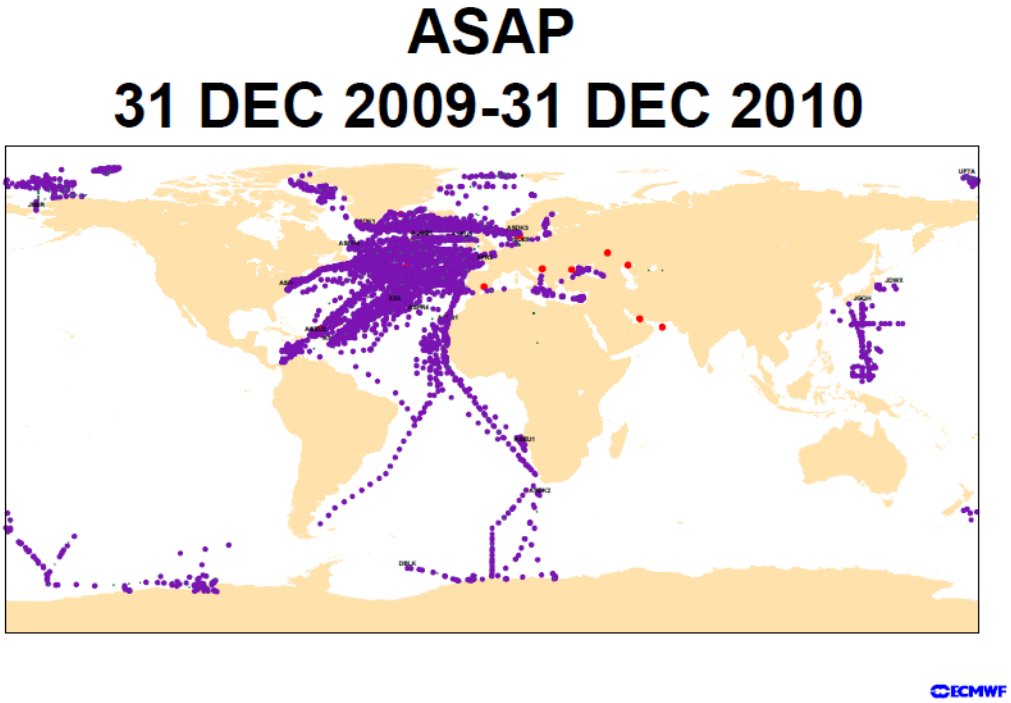


Figure 4
ASAP coverage January to December 2010

3. Troubleshooting

The problem of misallocated observations is still here but in a smaller number than in previous years. A detailed list of wrongly located observations can be seen in table 3 at the end of this report. In most of the cases a simple tracker or a land-sea mask can detect those wrong positions but this is not always the case.

In some cases the errors come from flipping over the sign of the longitude or as in the case of Danish unit ASDK02 reporting back from port when actually the vessel is sailing in the middle of the Atlantic. Two consecutive reports from this unit can be seen in figure 5.b, the 13 of July at 23 UTC observation was sent as reporting close to Greenland and the next one twelve hours later as reporting from Copenhagen. This report was rejected due the large discrepancies with the model profiles.

Figure 5.a show tephigrams from two consecutive reports 7 hours apart of unit ASDE04 with an obvious bad position of the first. Since the bad positioned reports were not systematic we didn't blacklist both Asap units leaving the 4DVAR quality control to handle and reject the bad data. Trickier it's been the case of Spanish unit ASES1 reporting the same position many times during 2010. A tracker will fail to detect bad data but the monitoring time series can spot systematic large discrepancies with the model profiles. Figure 6 shows time series of monthly averaged for temperature and wind vector rms from this unit. The periods with poor statistics show reports from wrong locations. The Asap operators were warned about the problem and the unit was blacklisted until the problem was fixed.

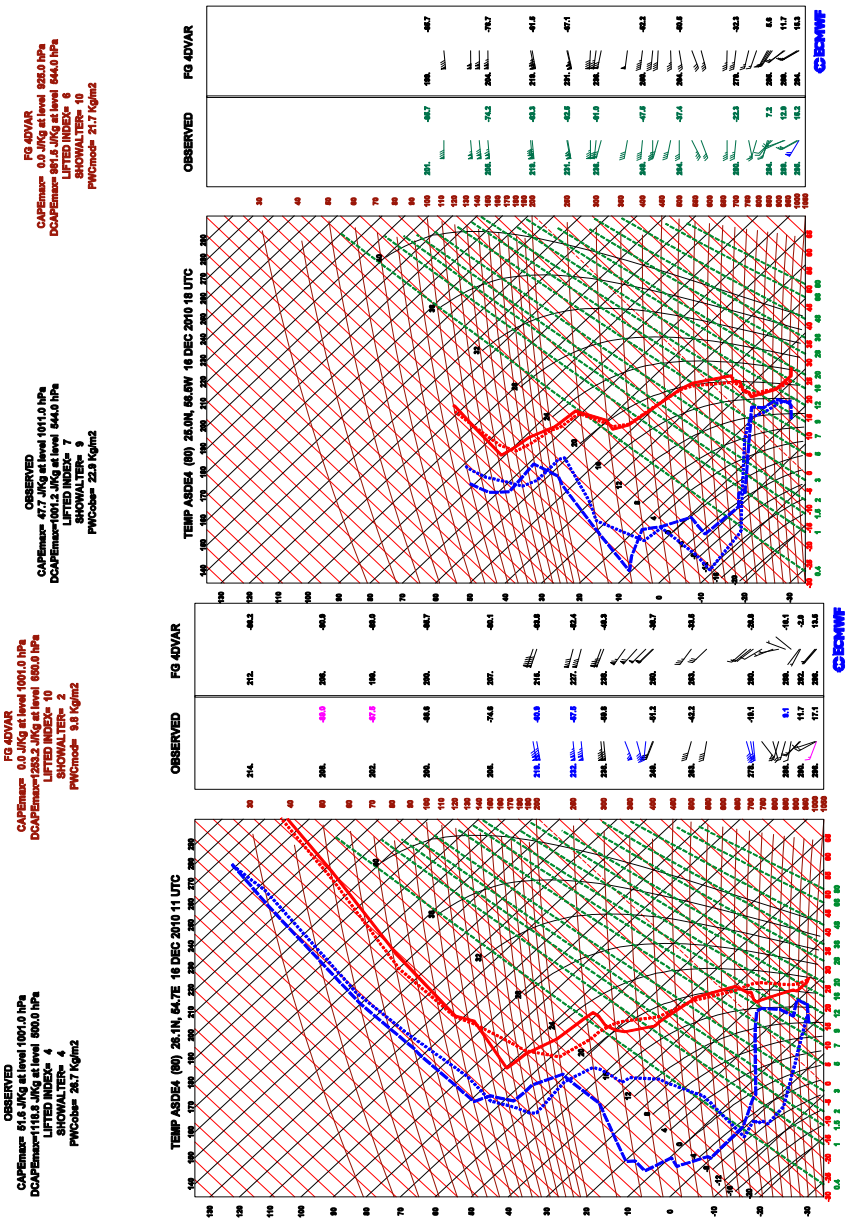


Figure 5.a

ASDE4 tephigrams 16 Dec 2010 11 UTC and 18 UTC.

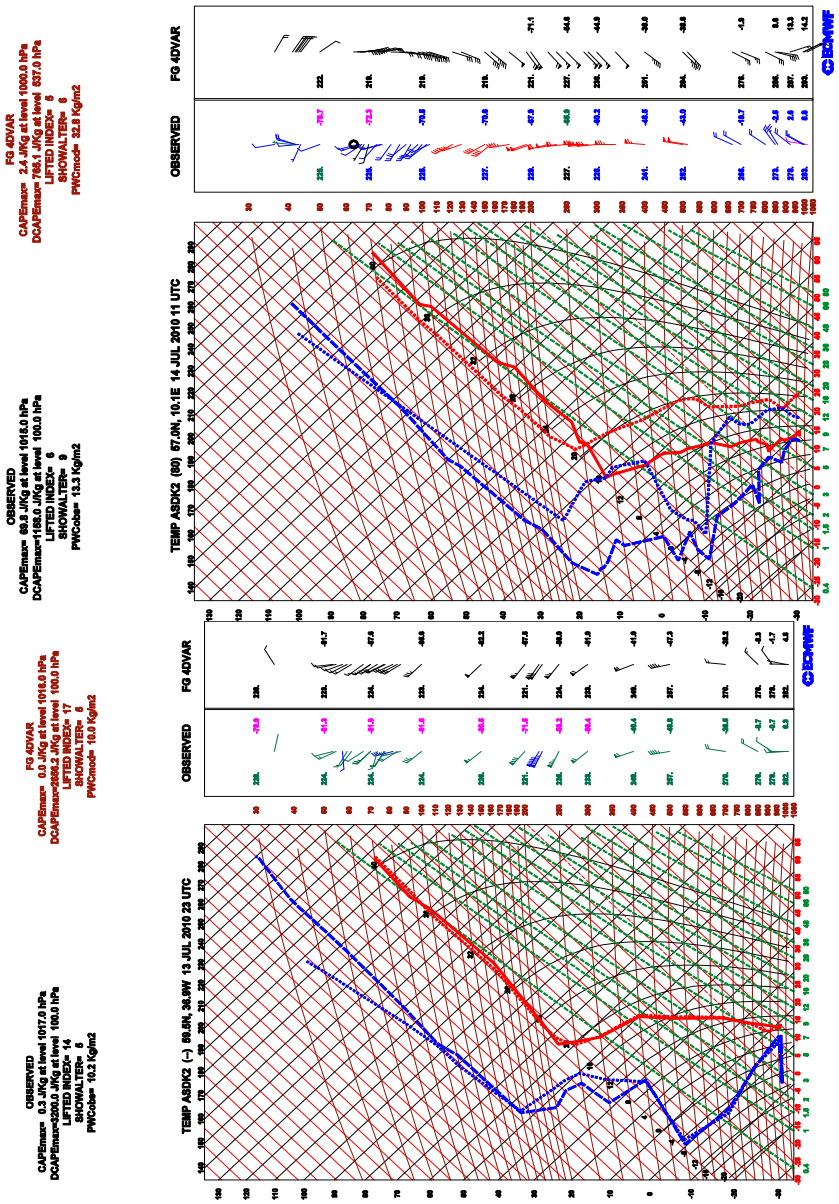


Figure 5.b
ASDK2 tephigrams 13 July 23 UTC and 14 July 11 UTC 2010.

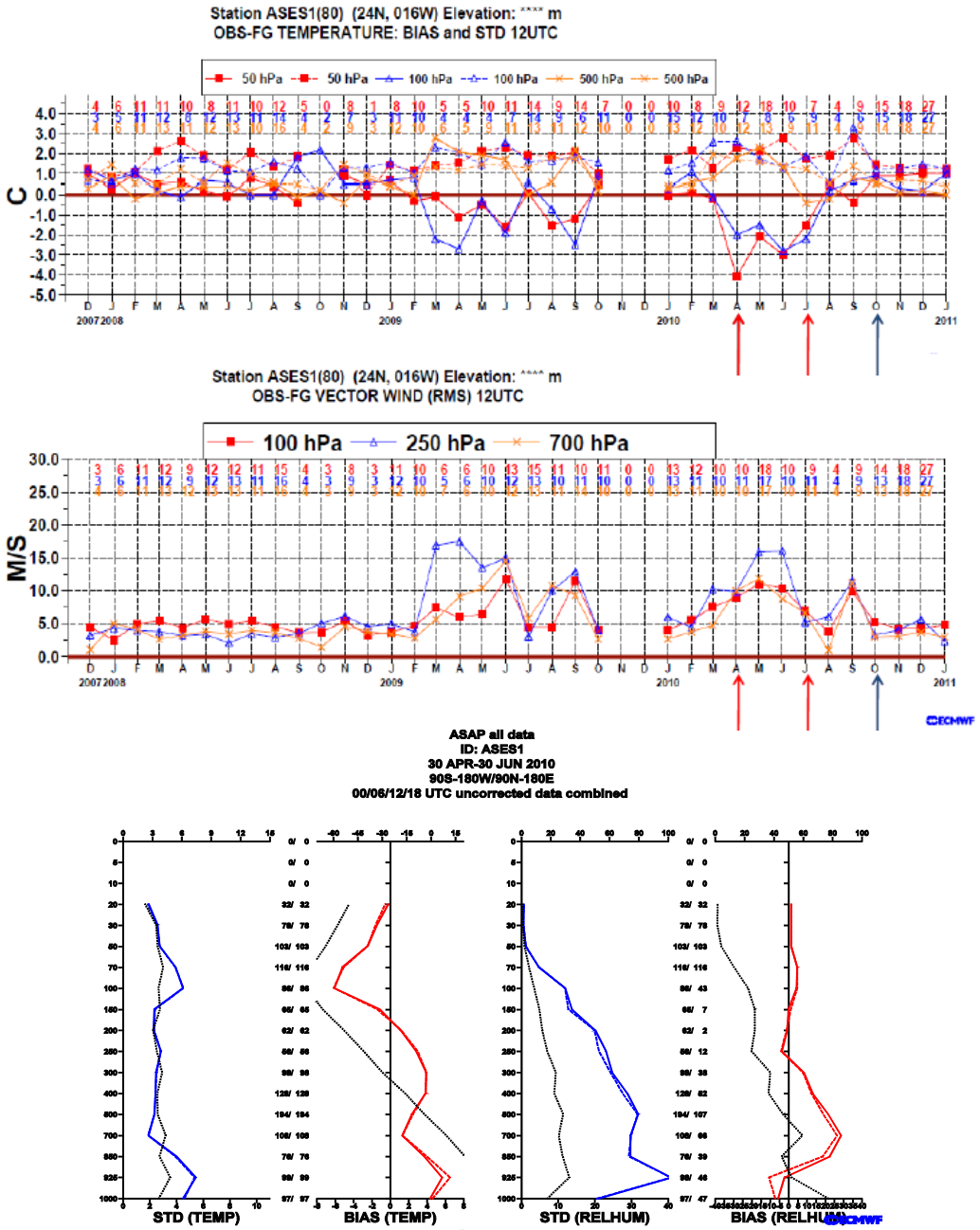


Figure 6

Time series of ASES1 December 2007 to January 2011 and vertical statistics May-June 2010

4. ASAP data monitoring at ECMWF

At ECMWF we monitor ASAP data on a daily and monthly basis. The tephigrams and track charts included in this report are examples of the daily monitoring of ASAP reports.

The time series shown in figures 7 to 11 contain temperature and wind statistics computed every 6 hours from 1 January to 31 December 2010. Comparing these time series with daily values of the previous years there are no remarkable changes in quality for the monitored parameters. January to December composite

statistics for temperature and wind speed can be seen in figures 12 and 13. The statistics have been computed by stratifying the samples into Japanese and not Japanese ASAP. Again the comparison to 2009 similar statistics shows no deterioration in the data quality.

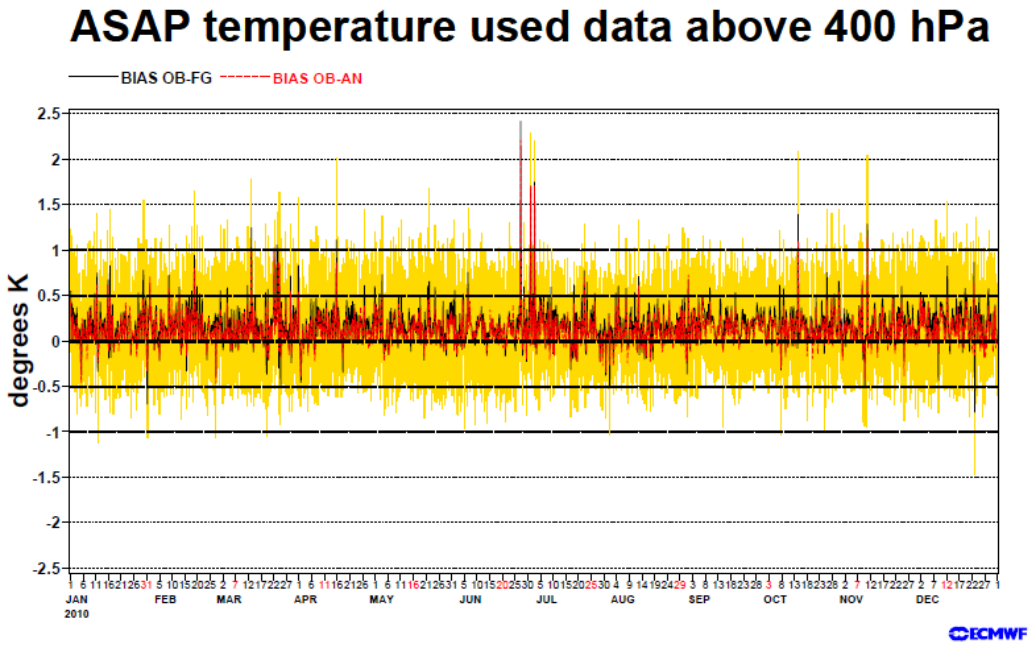


Figure 7
ASAP temperature statistics time series. The vertical bars are the STD OB-FG Vertical yellow bars: STD OB-FG. 1 January 2010 to 31 December 2010.

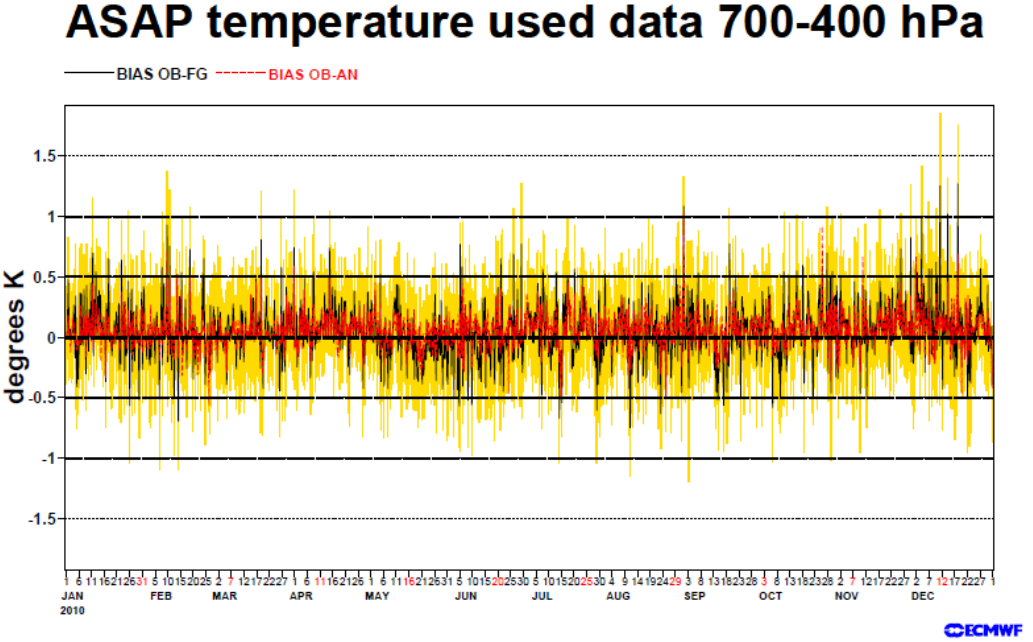


Figure 8
ASAP temperature statistics time series. The vertical bars are the STD OB-FG Vertical yellow bars: STD OB-FG. 1 January 2010 to 31 December 2010.

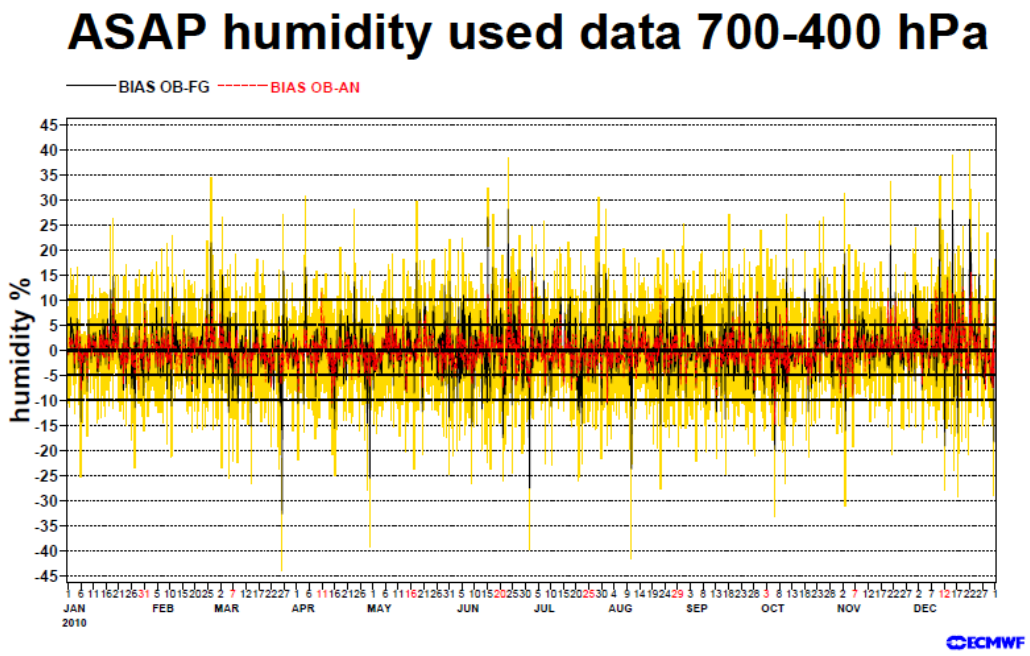


Figure 9

ASAP temperature statistics time series. The vertical bars are the STD OB-FG Vertical yellow bars: STD OB-FG. 1 January 2010 to 31 December 2010.

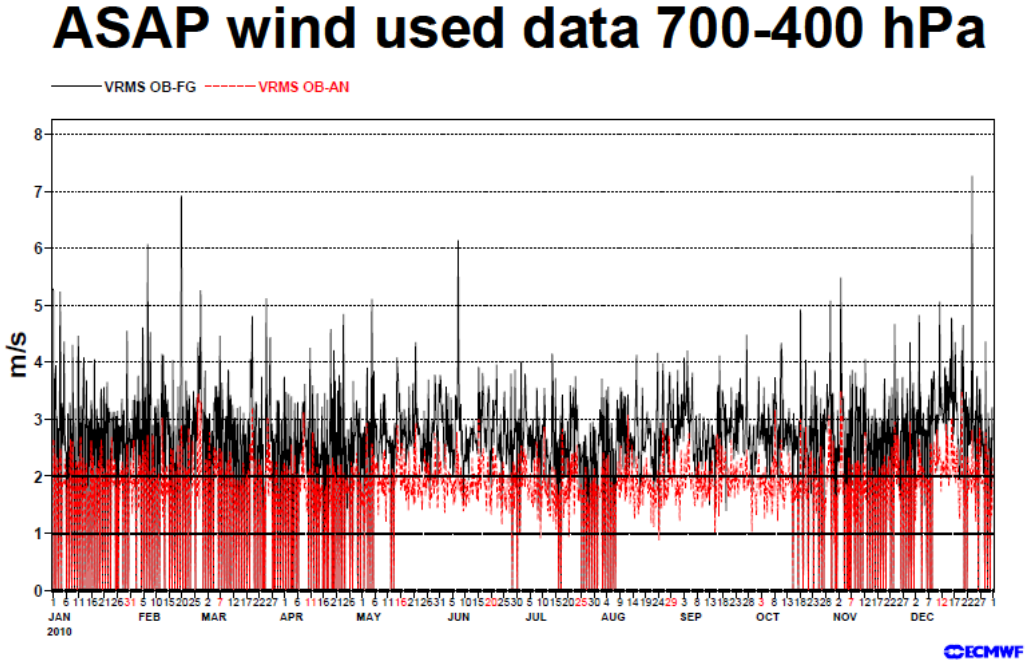


Figure 10

ASAP wind vector difference statistics time series. 1 January 2010 to 31 December 2010.

ASAP wind used data above 400 hPa

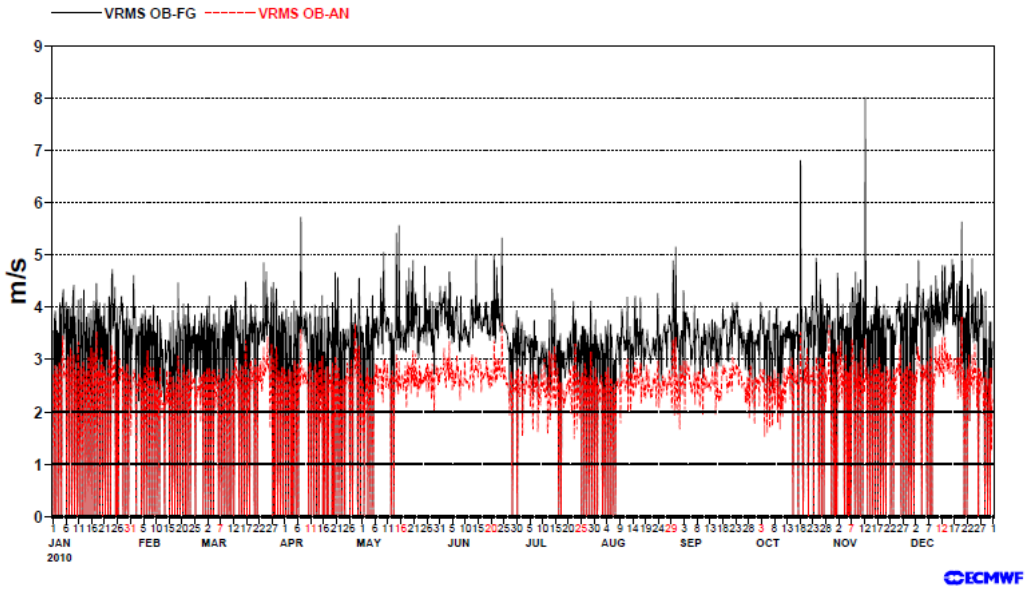
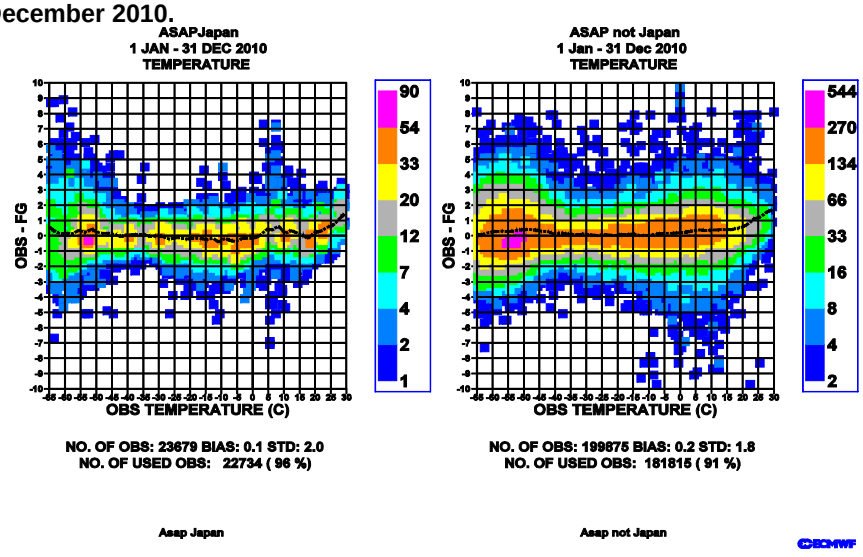


Figure 11

ASAP wind vector difference statistics time series. 1 January 2010 to 31 December 2010.



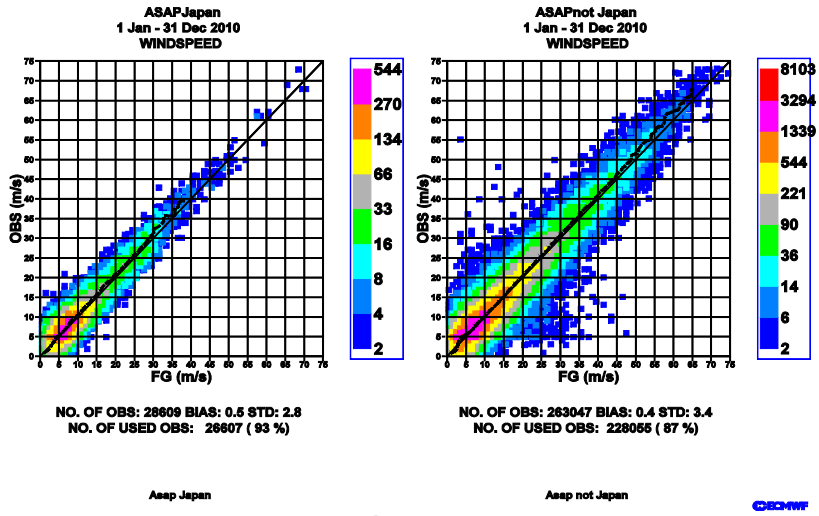


Figure 12
ASAP temperature and wind speed statistics. 1 January 2010 to 31 December 2010.

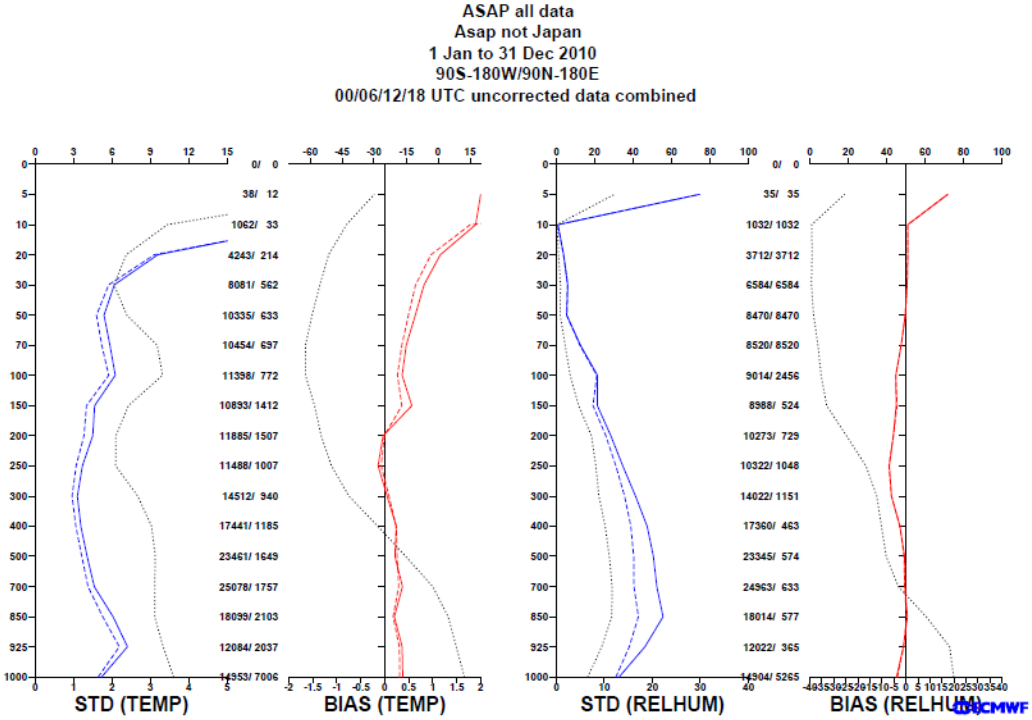


Figure 13
ASAP temperature and humidity vertical statistics: not Japanese ASAP

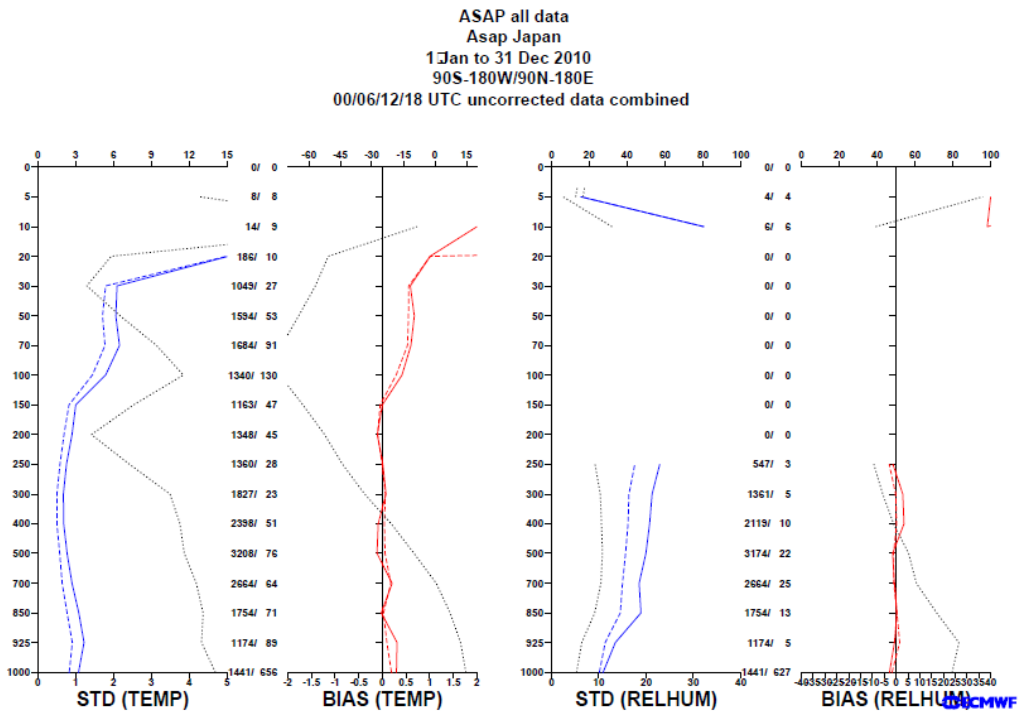


Figure 14
ASAP temperature and humidity vertical statistics: Japanese ASAP

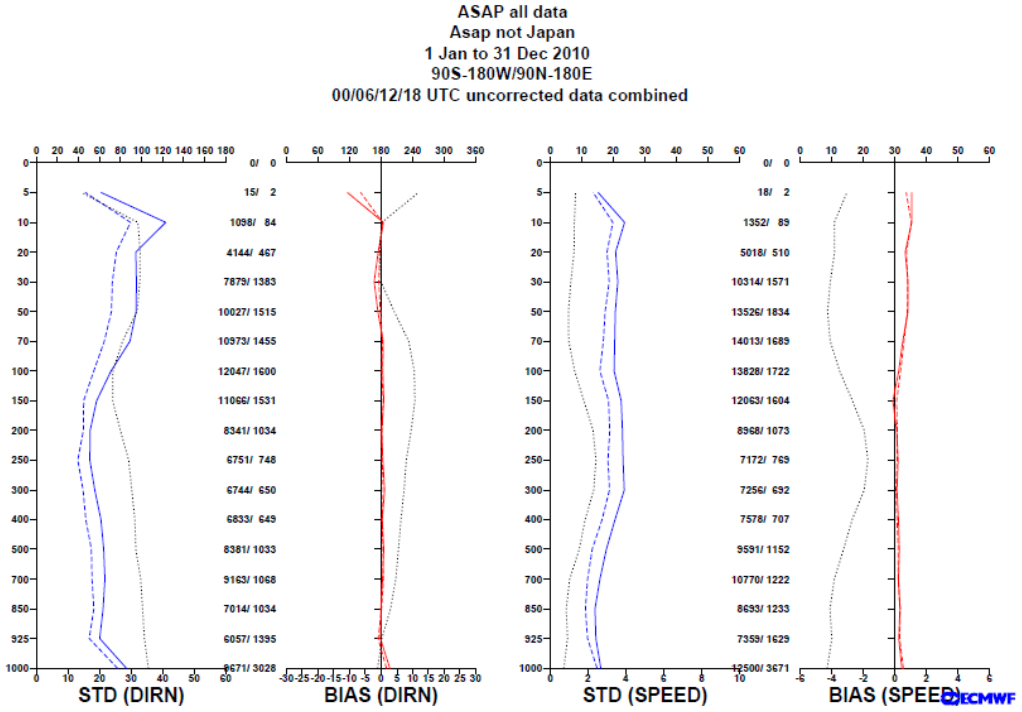


Figure 15
ASAP wind speed and direction vertical statistics: not Japanese ASAP

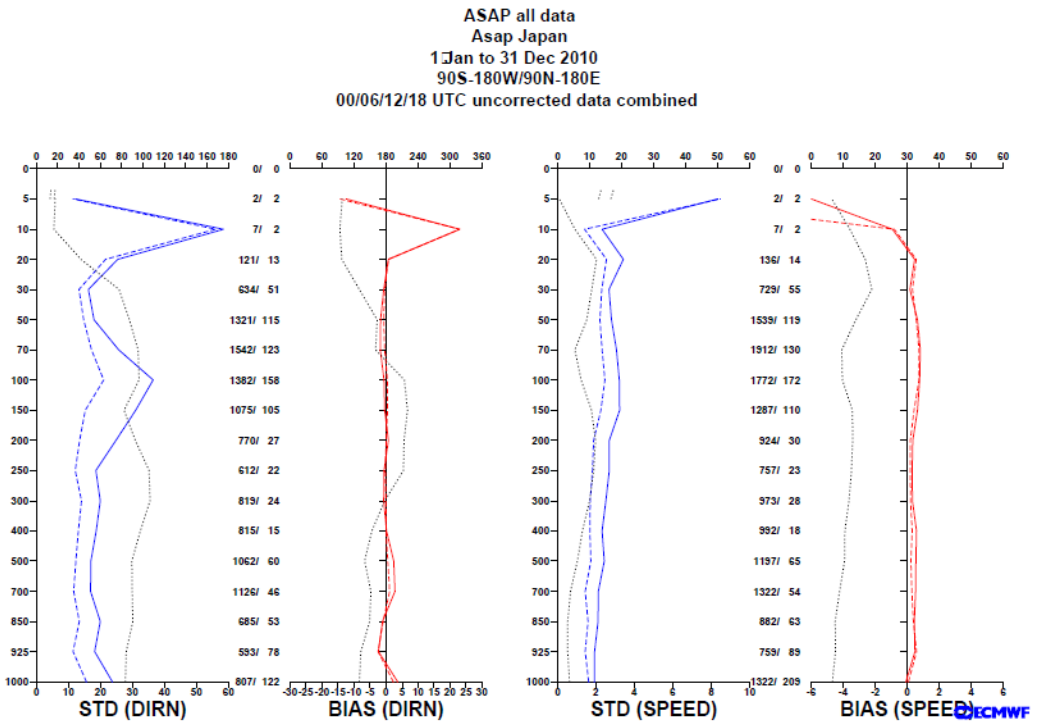


Figure 16
ASAP wind speed and direction vertical statistics: Japanese ASAP

Finally figures 13 to 16 show composite vertical statistics for the whole year 2010. The computation has been done using standard and significant levels for all the profiles. The vertical statistics show good quality data obtained in areas where high vertical resolution data with good quality is important for the NWP models.

5. Conclusions:

- The number of reports received at mid tropospheric levels during 2010 was slightly larger than in 2009 at 00 and 12 UTC and reduced by 35% and 15% at 06 and 18 UTC.
- The percentage of ascents reaching 100 hPa down to values of around 85% in the second half of 2010.
- The problem of wrongly located reports is still there although in smaller numbers than in 2009. This problem is absent in the Japanese ASAP.
- The quality of the ASAP data has continued to be good.

TABLE 1: **ASAP reports received at ECMWF January-December 2009 at 500 hPa**

	TEMPERATURE					WIND				
ID	00	06	12	18	TOTAL	00	06	12	18	TOTAL
ASBG1	1	0	1	1	3	1	0	1	1	3
ASDE1	107	18	113	131	369	96	18	101	117	332
ASDE2	7	1	225	55	288	5	1	222	52	280
ASDE3	72	2	102	61	237	72	2	102	61	237
ASDE4	147	16	128	142	433	129	6	118	129	382
ASDE9	0	7	49	1	57	0	7	47	1	55
ASDK1	100	32	112	47	291	97	31	103	44	275
ASDK2	108	28	125	29	290	103	26	111	22	262
ASDK3	98	16	90	41	245	98	16	88	41	243
ASES1	0	0	111	1	112	0	0	110	1	111
ASEU1	37	0	116	71	224	35	0	114	71	220
ASEU2	97	16	105	84	302	94	14	98	80	286
ASEU3	42	0	50	42	134	39	0	47	37	123
ASEU4	88	3	87	90	268	88	3	87	90	268
ASEU5	116	1	105	101	323	112	1	100	96	309
ASFR1	113	3	124	0	240	113	3	124	0	240
ASFR2	116	0	125	0	241	116	0	125	0	241
ASGB1	60	0	71	60	191	55	0	65	50	170
DBLK	21	23	241	4	289	21	23	238	4	286
DFCG	13	13	11	13	50	13	13	10	13	49
EKOFK	0	0	1	0	1	0	0	1	0	1
JBT	0	1	0	0	1	0	0	0	0	0
JCCX	22	0	21	0	43	22	0	21	0	43
JDWX	38	0	38	0	76	38	0	38	0	76
JGQH	75	5	76	4	160	75	5	76	4	160
JIVB	6	0	8	0	14	6	0	8	0	14
JNSR	31	32	31	31	125	31	32	31	31	125
LDWR	312	303	300	305	1220	312	303	300	305	1220
UFTA	9	0	5	0	14	6	0	3	0	9
WTEC	0	11	13	12	36	0	9	10	10	29
XXX	0	0	2	0	2	0	0	2	0	2
	1836	531	2586	1326	6279	1777	513	2501	1260	6051

TABLE 2: **ASAP reports received at ECMWF January-December 2010 at 500 hPa**

	TEMPERATURE					WIND				
ID	00	06	12	18	TOTAL	00	06	12	18	TOTAL
ASDE1	126	1	132	125	384	119	1	127	120	367
ASDE2	50	2	275	6	333	50	2	275	6	333
ASDE3	125	0	137	101	363	124	0	136	101	361
ASDE4	103	2	105	108	318	78	2	75	86	241
ASDE9	0	0	3	0	3	0	0	3	0	3
ASDK1	176	47	152	53	428	159	40	137	41	377
ASDK2	120	30	227	34	411	116	26	224	30	396
ASDK3	122	13	139	41	315	116	12	139	41	308
ASES1	0	0	211	2	213	0	0	207	2	209
ASEU1	0	0	199	103	302	0	0	196	103	299
ASEU2	100	3	91	99	293	99	3	89	99	290
ASEU3	76	7	92	77	252	72	7	87	76	242
ASEU4	121	0	111	105	337	120	0	111	105	336
ASEU5	82	0	96	83	261	81	0	94	81	256
ASFR1	134	1	141	0	276	134	1	141	0	276
ASFR2	151	0	153	0	304	151	0	153	0	304
ASFR3	103	0	121	0	224	103	0	121	0	224
ASFR4	83	1	120	0	204	83	1	120	0	204
ASGB1	58	0	80	75	213	48	0	64	63	175
DBLK	55	152	271	31	509	54	152	270	31	507
FQWZ	0	0	1	0	1	0	0	1	0	1
JDWX	2	0	2	0	4	2	0	2	0	4
JGQH	43	0	42	0	85	43	0	42	0	85
JNSR	89	89	87	88	353	88	89	87	88	352
MVKK	0	1	0	0	1	0	1	0	0	1
UFTA	3	0	0	0	3	6	0	0	0	6
WCZ71	0	1	0	0	1	0	1	0	0	1
XXX	0	0	5	0	5	0	0	4	0	4
	1922	350	2993	1131	6396	1846	338	2905	1073	6162

TABLE 3: **ASAP wrong positions detected January-December 2010**

ID:**ASDE1**

Date	Lat	Lon	Speed (*)	
2010-01-04 18: 0:00	40.9	-68.0		
2010-01-04 23: 0:00	41.8	-66.6 -->	30.8 Km/hr	
2010-01-05 23: 0:00	44.0	63.0 -->	440.0 Km/hr	←
2010-01-06 11: 0:00	44.0	58.0 -->	33.3 Km/hr	←
2010-01-06 17: 0:00	45.3	-55.7 -->	1499.2 Km/hr	
2010-03-18 23: 0:00	48.9	-47.3 -->	31.8 Km/hr	
2010-03-19 11: 0:00	50.5	42.7 -->	539.6 Km/hr	←
2010-03-19 17: 0:00	51.2	-40.4 -->	972.4 Km/hr	

ID:**ASDE3**

Date	Lat	Lon	Speed (*)
2010-11-13 23: 0:00	45.7	-52.4 -->	31.6 Km/hr
2010-11-13 23: 0:00	45.7	-52.4 -->	DUPLICATE?

ID:**ASDE4**

Date	Lat	Lon	Speed (*)	
2010-03-08 00: 0:00	40.5	-25.6 -->	38.1 Km/hr	
2010-03-08 12: 0:00	38.0	-3.0 -->	163.8 Km/hr	←
2010-03-08 18: 0:00	37.5	-31.9 -->	423.6 Km/hr	
2010-12-15 23: 0:00	28.0	-51.2 -->	32.3 Km/hr	
2010-12-16 11: 0:00	26.1	54.7 -->	874.1 Km/hr	←
2010-12-16 18: 0:00	25.0	-56.5 -->	1593.8 Km/hr	

ID:**ASDK1**

Date	Lat	Lon	Speed (*)	
2010-12-14 11: 0:00	60.7	-48.8 -->	0.4 Km/hr	
2010-12-14 17: 0:00	60.9	-28.4 -->	184.5 Km/hr	←
2010-12-14 23: 0:00	59.7	-43.3 -->	138.6 Km/hr	

ID:**ASDK2**

Date	Lat	Lon	Speed (*)	
2010-01-02 11: 0:00	-70.2	-3.6 -->	6.0 Km/hr	
2010-01-04 11: 0:00	57.0	10.1 -->	296.3 Km/hr	←
2010-01-05 11: 0:00	-70.2	-6.6 -->	594.3 Km/hr	
2010-06-15 23: 0:00	60.5	-40.8 -->	25.6 Km/hr	
2010-06-16 17: 0:00	57.0	10.1 -->	164.5 Km/hr	←
2010-06-16 23: 0:00	60.6	-47.9 -->	560.8 Km/hr	
2010-07-03 05: 0:00	63.7	-25.1 -->	25.8 Km/hr	
2010-07-03 11: 0:00	57.0	10.1 -->	345.8 Km/hr	←
2010-07-03 23: 0:00	64.8	-33.8 -->	210.6 Km/hr	
2010-07-13 23: 0:00	59.5	-36.9 -->	25.9 Km/hr	
2010-07-14 11: 0:00	57.0	10.1 -->	230.3 Km/hr	←
2010-07-15 11: 0:00	59.4	-20.6 -->	75.8 Km/hr	
2010-08-15 23: 0:00	61.0	-32.1 -->	26.5 Km/hr	
2010-08-16 11: 0:00	57.0	10.1 -->	204.8 Km/hr	←
2010-08-16 23: 0:00	59.7	-42.5 -->	257.0 Km/hr	
2010-09-14 11: 0:00	59.5	-40.1 -->	27.5 Km/hr	
2010-09-14 23: 0:00	57.0	10.1 -->	245.9 Km/hr	←
2010-09-15 11: 0:00	59.5	-28.3 -->	188.7 Km/hr	

ID:**ASES1**

Date	Lat	Lon	Speed (*)

All obs from April to July both included

ID:**ASEU1**

Date	Lat	Lon	Speed (*)
2010-09-17 14: 0:00	53.3	7.2 -->	0.8 Km/hr
2010-09-17 14: 0:00	53.3	7.2 -->	DUPLICATE?

ID:**ASEU2**

Date	Lat	Lon	Speed (*)
2010-06-19 17: 0:00	45.6	-16.4 -->	36.9 Km/hr
2010-06-19 23: 0:00	44.6	18.6 -->	458.2 Km/hr ←
2010-06-20 12: 0:00	42.4	-23.4 -->	261.3 Km/hr
2010-10-14 23: 0:00	26.0	-60.0 -->	40.6 Km/hr
2010-10-15 11: 0:00	23.0	63.0 -->	1037.5 Km/hr ←
2010-10-15 17: 0:00	22.0	-64.0 -->	2174.5 Km/hr

ID:**ASEU3**

Date	Lat	Lon	Speed (*)
2010-03-11 00: 0:00	43.4	-24.5 -->	30.2 Km/hr
2010-03-11 12: 0:00	44.3	29.5 -->	360.9 Km/hr ←
2010-03-11 18: 0:00	45.0	-32.2 -->	813.6 Km/hr
2010-03-13 06: 0:00	46.0	-47.1 -->	32.0 Km/hr
2010-03-13 12: 0:00	46.0	50.3 -->	1253.9 Km/hr ←
2010-03-21 12: 0:00	45.9	-50.5 -->	40.6 Km/hr

ID:**ASFR4**

Date	Lat	Lon	Speed (*)
2010-12-16 12: 0:00	36.0	-37.8 -->	38.6 Km/hr
2010-12-16 12: 0:00	36.0	-37.8 -->	DUPLICATE?

ID:**JNSR**

Date	Lat	Lon	Speed (*)
2010-05-14 00: 0:00	6.0	133.5 -->	3.4 Km/hr
2010-05-14 00: 0:00	6.0	133.5 -->	DUPLICATE?
2010-06-19 12: 0:00	5.0	139.5 -->	0.0 Km/hr
2010-06-19 12: 0:00	5.0	139.5 -->	DUPLICATE?

(*) The speed is computed using two consecutive reports and assuming the shortest trajectory between them
(←) Marks wrong positions