

European Centre for Medium-Range Weather Forecasts

**SUMMARY REPORT ON THE MONITORING OF ASAP SHIP DATA
January-December 2009**

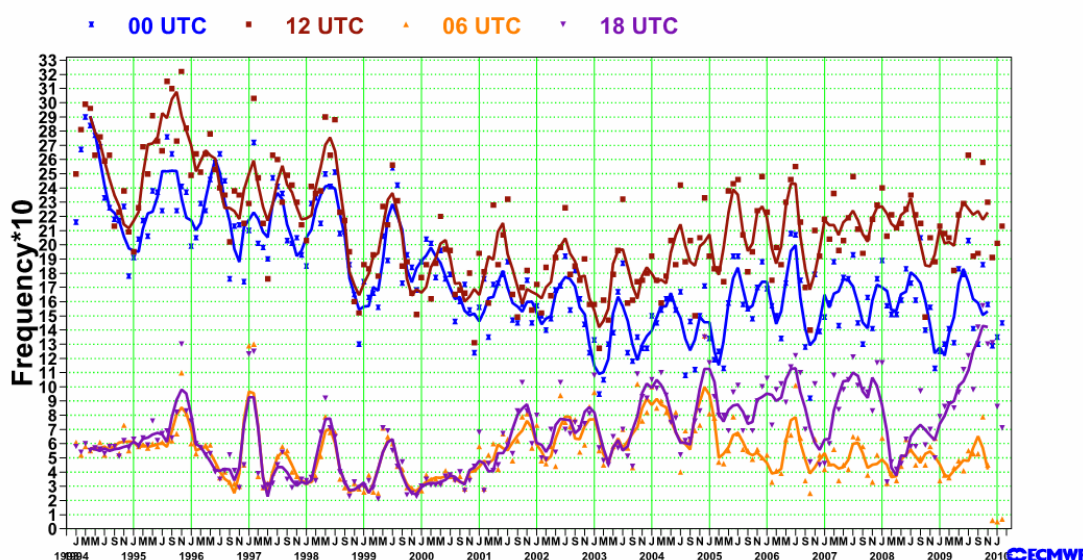
1. Summary:

The number of ASAP reports received at ECMWF were similar compared to 2007, the percentage of ascents reaching 100 hPa back to values around 90% in 2009. Still some problems related to wrongly located reports. 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:

Time series showing the ASAP data reception at ECMWF since January 1994 can be seen in figures 1 to 3. The number of reports received at mid tropospheric levels during 2009 was similar to 2008 at 00, 06 and 12 UTC. At 18 UTC there was a 79% remarkable increase of the numbers compared to 2008. Summaries for 2008 and 2009 can be found in tables 1 and 2 at the end of this report.

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



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

Figure 2 shows that the percentage of ascents reaching 100 hPa was on average around 90% in the second half of 2009. These values were smaller than those in 2008. The positive trend in the number of reports reaching the upper stratosphere which was clear up to 2007 has reached a saturation level in the last two years. This trend can be seen 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. ASAP ASDE2 sent reports from the tropical Pacific and southern Atlantic , ASDK2 from the southern Atlantic, DBLK from the southern Pacific and southern Atlantic, DFCEG a route from Japan to Australia, JNSR from north of Alaska and UFTA from the Arctic.

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

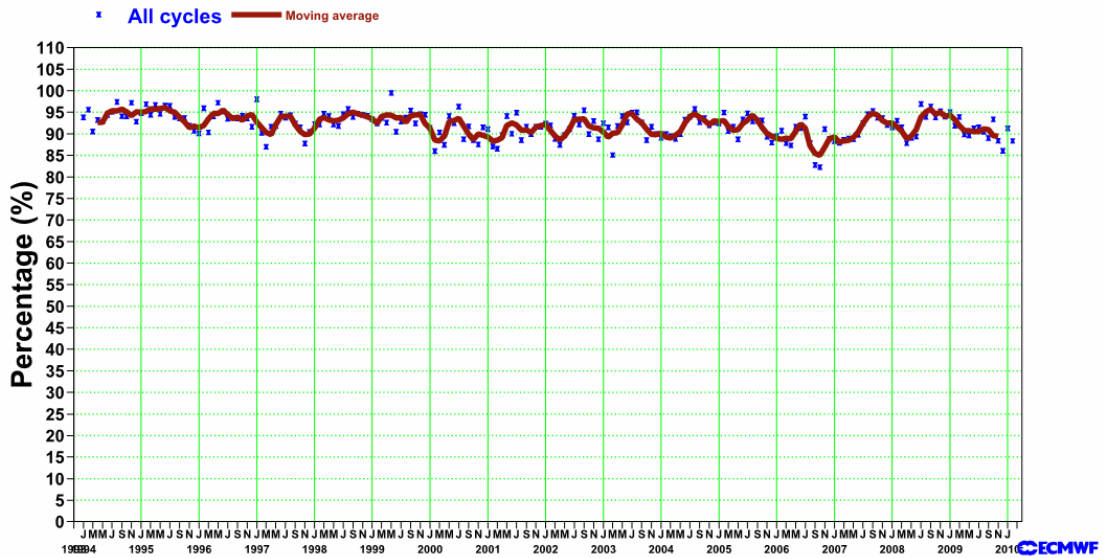


Figure 2
Percentage of ASAP reports reaching the 100 hPa level Jan 1994 to February 2010

Monthly counts of ASAP received at ECMWF Temperature 20 hPa - GLOBAL

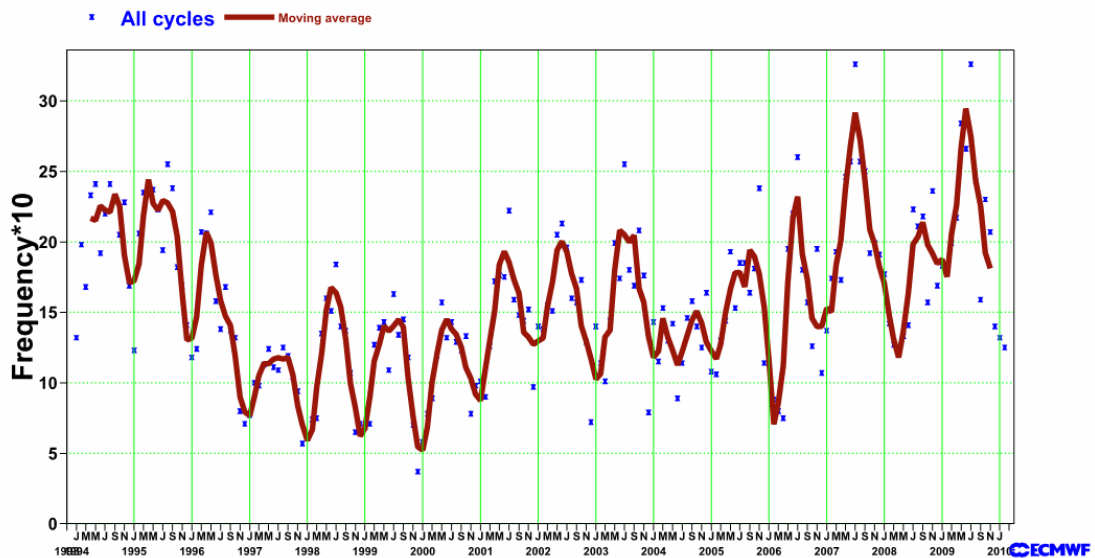
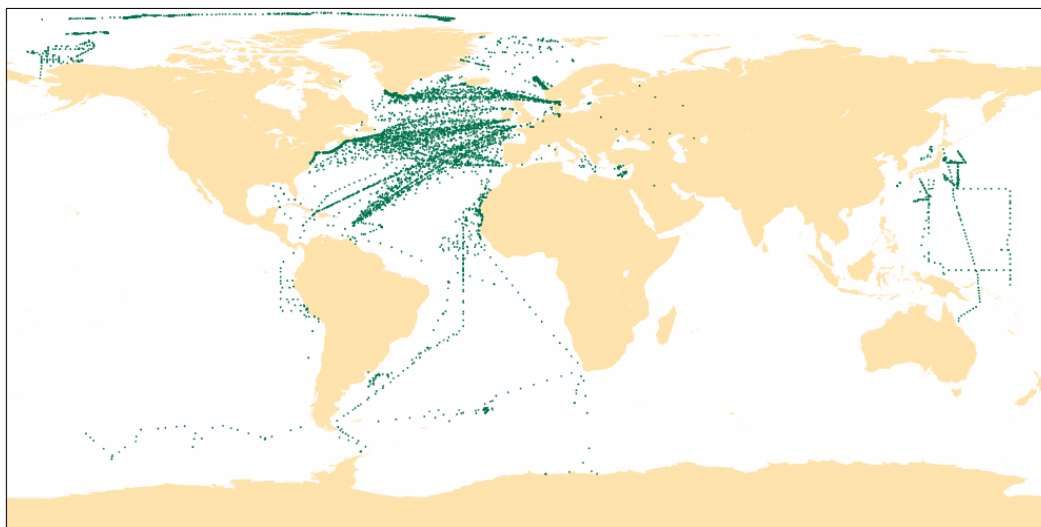


Figure 3
ASAP temperature data received at 20 hPa Jan 1994 to Feb 2010 (all cycles together)

ASAP

31 DEC 2008-31 DEC 2009



CECMWF

Figure 4
ASAP coverage January to December 2009

3. Troubleshooting

The details of wrongly located reports can be seen in table 3 at the end of this report. Figure 6 show the tracks of the ASAP ASDK2 unit with the larger amount of wrong positions. The bad positions in many cases are obvious in the tracking maps when they are produced by a change in the sign of the reported longitude or latitude. The case of ASDK2 is not clear at all having a look to the tracking charts. In most of the cases the bad positions are reported as 57N, 10E which is a location in Denmark when actually the vessel was sailing in the middle of North Atlantic. In such cases the reported profiles which are actually right are compared with profiles of the model in a distant location resulting in large data departures and data rejections. One example of this kind is shown in figures 6.a and 6.b. Figure 6.a shows an observation of 4 January 2009 at 11 UTC compared to the model profiles of temperature, dew point and wind. The agreement between the observation and the model is good. Six hours later the disagreement between the observation and the model is complete as shown in figure 6.b. The observed profiles are from the north Atlantic and the model profiles from a location close to Copenhagen, the differences between the observation and the model were so large that the whole profile was rejected by the 4DVAR quality control.

ASAP ASDK2 31 DEC 2008-31 DEC 2009

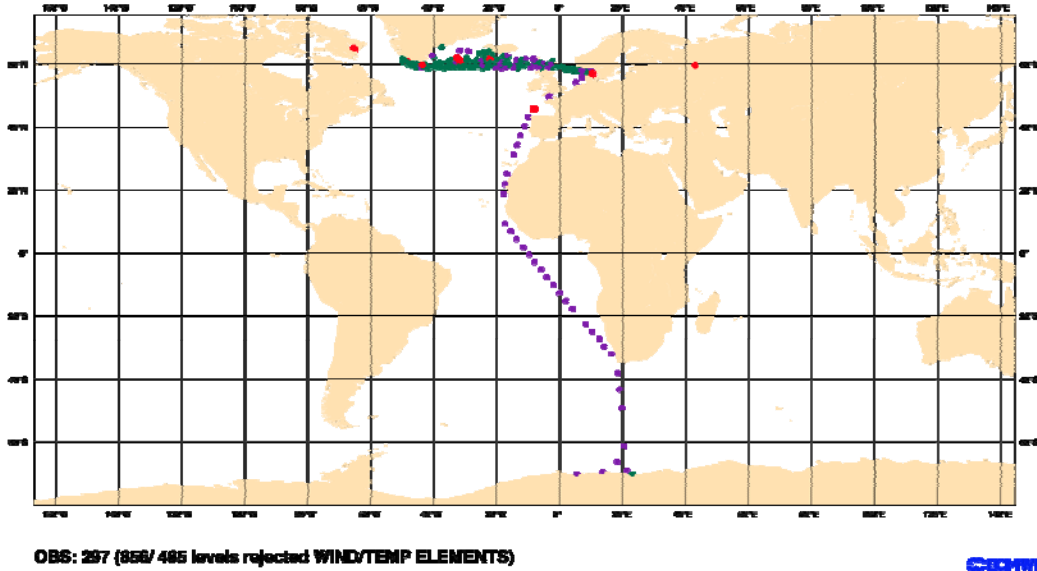


Figure 5
ASAP ASDK2 coverage January to December 2009

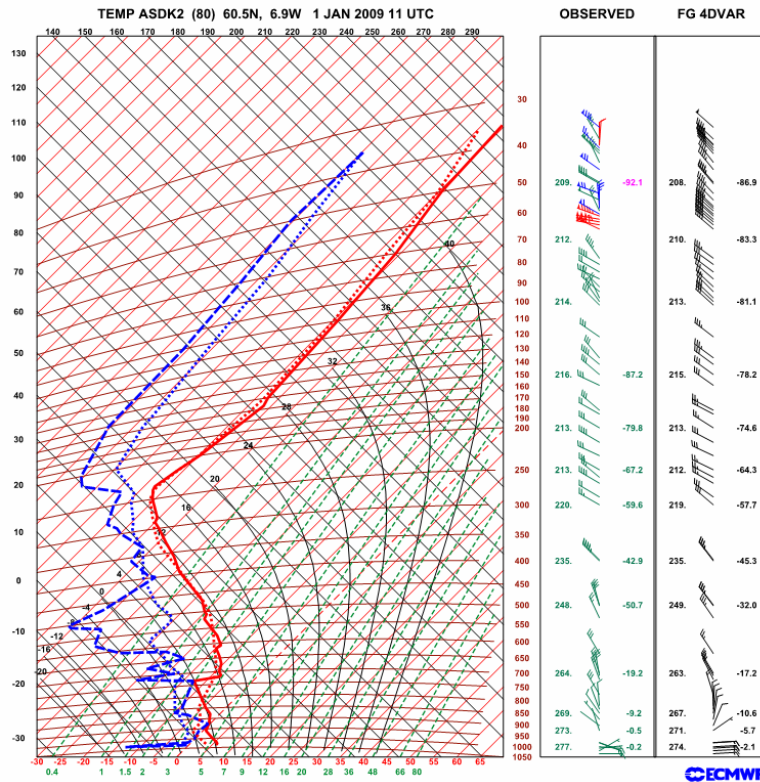


Figure 6.a
ASDK2 tephigram 4 Jan 2009 11 UTC.
Red full line: Observed temperature profile
Dotted red lines: FG temperature profile
Dashed blue line: Observed dew point profile
Dotted blue line: FG dew point profile

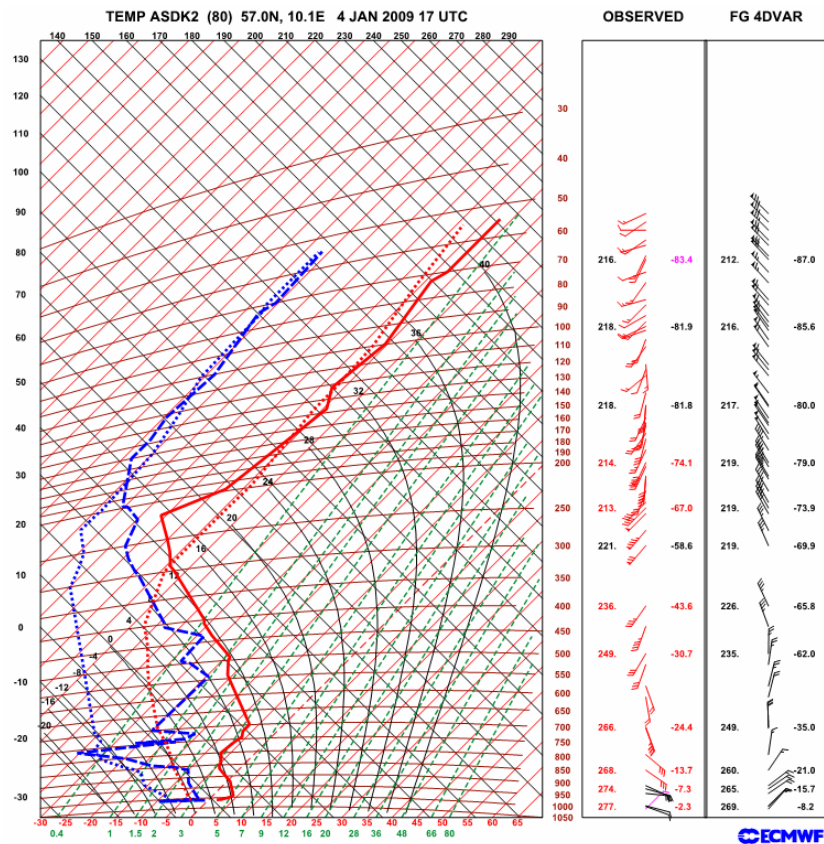


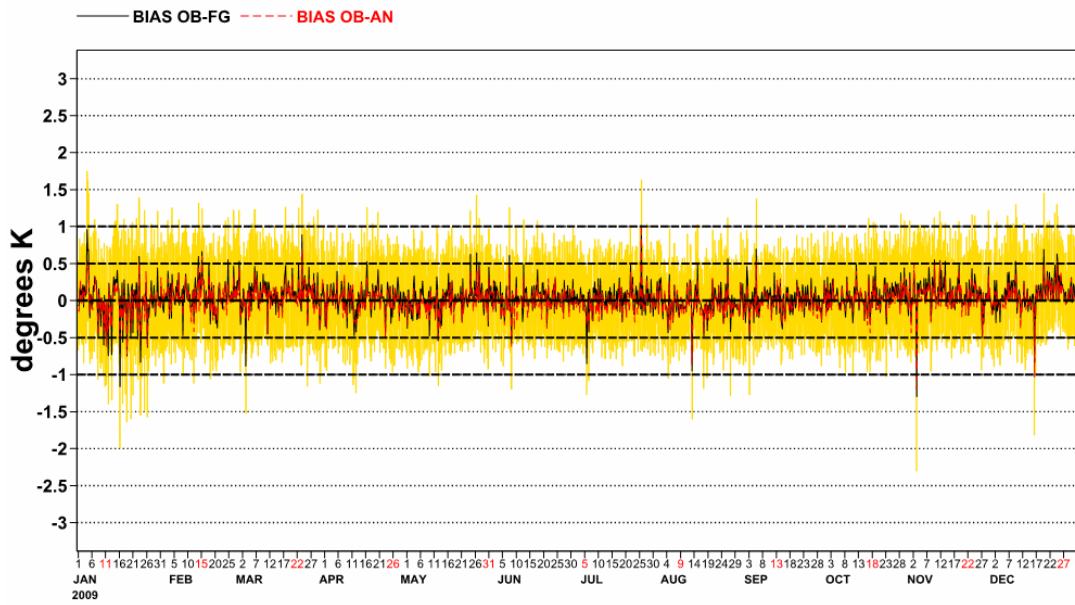
Figure 6.b
ASDK2 tephigram 4 Jan 2009 17 UTC. An erroneous positioned report
Red full line: Observed temperature profile
Dotted red lines: FG temperature profile
Dashed blue line: Observed dew point profile
Dotted blue line: FG dew point profile

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 2009. Comparing these time series with daily values to those of 2008 there are no remarkable changes in quality for all the monitored parameters. Figure 12 shows composite statistics regarding wind speed. The statistics have been computed by stratifying the samples into Japanese and not Japanese ASAP. Again the comparison to 2008 similar statistics shows no deterioration in the data quality.

ASAP temperature used data above 400 hPa

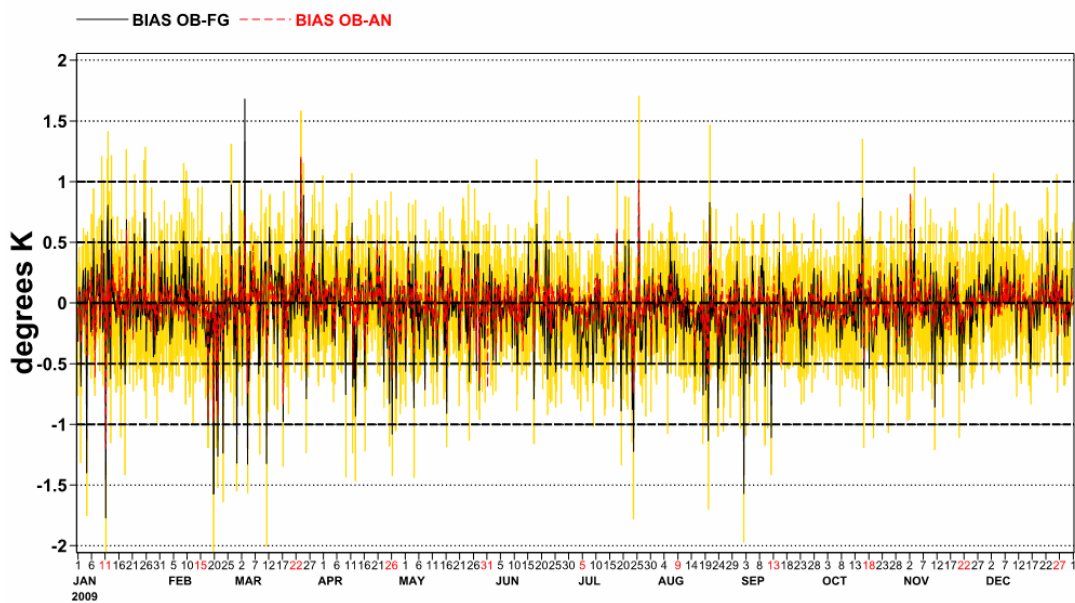


CECMWF

Figure 7

ASAP temperature statistics time series. The vertical bars are the STD OB-FG
Vertical yellow bars: STD OB-FG. 1 January 2009 to 31 December 2009.

ASAP temperature used data 700-400 hPa



CECMWF

Figure 8

ASAP temperature statistics time series. The vertical bars are the STD OB-FG
Vertical yellow bars: STD OB-FG. 1 January 2009 to 31 December 2009.

ASAP humidity used data 700-400 hPa

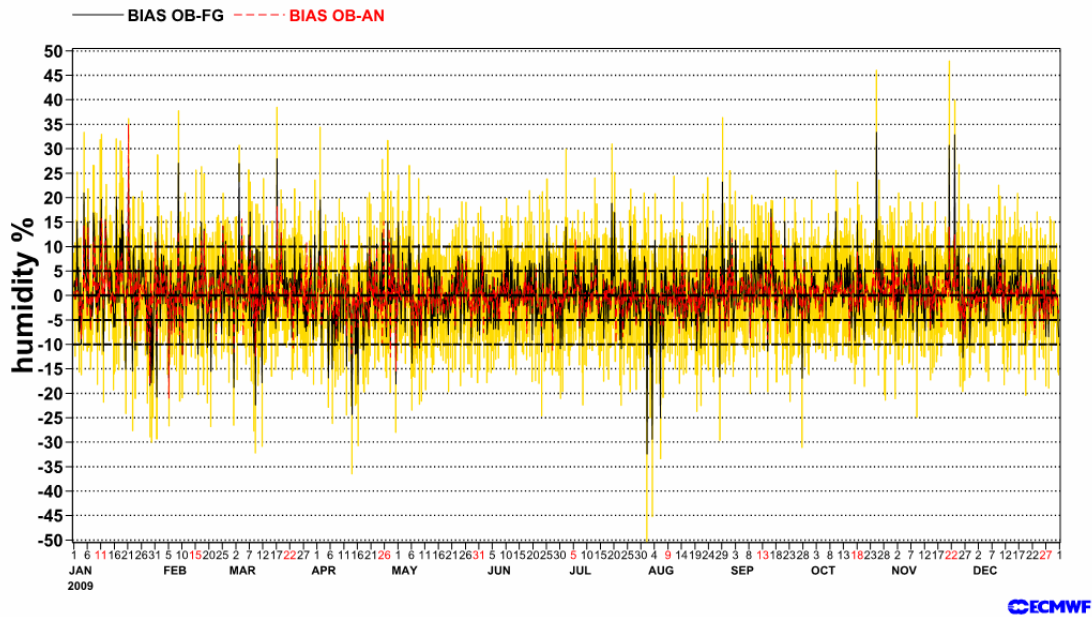


Figure 9
 ASAP temperature statistics time series. The vertical bars are the STD OB-FG
 Vertical yellow bars: STD OB-FG. 1 January 2009 to 31 December 2009.

ASAP wind used data 700-400 hPa

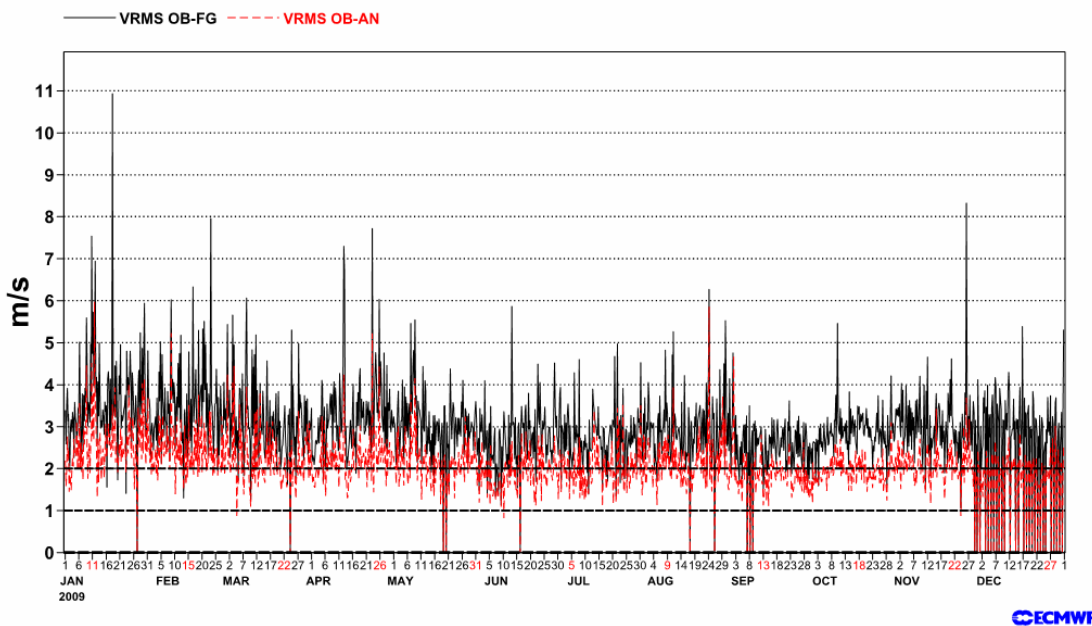


Figure 10
 ASAP wind vector difference statistics time series. 1 January 2009 to 31
 December 2009.

ASAP wind used data above 400 hPa

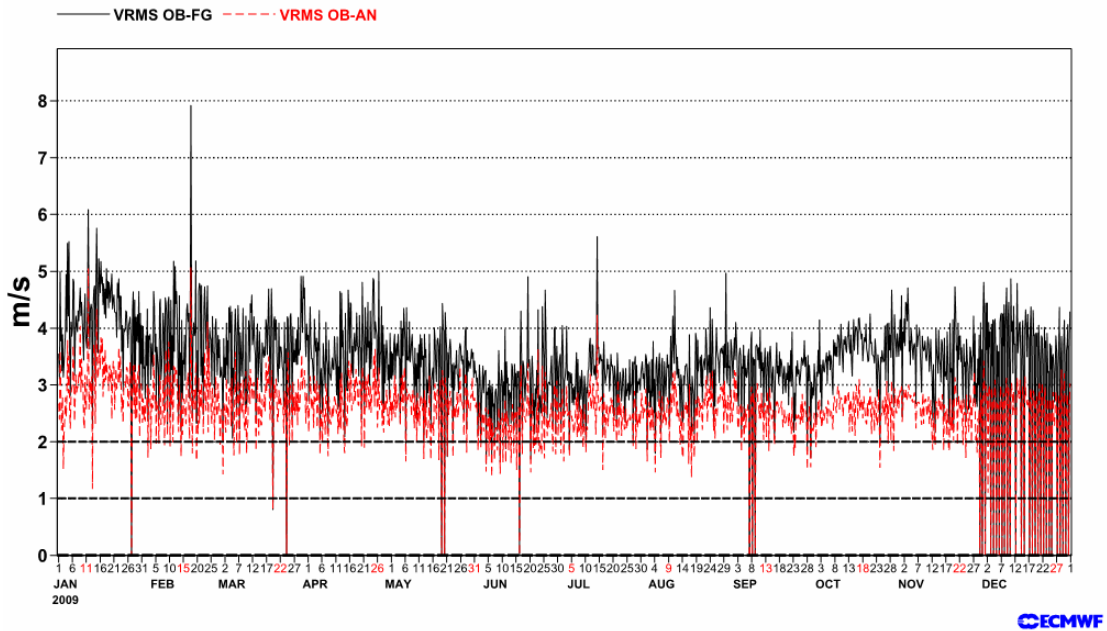


Figure 11
ASAP wind vector difference statistics time series. 1 January 2009 to 31 December 2009.

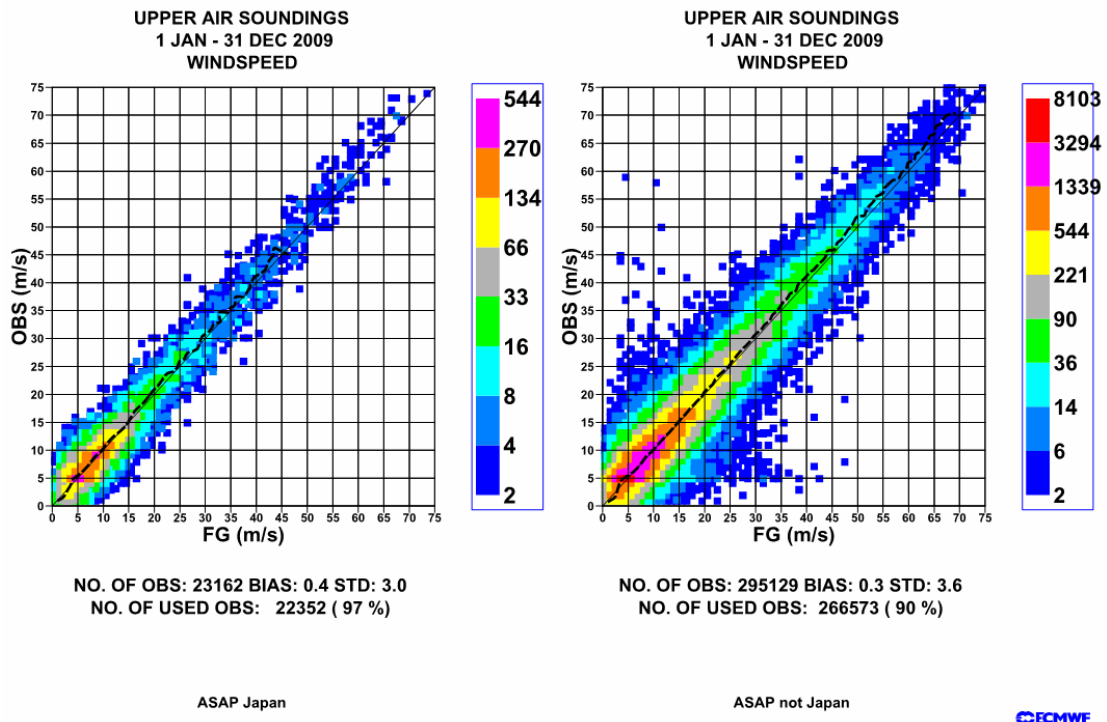


Figure 12
ASAP wind speed statistics. 1 January 2009 to 31 December 2009.

ASAP all data
 Asap not Japanese
 1 Jan-31 Dec 2009
 90S-180W/90N-180E
 00/06/12/18 UTC uncorrected data combined

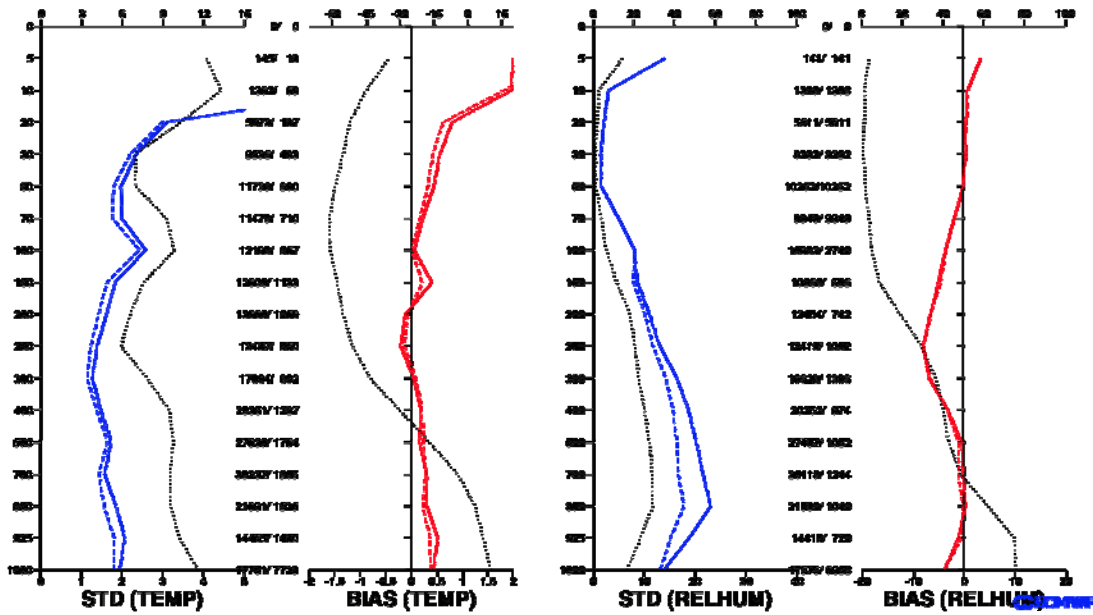


Figure 13
 ASAP temperature and humidity vertical statistics: not Japanese ASAP

ASAP all data
 Asap not Japanese
 1 Jan-31 Dec 2009
 90S-180W/90N-180E
 00/06/12/18 UTC uncorrected data combined

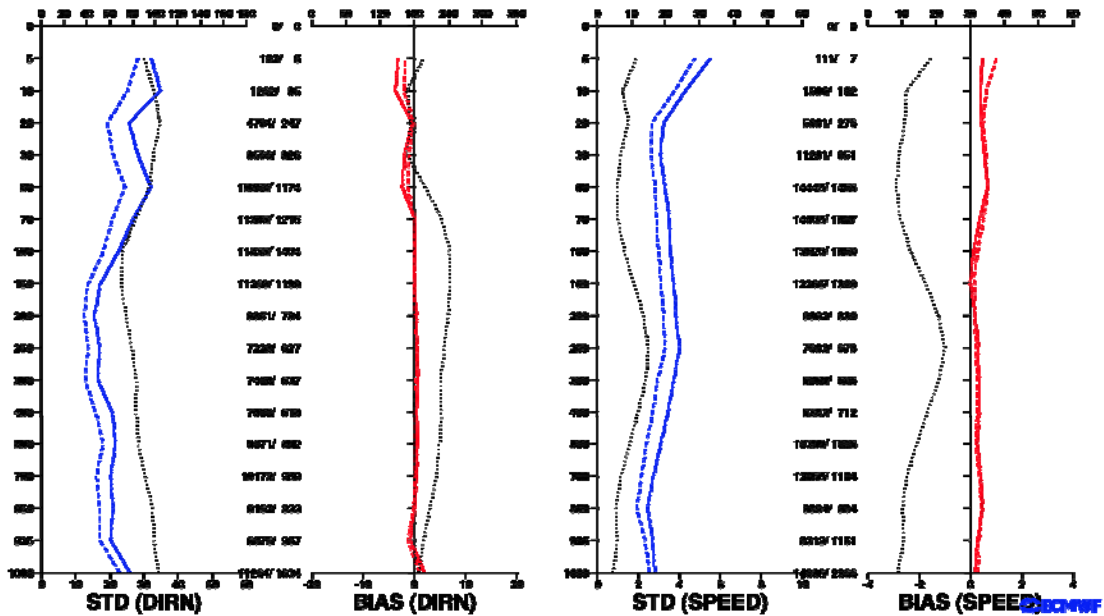


Figure 14
 ASAP wind speed and direction vertical statistics: not Japanese ASAP

ASAP all data
 ASAP Japan
 1 Jan-31 Dec 2009
 90S-180W/90N-180E
 00/06/12/18 UTC uncorrected data combined

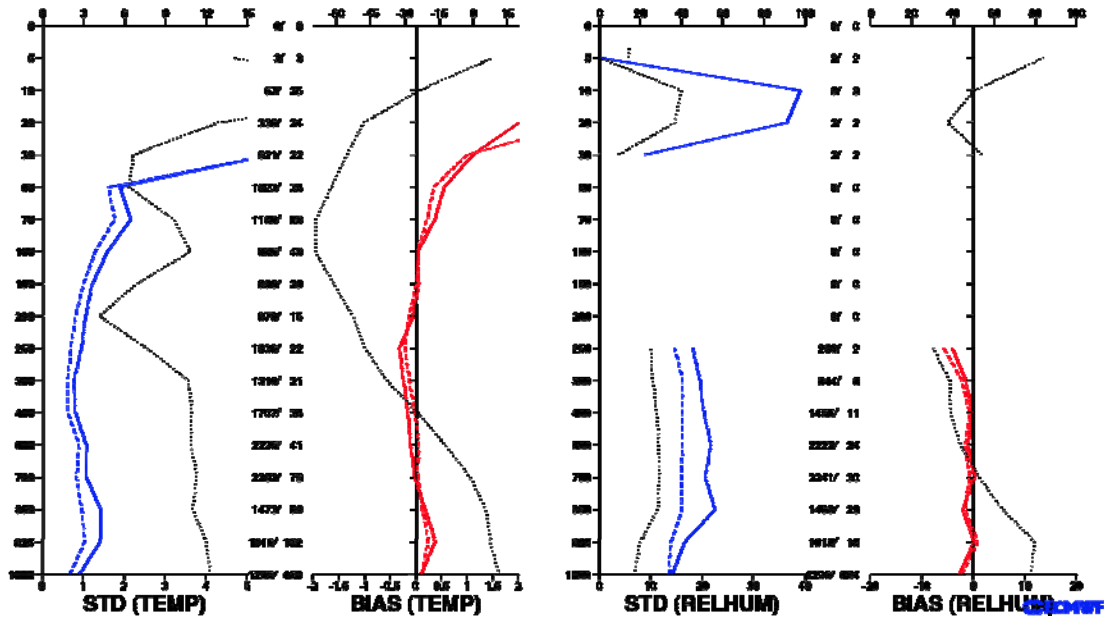


Figure 15
 ASAP temperature and humidity vertical statistics: Japanese ASAP

ASAP all data
 ASAP Japan
 1 Jan-31 Dec 2009
 90S-180W/90N-180E
 00/06/12/18 UTC uncorrected data combined

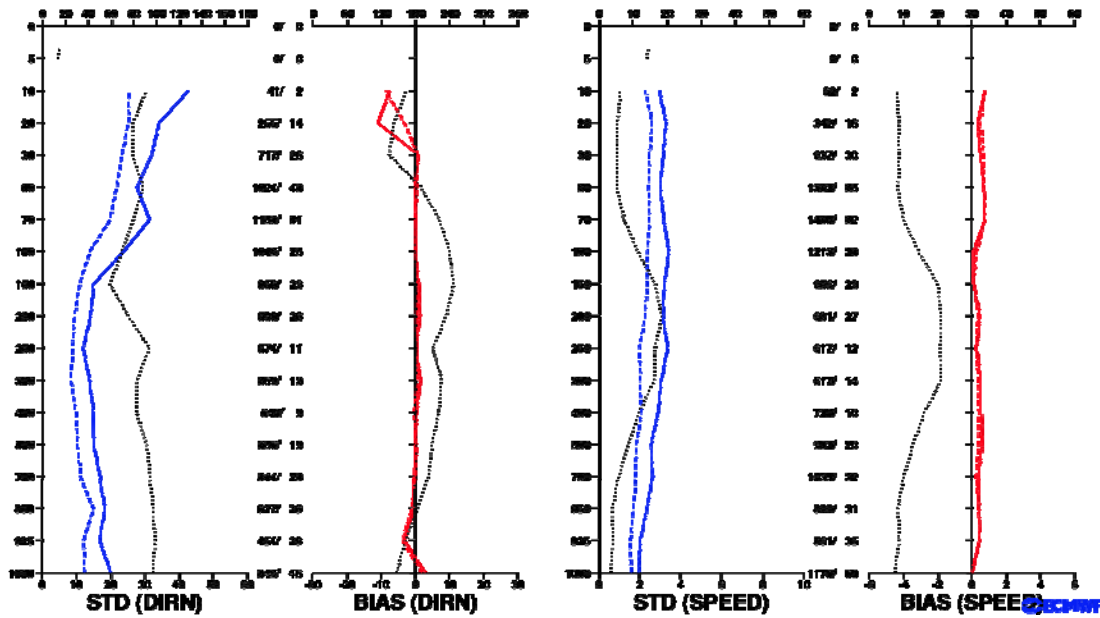


Figure 16
 ASAP wind speed and direction vertical statistics: Japanese ASAP

Finally figures 13 to 16 show composite vertical statistics for the whole year 2009. 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 2009 was similar to 2008 at 00, 06 and 12 UTC. 79% increase at 18 UTC.
- The percentage of ascents reaching 100 hPa back to values of around 90% in the second half of 2009.
- The problem of wrongly located reports is still there although in smaller numbers than in 2008. 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 2008 at 500 hPa

ID	TEMPERATURE					WIND				
	00	06	12	18	TOTAL	00	06	12	18	TOTAL
ARGU	3	1	1	0	5	3	1	1	0	5
ASDE1	110	17	103	37	267	110	17	103	37	267
ASDE2	1	4	216	2	223	1	4	216	2	223
ASDE3	95	5	115	24	239	94	5	115	24	238
ASDE4	129	0	120	7	256	118	0	109	3	230
ASDE9	0	1	55	1	57	0	1	54	1	56
ASDK1	125	22	126	27	300	117	21	113	26	277
ASDK2	98	29	115	40	282	91	26	104	38	259
ASES1	0	0	115	0	115	0	0	113	0	113
ASEU1	80	4	91	29	204	80	4	91	28	203
ASEU2	57	3	53	17	130	57	3	53	17	130
ASEU3	39	12	38	14	103	38	12	36	14	100
ASEU4	87	6	84	13	190	76	5	74	13	168
ASEU5	91	9	119	19	238	87	9	119	19	234
ASEU9	0	0	1	0	1	0	0	1	0	1
ASFR1	111	1	115	0	227	111	1	115	0	227
ASFR2	140	0	131	0	271	140	0	131	0	271
ASGB1	85	3	88	22	198	80	3	83	21	187
DBLK	42	50	221	40	353	42	50	221	40	353
JCCX	41	5	36	5	87	41	5	36	5	87
JDWX	14	0	14	0	28	14	0	14	0	28
JGQH	35	0	36	0	71	35	0	36	0	71
JIVB	29	1	29	2	61	29	1	29	2	61
JNSR	103	52	102	59	316	103	52	102	59	316
KNORR	0	0	1	1	2	0	0	0	1	1
LDWR	351	335	342	341	1369	346	321	329	326	1322
SHIP	1	0	1	4	6	1	0	1	3	5
UFTA	1	0	1	0	2	2	0	1	0	3
WTEC	34	34	30	36	134	34	34	30	36	134
XXX	1	0	10	0	11	1	0	10	0	11
ZSAF	37	0	23	0	60	37	0	23	0	60
	1940	594	2532	740	5806	1888	575	2463	715	5641

TABLE 2: ASAP reports received at ECMWF January-December 2009 at 500 hPa

ID	TEMPERATURE				TOTAL	WIND				TOTAL
	00	06	12	18		00	06	12	18	
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 3: ASAP wrong positions detected January-December 2009

ID:ASDE1

Date	Lat	Lon	Speed (*)
2009-09-11 11: 0:00	46.1	-54.3 -->	27.4 Km/hr
2009-09-11 17: 0:00	46.1	-54.3 -->	0.0 Km/hr
2009-09-11 23: 0:00	45.4	56.3 -->	1430.3 Km/hr ←
2009-09-12 11: 0:00	44.5	-60.6 -->	766.7 Km/hr
2009-09-24 23: 0:00	48.1	-38.4 -->	34.2 Km/hr
2009-09-25 11: 0:00	48.4	-53.4 -->	92.6 Km/hr
2009-09-25 17: 0:00	48.5	-31.2 -->	272.9 Km/hr
2009-12-24 23: 0:00	48.7	-44.7 -->	25.5 Km/hr
2009-12-25 11: 0:00	47.0	48.0 -->	576.7 Km/hr ←
2009-12-25 17: 0:00	47.1	-50.7 -->	1246.3 Km/hr
2009-12-25 23: 0:00	46.6	-52.6 -->	25.8 Km/hr
2009-12-26 17: 0:00	45.3	-58.7 -->	27.4 Km/hr
2009-12-28 11: 0:00	42.0	-66.0 -->	16.5 Km/hr
2009-12-28 17: 0:00	41.0	-67.9 -->	32.2 Km/hr

ID:ASDE2

Date	Lat	Lon	Speed (*)
2009-07-01 17: 0:00	-37.7	-53.7 -->	2.4 Km/hr
2009-07-08 08: 0:00	53.5	10.0 -->	77.6 Km/hr ←
2009-07-10 17: 0:00	-35.1	-55.6 -->	214.1 Km/hr

ID:ASDE4

Date	Lat	Lon	Speed (*)
2009-10-23 12: 0:00	36.0	-25.0 -->	20.8 Km/hr
2009-10-23 18: 0:00	34.8	-31.6 -->	102.2 Km/hr ←
2009-10-25 00: 0:00	30.0	-40.9 -->	32.9 Km/hr
2009-10-25 06: 0:00	29.1	42.6 -->	1346.3 Km/hr ←
2009-10-25 12: 0:00	27.9	-44.2 -->	1413.9 Km/hr
2009-10-25 18: 0:00	26.8	-45.8 -->	33.3 Km/hr

ID:ASDK2

Date	Lat	Lon	Speed (*)
2009-01-04 11: 0:00	59.9	-44.7 -->	26.1 Km/hr
2009-01-04 17: 0:00	57.0	10.1 -->	534.1 Km/hr ←
2009-01-04 23: 0:00	60.8	-48.3 -->	563.5 Km/hr
2009-01-09 11: 0:00	61.0	-49.1 -->	0.5 Km/hr
2009-01-24 00: 0:00	61.0	-12.3 -->	26.1 Km/hr
2009-01-24 11: 0:00	57.0	10.1 -->	123.4 Km/hr ←
2009-01-24 23: 0:00	61.7	-22.4 -->	159.6 Km/hr
2009-01-25 11: 0:00	60.9	-28.1 -->	26.4 Km/hr
2009-03-08 17: 0:00	63.8	-24.4 -->	4.1 Km/hr
2009-03-08 23: 0:00	57.0	10.1 -->	340.0 Km/hr ←
2009-03-09 11: 0:00	62.0	-32.7 -->	206.6 Km/hr
2009-03-09 23: 0:00	60.6	-38.1 -->	27.3 Km/hr
2009-03-19 11: 0:00	60.4	-12.4 -->	23.3 Km/hr
2009-03-19 23: 0:00	57.0	10.1 -->	112.8 Km/hr ←
2009-03-20 17: 0:00	59.1	-0.5 -->	37.0 Km/hr
2009-03-20 23: 0:00	58.8	1.7 -->	21.8 Km/hr
2009-05-30 23: 0:00	61.4	-20.0 -->	27.6 Km/hr
2009-05-31 11: 0:00	57.0	10.1 -->	148.5 Km/hr ←
2009-05-31 23: 0:00	60.9	-31.9 -->	204.0 Km/hr
2009-06-01 11: 0:00	60.4	-37.3 -->	25.0 Km/hr
2009-07-11 11: 0:00	64.5	-31.9 -->	29.6 Km/hr
2009-07-11 17: 0:00	65.0	-65.4 -->	265.0 Km/hr ←
2009-07-12 05: 0:00	65.6	-37.6 -->	107.8 Km/hr
2009-07-12 17: 0:00	65.6	-37.6 -->	0.0 Km/hr
2009-07-13 05: 0:00	65.6	-37.6 -->	0.0 Km/hr
2009-07-13 23: 0:00	62.4	-40.2 -->	21.0 Km/hr
2009-07-14 11: 0:00	59.5	43.0 -->	375.3 Km/hr ←
2009-07-15 04: 0:00	60.1	-45.2 -->	290.2 Km/hr
2009-07-15 17: 0:00	60.3	-46.7 -->	6.6 Km/hr

2009-10-24 23: 0:00	61.1	-25.1 -->	28.2 Km/hr
2009-10-25 11: 0:00	57.0	10.1 -->	172.0 Km/hr ←
2009-10-25 23: 0:00	57.0	10.1 -->	0.0 Km/hr
2009-10-26 11: 0:00	59.7	-43.7 -->	262.8 Km/hr
2009-11-04 17: 0:00	58.9	-28.6 -->	3.9 Km/hr
2009-11-26 11: 0:00	49.8	-3.4 -->	4.6 Km/hr
2009-11-26 23: 0:00	57.0	10.1 -->	100.1 Km/hr ←
2009-11-27 11: 0:00	45.8	-8.3 -->	148.6 Km/hr
2009-11-27 23: 0:00	43.2	-10.2 -->	27.2 Km/hr
2009-11-28 11: 0:00	40.4	-11.2 -->	26.8 Km/hr
2009-12-01 23: 0:00	18.8	-17.9 -->	29.1 Km/hr
2009-12-02 11: 0:00	57.0	10.1 -->	408.9 Km/hr ←
2009-12-03 11: 0:00	9.3	-17.6 -->	245.7 Km/hr
2009-12-03 23: 0:00	6.9	-15.7 -->	28.3 Km/hr

ID:ASEU1

Date	Lat	Lon	Speed (*)
2009-05-22 12: 0:00	54.1	-48.4 -->	4.1 Km/hr
2009-05-25 12: 0:00	56.6	52.5 -->	88.7 Km/hr ←
2009-05-30 12: 0:00	63.4	37.6 -->	9.3 Km/hr ←
2009-05-31 12: 0:00	63.0	-35.4 -->	152.5 Km/hr
2009-06-02 12: 0:00	64.9	-34.0 -->	4.6 Km/hr

ID:ASEU2

Date	Lat	Lon	Speed (*)
2009-11-05 11: 0:00	44.6	-33.0 -->	34.6 Km/hr
2009-11-05 17: 0:00	44.5	30.2 -->	834.7 Km/hr ←
2009-11-05 23: 0:00	44.5	-27.2 -->	758.7 Km/hr
2009-11-06 05: 0:00	45.0	-27.0 -->	9.6 Km/hr

ID:ASEU3

Date	Lat	Lon	Speed (*)
2009-03-31 23: 0:00	44.0	42.3 -->	43.6 Km/hr ←
2009-04-01 11: 0:00	42.1	-37.8 -->	542.7 Km/hr
2009-04-01 17: 0:00	41.5	-35.5 -->	33.7 Km/hr

ID:ASEU4

Date	Lat	Lon	Speed (*)
2009-01-30 17: 0:00	35.8	-23.7 -->	31.6 Km/hr
2009-01-31 16: 0:00	36.0	31.0 -->	214.2 Km/hr ←
2009-01-31 22: 0:00	36.5	-32.6 -->	950.6 Km/hr
2009-02-01 11: 0:00	37.9	-36.5 -->	29.1 Km/hr
2009-03-12 11: 0:00	36.7	-34.9 -->	34.5 Km/hr
2009-03-12 17: 0:00	36.0	32.0 -->	998.7 Km/hr ←
2009-03-12 23: 0:00	36.5	-30.3 -->	931.1 Km/hr
2009-03-13 11: 0:00	36.7	-25.5 -->	35.8 Km/hr
2009-09-08 11: 0:00	53.5	10.0 -->	5.1 Km/hr
2009-09-09 23: 0:00	45.8	-51.2 -->	124.7 Km/hr ←
2009-09-10 11: 0:00	44.7	-46.0 -->	35.4 Km/hr

ID:ASEU5

Date	Lat	Lon	Speed (*)
2009-01-08 17: 0:00	48.5	-43.7	
2009-01-08 23: 0:00	48.5	41.1 -->	1041.3 Km/hr ←
2009-01-09 11: 0:00	48.5	-35.2 -->	468.5 Km/hr
2009-01-09 17: 0:00	48.5	-32.3 -->	35.6 Km/hr
2009-01-09 23: 0:00	48.5	29.5 -->	758.9 Km/hr ←
2009-01-10 11: 0:00	49.2	-23.6 -->	323.8 Km/hr
2009-01-10 17: 0:00	49.5	-20.8 -->	34.3 Km/hr
2009-11-22 17: 0:00	51.9	-26.8 -->	30.5 Km/hr
2009-11-22 23: 0:00	52.6	24.3 -->	579.9 Km/hr ←
2009-11-23 11: 0:00	53.8	-19.1 -->	241.2 Km/hr
2009-11-23 17: 0:00	54.3	-16.5 -->	29.8 Km/hr

ID:ASGB1			
Date	Lat	Lon	Speed (*)
2009-06-13 12: 0:00	47.3	-36.0 -->	34.2 Km/hr
2009-06-13 18: 0:00	47.7	33.3 -->	867.7 Km/hr ←
2009-06-14 00: 0:00	48.2	-30.2 -->	788.3 Km/hr
2009-06-14 12: 0:00	49.0	-25.2 -->	31.5 Km/hr

ID:WTEC			
Date	Lat	Lon	Speed (*)
2009-06-18 18: 0:00	-30.1	-76.2	
2009-06-19 06: 0:00	28.9	-74.1 -->	547.1 Km/hr ←
2009-06-19 12: 0:00	-20.9	-74.8 -->	923.0 Km/hr
2009-06-19 18: 0:00	-20.9	-74.8 -->	0.0 Km/hr
2009-06-20 12: 0:00	25.4	-70.1 -->	287.5 Km/hr ←
2009-06-23 12: 0:00	16.3	-60.5 -->	19.7 Km/hr
2009-06-23 18: 0:00	16.3	-60.5 -->	0.0 Km/hr
2009-06-25 18: 0:00	16.3	-60.5 -->	2.6 Km/hr
2009-06-26 06: 0:00	-20.9	-74.8 -->	369.3 Km/hr ←
2009-06-26 12: 0:00	16.5	-57.9 -->	760.5 Km/hr
2009-06-26 18: 0:00	16.1	-57.2 -->	14.5 Km/hr

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

(←) Marks wrong positions