European Centre for Medium-Range Weather Forecasts

SUMMARY REPORT ON THE MONITORING OF ASAP SHIP DATA January-December 2007

1. Summary:

The number of reports received at ECMWF were slightly reduced compared to 2006, the percentage of ascents reaching 100 hPa back to normal values between 90 and 95%. The main problems were related to wrongly located reports particularly from January to June 2006. Apart from that the statistics show a good general performance of the ASAP units.

2. Data reception:

Time series showing the ASAP data reception at ECMWF since January 1994 can be seen in figures 1 to 3.

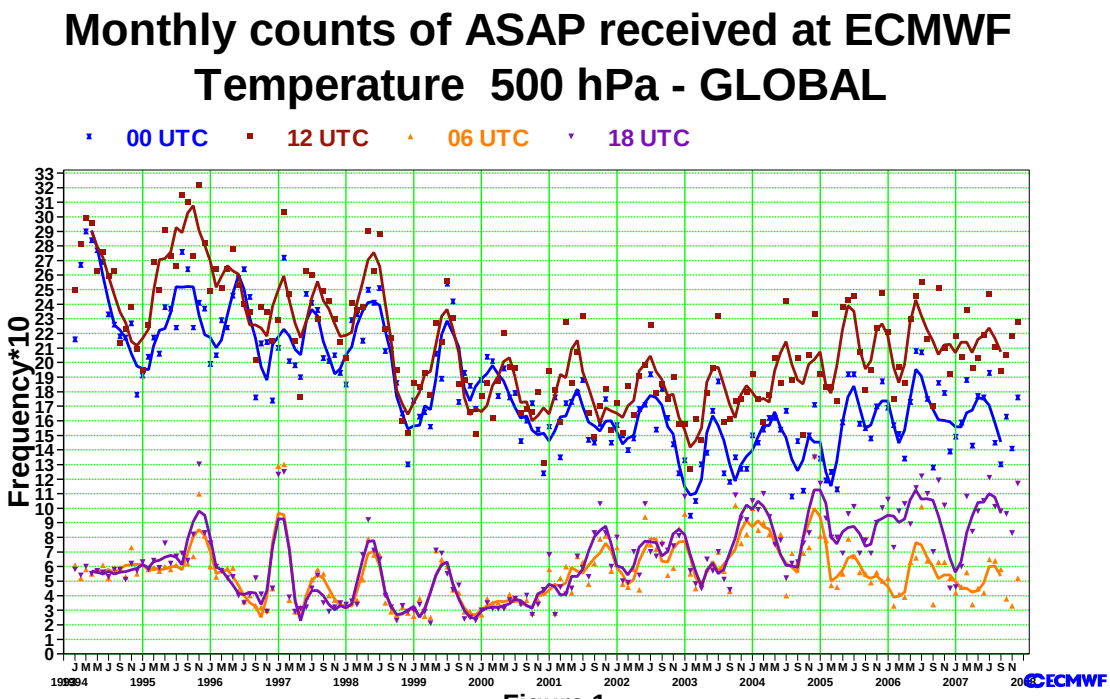


Figure 1

ASAP temperature data received at ECMWF 500 hPa (January 1994 to December 2007)

The global number of reports in 2007 was similar to 2006 as shown in figure 1. The level of 500 hPa is a good indication of the total number of reports since the percentage of ascents reaching that level is close to 100 %. Detailed figures of the reception in 2006 and 2007 can be found also in tables 1 and 2. The global number of reports was slightly reduced in 2007 compared to 2006 as shown in the tables. When looking to the lower stratosphere the percentage of ascents reaching 100 hPa are back to the values of 2005 between 90 and 95 % as shown in figure 2.

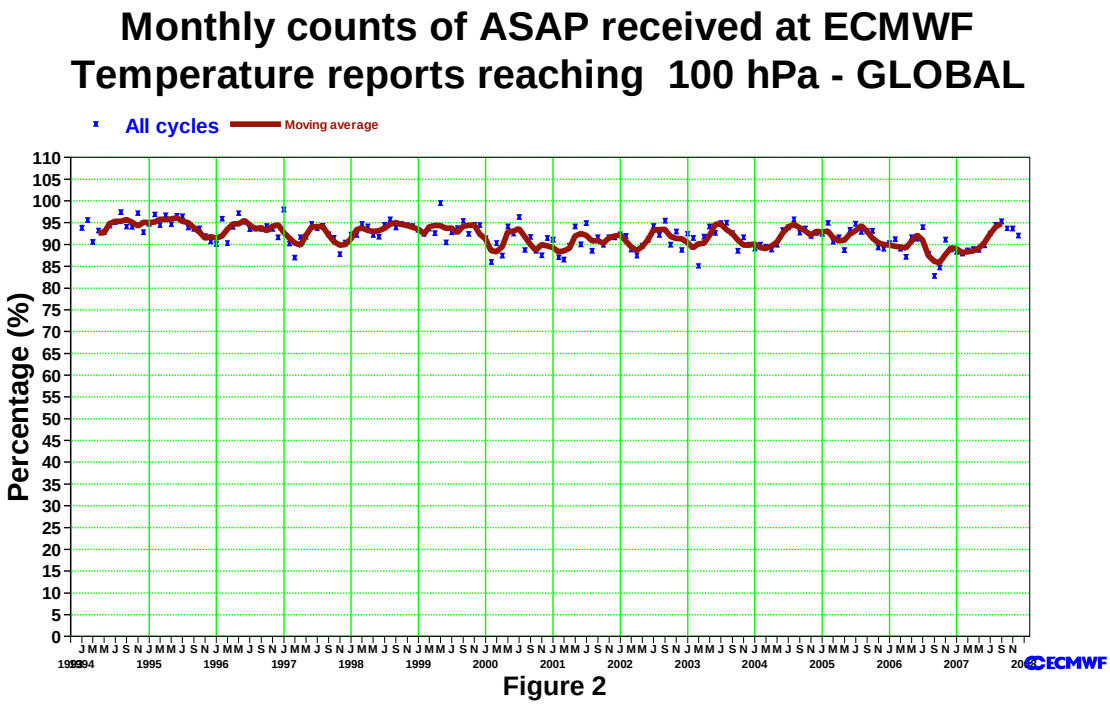


Figure 2

Percentage of ASAP reports reaching the 100 hPa level Jan 1994 to Dec 2007

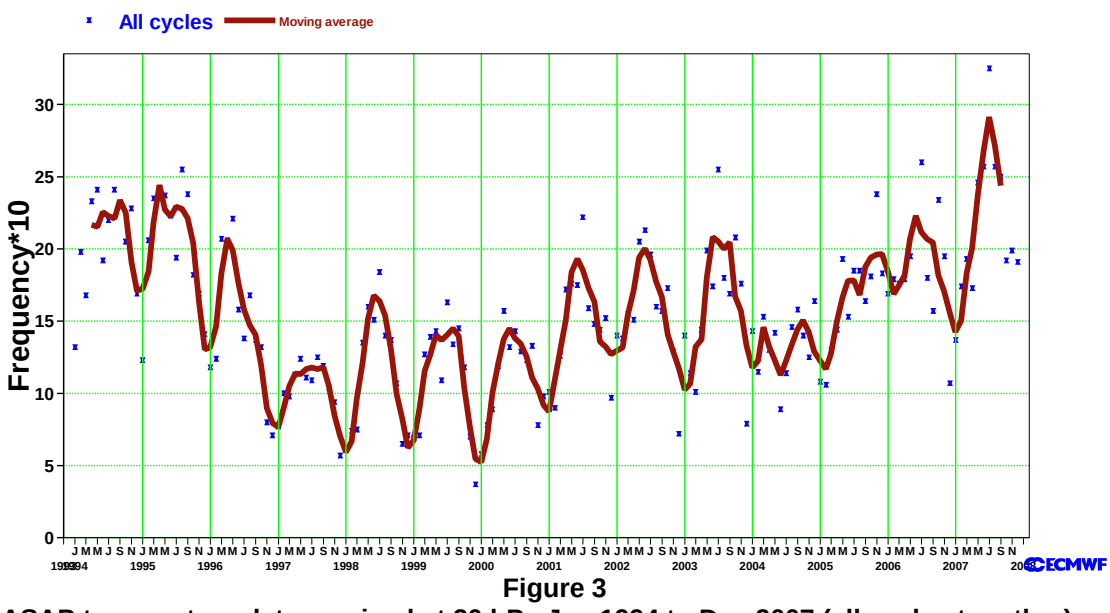


Figure 3

ASAP temperature data received at 20 hPa Jan 1994 to Dec 2007 (all cycles together)

The amount of data received at 20 hPa is still increasing. In the summer of 2007 we received the largest amount of data ever from ASAP platforms as shown in figure 3.

The coverage area covered by the ASAP units is mostly the North Atlantic and areas close to Japan. Sometimes ASAP operating in the South Atlantic, South Indian, Mediterranean and Black sea can be found. The

Caribbean is a regular destination for several French ASAP, the Spanish ASAP operates south of the Canary Islands and a few reports were available

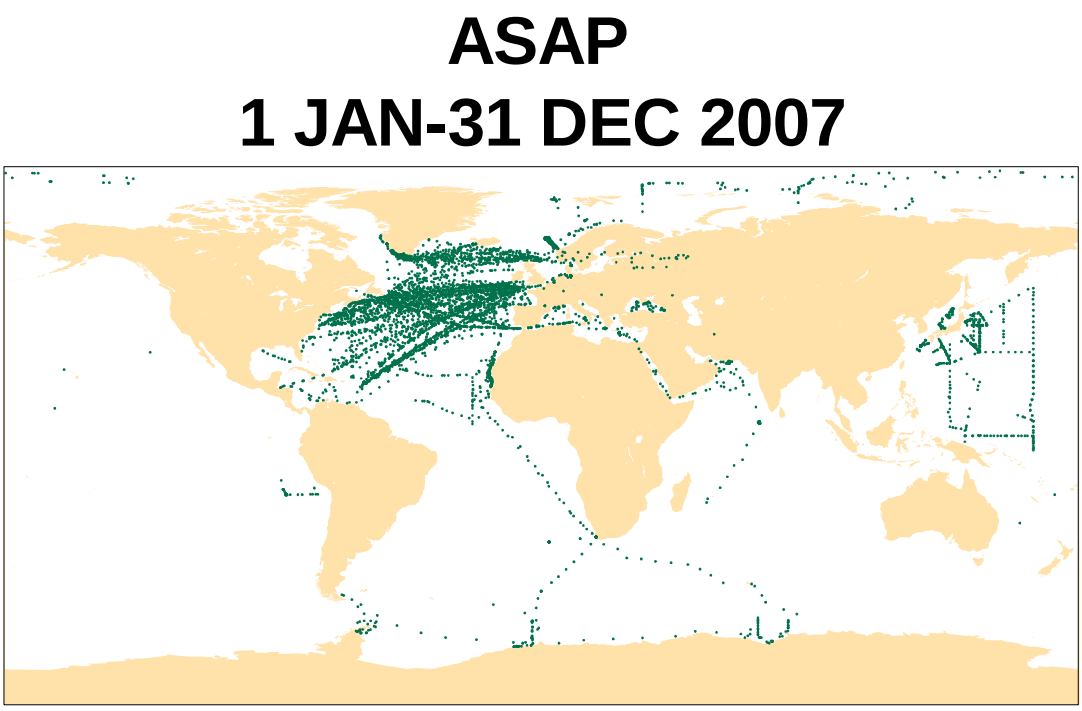


Figure 4
ASAP coverage January to December 2007

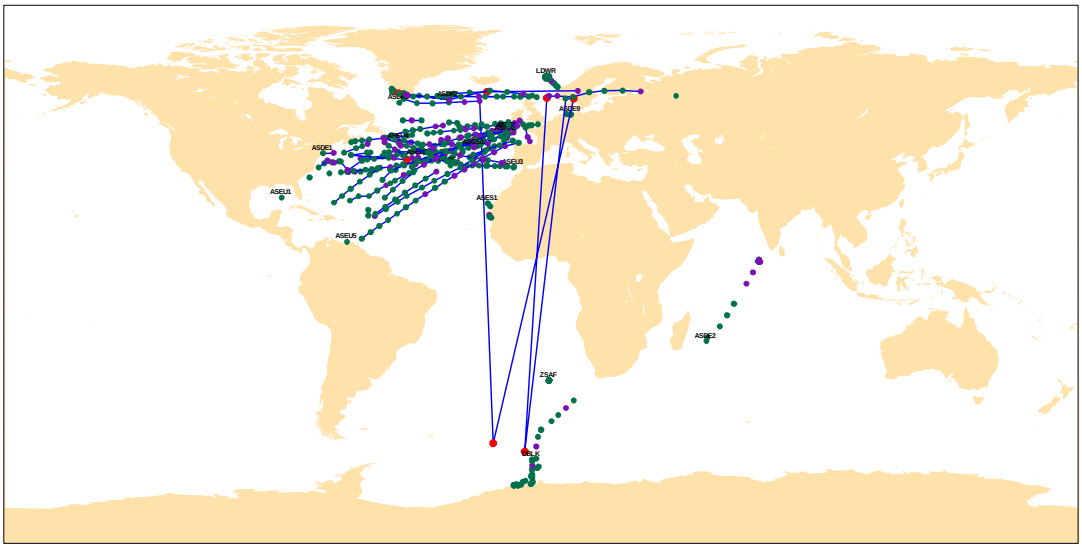
in the tropical Pacific. Figure 4 shows a summary of the operating ASAP in 2007.

3. Troubleshooting:

The main problem in 2007 was a significant number of reports wrongly located particularly for the period January to June. A good number of the wrongly located reports can be spotted either visually in a coverage chart as the one shown in figure 4 or using an automatic tracker which will get easily ships travelling at unrealistic speeds (see table 3). But there are occasions when a wrong location will skip a filter like that. Several cases of that kind took place in 2007 involving mainly to the Danish ASAP units. For example in January 2007 21% of the reports of ASAP OXTS2 were bad positioned and 56% in February. Another Danish ASAP with Id OXGN2 got 32%, 23% and 29% of wrong positions in February, March and April 2007. In most of the cases the error was due to a change in the longitude sign but in 23 occasions between February and April 2007 OXGN2 reported as positioned in port close to Copenhagen when actually was sailing in the North Atlantic. A detailed list of bad positions in 2007 can be found in table 3.

The problem with the Danish ASAP was the reason why they were blacklisted at ECMWF for several months until the problem was fixed at the end of April 2007. Since then we still see one or two cases every month but far away from the high percentages seen the first four months of 2007. As an

ASAP
1-31 DEC 2007



ECMWF

Figure 5
ASAP tracks in December 2007

example in figure 5 ASAP tracks for December 2007 shows ASAP ASDK01 which changed twice the latitude sign from North to South Hemisphere.

The number of corrupted call-signs looks larger in 2007 compared to 2006. Tables 1 and 2 contain detailed figures with the reports received at ECMWF in 2006 and 2007.

4. ASAP data monitoring at ECMWF:

The monitoring tools at ECMWF have been updated and refined to deal with reporting issues and data quality both in the daily monitoring and longer time scales namely monthly biannual and annual.

Figures 6 to 10 the time series used to monitor the quality of conventional data can be found. We compute and update these time series on a daily basis for different parameters and atmospheric layers. Figure 6 is for used data above 400 hPa and it does not show relevant changes in the trends. The average differences OB-FG and OB-AN are small and the spread of the observations around the FG (vertical lines) is within normal limits. A more noisy structure can be seen for the layer 400-700 hPa shown in figure 7 but again both the biases and the spread are not bad. Figures 8 and 9 are for wind vector differences with FG and AN at two different atmospheric layers. Again the time series show a general good performance. It's worth to note that in figures 6 to 10 only used data have been considered so the wrongly located reports are not part of this data set since most of them were rejected by the model quality control. The time series for humidity at mid tropospheric levels shows also good data quality.

ASAP temperature used data above 400 hPa

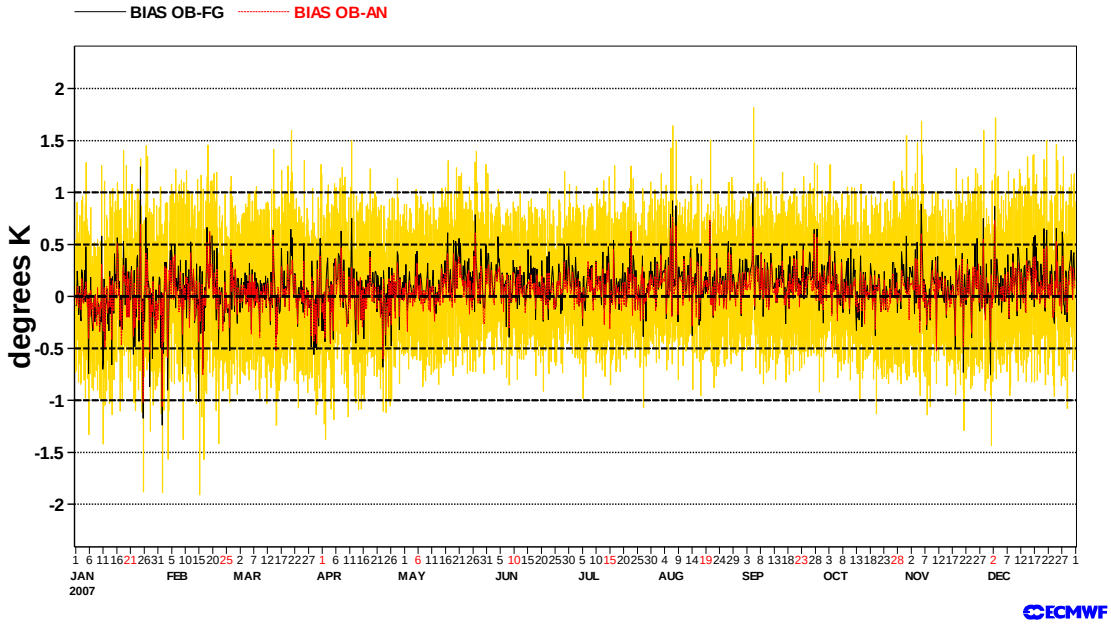


Figure 6
ASAP temperature statistics time series. The vertical bars are the std OB-FG

ASAP temperature used data 700-400 hPa

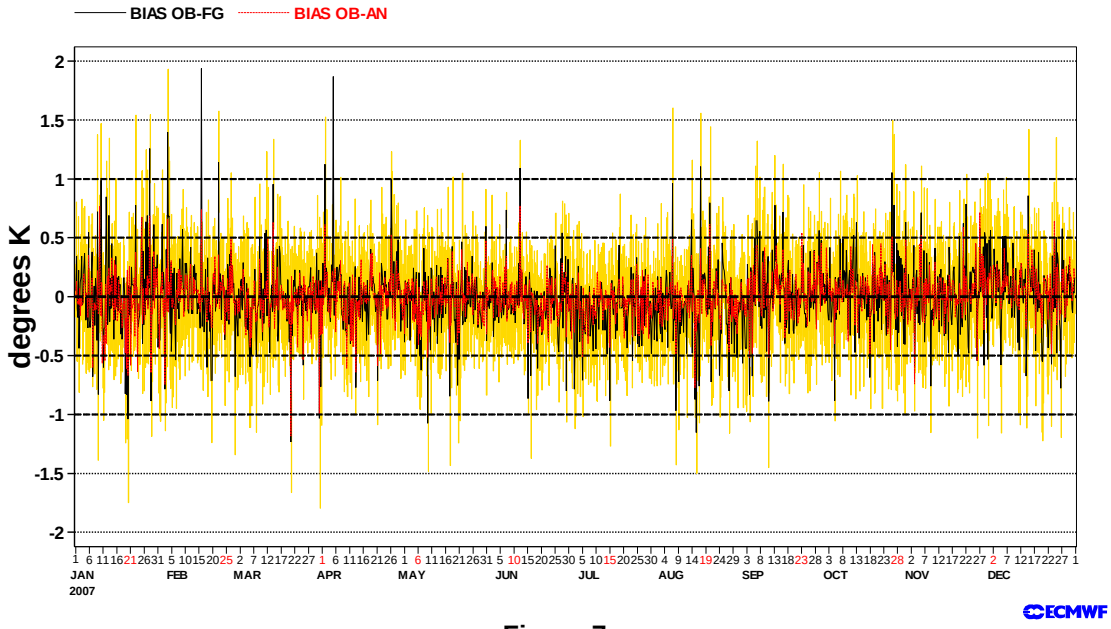


Figure 7
ASAP temperature statistics time series. The vertical bars are the std OB-FG

ASAP humidity used data 700-400 hPa

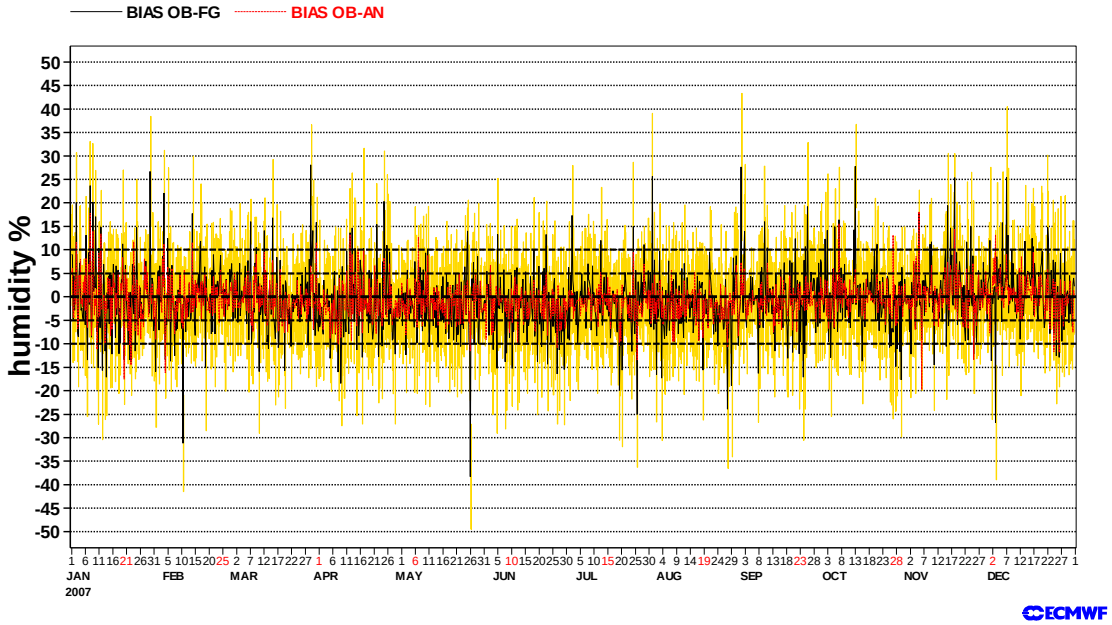


Figure 8
ASAP temperature statistics time series. The vertical bars are the std OB-FG

ASAP wind used data 700-400 hPa

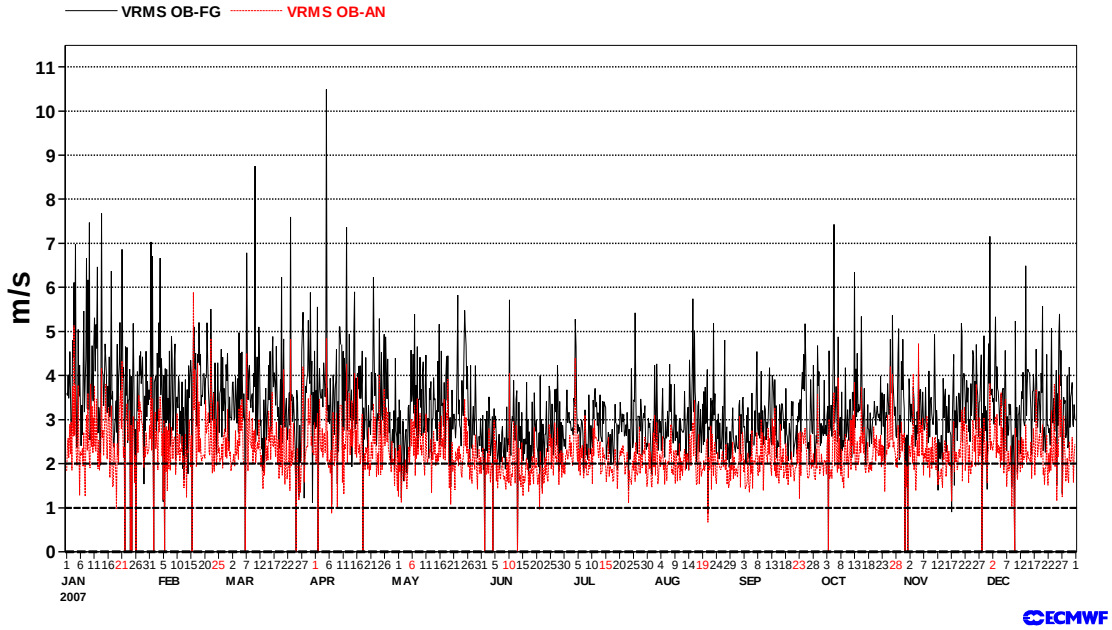


Figure 9
ASAP wind vector difference statistics time series

ASAP wind used data above 400 hPa

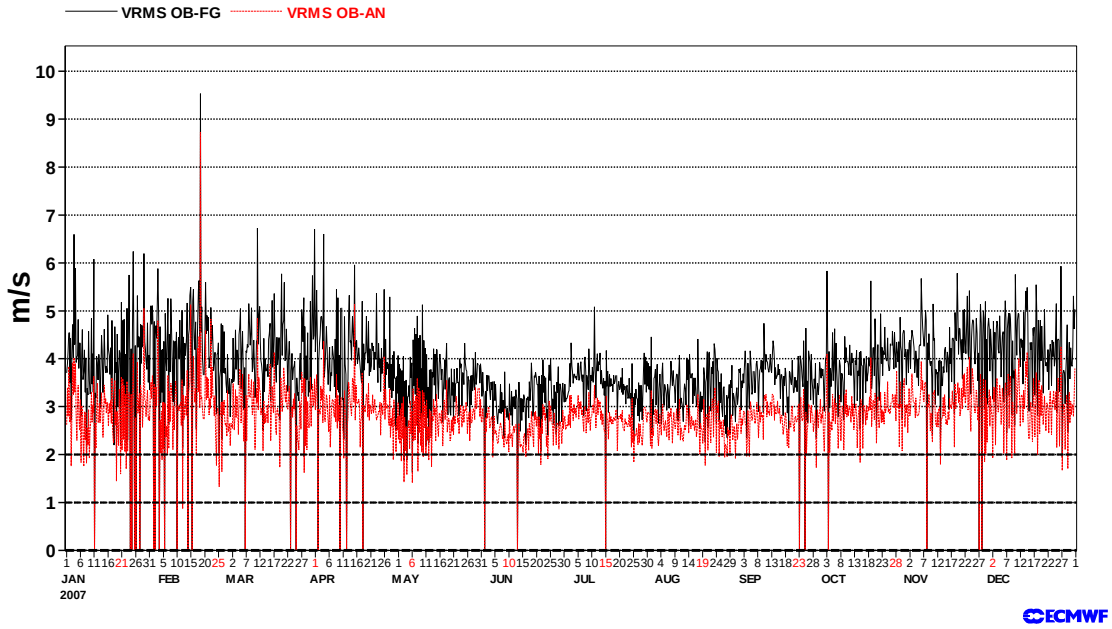


Figure 10
ASAP wind vector difference statistics time series

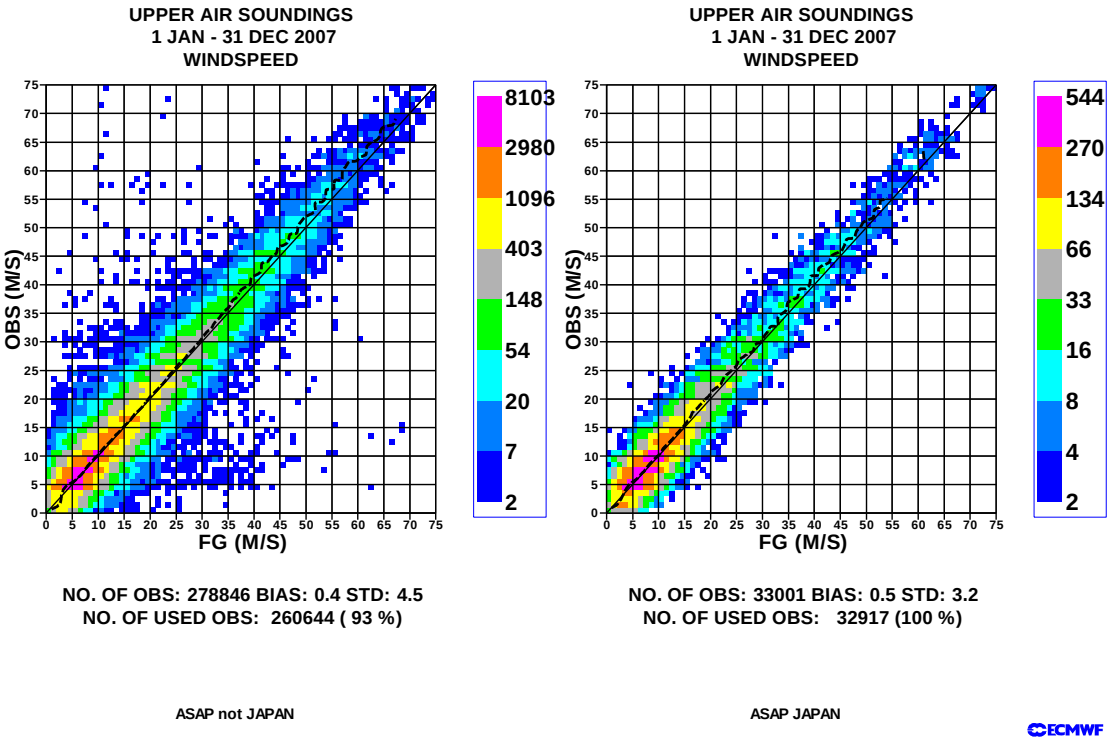


Figure 11
ASAP wind speed statistics

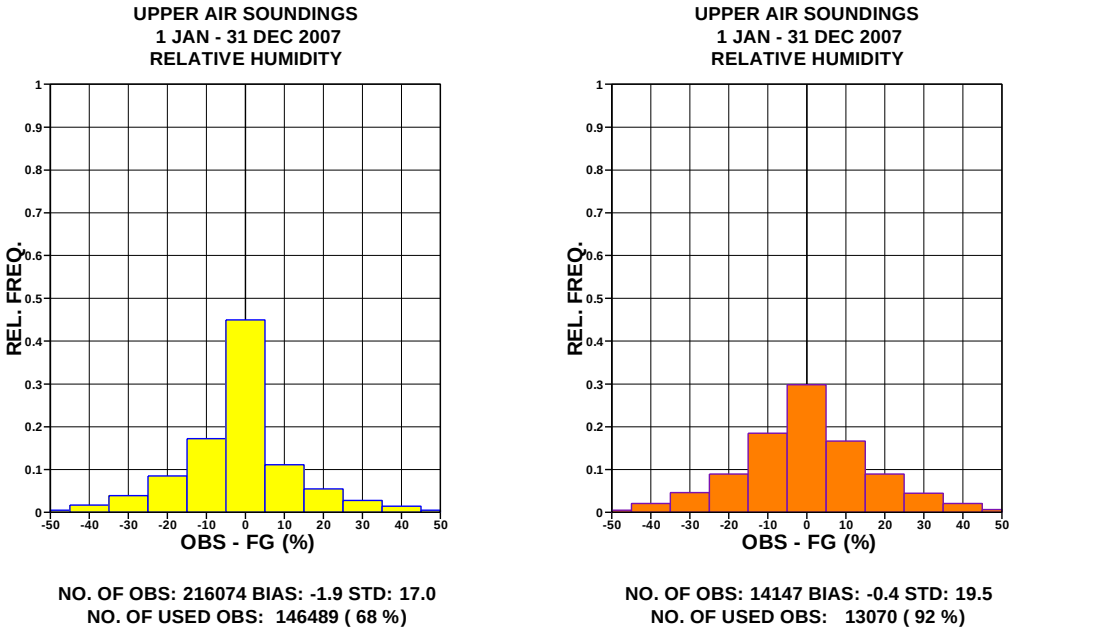


Figure 12
ASAP relative humidity statistics

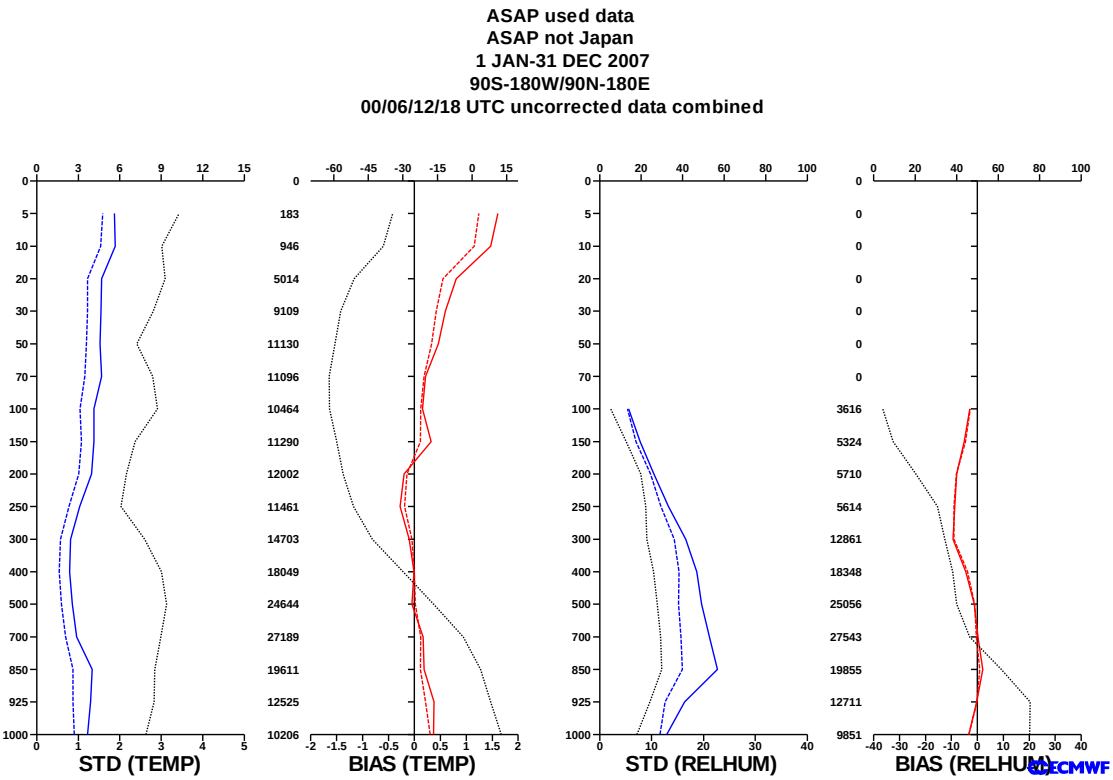


Figure 13
ASAP temperature and humidity vertical statistics: not Japanese ASAP

ASAP used data
ASAP not Japan
1 JAN-31 DEC 2007
90S-180W/90N-180E
00/06/12/18 UTC uncorrected data combined

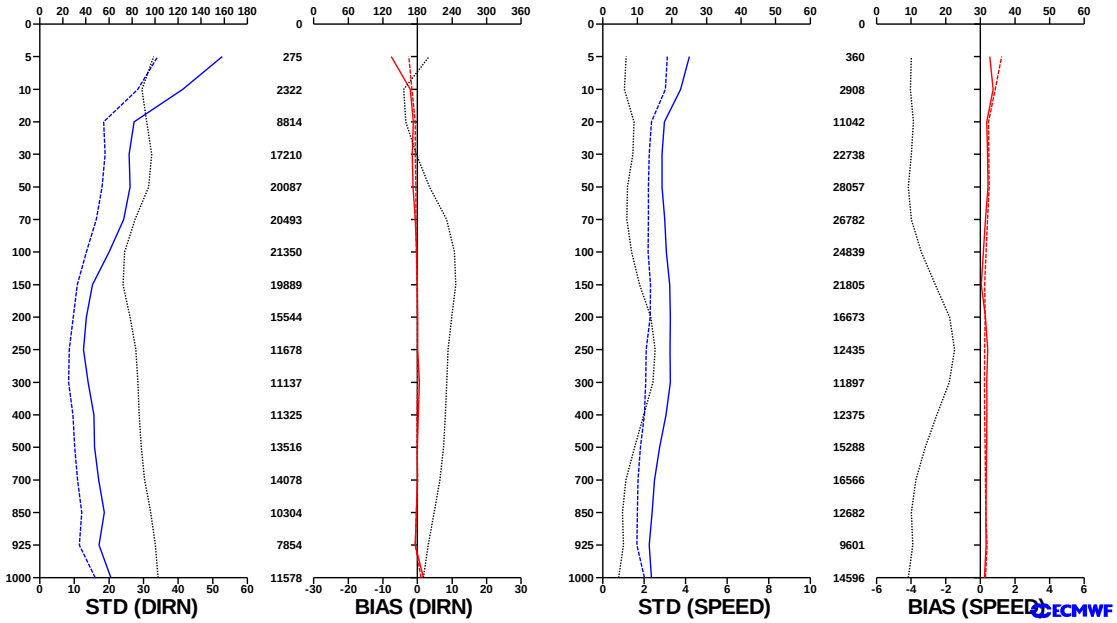


Figure 14
ASAP wind speed and direction vertical statistics: not Japanese ASAP

ASAP used data
ASAP Japan
1 JAN-31 DEC 2007
90S-180W/90N-180E
00/06/12/18 UTC uncorrected data combined

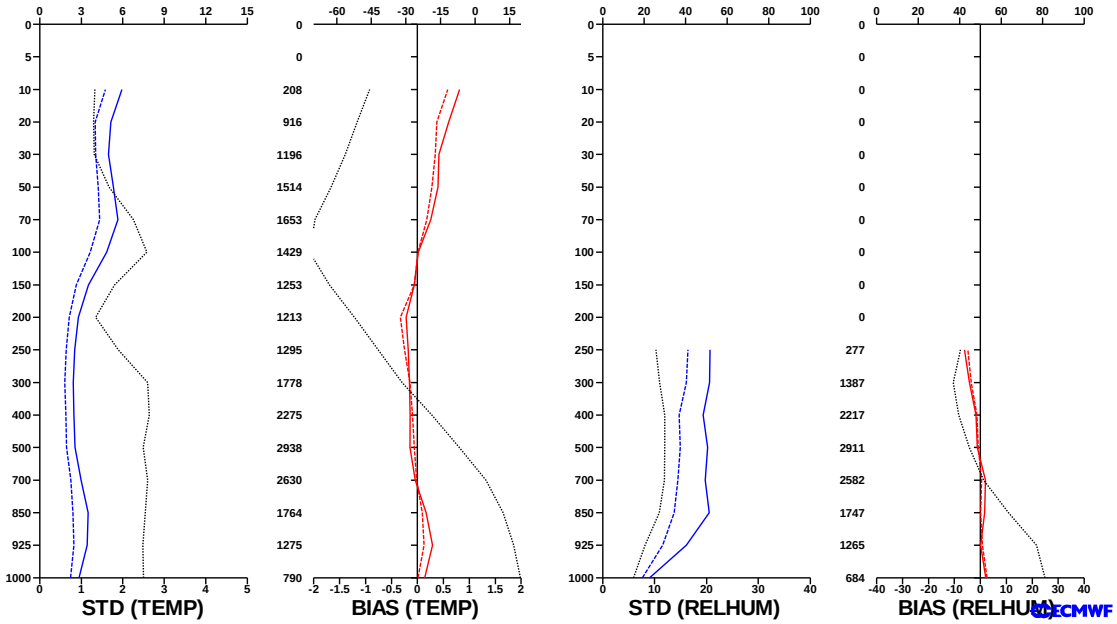


Figure 15
ASAP temperature and humidity vertical statistics: Japanese ASAP

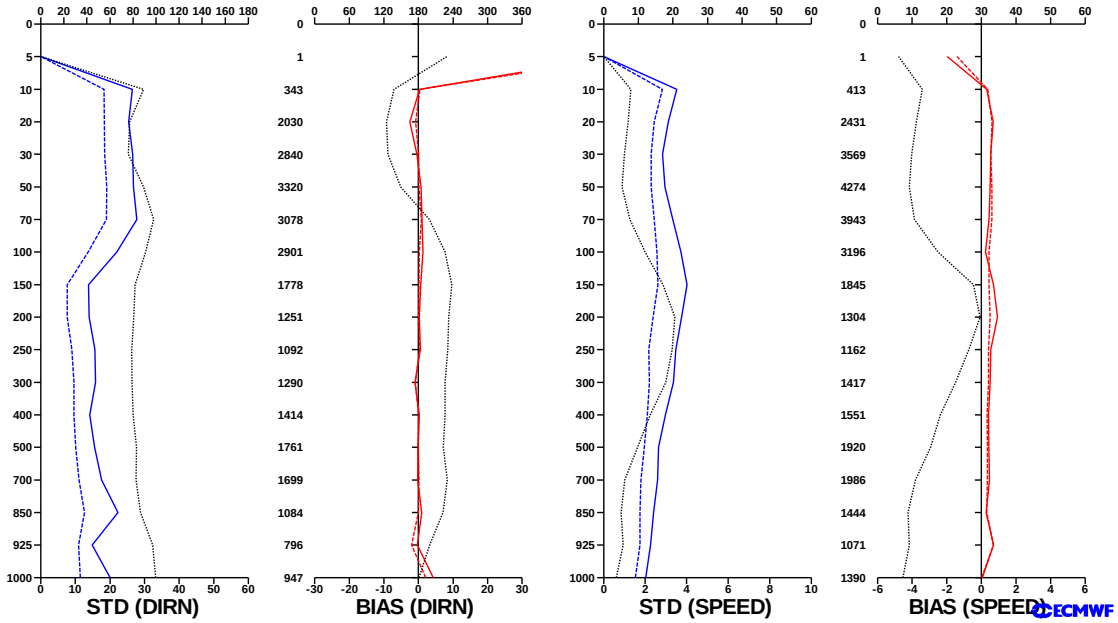


Figure 16
ASAP wind speed and direction vertical statistics: Japanese ASAP

Figures 11 to 16 show composite vertical statistics for the whole year 2007 for two different samples Japanese and not Japanese ASAP.

At the time of writing this report only two ASAP units are in the ECMWF blacklist.

ASFR1 for wind
ZSAF for wind and temperature

Figures 17 and 18 show vertical statistics for these platforms

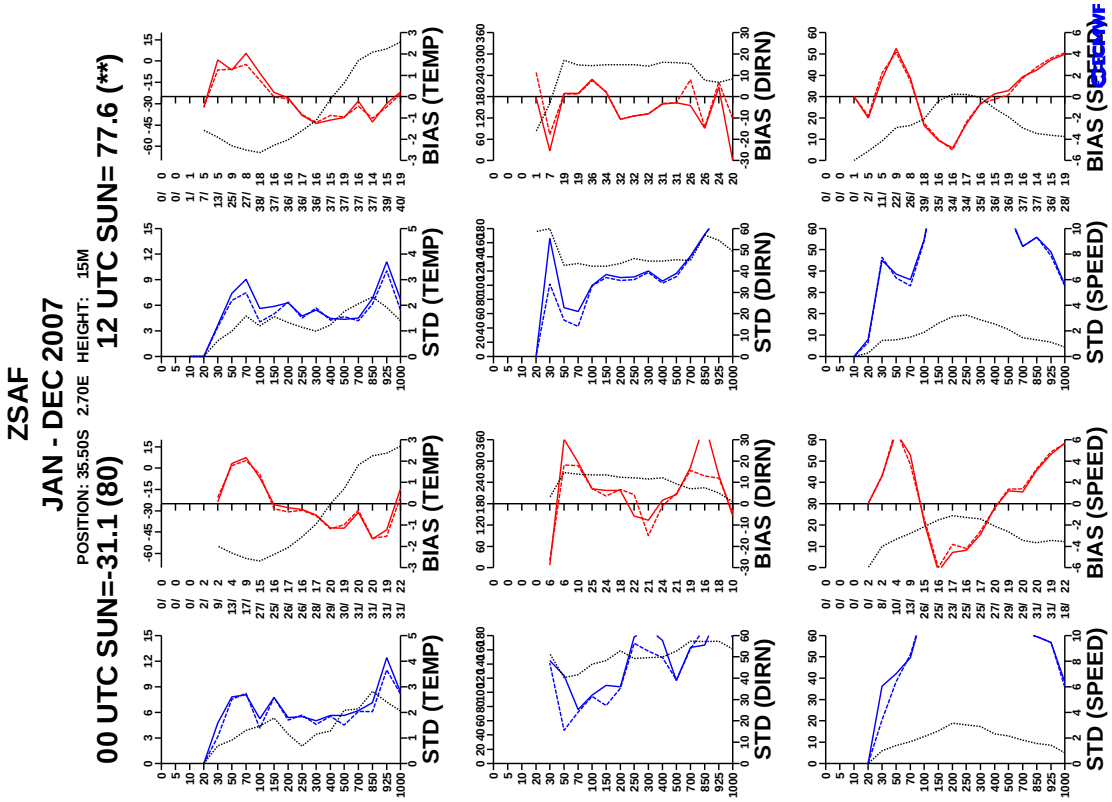


Figure 17

Vertical statistics ASAP ZSAF: Temperature, wind direction and speed

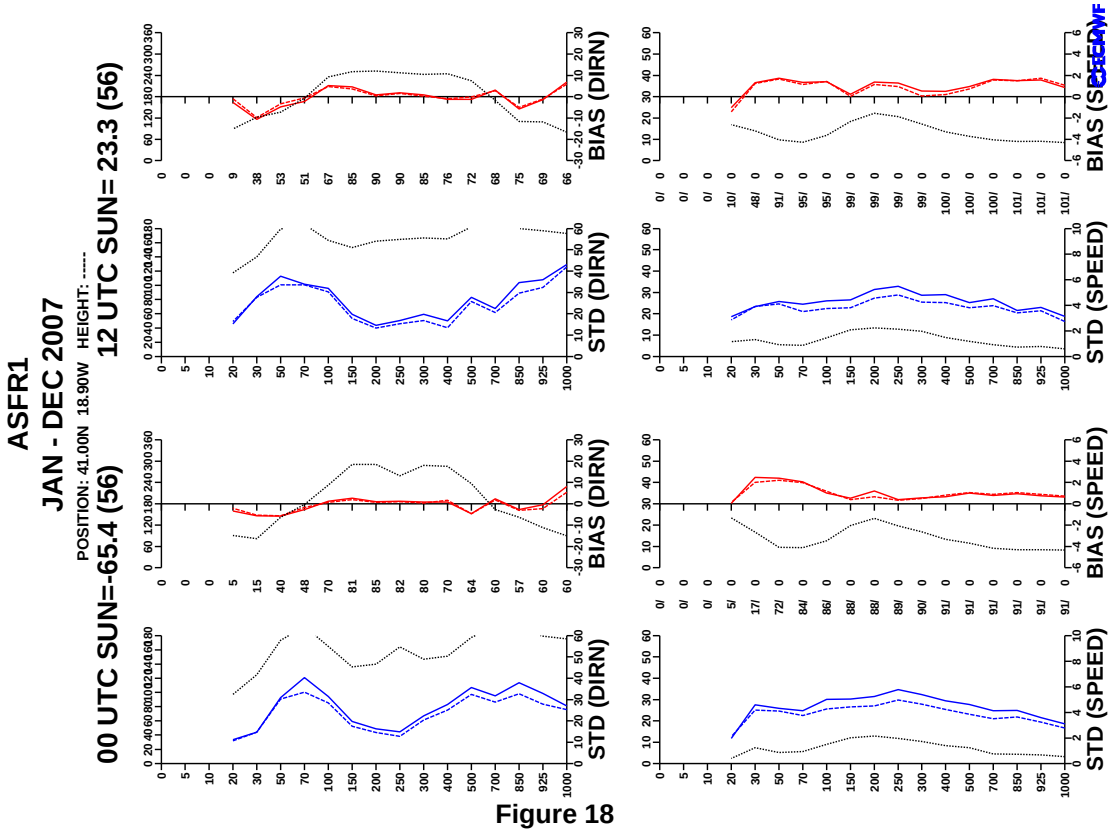


Figure 18

Vertical statistics ASAP ASFR1 : Temperature, wind direction and speed

5. Conclusions:

- The number of ASAP reports received at ECMWF show a slight reduction in 2007 compared to 2006.
- The percentage of launches reaching the level of 100 hPa is back to values between 90 and 95% in 2007.
- Corrupted call-signs received from time to time.
- The wrongly reported positions have been a major issue in 2007 particularly from January to June 2007. In most of the cases the reports were rejected by the model QC but in a few occasions passed though the model quality control. This problem has not been detected in any of the Japanese ASAP.
- The ASAP data are monitored at ECMWF using a number of products updated on a daily basis in our web site.
- The ASAP statistics have continued to show a good performance.

TABLE 1: **ASAP reports received at ECMWF January-December 2006 at 500 hPa**

	TEMPERATURE					WIND				
ID	00	06	12	18	TOTAL	00	06	12	18	TOTAL
ASDE0	41	1	50	42	134	40	1	50	41	132
ASDE1	36	7	33	43	119	35	7	33	43	118
ASDE2	52	2	89	0	143	52	2	89	0	143
ASDE3	62	0	58	49	169	62	0	58	49	169
ASDE4	60	0	53	61	174	60	0	52	61	173
ASEU0	54	14	52	46	166	47	10	44	38	139
ASEU1	51	0	50	39	140	51	0	49	39	139
ASEU2	59	0	60	45	164	58	0	60	45	163
ASEU3	41	19	38	19	117	41	19	37	19	116
ASEU4	32	14	40	22	108	22	12	26	19	79
ASEU5	82	29	95	17	223	81	29	94	17	221
ASGB1	11	2	19	15	47	11	2	19	14	46
ASTET	0	0	1	0	1	0	0	1	0	1
ASUK0	15	6	17	25	63	14	6	15	25	60
ASUK1	16	6	18	22	62	13	6	18	22	59
DASA5	0	0	0	0	0	0	0	0	0	0
DBBH	30	0	13	0	43	28	0	13	0	41
DBLK	2	71	282	2	357	2	71	282	2	357
EBUQ	0	0	180	0	180	0	0	155	0	155
ELML7	42	0	42	19	103	42	0	42	19	103
FQFL	130	1	134	0	265	129	1	134	0	264
FQFM	129	0	134	0	263	128	0	132	0	260
HPII	7	3	9	1	20	7	3	9	1	20
JCCX	52	17	53	17	139	49	17	52	17	135
JDWX	54	4	53	3	114	54	4	52	3	113
JGQH	91	0	84	0	175	91	0	82	0	173
JIVB	31	18	32	19	100	31	18	32	19	100
JNSR	0	32	0	33	65	0	32	0	33	65
KRPD	22	0	27	27	76	22	0	27	27	76
LDWR	348	340	338	347	1373	338	312	321	318	1289
NNNN=	0	0	0	0	0	0	0	0	0	0
OXGN2	107	16	118	22	263	98	14	106	20	238
OXTS2	9	9	11	8	37	6	9	9	4	28
OXVH2	80	12	85	23	200	70	10	76	16	172
OXYH2	0	1	0	0	1	0	1	0	0	1
SHIP	4	5	0	2	11	4	3	0	2	9
SKUN	16	13	20	26	75	16	13	20	26	75
TEST	0	0	2	0	2	0	0	2	0	2
TEST2	0	0	1	0	1	0	0	1	0	1
TEST3	0	0	1	0	1	0	0	1	0	1
TEST4	0	0	0	0	0	0	0	0	0	0
TEST7	0	0	1	0	1	0	0	1	0	1
TESTM	0	0	3	0	3	0	0	3	0	3
V2BD9	26	3	23	8	60	26	3	23	7	59
V2XM	77	5	74	7	163	76	5	71	7	159
WAAH	33	1	30	33	97	32	1	30	33	96
WPKD	26	0	29	34	89	25	0	28	34	87
WTEC	10	8	11	7	36	10	8	11	7	36
XXX	1	0	3	0	4	1	0	3	0	4
ZCBE7	14	7	22	20	63	11	5	0	3	19
ZCBF3	11	1	15	13	40	10	1	12	10	33
ZCBP6	22	4	21	35	82	21	4	21	34	80
ZSAF	20	0	25	0	45	20	0	25	0	45
	2006	671	2549	1151	6377	1934	629	2421	1074	6058

TABLE 2: **ASAP reports received at ECMWF January-December 2007 at 500 hPa**

	TEMPERATURE					WIND				
ID	00	06	12	18	TOTAL	00	06	12	18	TOTAL
ALEX	0	0	1	0	1	0	0	1	0	1
ASAP9	0	0	7	0	7	0	0	7	0	7
ASBG1	1	0	1	1	3	1	0	1	0	2
ASDE1	87	19	85	93	284	87	19	85	93	284
ASDE2	1	11	201	0	213	1	11	200	0	212
ASDE3	111	1	93	88	293	109	1	93	87	290
ASDE4	121	2	124	86	333	108	2	108	73	291
ASDE7	0	0	4	1	5	0	0	4	1	5
ASDE8	0	1	1	0	2	0	1	1	0	2
ASDE9	0	1	36	3	40	0	1	35	3	39
ASDK1	91	27	105	27	250	78	24	71	23	196
ASDK2	46	12	54	12	124	41	10	48	10	109
ASES1	0	0	4	0	4	0	0	5	0	5
ASEU1	97	1	98	85	281	97	1	98	84	280
ASEU2	83	0	72	61	216	83	0	71	60	214
ASEU3	64	7	62	68	201	64	6	61	68	199
ASEU4	56	9	59	49	173	56	9	59	49	173
ASEU5	121	3	125	51	300	119	3	124	51	297
ASFR1	105	1	100	0	206	105	1	100	0	206
ASFR2	78	0	91	0	169	78	0	91	0	169
ASGB1	74	0	86	74	234	62	0	75	64	201
ASIS1	4	1	11	1	17	3	1	11	1	16
DBLK	24	67	263	3	357	24	67	263	3	357
EBUQ	11	0	117	1	129	11	0	117	1	129
FQFL	6	0	8	0	14	6	0	8	0	14
FQFL/	22	0	27	0	49	22	0	27	0	49
FQFM	6	0	6	0	12	6	0	6	0	12
FQFM/	28	0	29	0	57	28	0	29	0	57
JCCX	43	15	46	15	119	43	15	46	15	119
JDWX	43	0	44	0	87	43	0	44	0	87
JGQH	92	0	91	0	183	92	0	91	0	183
JIVB	28	16	36	16	96	28	16	35	16	95
JNSR	1	6	3	3	13	1	6	3	3	13
LDWR	351	339	341	344	1375	333	321	319	320	1293
LFPW	1	0	0	0	1	1	0	0	0	1
OXGN2	70	17	65	18	170	55	13	34	8	110
OXTS2	21	12	19	11	63	15	10	13	6	44
RAN	0	0	0	0	0	0	0	0	0	0
S3539	0	0	0	0	0	0	0	0	0	0
SHIP	2	6	3	5	16	2	3	3	3	11
V2BD9	1	0	1	0	2	1	0	1	0	2
V2XM	16	0	21	0	37	16	0	22	0	38
WTEC	0	0	0	0	0	0	0	0	0	0
XXX	1	0	3	0	4	1	0	3	0	4
ZSAF	33	1	37	1	72	32	1	36	1	70
	1940	575	2580	1117	6212	1852	542	2449	1043	5886

TABLE 3: **ASAP wrong positions detected January-December 2007**

ID:OXTS2

Date	Lat	Lon	Speed (*)
2007-01-23 11: 0:00	59.2	40.1 -->	325.6 Km/hr
2007-01-23 23: 0:00	59.5	45.2 -->	24.3 Km/hr
2007-01-29 11: 0:00	60.4	47.7 -->	48.6 Km/hr
2007-01-29 23: 0:00	59.5	42.9 -->	23.8 Km/hr
2007-01-30 11: 0:00	60.3	37.3 -->	27.1 Km/hr
2007-01-30 22: 0:00	60.8	31.5 -->	29.3 Km/hr
2007-01-31 11: 0:00	61.0	25.7 -->	24.2 Km/hr

Date	Lat	Lon	Speed (*)
2007-02-09 11: 0:00	61.4	-4.5 -->	53.3 Km/hr
2007-02-09 17: 0:00	61.5	7.3 -->	104.5 Km/hr
2007-02-12 11: 0:00	59.4	41.3 -->	357.8 Km/hr
2007-02-12 23: 0:00	59.5	48.6 -->	34.4 Km/hr
2007-02-13 17: 0:00	60.4	46.0 -->	390.4 Km/hr
2007-02-18 11: 0:00	60.0	49.2 -->	1.6 Km/hr
2007-02-18 23: 0:00	59.2	45.5 -->	18.9 Km/hr
2007-02-19 23: 0:00	56.5	42.0 -->	15.2 Km/hr
2007-02-20 11: 0:00	56.3	37.5 -->	793.8 Km/hr
2007-02-20 23: 0:00	56.2	34.0 -->	714.7 Km/hr
2007-02-21 11: 0:00	56.4	32.1 -->	572.4 Km/hr
2007-02-21 17: 0:00	56.1	31.1 -->	11.7 Km/hr

ID:OXGN2

Date	Lat	Lon	Speed (*)
2007-02-15 11: 0:00	58.1	30.4 -->	325.2 Km/hr
2007-02-15 23: 0:00	58.1	25.2 -->	25.5 Km/hr
2007-02-16 22: 0:00	58.5	13.4 -->	30.0 Km/hr
2007-02-24 11: 0:00	57.0	10.1 -->	113.3 Km/hr
2007-02-24 23: 0:00	57.0	10.1 -->	266.2 Km/hr
2007-02-25 11: 0:00	57.0	10.1 -->	318.9 Km/hr
2007-02-25 23: 0:00	57.0	10.1 -->	370.6 Km/hr
2007-02-27 17: 0:00	57.0	10.1 -->	570.3 Km/hr
2007-02-28 17: 0:00	57.0	10.1 -->	577.9 Km/hr

Date	Lat	Lon	Speed (*)
2007-03-02 22: 0:00	57.0	10.1 -->	693.4 Km/hr
2007-03-03 17: 0:00	57.0	10.1 -->	578.0 Km/hr
2007-03-04 17: 0:00	57.0	10.1 -->	528.2 Km/hr
2007-03-04 23: 0:00	57.0	10.1 -->	0.0 Km/hr
2007-03-05 23: 0:00	57.0	10.1 -->	422.2 Km/hr
2007-03-06 11: 0:00	57.0	10.1 -->	378.1 Km/hr
2007-03-06 23: 0:00	57.0	10.1 -->	0.0 Km/hr
2007-03-07 11: 0:00	57.0	10.1 -->	0.0 Km/hr
2007-03-07 23: 0:00	57.0	10.1 -->	0.0 Km/hr
2007-03-08 23: 0:00	57.0	10.1 -->	60.1 Km/hr

Date	Lat	Lon	Speed (*)
2007-04-07 10: 0:00	57.0	10.1 -->	0.0 Km/hr
2007-04-07 23: 0:00	57.0	10.1 -->	0.0 Km/hr
2007-04-08 11: 0:00	57.0	10.1 -->	0.0 Km/hr
2007-04-08 23: 0:00	57.0	10.1 -->	0.0 Km/hr
2007-04-16 23: 0:00	57.0	10.1 -->	543.0 Km/hr
2007-04-17 23: 0:00	57.0	10.1 -->	254.3 Km/hr
2007-04-18 11: 0:00	57.0	10.1 -->	0.0 Km/hr

ID:ASDK1

Date	Lat	Lon	Speed (*)
2007-03-03 22: 0:00	56.8	-10.7 -->	115.0 Km/hr
2007-03-25 11: 0:00	59.7	15.5 -->	122.3 Km/hr
2007-03-26 23: 0:00	59.5	30.4 -->	242.7 Km/hr

Date	Lat	Lon	Speed (*)
2007-05-05 10: 0:00	60.7	20.3 -->	30.2 Km/hr

Date	Lat	Lon	Speed (*)
2007-12-14 11: 0:00	-56.5	-16.0 -->	1061.8 Km/hr
2007-12-15 11: 0:00	-59.3	-5.4 -->	2203.4 Km/hr

ID:ASDE4

Date	Lat	Lon	Speed (*)
2007-05-18 23: 0:00	34.0	58.0 -->	1819.6 Km/hr

Date	Lat	Lon	Speed (*)
2007-06-02 11: 0:00	44.0	14.0 -->	164.7 Km/hr
2007-06-25 17: 0:00	47.2	20.3 -->	546.3 Km/hr

ID:ASFR1

Date	Lat	Lon	Speed (*)
2007-07-04 12: 0:00	43.5	1.3 -->	3644.2 Km/hr

Date	Lat	Lon	Speed (*)
2007-08-14 08: 0:00	43.5	1.3 -->	4.9 Km/hr
2007-08-14 12: 0:00	43.5	1.3 -->	0.0 Km/hr

ID:ASEU1

Date	Lat	Lon	Speed (*)
2007-09-09 23: 0:00	47.0	44.0 -->	1081.2 Km/hr

Date	Lat	Lon	Speed (*)
2007-12-26 16: 0:00	38.4	-44.9 -->	325.9 Km/hr

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