

SUMMARY REPORT ON THE MONITORING OF ASAP SHIP DATA January-December 2008

(report submitted by Antonio Garcia Mendez, ECMWF)

European Centre for Medium-Range Weather Forecasts

1. Summary:

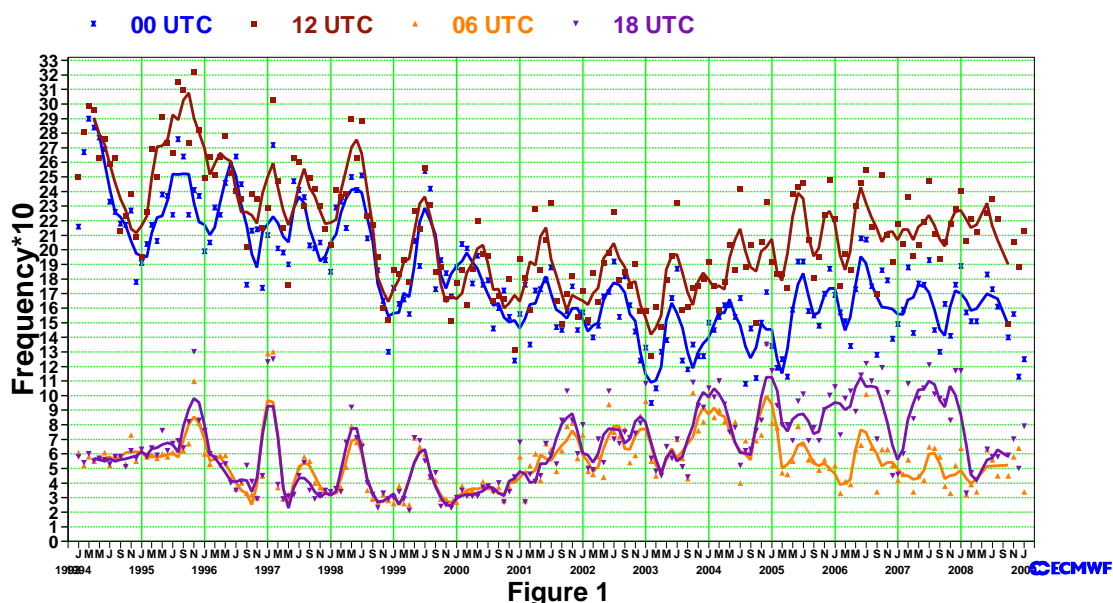
The number of ASAP reports received at ECMWF were slightly reduced compared to 2007, the percentage of ascents reaching 100 hPa back to values of around 95% in the second half of 2008.

Still some problems related to incorrectly 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 pieces of information received at mid tropospheric levels during 2008 was similar to 2007 at 00, 06 and 12 UTC. At 18 UTC, there was a 35% reduction in the numbers compared to 2007. Summaries for 2007 and 2008 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



ASAP temperature data received at ECMWF 500 hPa (January 1994 to December 2008)

Figure 2 shows that the percentage of ascents reaching 100 hPa was around 95% in the second half of 2008. These values were smaller in 2007. The positive trend in the number of reports reaching the upper stratosphere is still in place as 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, southern Atlantic and south Indian ocean, DBLK from the southern Atlantic and Arctic ocean (see figure 5) and WTEC was involved in VOCALS (VAMOS Ocean Cloud Atmosphere Land Study) in the south-eastern Pacific (see figure 9).

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

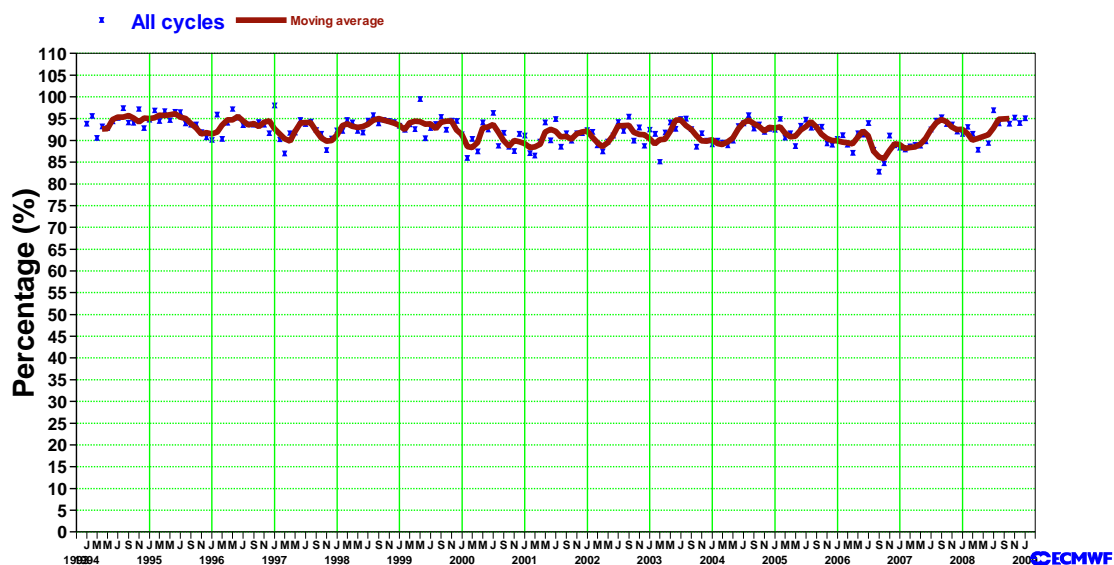


Figure 2
Percentage of ASAP reports reaching the 100 hPa level Jan 1994 to Dec 2008

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

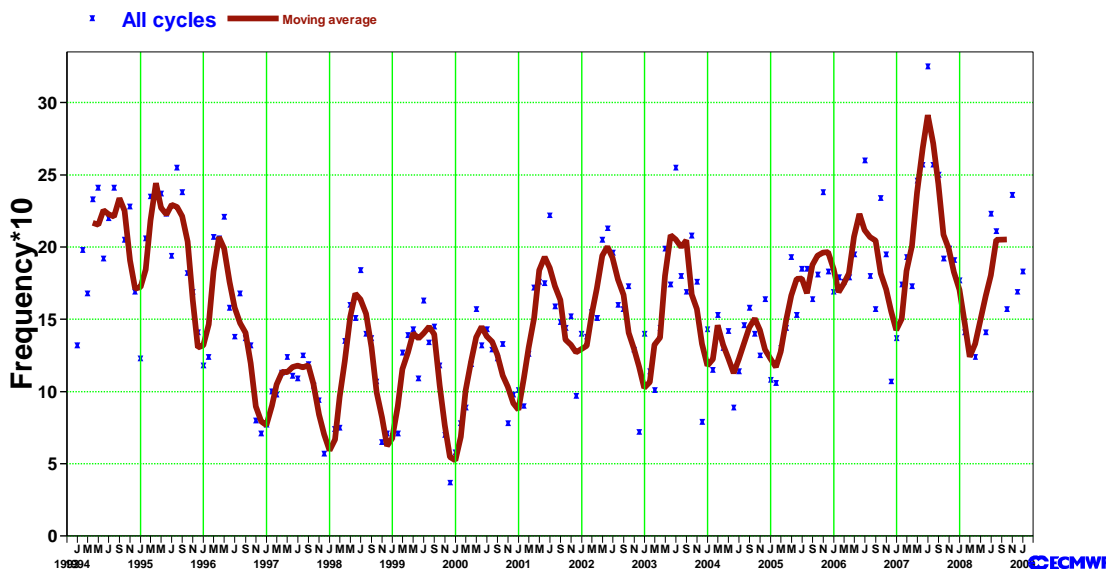
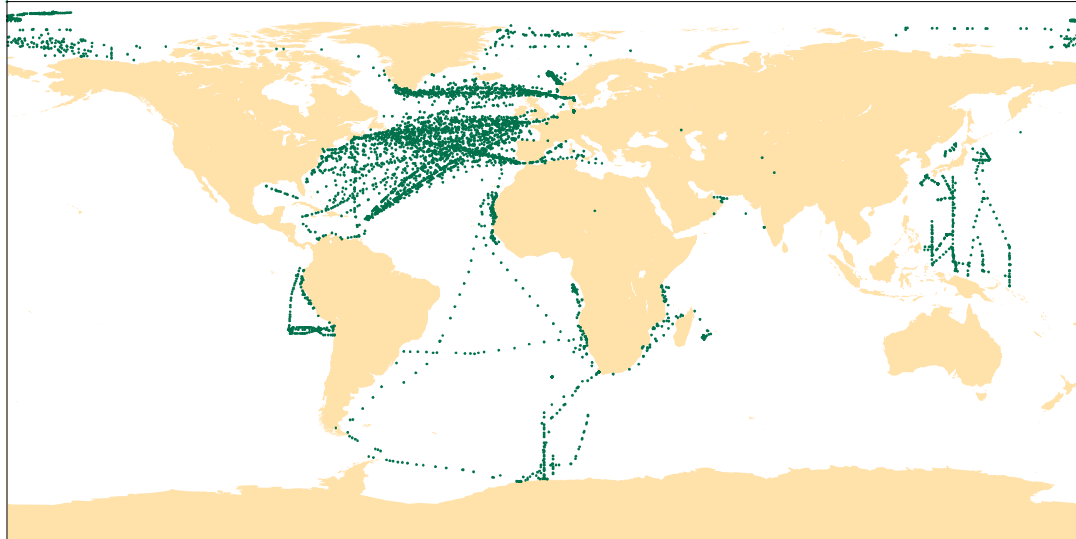


Figure 3
ASAP temperature data received at 20 hPa Jan 1994 to Dec 2008 (all cycles together)

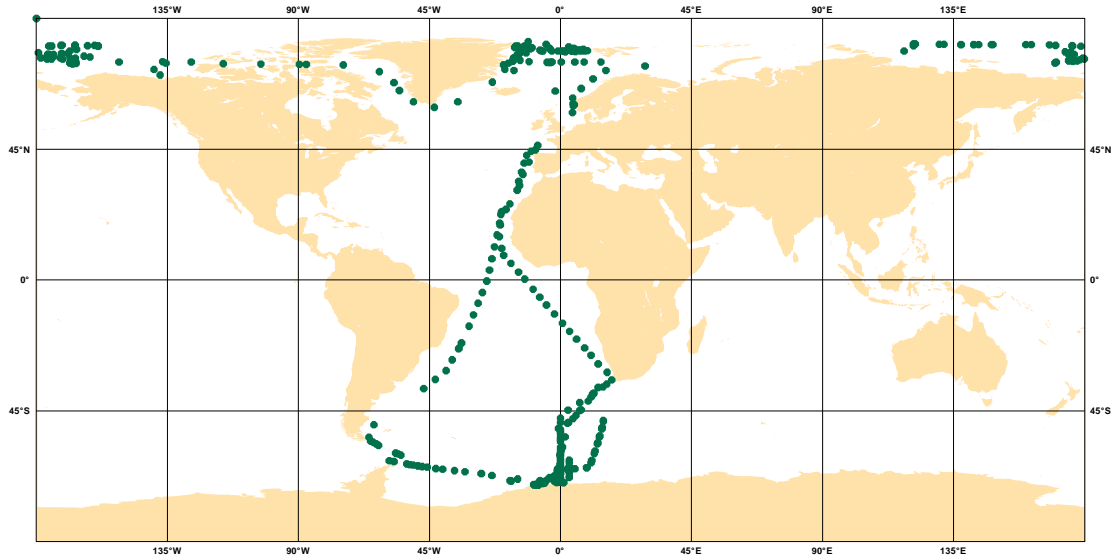
ASAP 1 JAN-31 DEC 2008



ECMWF

Figure 4
ASAP coverage January to December 2008

ASAP DBLK 1 JAN-31 DEC 2008



OBS: 359 (188/ 187 levels rejected WIND/TEMP ELEMENTS)

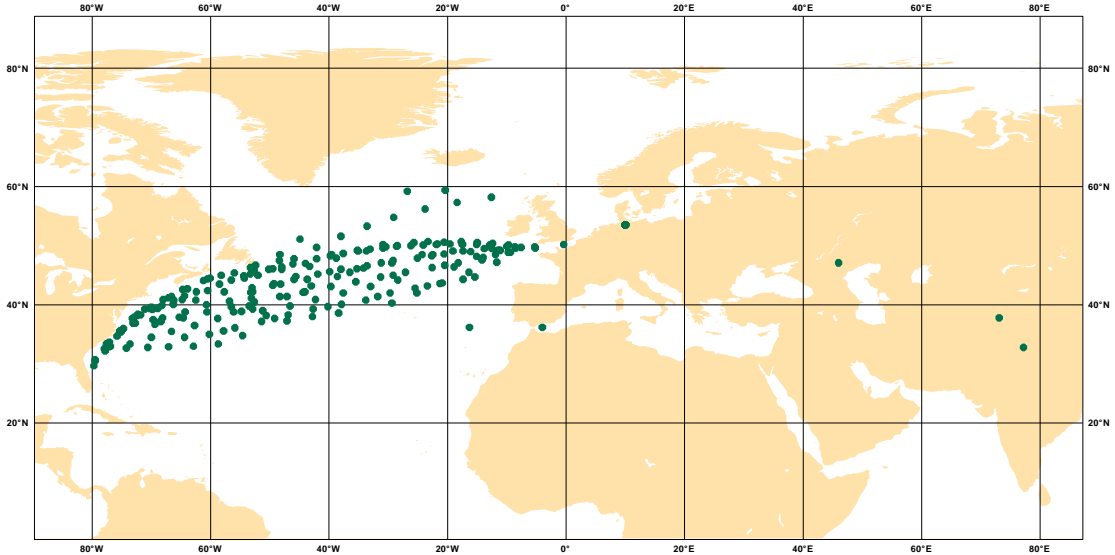
ECMWF

Figure 5
ASAP DBLK coverage January to December 2008

3. Troubleshooting

The details of incorrectly located reports can be seen in table 3 at the end of this report. Figures 6 and 7 show the tracks of the ASAP units with a larger amount of

ASAP ASDE3 1 JAN-31 DEC 2008

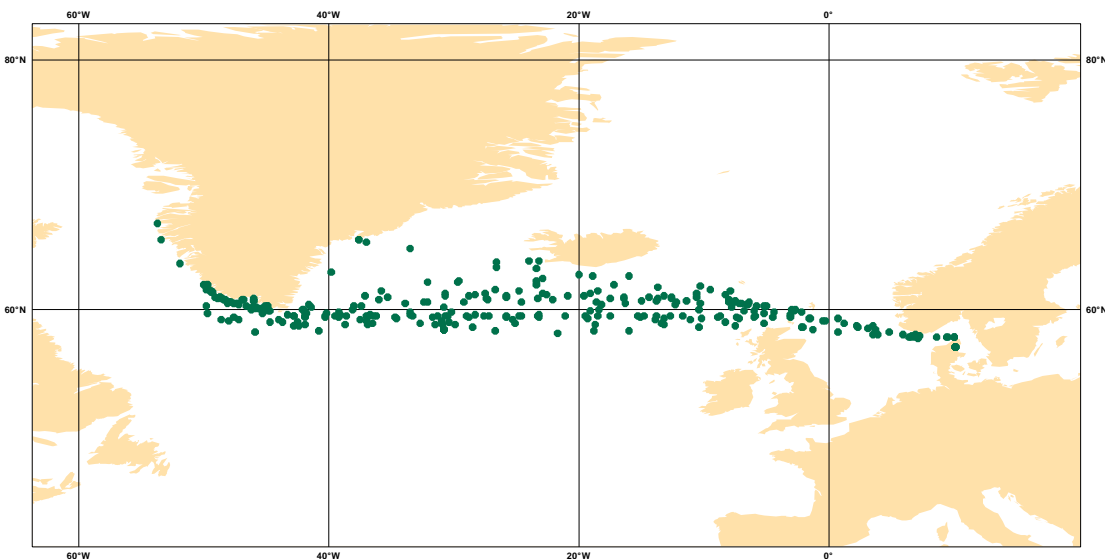


OBS: 248 (56/ 75 levels rejected WIND/TEMP ELEMENTS)



Figure 6
ASAP ASDE3 coverage January to December 2008

ASAP ASDK2 1 JAN-31 DEC 2008



OBS: 324 (467/ 438 levels rejected WIND/TEMP ELEMENTS)



Figure 7
ASAP ASDK2 coverage January to December 2008

incorrect positions. The bad positions are obvious in the tracking map of ASDE3, which are mainly produced by a change in the sign of the reported longitude. The case of ASDK2 is not at all clear having a look at the tracking chart. 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.

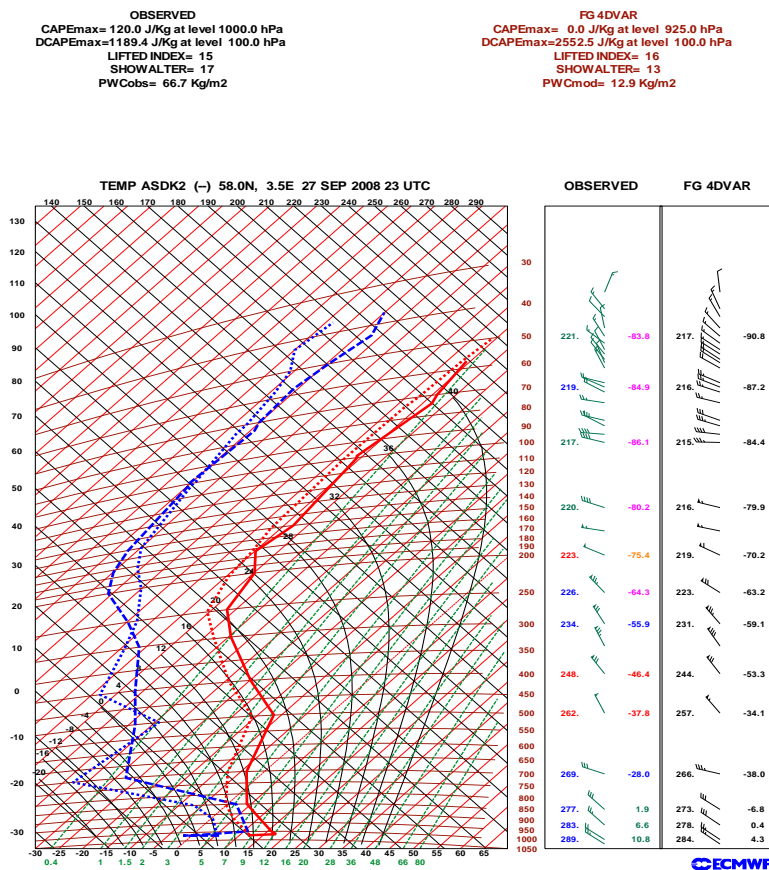


Figure 8.a

ASDK2 tephigram 27 Sept 2008 23 UTC. An erroneous positioned report partially used in ECMWF 4DVAR.
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

The profile shown in figure 8.a has all the temperature profile rejected by ECMWF quality control but the departures from FG were not big enough to reject the wind profile and a few humidity data at the PBL. The case shown in figure 8.b is extreme and all data was rejected by quality control except, winds above 60 hPa and a few temperature and humidity data below 500 hPa.

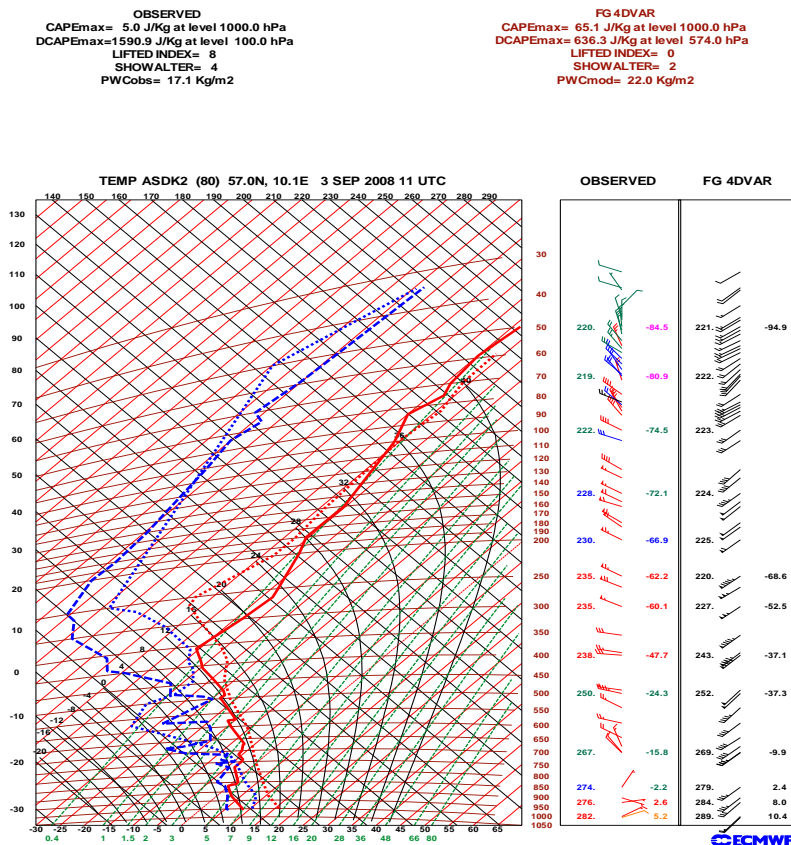


Figure 8.b

ASDK2 tephigram 3 Sept 2008 11 UTC. An erroneous positioned report partially used in ECMWF 4DVAR

- 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**

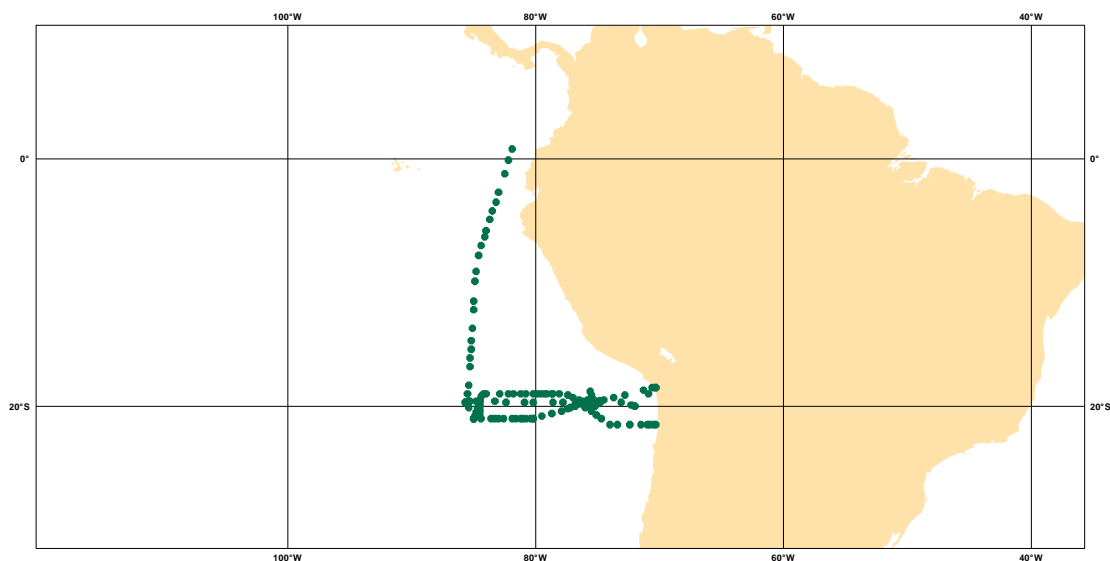
4. ASAP data monitoring at ECMWF

We keep on monitoring 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. One example of the daily monitoring is shown in figures 9.a and 9.b. In November 2008, ASAP unit WTEC produced 116 reports in the tropical Pacific as part of VOCALS (VAMOS Ocean Cloud Atmosphere Land Study). Figure 9.b shows a tephigram of one of the ascents comparing the observed profiles and those from the model background fields.

The time series shown in figures 10 to 14 contain temperature and wind statistics computed every 6 hours from 1 January to 31 December 2008. Comparing these time series with daily values to those of 2007 there are no remarkable changes in quality for all monitored parameters. Figures 15 and 16 show composite statistics regarding wind speed and relative humidity. The statistics have been computed by stratifying the samples into Japanese and not Japanese ASAP. Again, in comparison to 2007, similar statistics shows no deterioration in the data quality.

ASAP WTEC

1 OCT-30 NOV 2008



OBS: 166 (21/ 440 levels rejected WIND/TEMP ELEMENTS)



Figure 9.a

Tracks WTEC October-November 2008

OBSERVED
 CAPEmax= 71.1 J/Kg at level 1014.0 hPa
 DCAPEmax=1434.0 J/Kg at level 500.0 hPa
 LIFTED INDEX= 15
 SHOWALTER= 30
 PWCobs= 16.3 Kg/m2

FG 4DVAR
 CAPEmax= 4.8 J/Kg at level 1012.0 hPa
 DCAPEmax=1498.1 J/Kg at level 500.0 hPa
 LIFTED INDEX= 16
 SHOWALTER= 1
 PWCmod= 15.5 Kg/m2

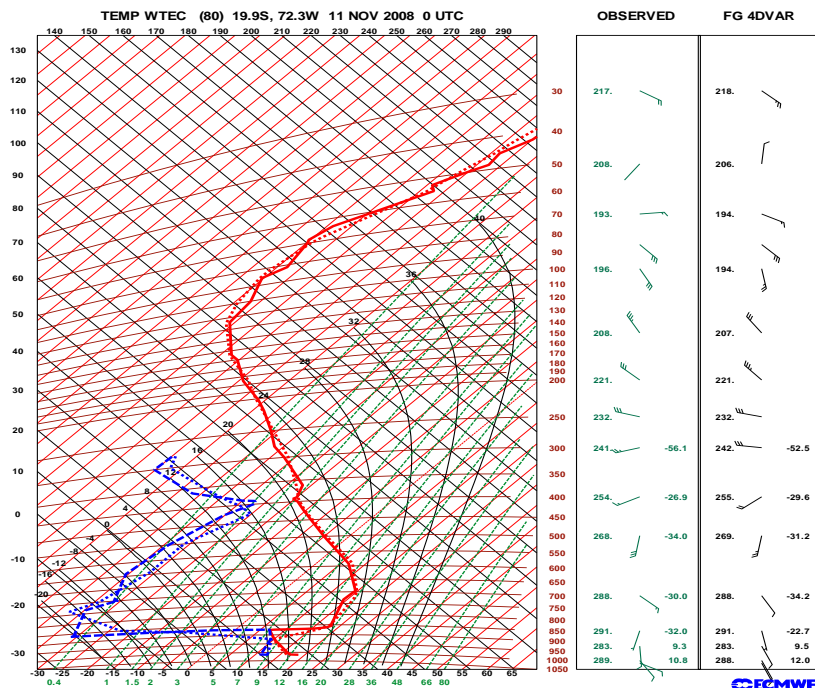
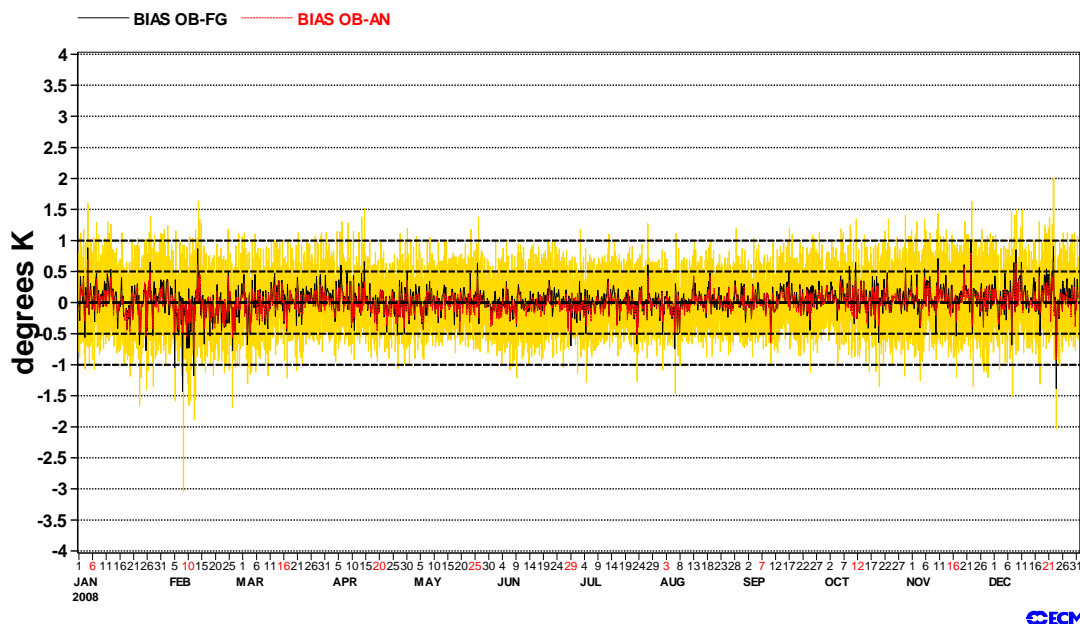


Figure 9.b

Tephigram WTEC 11 November 2008 00 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

ASAP temperature used data above 400 hPa

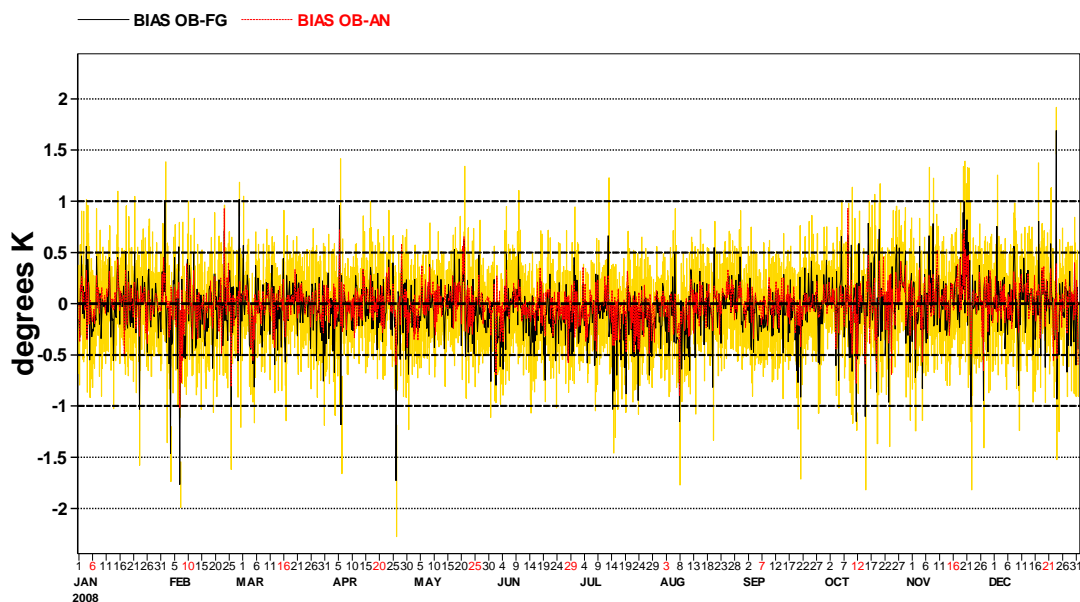


ECMWF

Figure 10

ASAP temperature statistics time series. The vertical bars are the Std OB-FG
Vertical yellow bars: Std OB-FG

ASAP temperature used data 700-400 hPa



ECMWF

Figure 11

ASAP temperature statistics time series. The vertical bars are the Std OB-FG
Vertical yellow bars: Std OB-FG

ASAP humidity used data 700-400 hPa

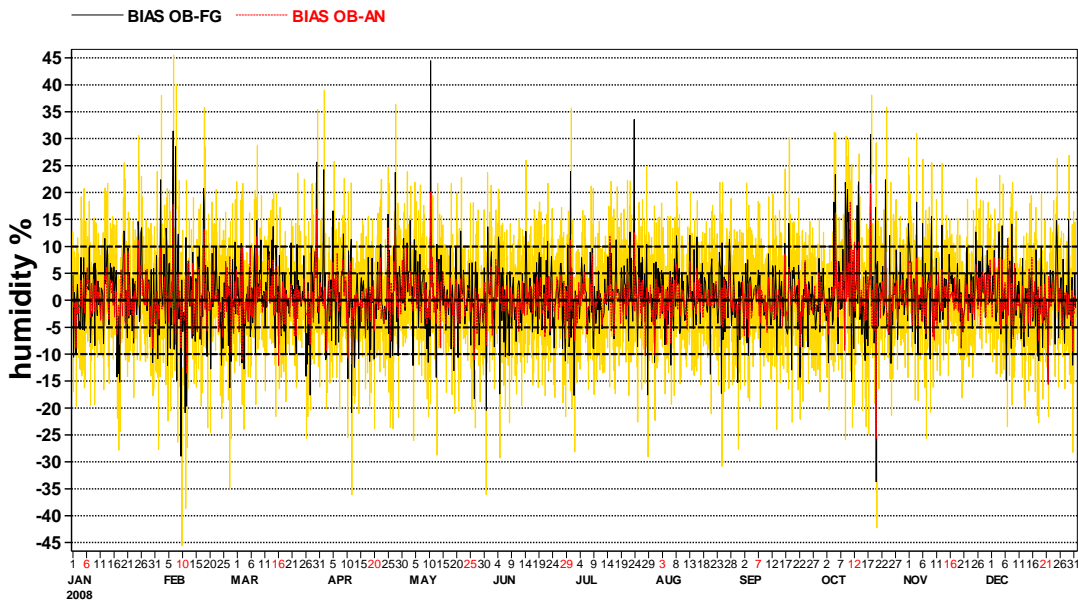


Figure 12
ASAP temperature statistics time series. The vertical bars are the Std OB-FG
Vertical yellow bars: Std OB-FG

ASAP wind used data 700-400 hPa

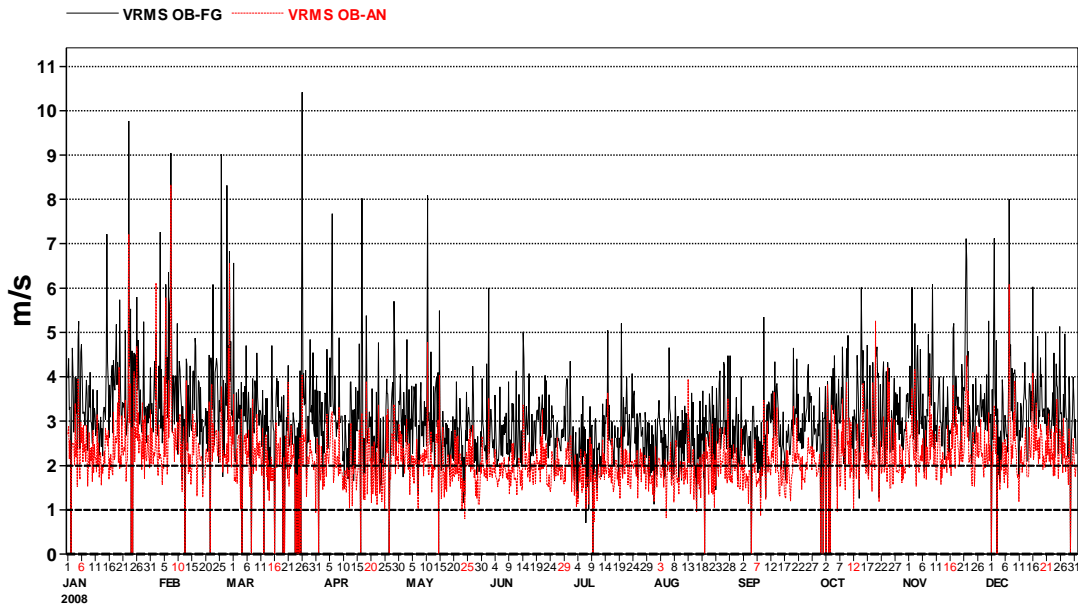
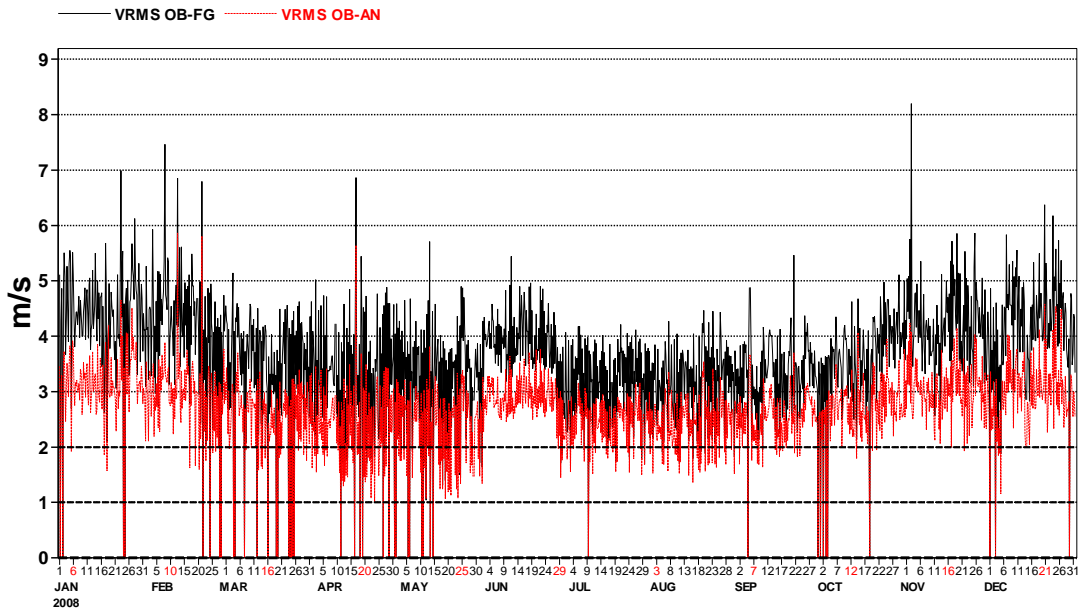


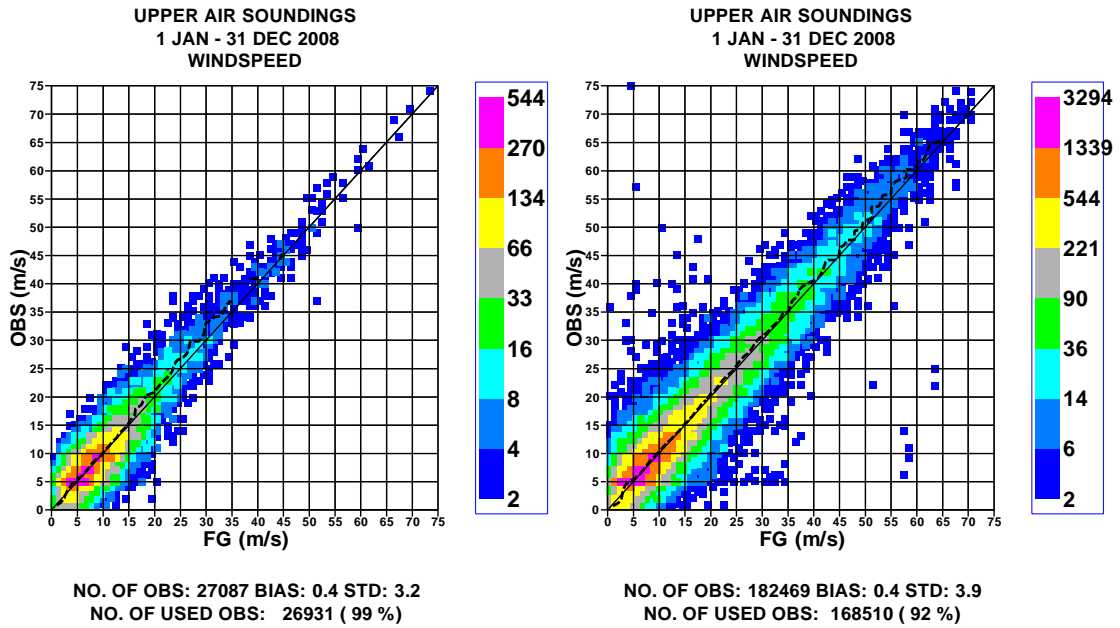
Figure 13
ASAP wind vector difference statistics time series

ASAP wind used data above 400 hPa



ECMWF

Figure 14
ASAP wind vector difference statistics time series



ASAP Japan

ASAP

ECMWF

Figure 15
ASAP wind speed statistics

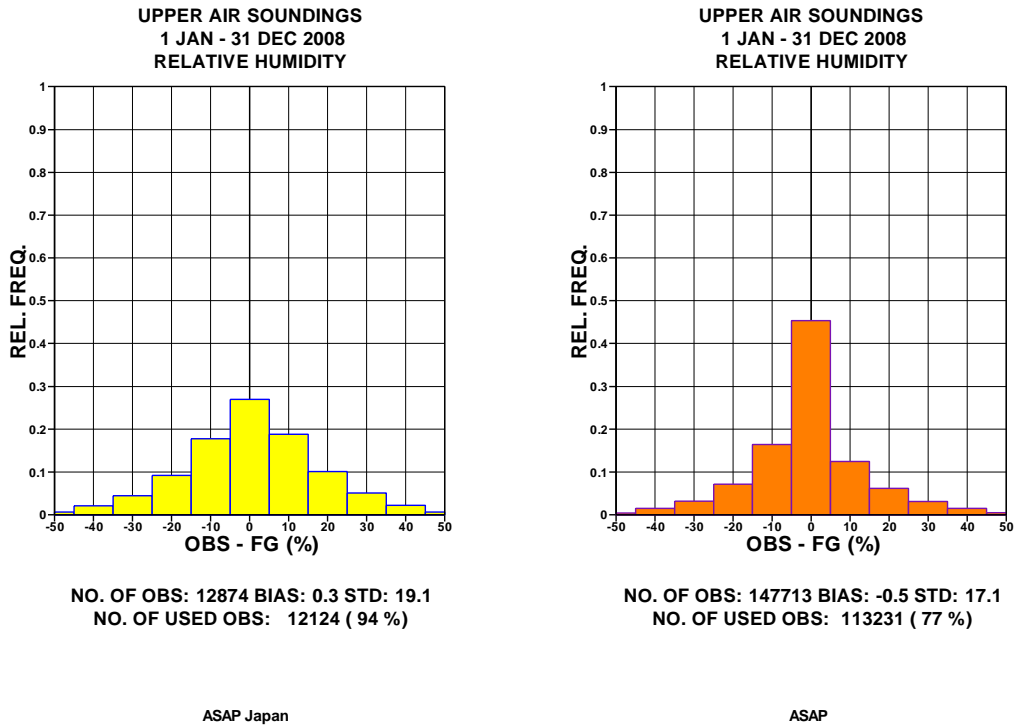


Figure 16
ASAP relative humidity statistics

ASAP used data
ASAP not Japan
1 JAN-31 DEC 2008
90S-180W/90N-180E
00/06/12/18 UTC uncorrected data combined

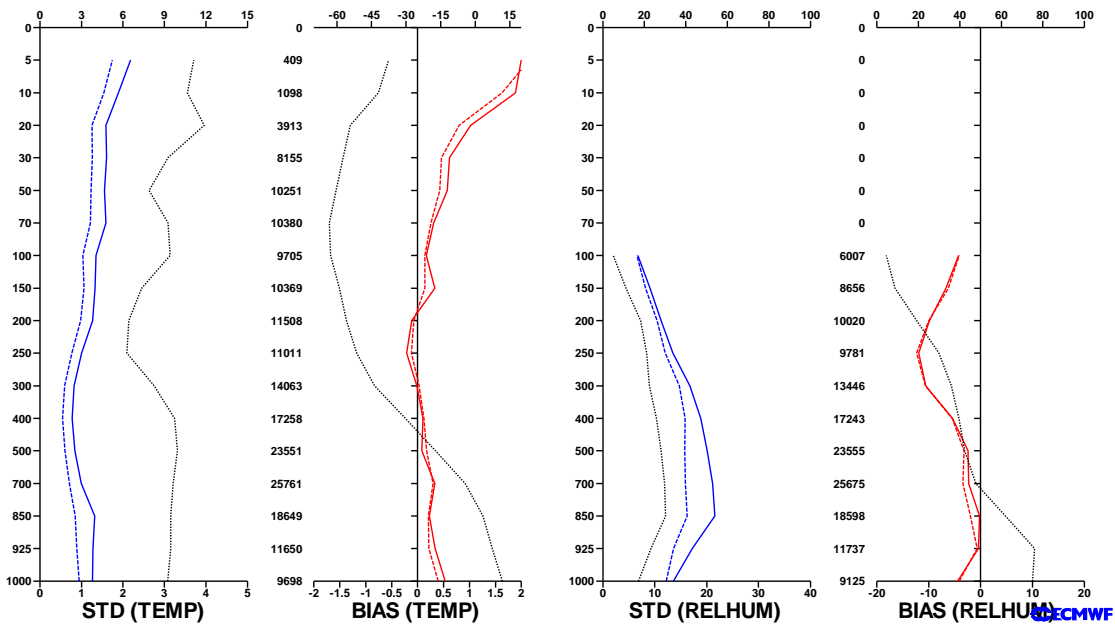


Figure 17
ASAP temperature and humidity vertical statistics: not Japanese ASAP

ASAP used data
 ASAP not Japan
 1 JAN-31 DEC 2008
 90S-180W/90N-180E
 00/06/12/18 UTC uncorrected data combined

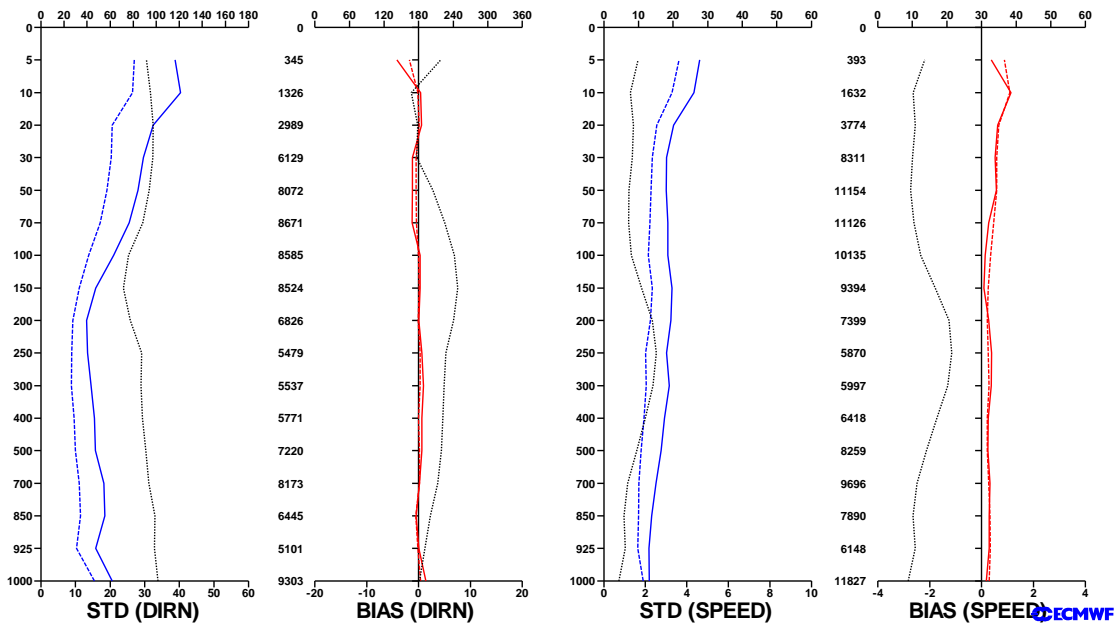


Figure 18

ASAP wind speed and direction vertical statistics: not Japanese ASAP

ASAP used data
 ASAP Japan
 1 JAN-31 DEC 2008
 90S-180W/90N-180E
 00/06/12/18 UTC uncorrected data combined

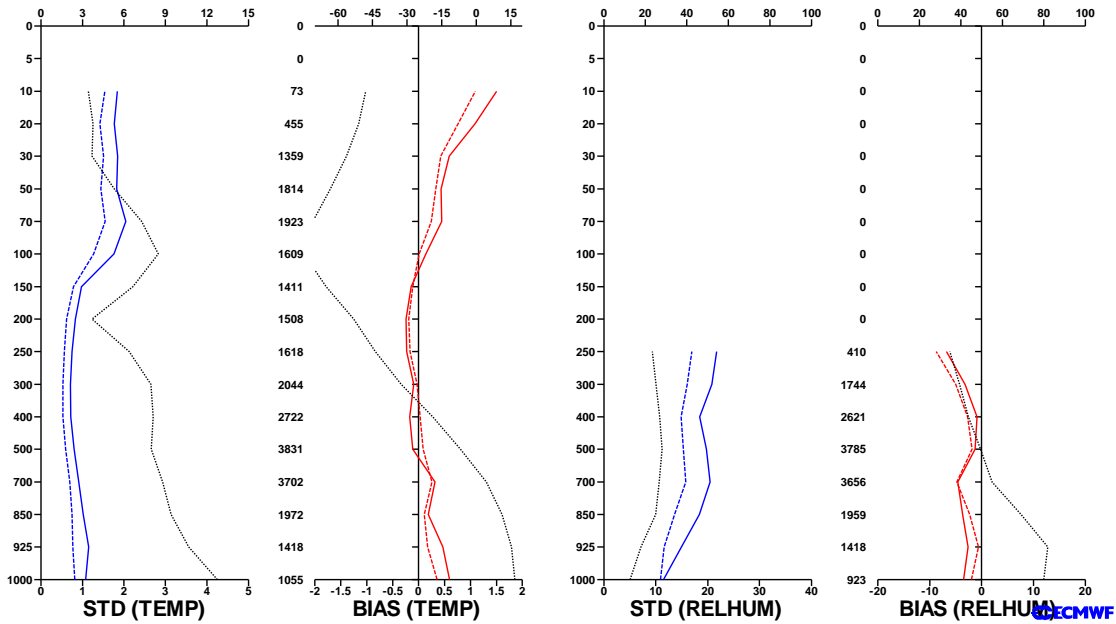


Figure 19

ASAP temperature and humidity vertical statistics: Japanese ASAP

ASAP used data
 ASAP Japan
 1 JAN-31 DEC 2008
 90S-180W/90N-180E
 00/06/12/18 UTC uncorrected data combined

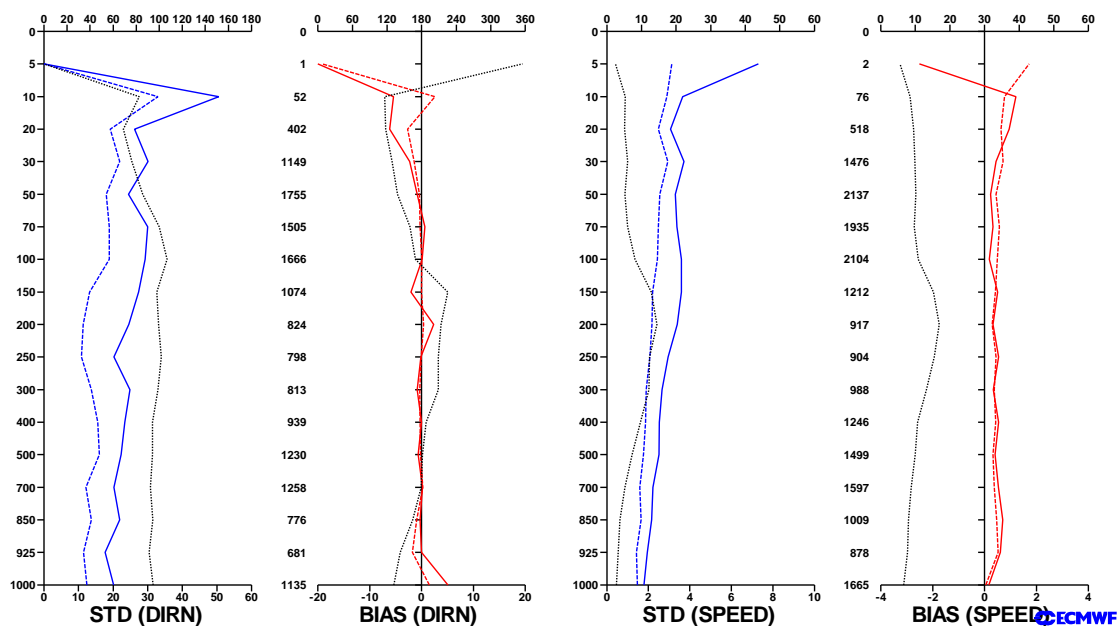


Figure 20
 ASAP wind speed and direction vertical statistics: Japanese ASAP

Finally, figures 17 to 20 show composite vertical statistics for the whole year 2008. 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 ASAP reports received at ECMWF in 2008 show a slight reduction compared to 2007.
- The percentage of ascents reaching 100 hPa back to values of around 95% in the second half of 2008.
- The number of corrupted call-signs reduced in 2008.
- The problem of wrongly located reports is still there although less severe than in 2007. 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 2007 at 500 hPa

ID	TEMPERATURE					WIND				
	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 2: 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 3: ASAP wrong positions detected January-December 2008

ID:ASDE3

Date	Lat	Lon	Speed (*)
2008-02-14 23: 0:00	43.7	-20.9 -->	34.1 Km/hr
2008-02-15 05: 0:00	36.2	-4.0 -->	277.4 Km/hr ←
2008-02-15 23: 0:00	40.3	-29.4 -->	33.3 Km/hr
2008-02-16 11: 0:00	36.2	-16.3 -->	102.6 Km/hr ←
2008-07-25 11: 0:00	46.0	-48.0 -->	27.6 Km/hr
2008-07-25 17: 0:00	47.1	46.0 -->	1198.2 Km/hr ←
2008-08-13 11: 0:00	39.6	-70.0 -->	25.3 Km/hr
2008-08-13 23: 0:00	37.8	73.1 -->	1035.0 Km/hr ←
2008-08-23 23: 0:00	30.5	-79.5 -->	1.8 Km/hr
2008-08-24 11: 0:00	32.8	77.2 -->	1236.2 Km/hr ←

ID:ASDE4

Date	Lat	Lon	Speed (*)
2008-01-04 23: 0:00	21.0	-54.0 -->	25.3 Km/hr
2008-01-05 11: 0:00	19.0	57.0 -->	966.7 Km/hr ←

ID:ASDK2

Date	Lat	Lon	Speed (*)
2008-04-01 11: 0:00	61.0	-48.7 -->	8.7 Km/hr
2008-04-01 17: 0:00	58.4	-30.8 -->	174.2 Km/hr ←
2008-04-05 11: 0:00	58.4	-30.8 -->	13.3 Km/hr
2008-04-05 23: 0:00	60.4	-18.2 -->	62.3 Km/hr ←
2008-04-06 11: 0:00	58.4	-30.8 -->	62.3 Km/hr
2008-04-06 23: 0:00	59.9	-6.8 -->	114.9 Km/hr ←
2008-06-15 17: 0:00	59.6	-3.1 -->	27.6 Km/hr
2008-06-15 23: 0:00	58.4	-30.8 -->	265.3 Km/hr ←
2008-08-26 05: 0:00	60.1	-45.3 -->	12.0 Km/hr
2008-08-26 11: 0:00	57.0	10.1 -->	538.8 Km/hr ←
2008-09-01 17: 0:00	63.7	-51.9 -->	7.6 Km/hr
2008-09-02 11: 0:00	57.0	10.1 -->	193.9 Km/hr ←
2008-09-02 17: 0:00	60.2	-45.8 -->	543.0 Km/hr
2008-09-03 11: 0:00	57.0	10.1 -->	181.0 Km/hr ←
2008-09-03 17: 0:00	60.3	-38.0 -->	467.8 Km/hr
2008-09-03 23: 0:00	57.0	10.1 -->	467.8 Km/hr ←
2008-09-25 11: 0:00	58.9	-25.1 -->	27.8 Km/hr
2008-09-25 23: 0:00	57.0	10.1 -->	174.0 Km/hr ←
2008-11-05 11: 0:00	61.7	-49.7 -->	2.0 Km/hr
2008-11-06 05: 0:00	57.0	10.1 -->	190.5 Km/hr ←
2008-11-08 23: 0:00	59.5	-12.7 -->	24.5 Km/hr
2008-11-09 11: 0:00	57.0	10.1 -->	113.6 Km/hr ←
2008-11-25 23: 0:00	60.5	-48.1 -->	0.3 Km/hr
2008-11-26 11: 0:00	57.0	10.1 -->	281.6 Km/hr ←
2008-11-30 05: 0:00	59.3	-1.6 -->	27.5 Km/hr
2008-11-30 11: 0:00	57.0	10.1 -->	122.1 Km/hr ←
2008-12-07 11: 0:00	61.3	-27.5 -->	19.2 Km/hr
2008-12-07 23: 0:00	57.0	10.1 -->	183.1 Km/hr ←
2008-12-08 11: 0:00	57.0	10.1 -->	0.0 Km/hr ←
2008-12-09 11: 0:00	59.9	-44.7 -->	27.8 Km/hr
2008-12-09 17: 0:00	57.0	10.1 -->	534.1 Km/hr ←

ID:ASES1

Date	Lat	Lon	Speed (*)
2008-11-20 11: 0:00	18.1	-16.3 -->	9.3 Km/hr
2008-11-22 11: 0:00	20.0	17.0 -->	73.0 Km/hr ←

ID:DBLK

Date	Lat	Lon	Speed (*)
2008-03-04 11: 0:00	-70.6	-8.1 -->	0.0 Km/hr

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2008-03-04 13: 0:00 90.0 180.0 --> 12979.7 Km/hr ←

ID:LDWR

Date	Lat	Lon	Speed (*)
2008-10-14 18: 0:00	65.6	2.0 -->	5.6 Km/hr
2008-10-15 00: 0:00	59.9	2.2 -->	105.6 Km/hr ←
2008-12-01 00: 0:00	65.9	1.9 -->	2.0 Km/hr
2008-12-01 06: 0:00	59.9	1.6 -->	111.2 Km/hr ←

ID:WTEC

Date	Lat	Lon	Speed (*)
2008-11-21 20: 0:00	-21.0	-85.0 -->	0.0 Km/hr
2008-11-22 00: 0:00	-18.5	-70.3 -->	390.8 Km/hr ←
2008-11-24 20: 0:00	-21.0	-82.6 -->	10.4 Km/hr
2008-11-25 00: 0:00	-18.5	-70.3 -->	329.2 Km/hr ←

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