

# **Report on the Quality of Land Surface Observations in Region II (Asia)**

**July – December 2022**

**No. 64**

**March 2023**

**RSMC Tokyo  
Lead Center for Monitoring Quality of Land Surface Observations**

**Japan Meteorological Agency  
3-6-9 Tranomon, Minato City, Tokyo 105-8431  
Japan**

**Report on the Quality of Land Surface Observations in Region II**  
**(No. 64)**  
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## **Summary**

In its role as a Lead Center, RSMC Tokyo has issued the 64th report on the land surface observation quality monitoring for the period from July to December 2022. The report includes a consolidated list of stations suspected of producing low-quality observation data.

### **(1) SLP**

As a result of monitoring, two stations (48001, 41244) were excluded from the consolidated lists of the previous report (January – June 2022), and three stations (30673, 41252, 43113) were newly added to the lists.

### **(2) MSLP**

As a result of monitoring, one station (41244) was excluded from the consolidated lists of the previous report (January – June 2022).

## **1. Introduction**

Pursuant to Paragraph 22 of Attachment II.7 of the Manual on the Global Data Processing and Forecasting System (WMO No. 485), the Regional Specialized Meteorological Center (RSMC) Tokyo was designated by the President of the Commission for Basic Systems (CBS) as a Lead Center for monitoring the quality of land surface observations (i.e., SYNOP) in Region II in March 1991. The Center is responsible for monitoring the quality of land surface observations and maintaining consolidated lists of stations suspected of reporting low-quality observation data together with adequate evidence. The lists are to be passed on to the WMO Secretariat and monitoring centers participating in this activity as well as to Members of Regional Association (RA) II for their reference.

## **2. Monitored Data**

Monitored surface observation data are obtained at 00, 06, 12 and 18 UTC and collected at RSMC Tokyo before the data cut-off time, defined as the end of the period in which observation data are gathered for operational analysis. The cut-off times for Japan Meteorological Agency (JMA) global analysis are shown in Table 1.

Table 1 Data cut-off times for JMA global analysis.

Analysis time	Data cut-off time
00 UTC	11:50 UTC
06 UTC	13:50 UTC
12 UTC	23:50 UTC
18 UTC	01:50 UTC

The observation elements monitored are (1) station level pressure, (2) mean sea level pressure and (3) geopotential height, hereafter referred to as SLP, MSLP and GZ, respectively. In accordance with the Manual on Codes (WMO No. 306) Volume II, GZ data on an agreed standard pressure level are reported at the stations whose elevation is higher than 800 m. Standard pressure levels defined in line with station elevation are shown in Table 2.

Table 2 Elevation of stations reporting GZ data and corresponding standard pressure levels.

Station elevation (m)	Pressure level (hPa)
800 - 2,300	850
2,300 - 3,700	700
Higher than 3,700	500

The numbers of stations reporting SLP, MSLP and/or GZ data in Region II are shown in Table 3, and the locations of these land surface stations are shown in Figure 1.

Table 3 Numbers of stations reporting SLP, MSLP and/or GZ data in Region II

Element	Number of stations
SLP	1903
MSLP	1999
GZ	86

### 3. Monitoring Methods

The three items described below are examined for each element.

- (i) Monthly statistics on observation deviations from the most recent forecast of JMA's global model (referred to as first-guess values) (observation minus guess, hereafter referred to as O-G) and on related trends over the monitoring period
- (ii) Monthly statistics on deviations from values observed at surrounding stations
- (iii) Reference information from other monitoring centers

Information on the latitude, longitude and altitude of each station is necessary for calculation of first-guess values. Such data for land surface station locations is retrieved from the surface-based observing

system component of the Observing Systems Capability Analysis and Review Tool (OSCAR/Surface)\* , replacing WMO No. 9, Volume A.

The monitoring procedure has two steps as outlined below.

(1) Exclusion of data with gross errors from the statistical calculation sample

The following thresholds are applied for the gross error check in the first step:

$$\begin{aligned}|O-G| &\geq 15 \text{ hPa for SLP and MSLP} \\ |O-G| &\geq 100 \text{ gpm for GZ}\end{aligned}$$

Gross error data are excluded from the calculation of BIAS (the mean of O-G) and SD (the standard deviation of O-G).

(2) Identification of suspect stations

When the total number of observations (NOBS) is 184 or more, the next criteria are applied:

- BIAS	$ BIAS  \geq 3 \text{ hPa for SLP and MSLP}$
	$ BIAS  \geq 30 \text{ gpm for GZ}$
- SD	$SD \geq 5 \text{ hPa for SLP and MSLP}$
	$SD \geq 40 \text{ gpm for GZ}$
- Percentage of gross errors (PGE)	$PGE \geq 25\%$

Stations with even one statistic exceeding the threshold are considered suspect.

Note:

- (i) The quality of observation data from stations is not checked when the NOBS value is less than 184 or the difference between the station elevation and the model elevation is greater than 1,000 m. MSLP reports are also not checked for stations located at altitudes higher than 1,000 m above sea level.
- (ii) In case of low quality of the first-guess field, those statistics can exceed the threshold and the stations are listed in the consolidated list. To avoid such situations, statistics of surrounding stations and information from other monitoring centers are also used to judge whether the quality of the station's first-guess field value is appropriate.

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\*<https://oscar.wmo.int/surface/index.html#/>

## 4. Monitoring Results

### 4.1 Consolidated list of suspect stations throughout the period

Table 4 List of suspect land surface stations during the period from July to December 2022

WMO IDENT	LAT (N)	LON (E)	H (m)	HM (m)	ELEM	NOBS	PGE (%)	SD	BIAS	RMS
35284	50.6	70.0	384	324	SLP	736	0	0.8	6.5	6.5
					MSLP	736	0	1.0	0.8	1.3
35615	47.6	53.3	-21	-20	SLP	587	0	0.5	0.3	0.6
					MSLP	587	0	0.6	5.2	5.2
35701	47.2	51.0	-27	-21	SLP	496	0	0.4	0.1	0.4
					MSLP	496	0	0.6	6.4	6.4
38262	43.0	59.8	93	58	SLP	716	0	0.7	3.8	3.9
					MSLP	716	0	0.9	0.6	1.1
38313	43.7	69.0	405	709	SLP	592	73	0.9	14.0	14.0
					MSLP	592	0	2.6	-1.2	2.9
38318	42.1	68.1	183	219	SLP	666	0	0.5	-8.2	8.2
					MSLP	666	0	0.6	-4.0	4.0
38836	38.6	68.7	800	1188	SLP	689	1	1.4	-3.6	3.9
					MSLP	684	0	1.9	-4.7	5.1
38875	39.0	73.6	3930	4306	SLP	346	100	0.0	-4.4	4.4
					-	-	-	-	-	-
38880	38.0	58.4	312	308	SLP	736	1	1.2	11.7	11.8
					MSLP	736	0	0.9	0.0	0.9
38944	37.5	69.4	447	586	SLP	691	0	1.3	-5.8	5.9
					MSLP	691	0	1.5	-6.2	6.4
40877	28.0	57.7	499	682	SLP	729	0	0.6	-0.9	1.1
					MSLP	729	0	1.1	-4.5	4.6
41265	22.8	58.5	469	592	SLP	678	0	0.5	-5.0	5.0
					MSLP	678	0	0.7	-1.8	1.9
41315	17.3	54.1	881	597	SLP	645	96	0.2	14.8	14.8
					GZ850	249	98	58.1	6.9	58.5
41573	33.9	73.4	2127	1312	SLP	660	0	1.5	9.1	9.2
					GZ850	661	0	11.3	-0.9	11.3
42056	32.7	74.8	323	308	SLP	712	1	0.6	-6.6	6.6
					-	-	-	-	-	-
42083	31.1	77.2	2202	1560	SLP	367	94	0.2	14.8	14.8
					GZ850	4	100	*****	*****	*****
42111	30.3	78.0	683	871	SLP	723	0	0.9	5.5	5.6
					MSLP	723	0	1.3	-2.0	2.4
42114	30.4	78.5	770	1525	SLP	365	100	*****	*****	*****
					-	-	-	-	-	-
42147	29.5	79.7	2311	1571	SLP	365	0	0.8	4.5	4.6
					-	-	-	-	-	-

WMO IDENT	LAT (N)	LON (E)	H (m)	HM (m)	ELEM	NOBS	PGE (%)	SD	BIAS	RMS
42299	27.3	88.6	1756	1989	SLP	366	0	0.6	0.5	0.8
					GZ850	366	0	9.0	57.8	58.5
43418	8.6	81.2	79	10	SLP	680	0	0.5	4.6	4.6
					MSLP	680	0	0.4	-0.2	0.4
43479	7.0	81.1	670	862	SLP	457	0	0.5	-9.6	9.6
					-	-	-	-	-	-
44406	29.3	80.9	617	1566	SLP	499	0	1.7	4.4	4.7
					MSLP	499	0	2.9	-2.7	4.0
44429	28.0	82.5	634	806	SLP	500	0	0.5	-3.6	3.6
					MSLP	500	0	1.2	0.6	1.3
47037	40.0	125.3	99	215	SLP	736	0	1.2	-4.4	4.6
					MSLP	736	0	1.3	-4.3	4.5
47102	38.0	124.7	146	4	SLP	736	0	0.7	11.8	11.8
					MSLP	736	0	0.5	-1.2	1.3
47145	36.8	127.3	26	112	SLP	736	0	0.6	-6.8	6.8
					MSLP	736	0	0.6	0.2	0.6
47152	35.6	129.3	36	121	SLP	736	0	0.7	-5.5	5.5
					MSLP	736	0	0.6	-0.2	0.6
48018	24.2	96.3	95	197	SLP	539	0	1.2	3.7	3.9
					MSLP	539	0	1.2	-0.5	1.3
48062	20.1	92.9	5	3	SLP	542	0	1.0	6.4	6.5
					MSLP	541	0	0.9	-0.4	1.0
48085	17.6	94.6	3	78	SLP	532	0	0.8	6.9	6.9
					MSLP	533	0	0.7	-0.4	0.8
48107	15.3	97.9	7	89	SLP	543	0	0.9	-3.2	3.3
					MSLP	542	0	0.9	0.4	1.0
48921	21.6	101.9	1360	1072	SLP	531	1	1.1	-4.6	4.7
					GZ850	530	99	7.7	86.7	87.0
48925	20.7	102.0	636	950	SLP	514	1	1.2	-3.6	3.8
					MSLP	514	0	1.3	-1.7	2.1
48935	19.5	103.1	1094	1196	SLP	531	2	0.9	1.0	1.3
					GZ850	530	1	7.0	-81.2	81.5
48952	15.7	106.4	180	334	SLP	538	0	1.2	3.6	3.8
					MSLP	538	0	1.2	2.3	2.6
54945	35.5	119.6	37	22	SLP	736	0	0.5	-3.2	3.2
					MSLP	736	0	0.5	0.3	0.6
56946	23.6	99.4	1104	1396	SLP	736	0	0.7	-4.0	4.1
					MSLP	736	0	1.9	0.8	2.1
56951	24.0	100.2	1503	1839	SLP	736	0	0.6	-13.0	13.0
					MSLP	736	0	2.3	1.0	2.5
57731	28.0	108.3	418	727	SLP	736	100	0.1	-14.9	14.9
					MSLP	736	0	1.1	0.2	1.1
58921	26.0	117.4	204	530	SLP	736	0	0.7	-6.4	6.4
					MSLP	736	0	0.8	0.0	0.8
59632	22.0	108.6	6	25	SLP	736	0	0.5	-5.3	5.3

WMO IDENT	LAT (N)	LON (E)	H (m)	HM (m)	ELEM	NOBS	PGE (%)	SD	BIAS	RMS
					MSLP	736	0	0.4	-0.1	0.4

WMO IDENT: WMO station identification number  
 LAT: station latitude  
 LON: station longitude  
 H: barometer elevation  
 HM: model elevation  
 ELEM: observed element  
 NOBS: total number of observations during the period  
 PGE: percentage of gross errors  
 SD: standard deviation of (observation - guess)  
 BIAS: bias of (observation - guess)  
 RMS: root mean square of (observation - guess)

## KAZAKHSTAN

- 35284** - Positive bias of O-G at the station level (Figures 2 and 3)
- 35615** - Positive bias of O-G at the mean sea level (Figures 4 and 5)
- 35701** - Positive bias of O-G at the mean sea level (Figures 4 and 6)
- 38313** - Positive bias of O-G at the station level (Figures 9 and 10)
- 38318** - Negative bias of O-G at the station level (Figures 9 and 11)

## UZBEKISTAN

- 38262** - Positive bias of O-G at the station level (Figures 7 and 8)

## TAJIKISTAN

- 38836** - Negative bias of O-G at the mean sea level (Figures 12 and 13)
- 38875** - Positive bias of O-G at the station level (Figures 14 and 15)
- 38944** - Negative biases of O-G at the station level and the mean sea level (Figures 12, 14 and 17)

## TURKMENISTAN

- 38880** - Positive bias of O-G at the station level (Figures 7 and 16)

## IRAN, ISLAMIC REPUBLIC OF

- 40877** - Negative bias of O-G at the mean sea level (Figures 18 and 19)

## OMAN

- 41265** - Negative bias of O-G at the station level (Figures 20 and 21)
- 41315** - Positive bias of O-G at the station level and negative bias of O-G at 850 hPa (Figures 22, 23 and 24)

## PAKISTAN

**41573** - Positive bias of O-G at the station level (Figures 25 and 26)

#### **INDIA**

**42056** - Negative bias of O-G at the station level (Figures 25 and 27)

**42083** - Positive bias of O-G at the station level (Figures 25 and 28)

**42111** - Positive bias of O-G at the station level (Figures 25 and 29)

**42114** - Negative bias of O-G at the station level (Figures 25 and 30)

**42147** - Positive bias of O-G at the station level (Figures 25 and 31)

**42299** - Positive bias of O-G at 850 hPa (Figures 32 and 33)

#### **SRI LANKA**

**43418** - Positive bias of O-G at the station level (Figures 34 and 35)

**43479** - Negative bias of O-G at the station level (Figures 34 and 36)

#### **NEPAL**

**44406** - Positive bias of O-G at the station level (Figures 25 and 37)

**44429** - Negative bias of O-G at the station level (Figures 25 and 38)

#### **KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF**

**47037** - Negative biases of O-G at the station level and the mean sea level (Figures 39, 40 and 41)

#### **KOREA, REPUBLIC OF**

**47102** - Positive bias of O-G at the station level (Figures 39 and 42)

**47145** - Negative bias of O-G at the station level (Figures 39 and 43)

**47152** - Negative bias of O-G at the station level (Figures 39 and 44)

#### **MYANMAR**

**48018** - Positive bias of O-G at the station level (Figures 45 and 46)

**48062** - Positive bias of O-G at the station level (Figures 45 and 47)

**48085** - Positive bias of O-G at the station level (Figures 45 and 48)

**48107** - Negative bias of O-G at the station level (Figures 45 and 49)

#### **LAO PEOPLE'S DEMOCRATIC REPUBLIC**

**48921** - Negative biases of O-G at the station level and 850 hPa (Figures 50, 51 and 52)

**48925** - Negative bias of O-G at the station level (Figures 50 and 53)

**48935** - Negative bias of O-G at 850 hPa (Figures 51 and 54)

**48952** - Positive bias of O-G at the station level (Figures 50 and 55)

#### **CHINA**

**54945** - Negative bias of O-G at the station level (Figures 39 and 56)

**56946** - Negative bias of O-G at the station level (Figures 50 and 57)

**56951** - Negative bias of O-G at the station level (Figures 50 and 58)

**57731** - Negative bias of O-G at the station level (Figures 59 and 60)

**58921** - Negative bias of O-G at the station level (Figures 61 and 62)

**59632** - Negative bias of O-G at the station level (Figures 63 and 64)

## 4.2 Stations where quality deteriorated during the period

Table 5 List of suspect land surface stations where quality deteriorated during the period

WMO IDENT	LAT (N)	LON (E)	H (m)	HM (m)	ELEM	NOBS	PGE (%)	SD	BIAS	RMS
30673	53.8	119.7	625	756	SLP	734	0	3.7	-6.7	7.7
					MSLP	468	0	1.4	0.3	1.4
41252	23.2	56.4	327	352	SLP	338	100	*****	*****	*****
					MSLP	338	1	2.3	0.8	2.4
43113	17.5	74.1	661	728	SLP	184	0	0.8	-3.9	4.0
					MSLP	184	0	0.9	0.1	0.9

### RUSSIAN FEDERATION IN ASIA

**30673** - Negative bias of O-G at the station level (Figures 65 and 66)

The negative bias of O-G at the station level appears to have been observed since August 2022.

### OMAN

**41252** - Positive bias of O-G at the station level (Figures 20 and 67)

The positive bias of O-G at the station level appears to have been observed since October 2022.

### INDIA

**43113** - Negative bias of O-G at the station level (Figures 68 and 69)

## 4.3 Stations improved and excluded from the previous consolidated list

### MYANMAR

**48001** - The percentage of gross errors (PGE) has improved from the previous list (January – June 2022) (Figure 70).

## 4.4 Stations removed from the previous consolidated list

### **OMAN**

**41244** - O-Gs at the station level and the mean sea level fluctuated slightly in August and from mid-December onward, and were removed from the consolidated list because SDs exceeded the threshold at neither level (Figure 71).

## **5. Possible Causes of Remarkable and Sustained Biases**

The following are possible causes of remarkable and sustained biases

- (i) The barometer used for observation is not correctly calibrated.
- (ii) The latitude, longitude or altitude of the station in OSCAR/Surface has not been updated in a timely and appropriate manner. This could result in remarkable biases because it may cause incorrect calculated first-guess field values.
- (iii) Biases are specific to the NWP model used in quality monitoring.

Note: Model biases are likely to appear in relatively large areas.

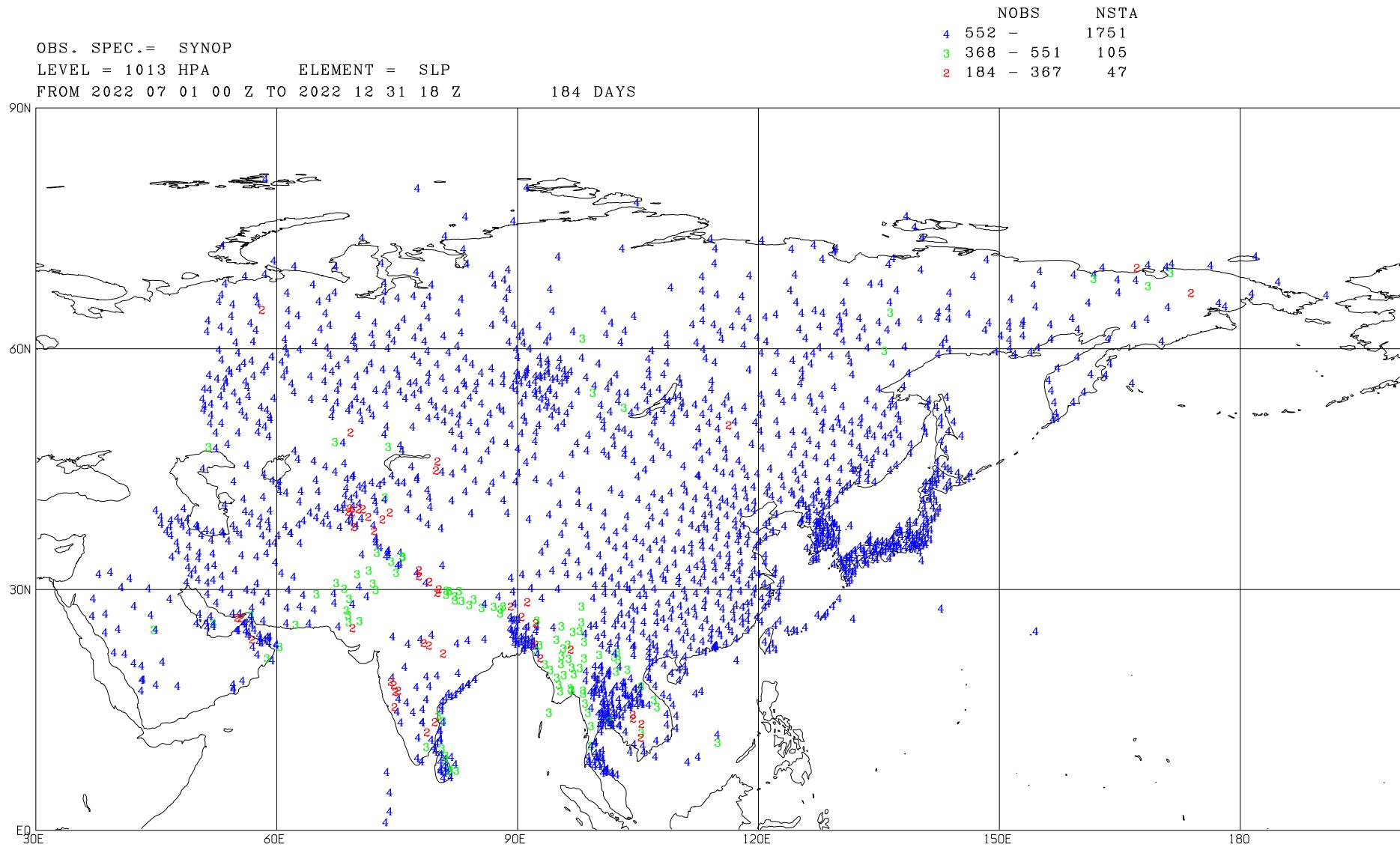


Figure 1(a) Location of all land surface stations reporting station level pressure (SLP) observations in Region II over the six-month period from July to December 2022. Numbers (2, 3, 4) show the total number of observations (NOBS) received at RSMC Tokyo. The total numbers of stations (NSTA) reporting SLP are shown at the top of the figure.

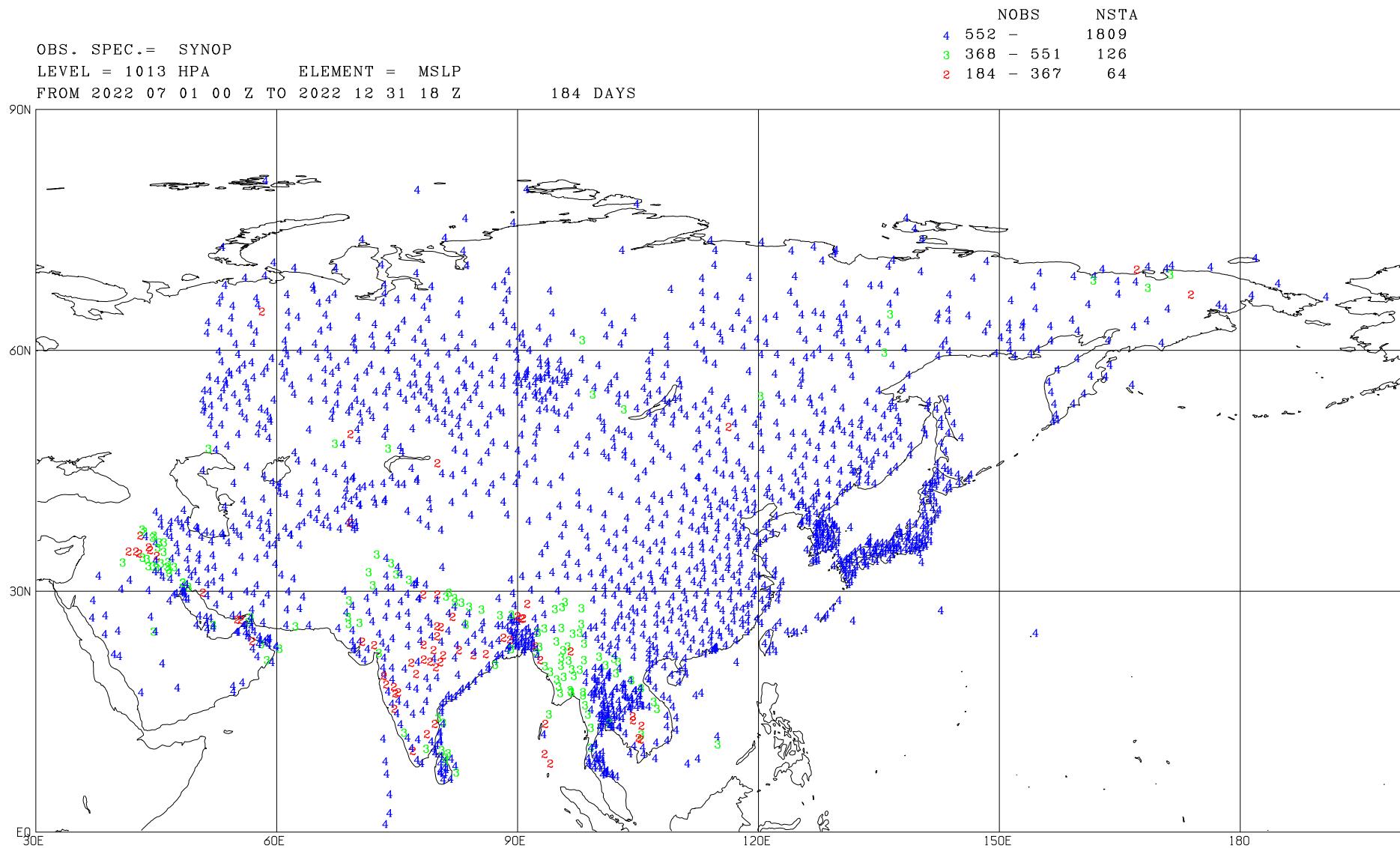


Figure 1(b) Location of all land surface stations reporting mean sea level pressure (MSLP) observations in Region II over the six-month period from July to December 2022. Numbers (2, 3, 4) show the total number of observations (NOBS) received at RSMC Tokyo. The total numbers of stations (NSTA) reporting MSLP are shown at the top of the figure.

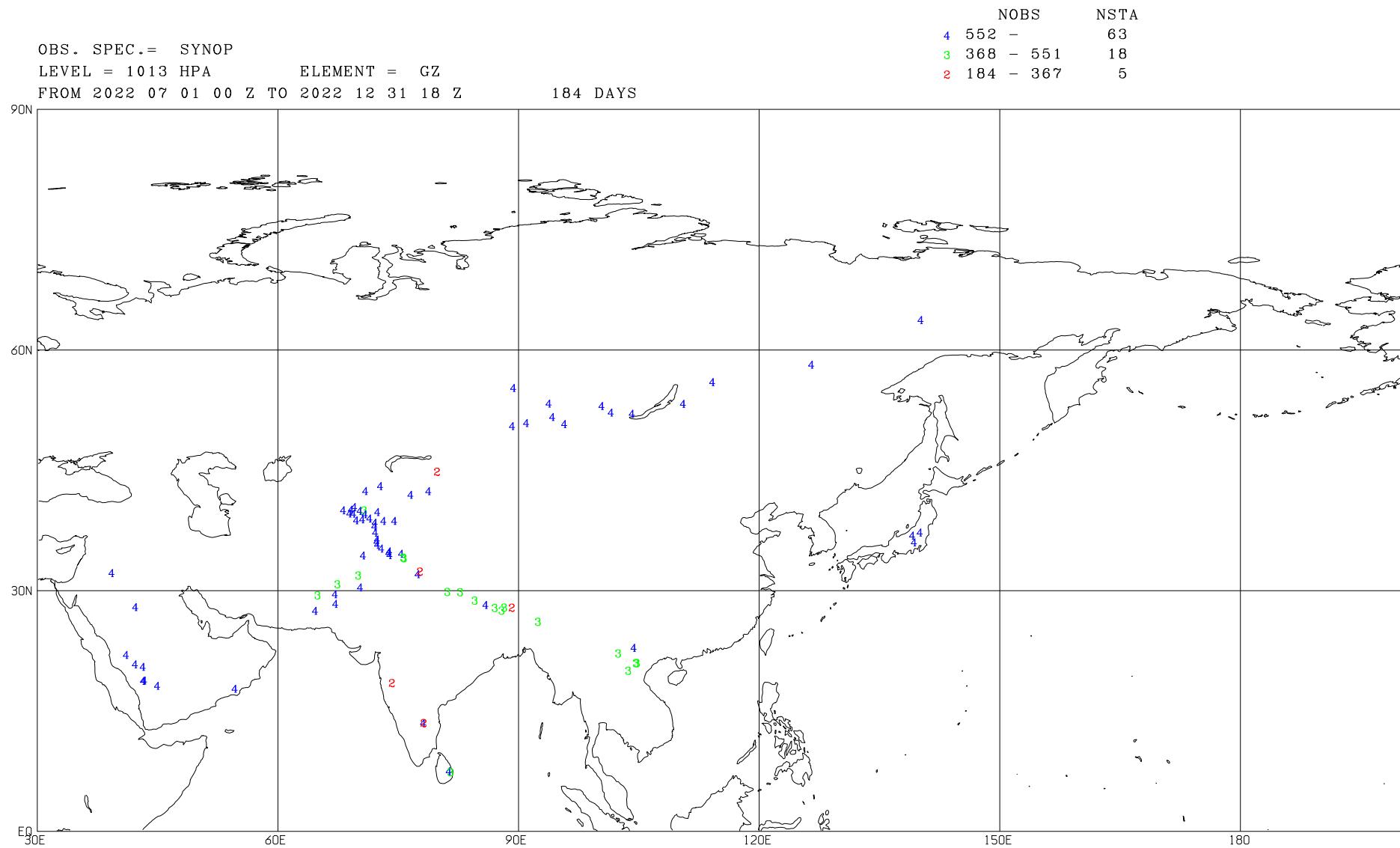
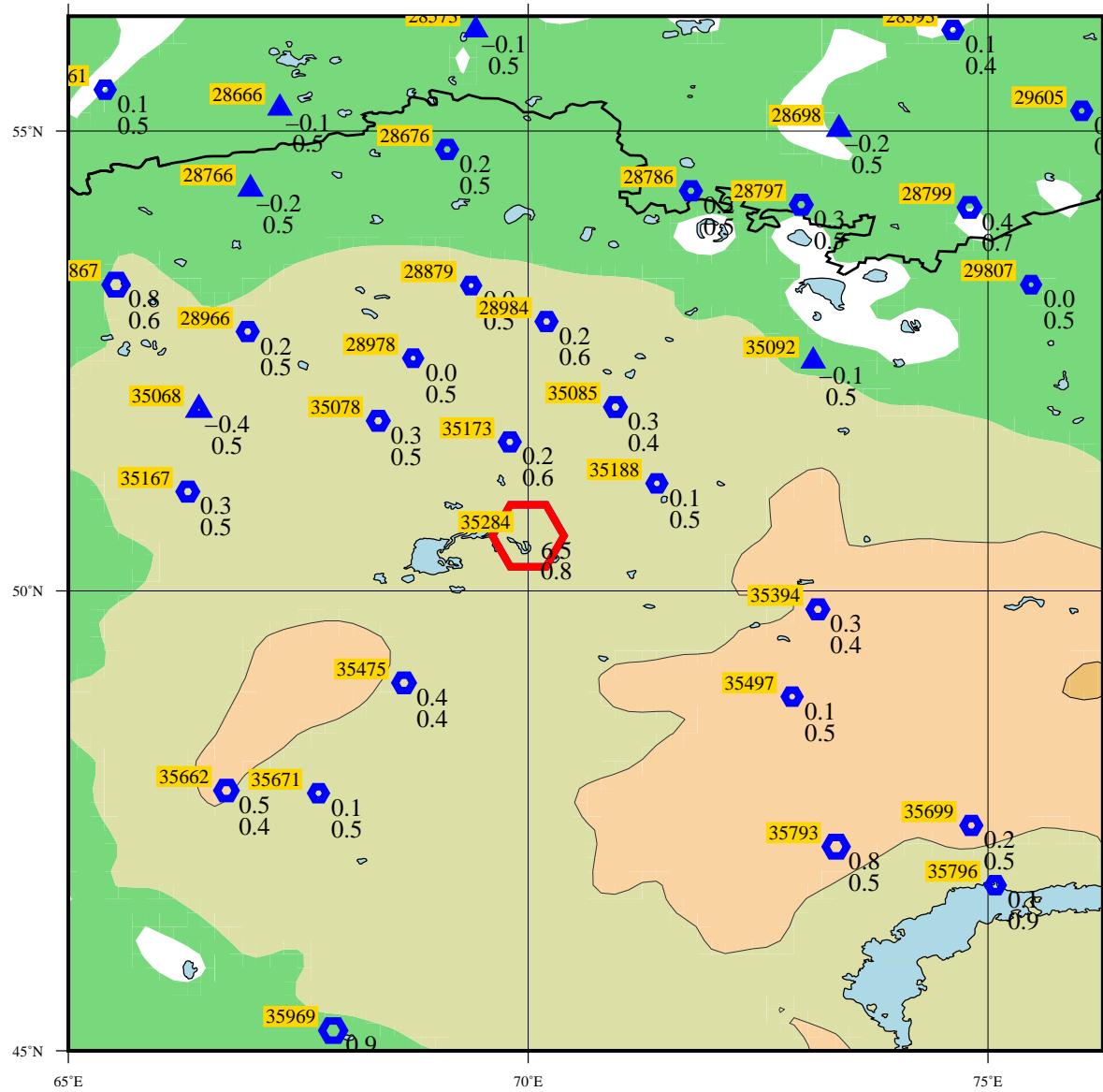


Figure 1(c) Location of all land surface stations reporting geopotential height (GZ) observations in Region II over the six-month period from July to December 2022. Numbers (2, 3, 4) show the total number of observations (NOBS) received at RSMC Tokyo. The total numbers of stations (NSTA) reporting GZ are shown at the top of the figure.

LEVEL = SUR            ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

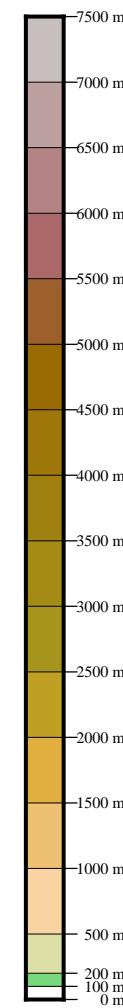


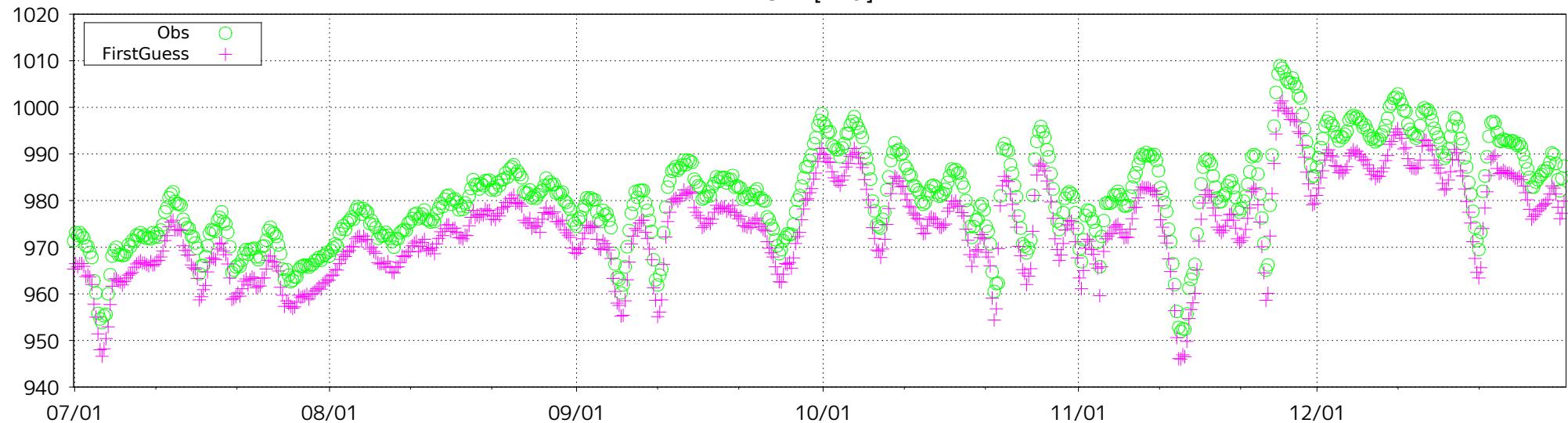
Figure 2 BIAS and SD of SLP for station 35284 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 35284 (lat: 50.6N, lon: 70.0E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

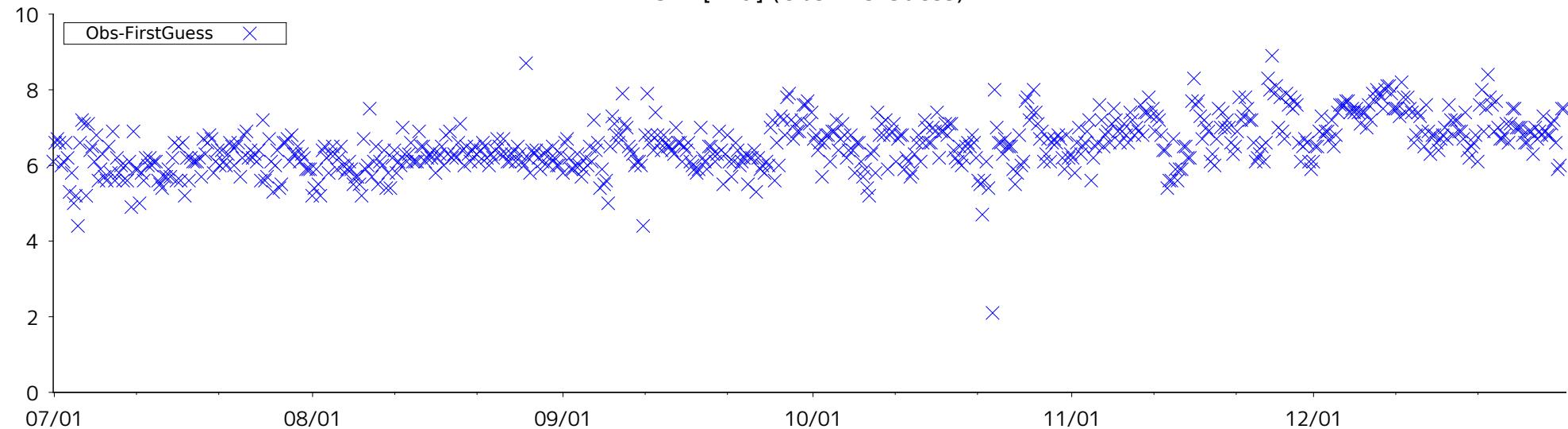


Figure 3 Time-series representation of SLP Obs minus FirstGuess for station 35284

LEVEL = SUR      ELEMENT = MSLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)

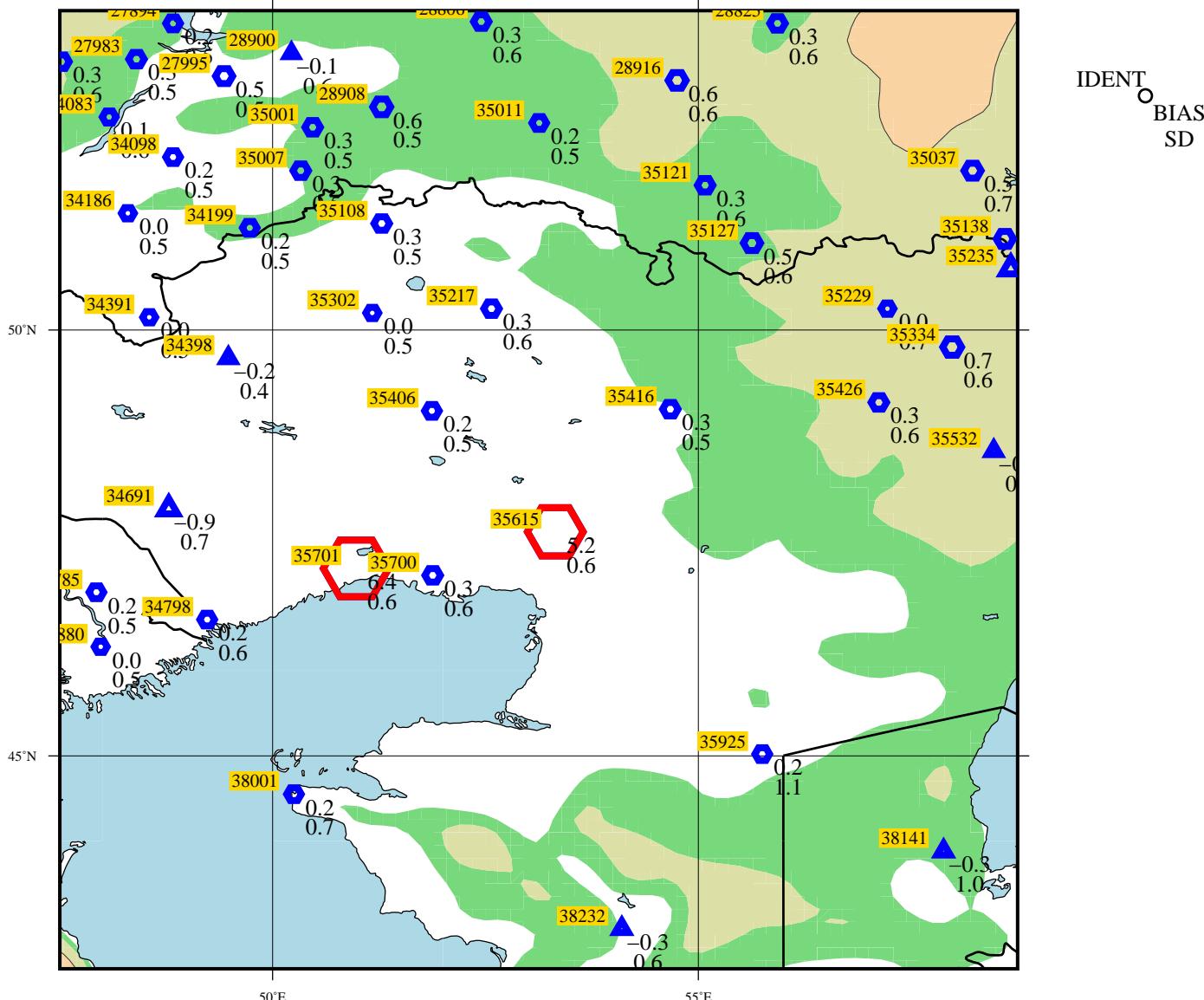
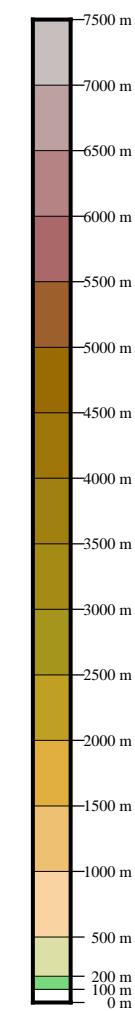


Figure 4 BIAS and SD of MSLP for station 35615, 35701 (red) and surrounding stations (blue).

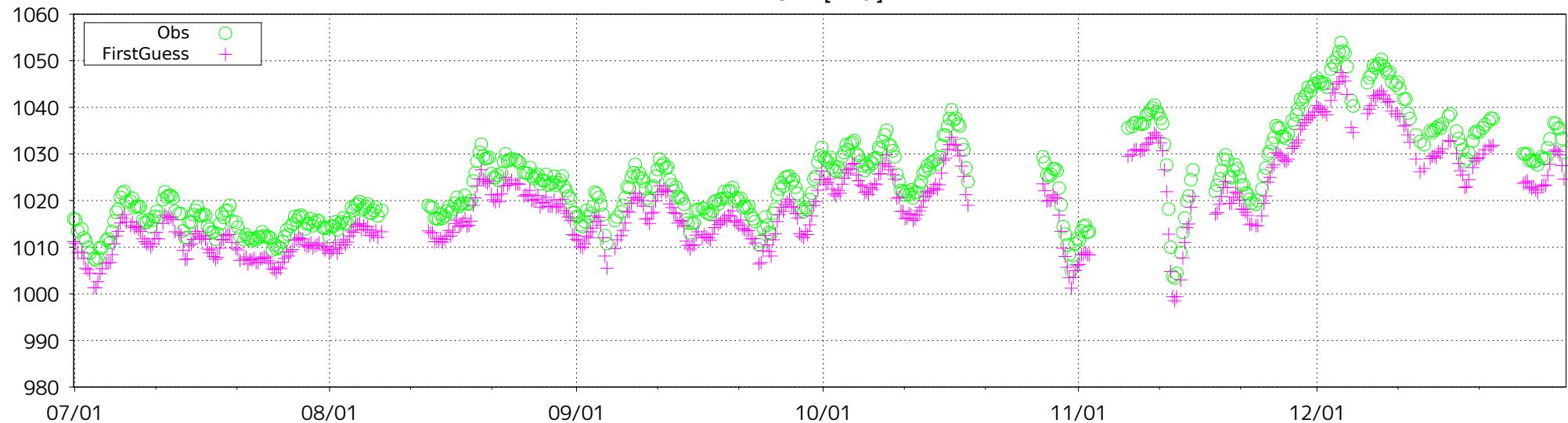
The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.



ID: 35615 (lat: 47.6N, lon: 53.3E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

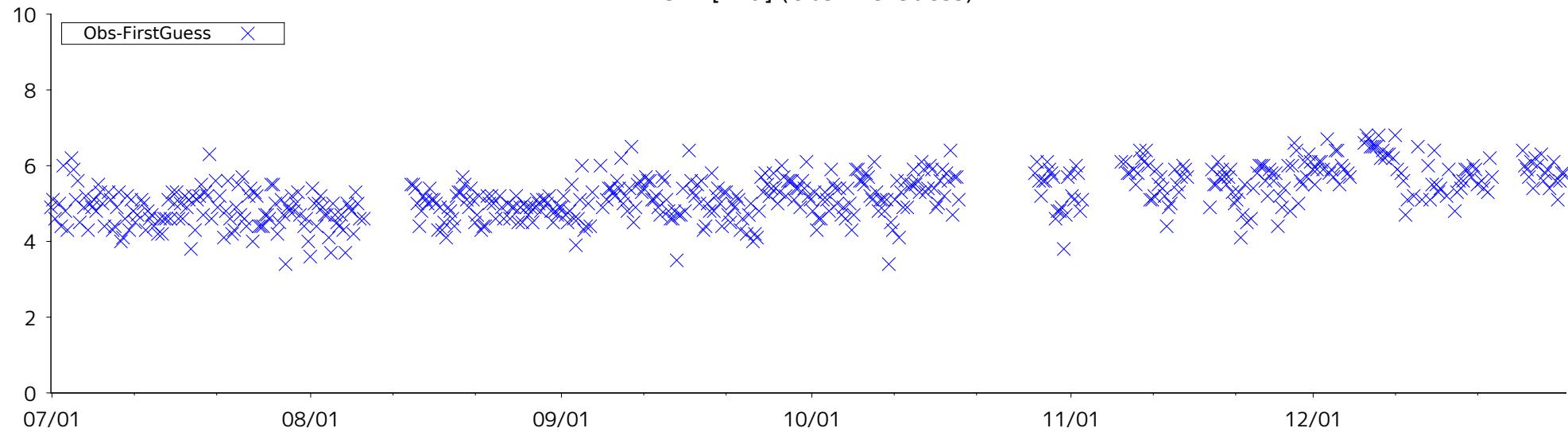
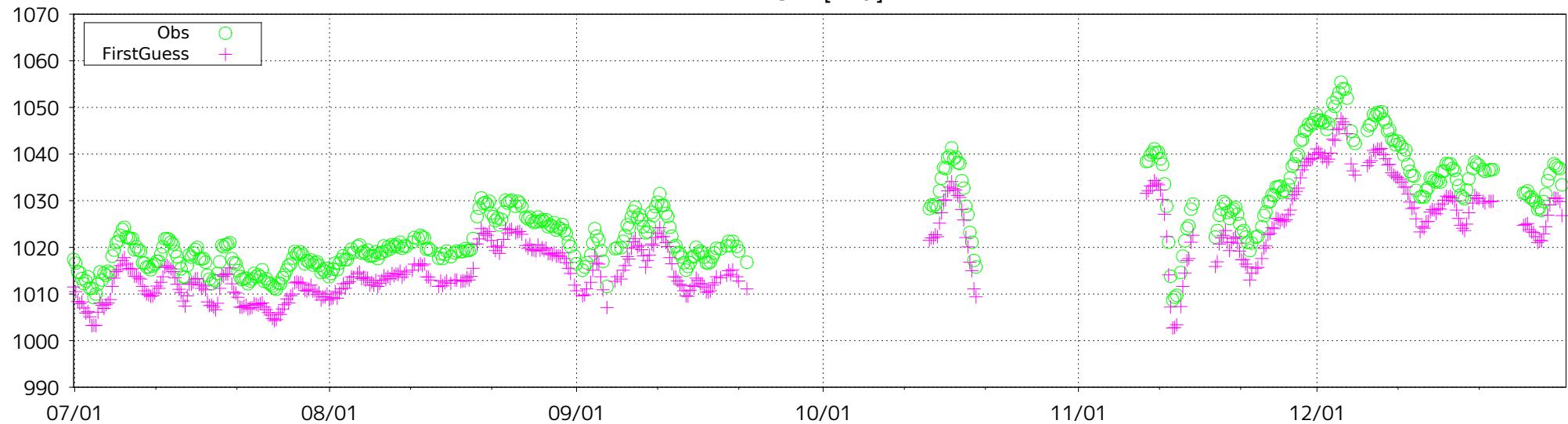


Figure 5 Time-series representation of MSLP Obs minus FirstGuess for station 35615

ID: 35701 (lat: 47.2N, lon: 51.0E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

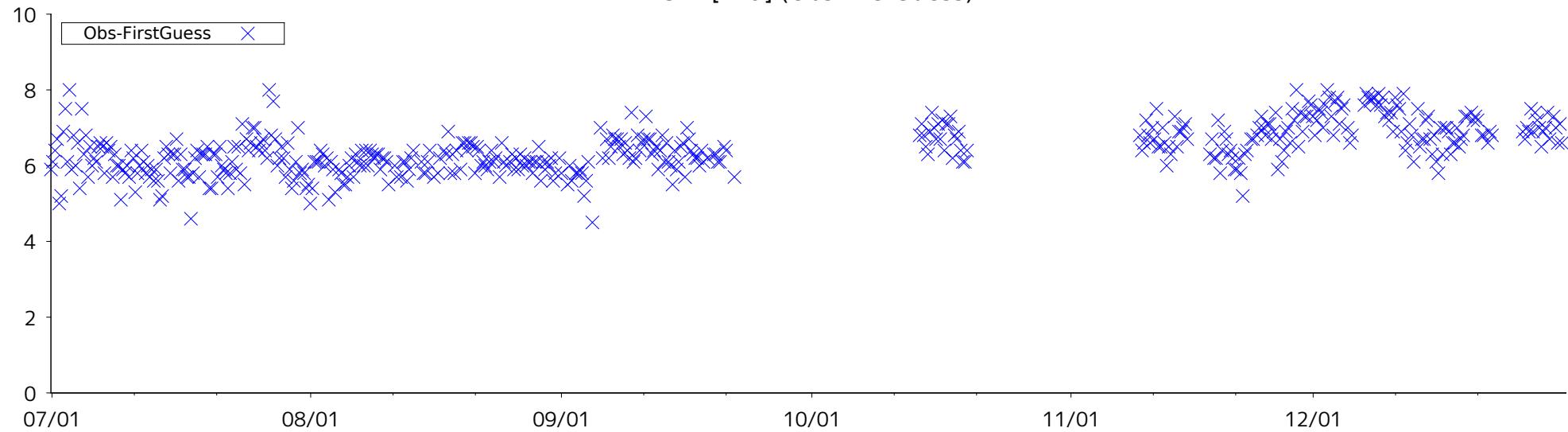
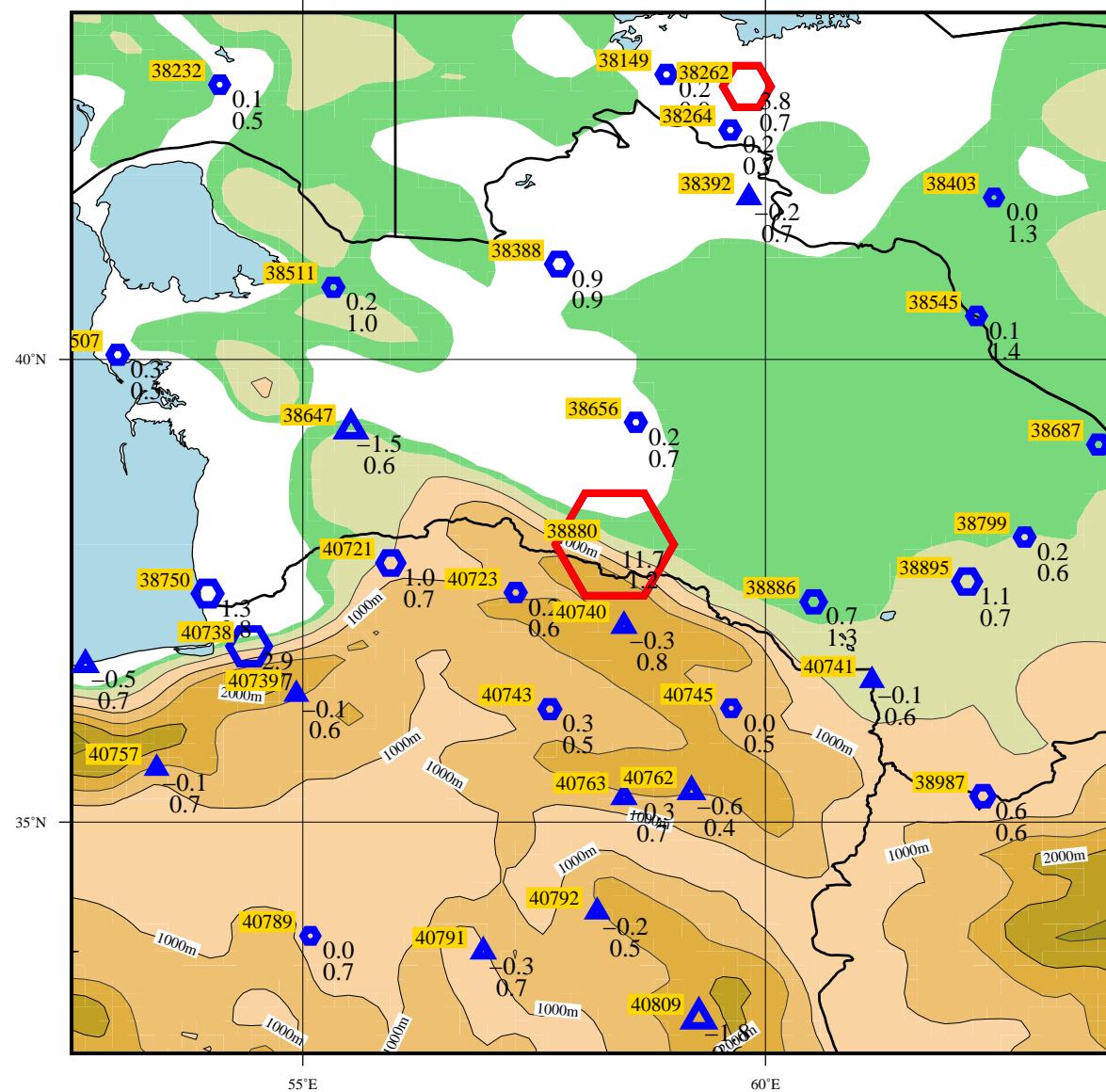


Figure 6 Time-series representation of MSLP Obs minus FirstGuess for station 35701

LEVEL = SUR

ELEMENT = SLP

2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

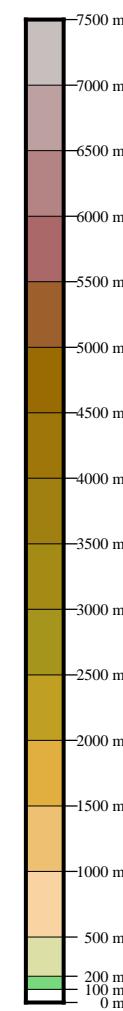


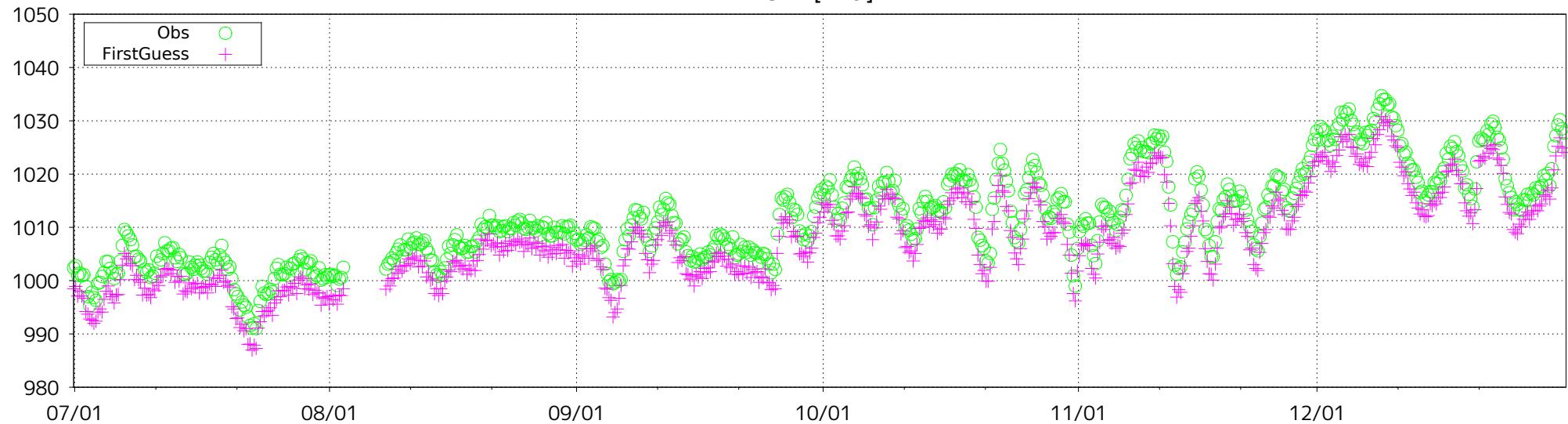
Figure 7 BIAS and SD of SLP for station 38262, 38880 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 38262 (lat: 43.0N, lon: 59.8E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

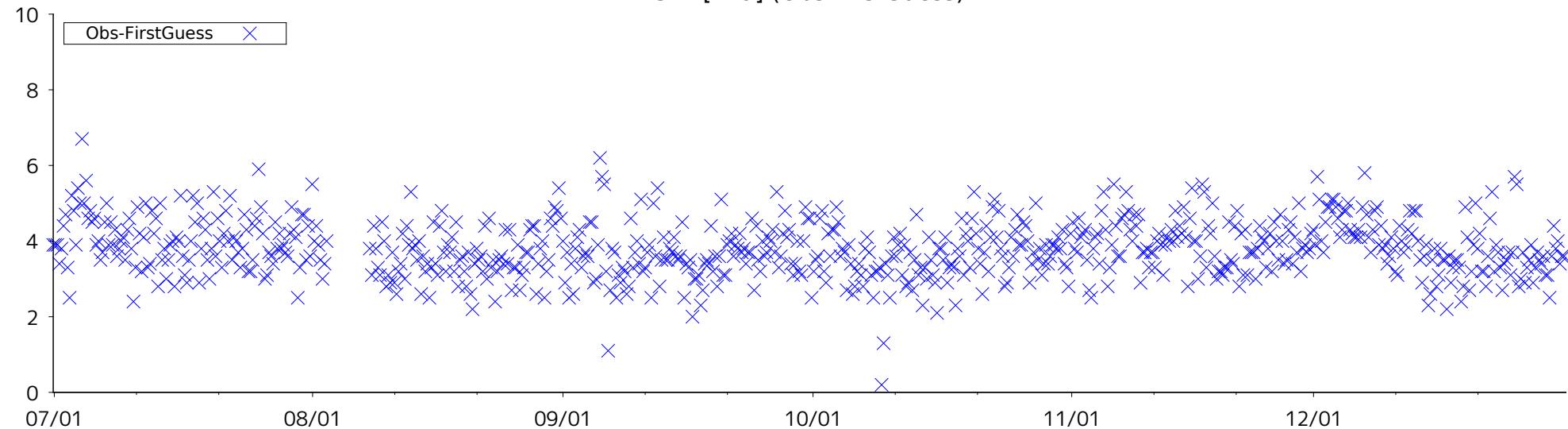
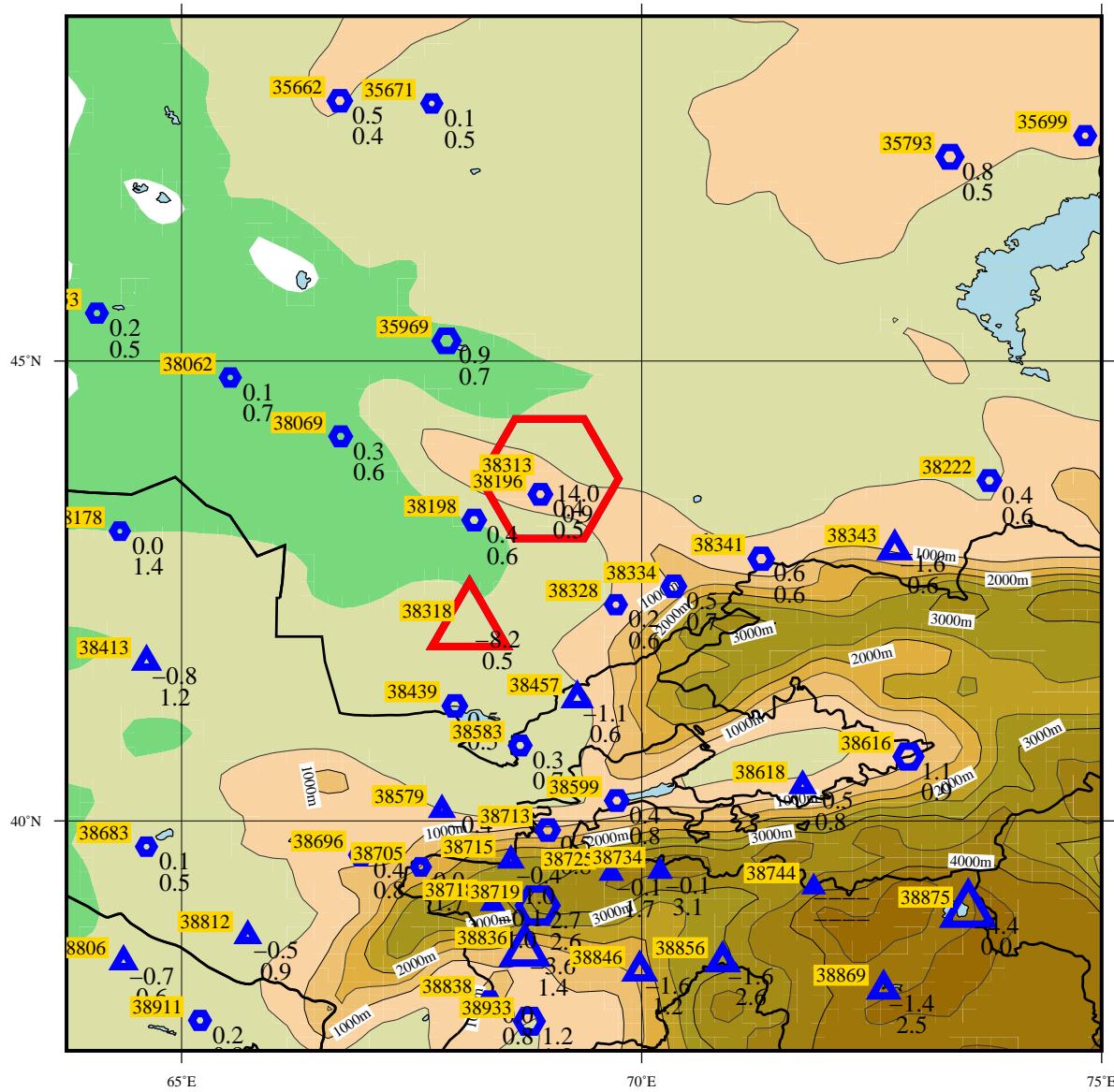


Figure 8 Time-series representation of SLP Obs minus FirstGuess for station 38262

LEVEL = SUR

ELEMENT = SLP

2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

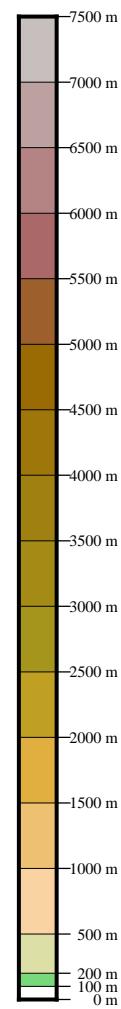


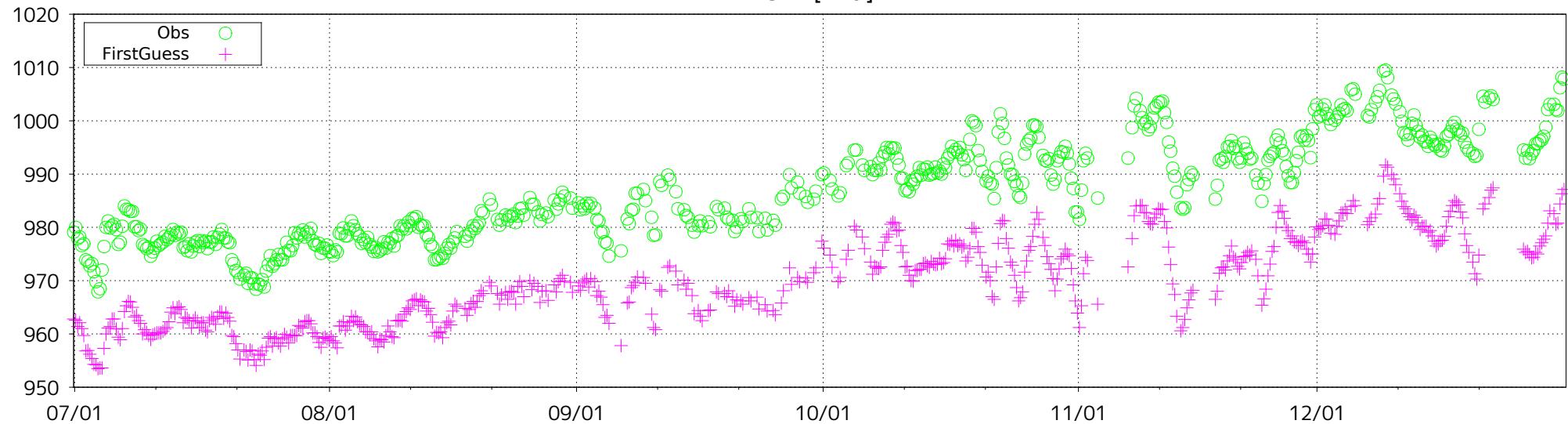
Figure 9 BIAS and SD of SLP for station 38313, 38318 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 38313 (lat: 43.7N, lon: 69.0E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

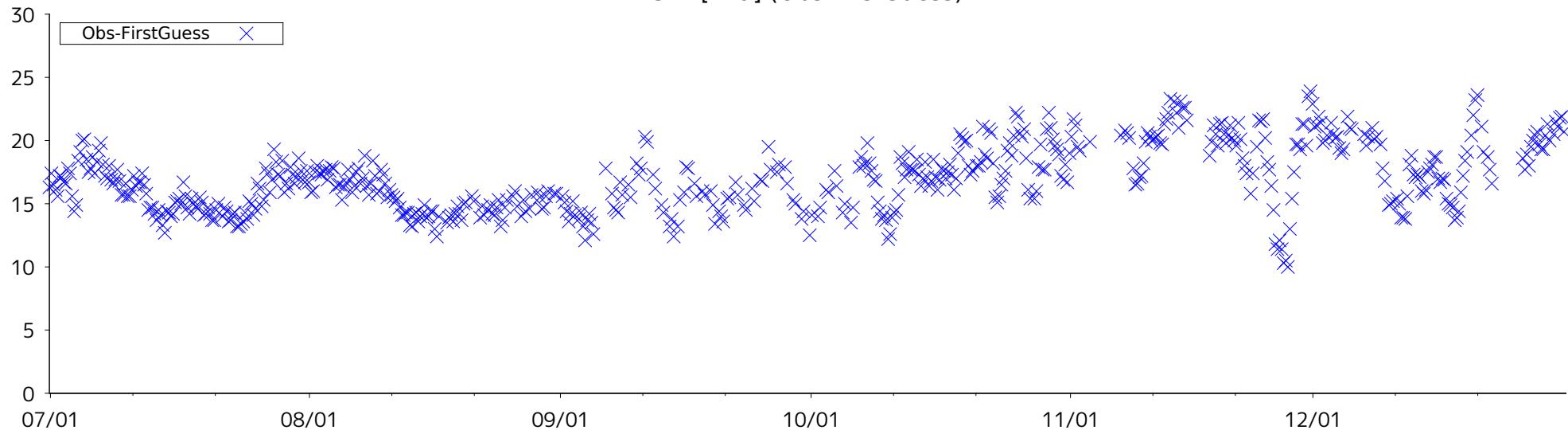
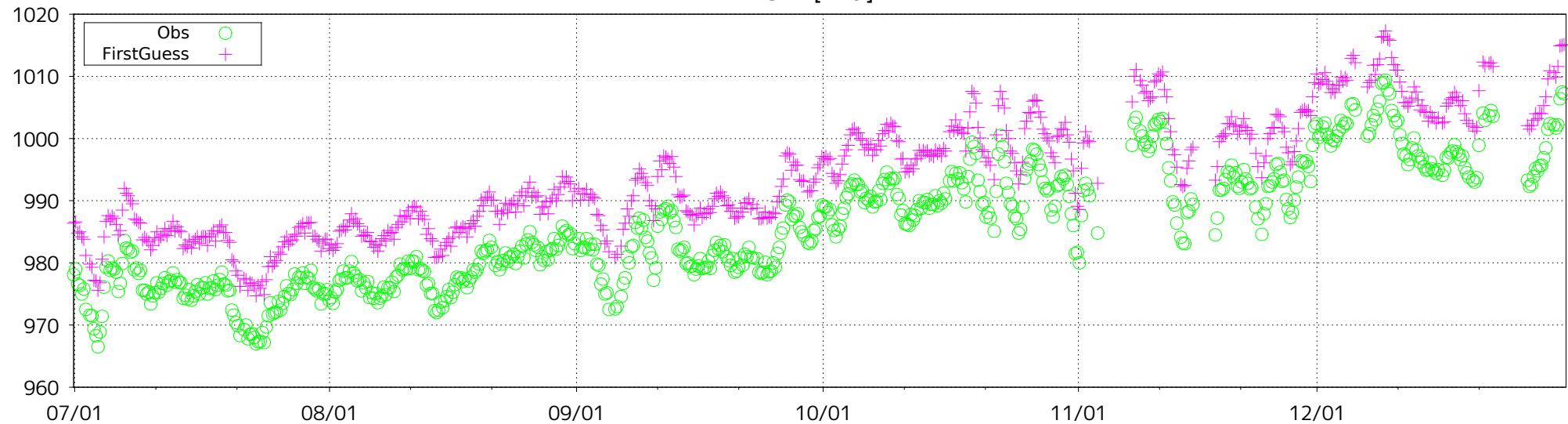


Figure 10 Time-series representation of SLP Obs minus FirstGuess for station 38313

ID: 38318 (lat: 42.1N, lon: 68.1E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

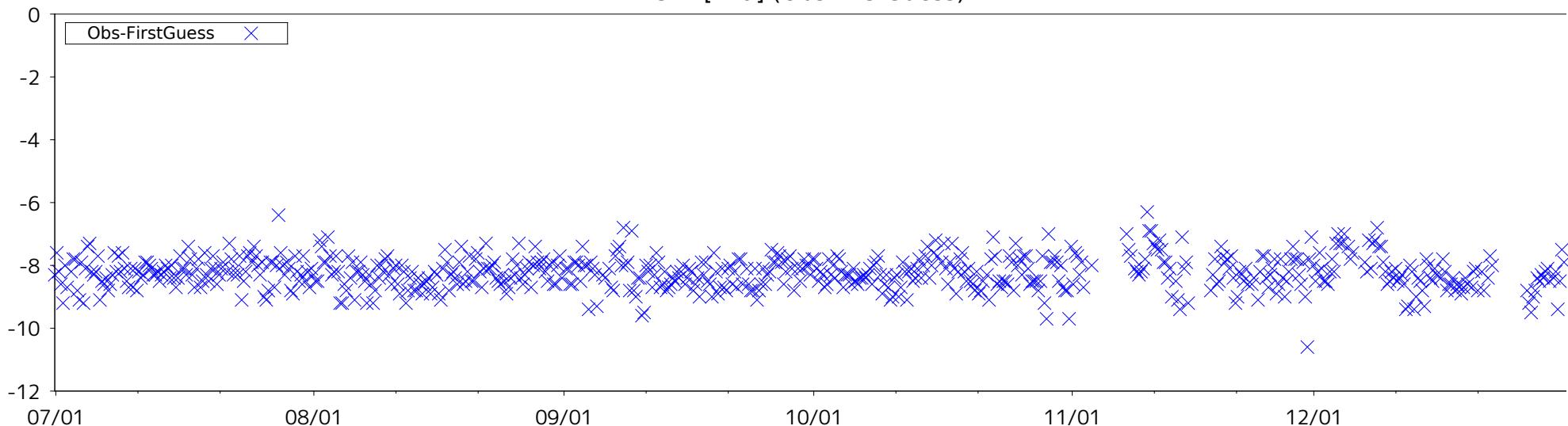
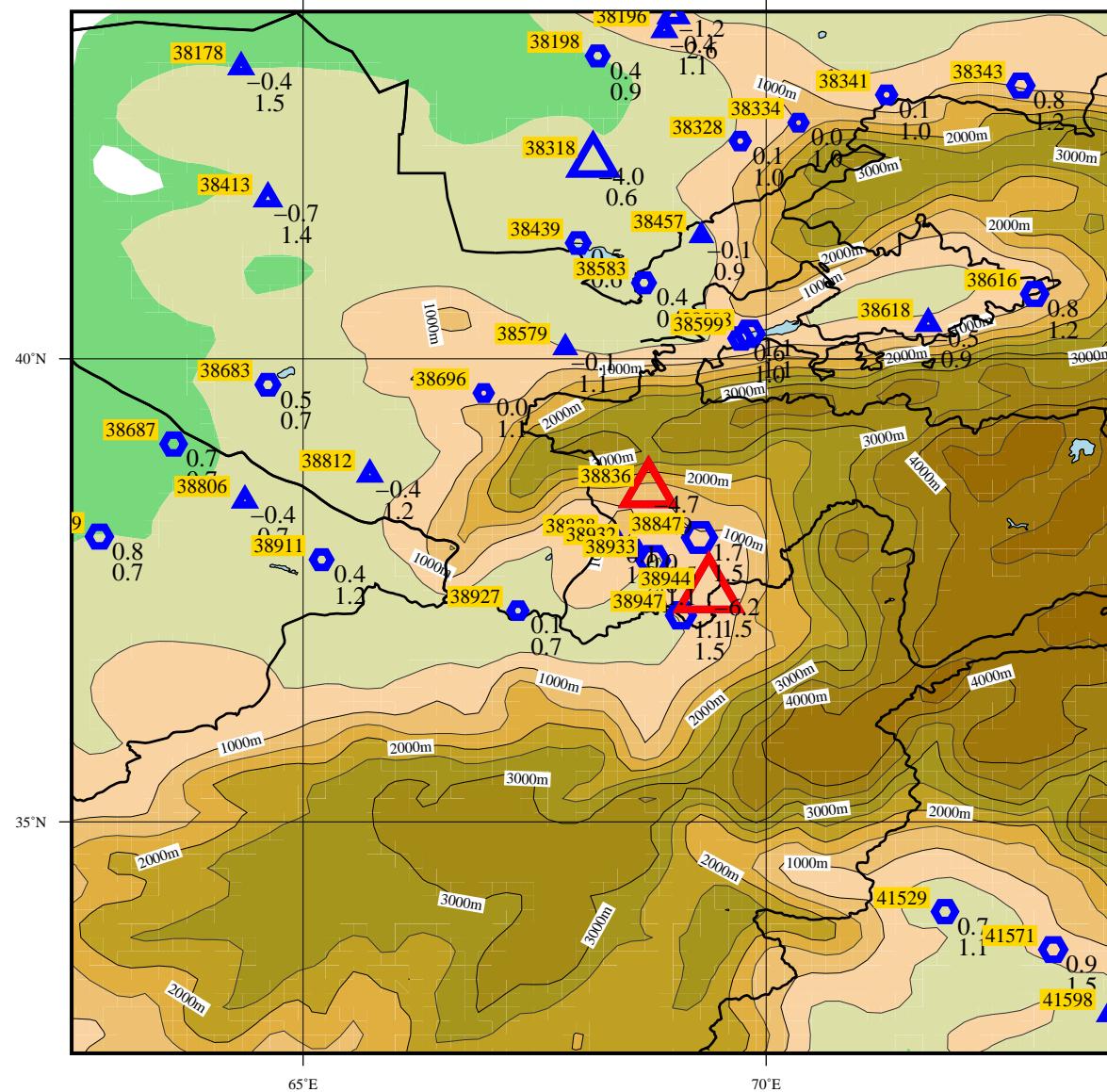


Figure 11 Time-series representation of SLP Obs minus FirstGuess for station 38318

LEVEL = SUR

ELEMENT = MSLP

2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

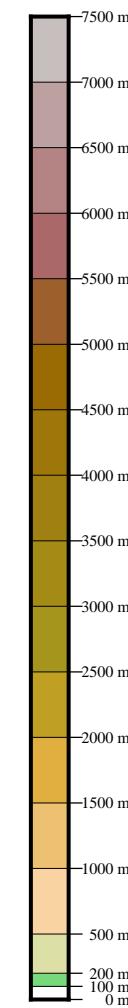


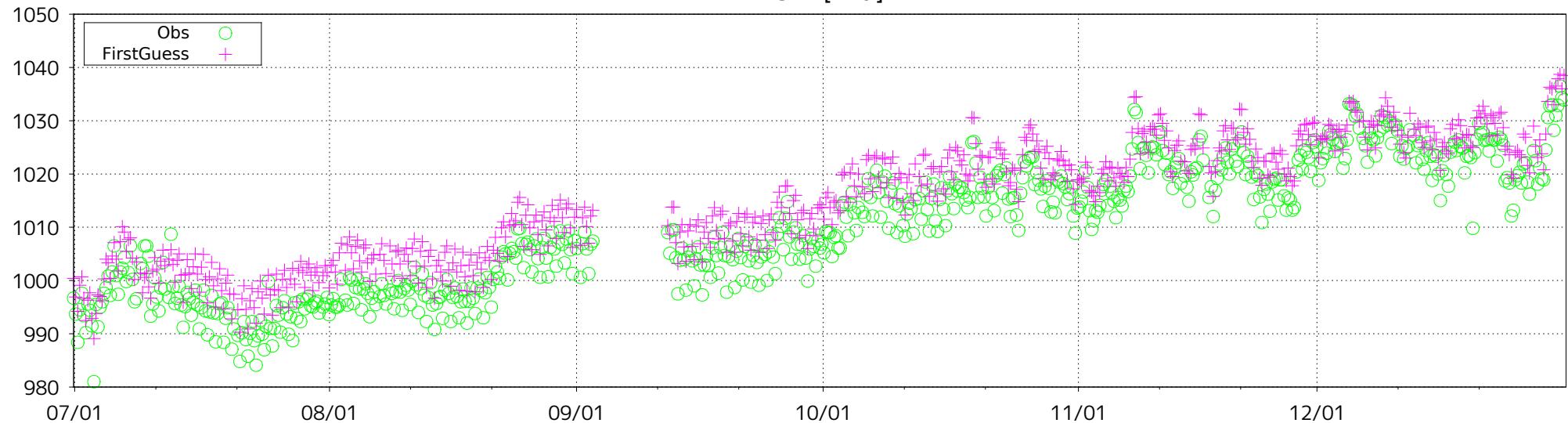
Figure 12 BIAS and SD of MSLP for station 38836, 38944 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 38836 (lat: 38.6N, lon: 68.7E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

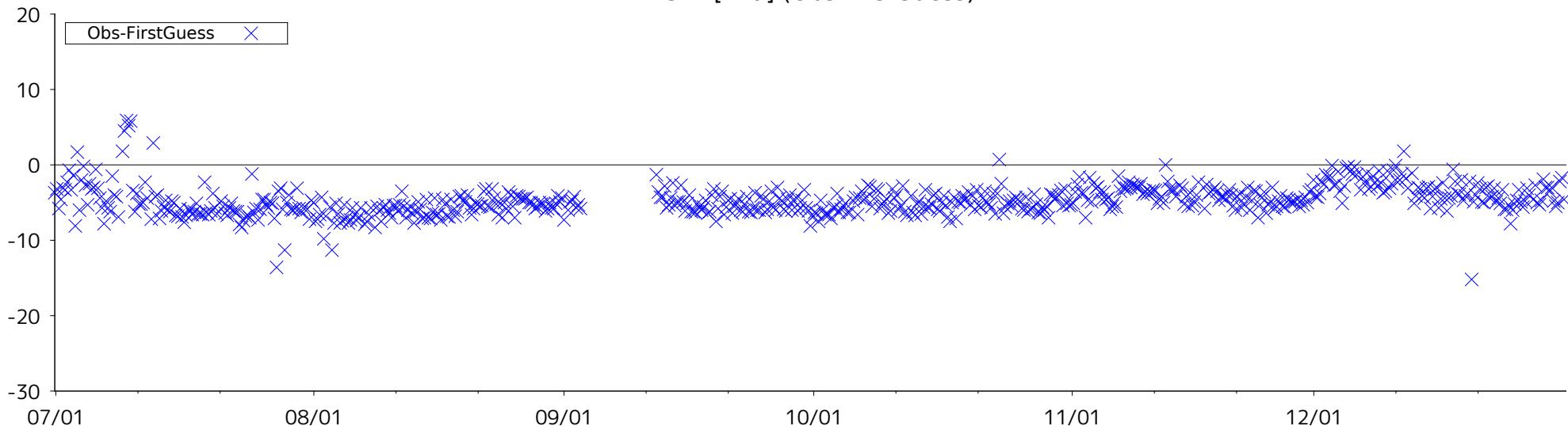


Figure 13 Time-series representation of MSLP Obs minus FirstGuess for station 38836

LEVEL = SUR ELEMENT = S

LEVEL = SUR ELEMENT = SLP  
2022 07 01 00 UTC -> 2022 12 31 18 UTC ( 184 DAYS)

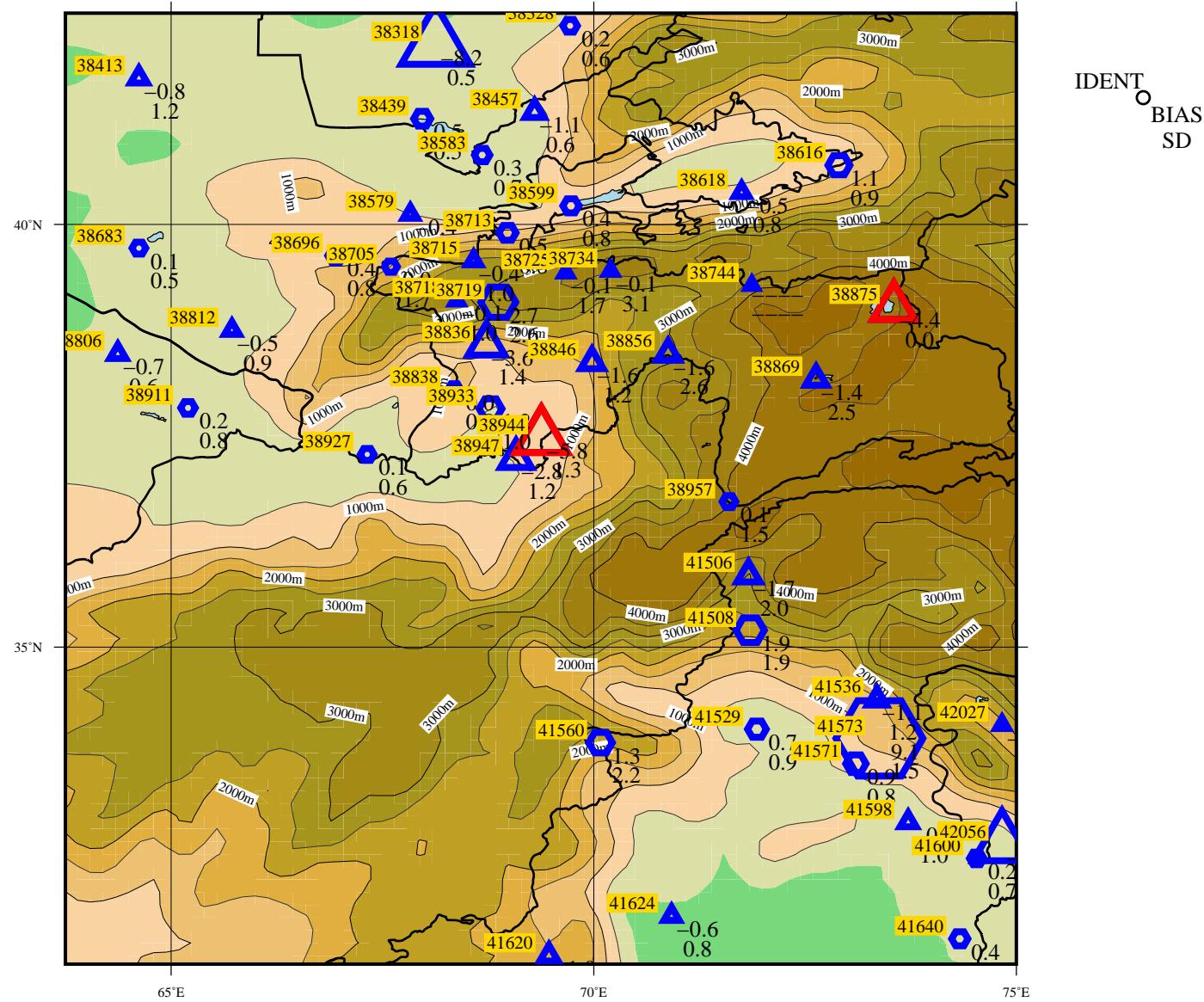


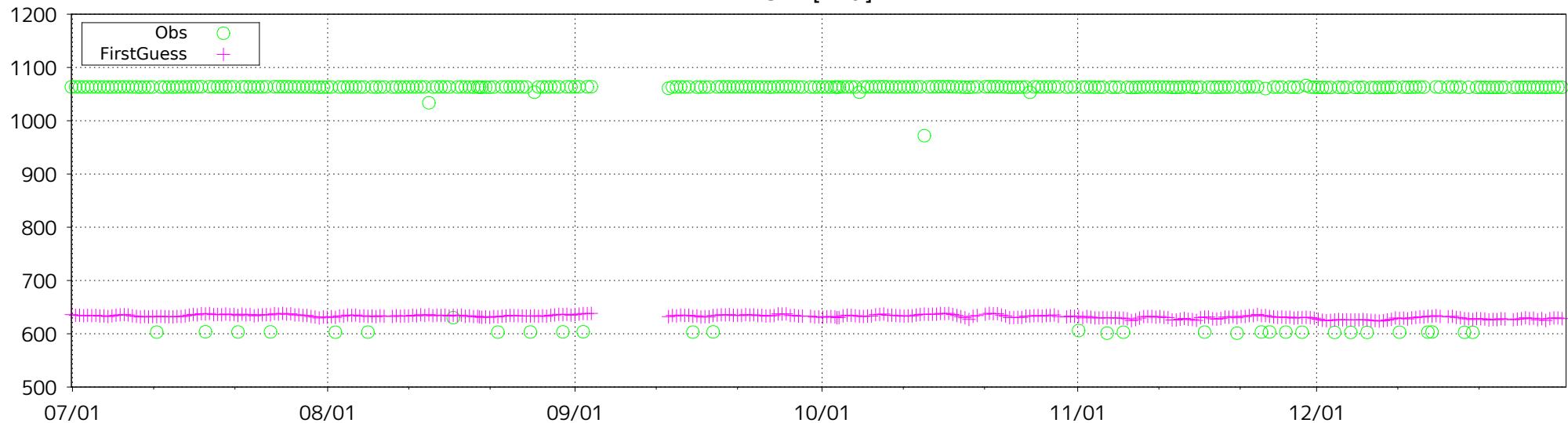
Figure 14 BIAS and SD of SLP for station 38875, 38944 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The distance to the upper-left of each symbol is the **WATSON**, and those to the lower-right are the values of **BIAS** and **SD**. The size of each symbol is proportional to the value of **BIAS**, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 38875 (lat: 39.0N, lon: 73.6E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

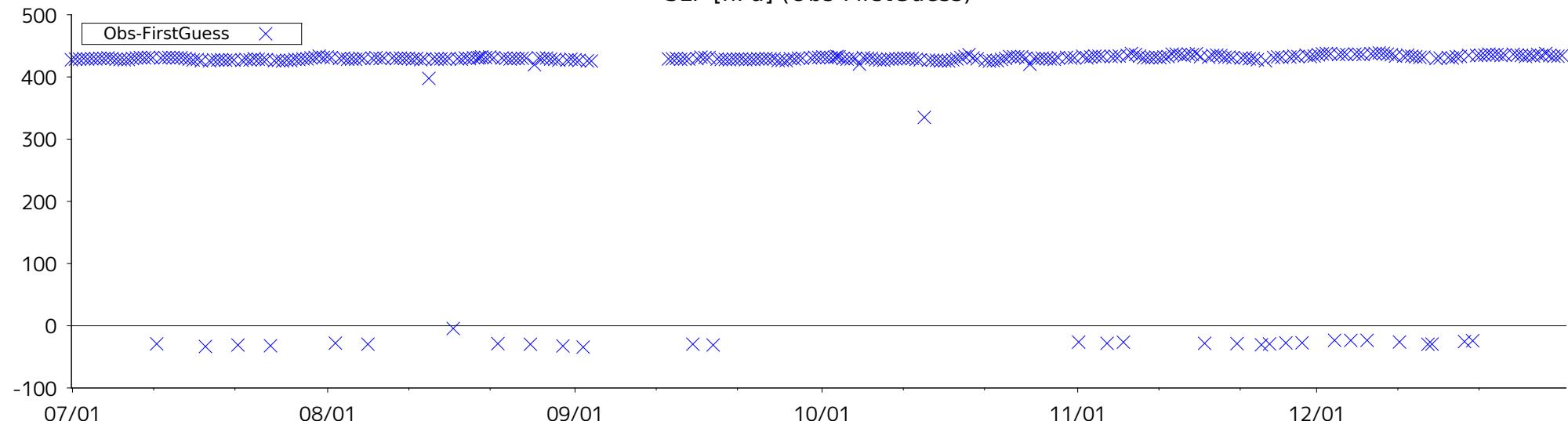
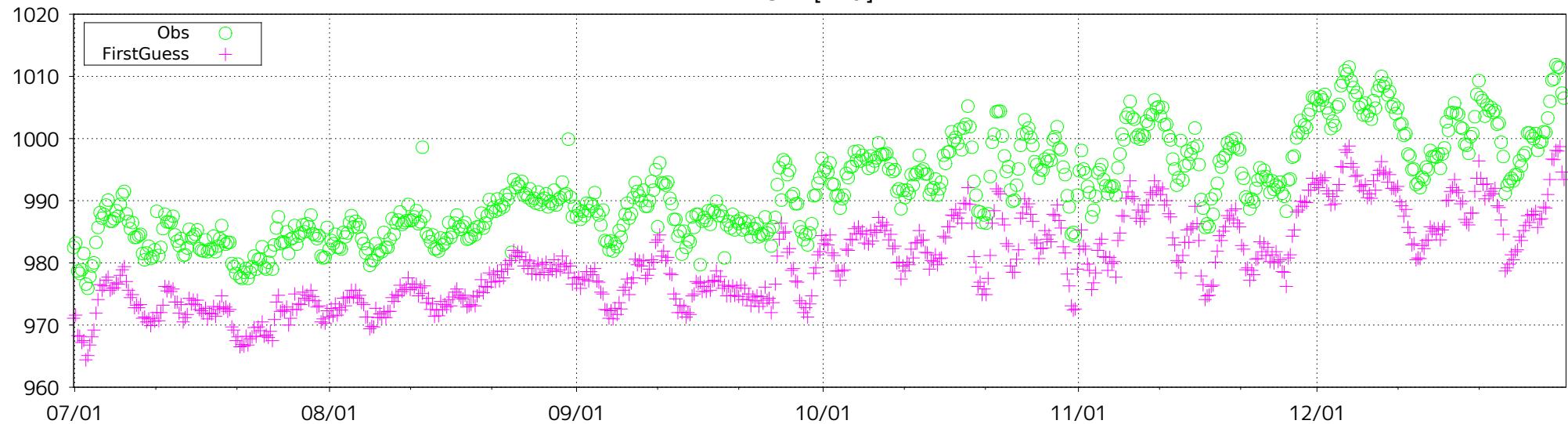


Figure 15 Time-series representation of SLP Obs minus FirstGuess for station 38875

ID: 38880 (lat: 38.0N, lon: 58.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

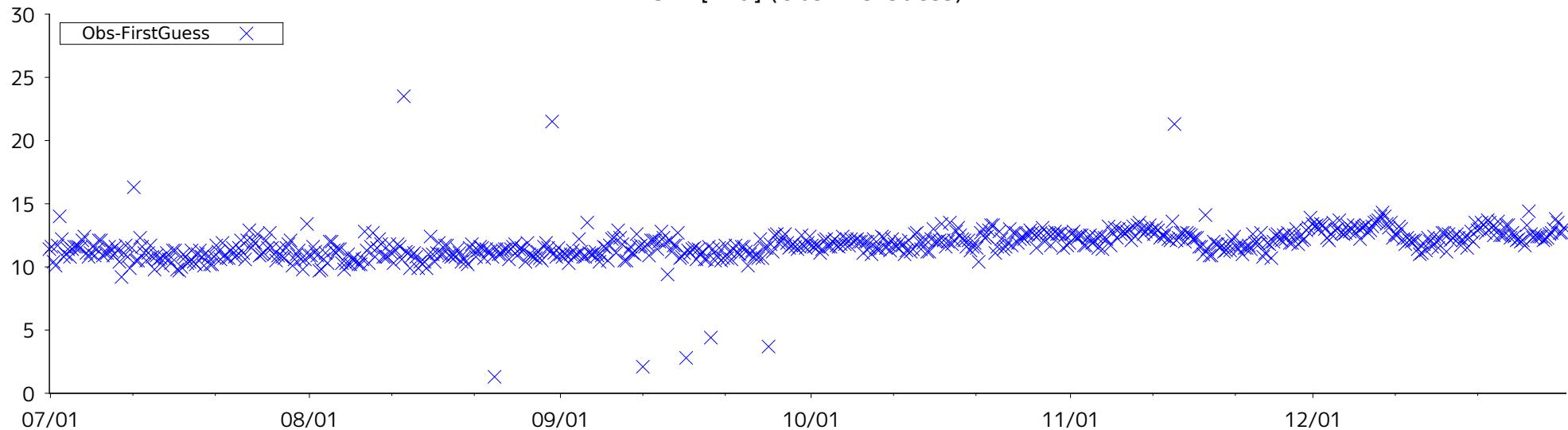
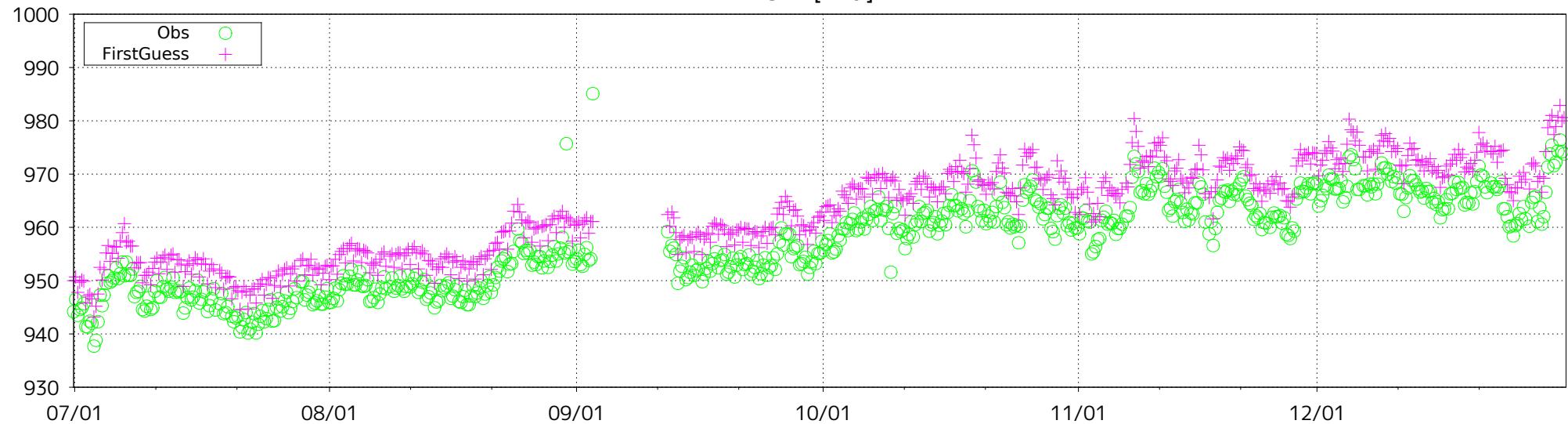


Figure 16 Time-series representation of SLP Obs minus FirstGuess for station 38880

ID: 38944 (lat: 37.5N, lon: 69.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

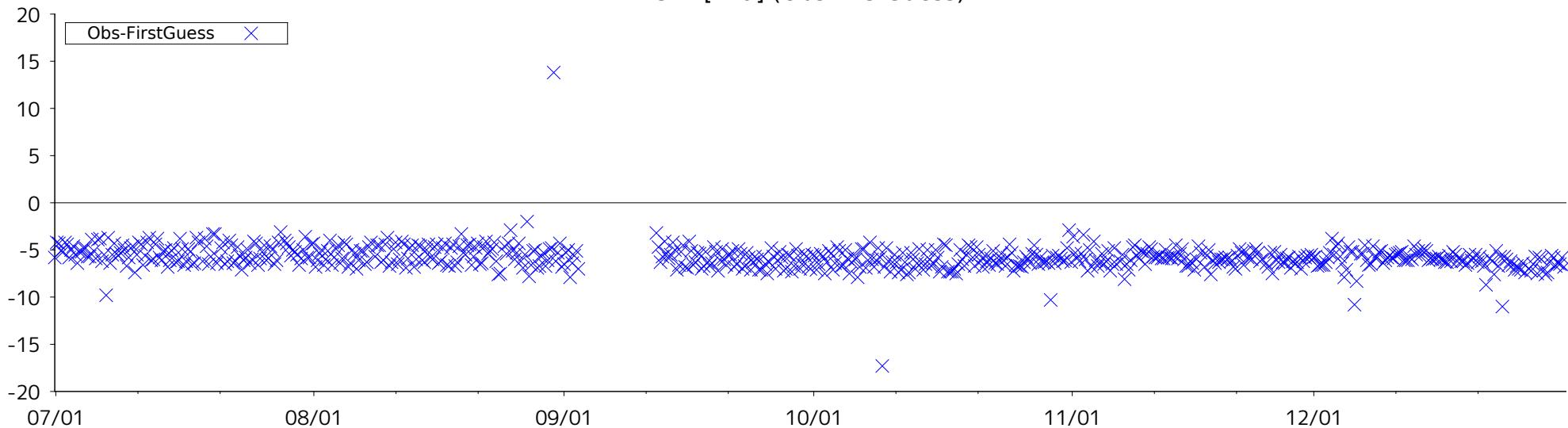
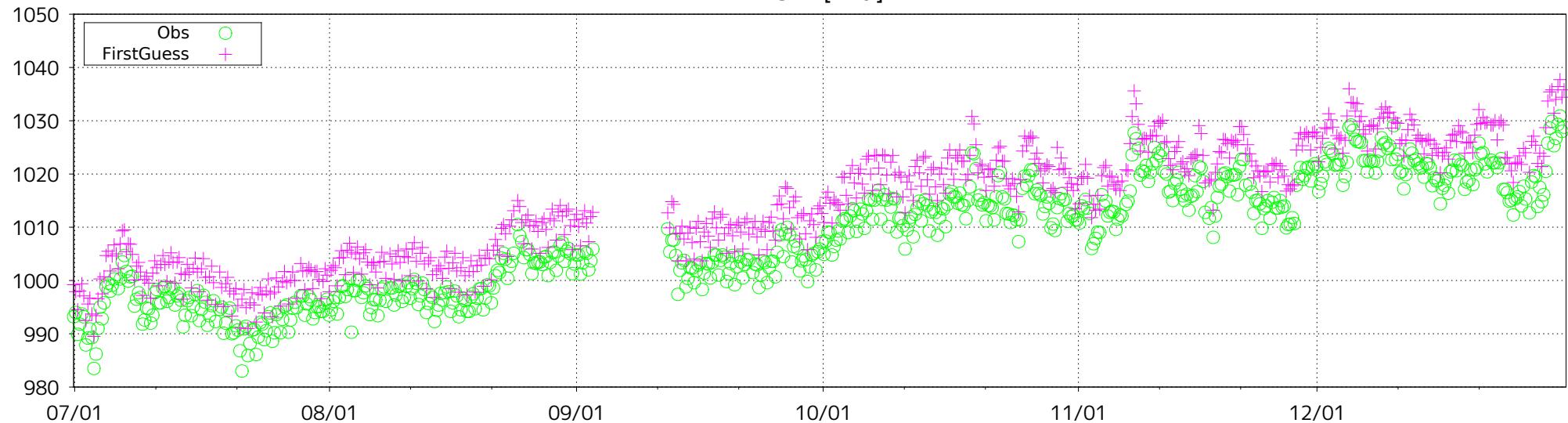


Figure 17(a) Time-series representation of SLP Obs minus FirstGuess for station 38944

ID: 38944 (lat: 37.5N, lon: 69.4E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

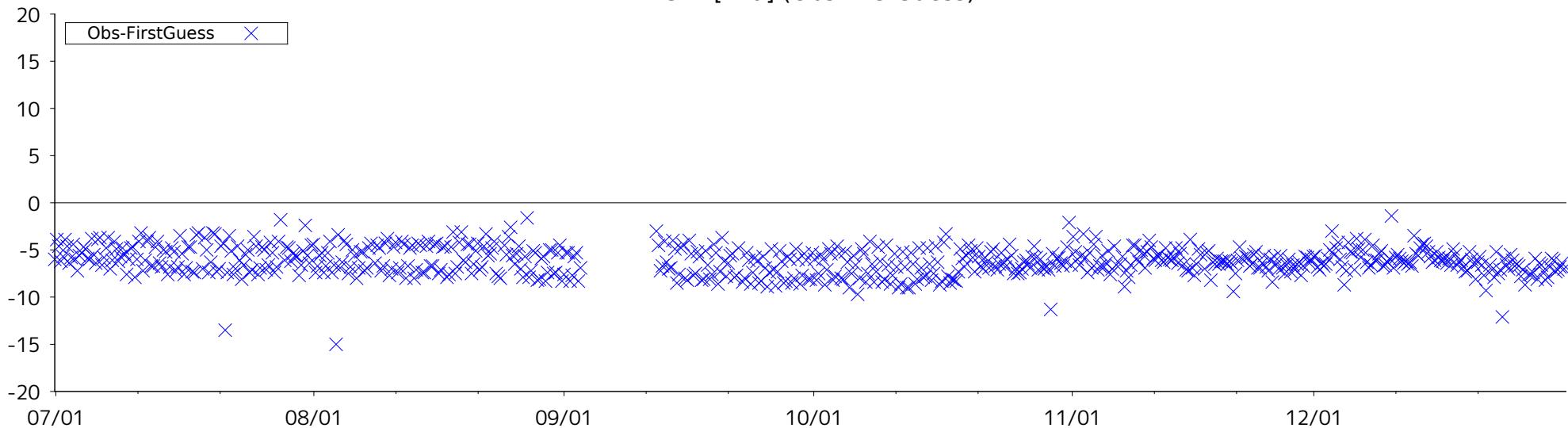
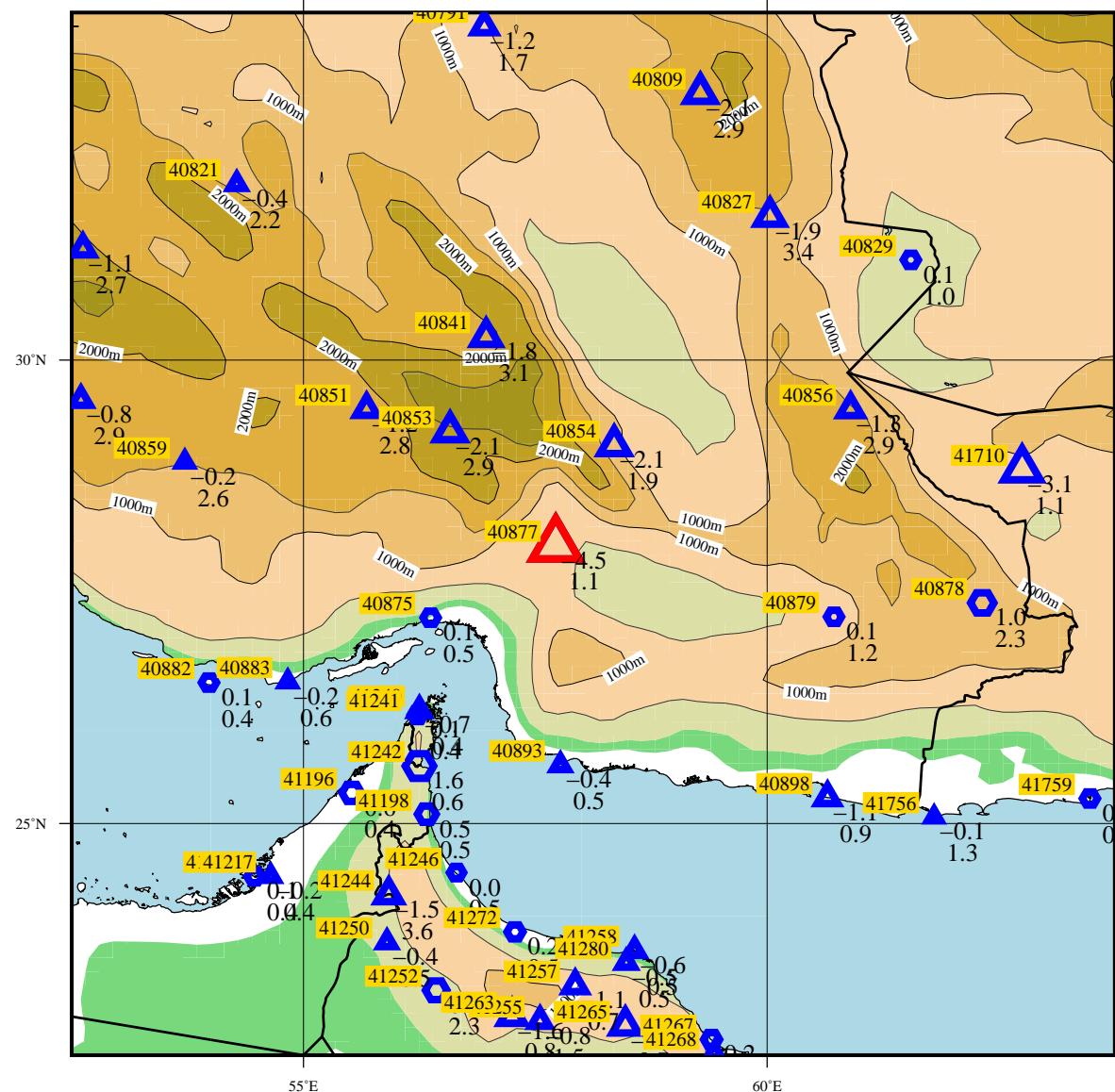


Figure 17(b) Time-series representation of MSLP Obs minus FirstGuess for station 38944

LEVEL = SUR

ELEMENT = MSLP

2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT O BIAS SD

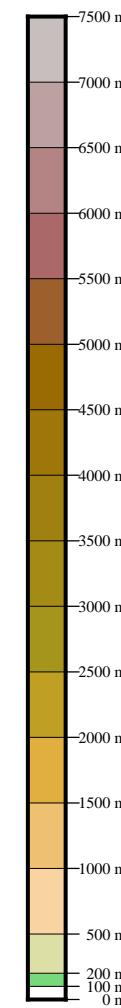


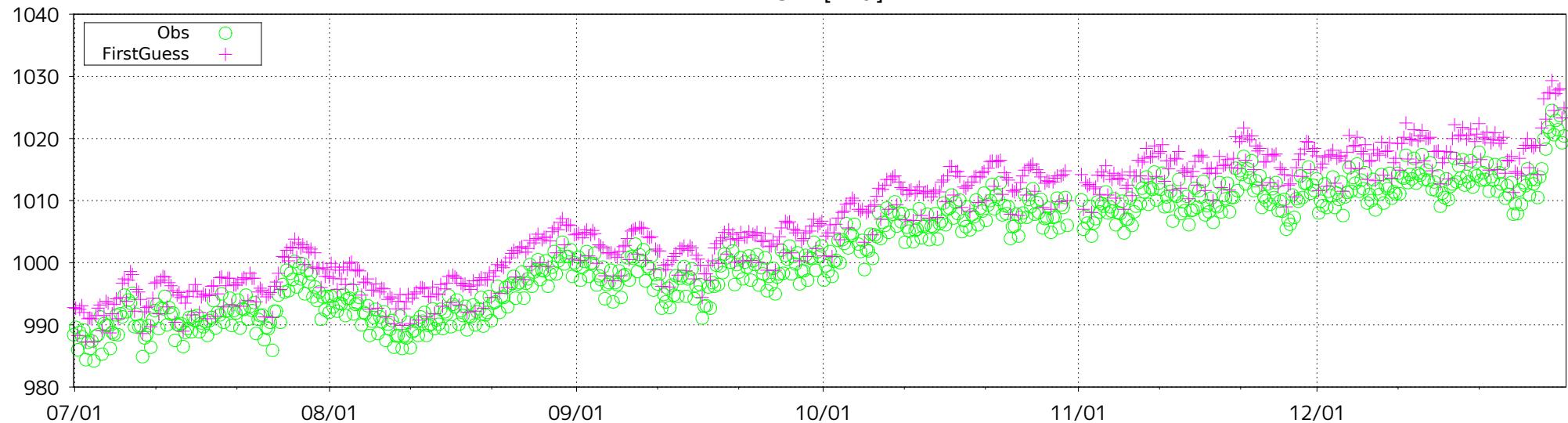
Figure 18 BIAS and SD of MSLP for station 40877 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of Bias, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 40877 (lat: 28.0N, lon: 57.7E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

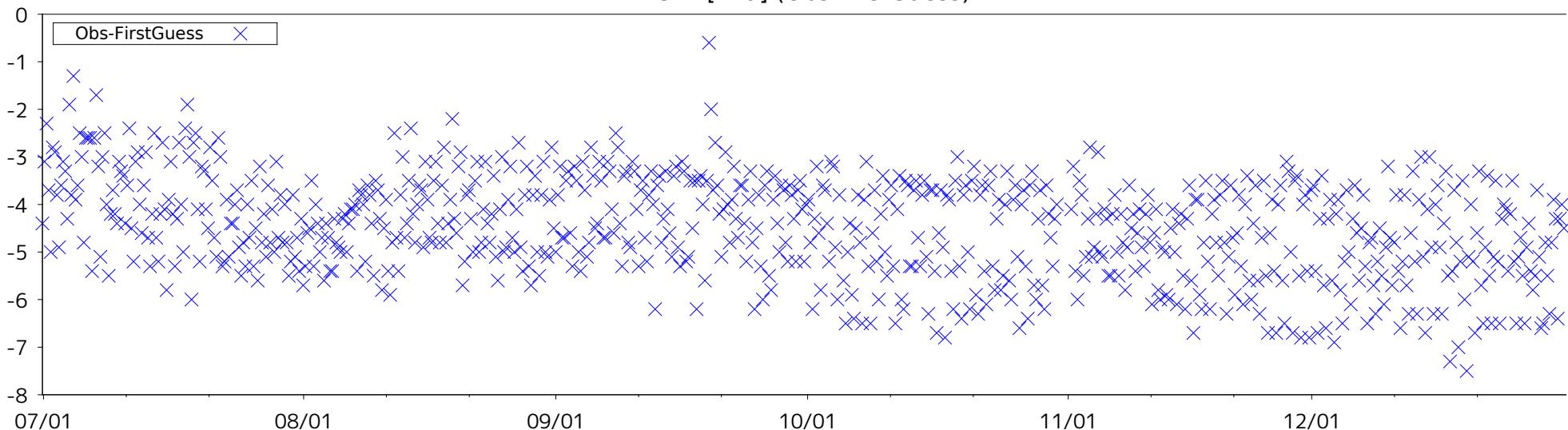
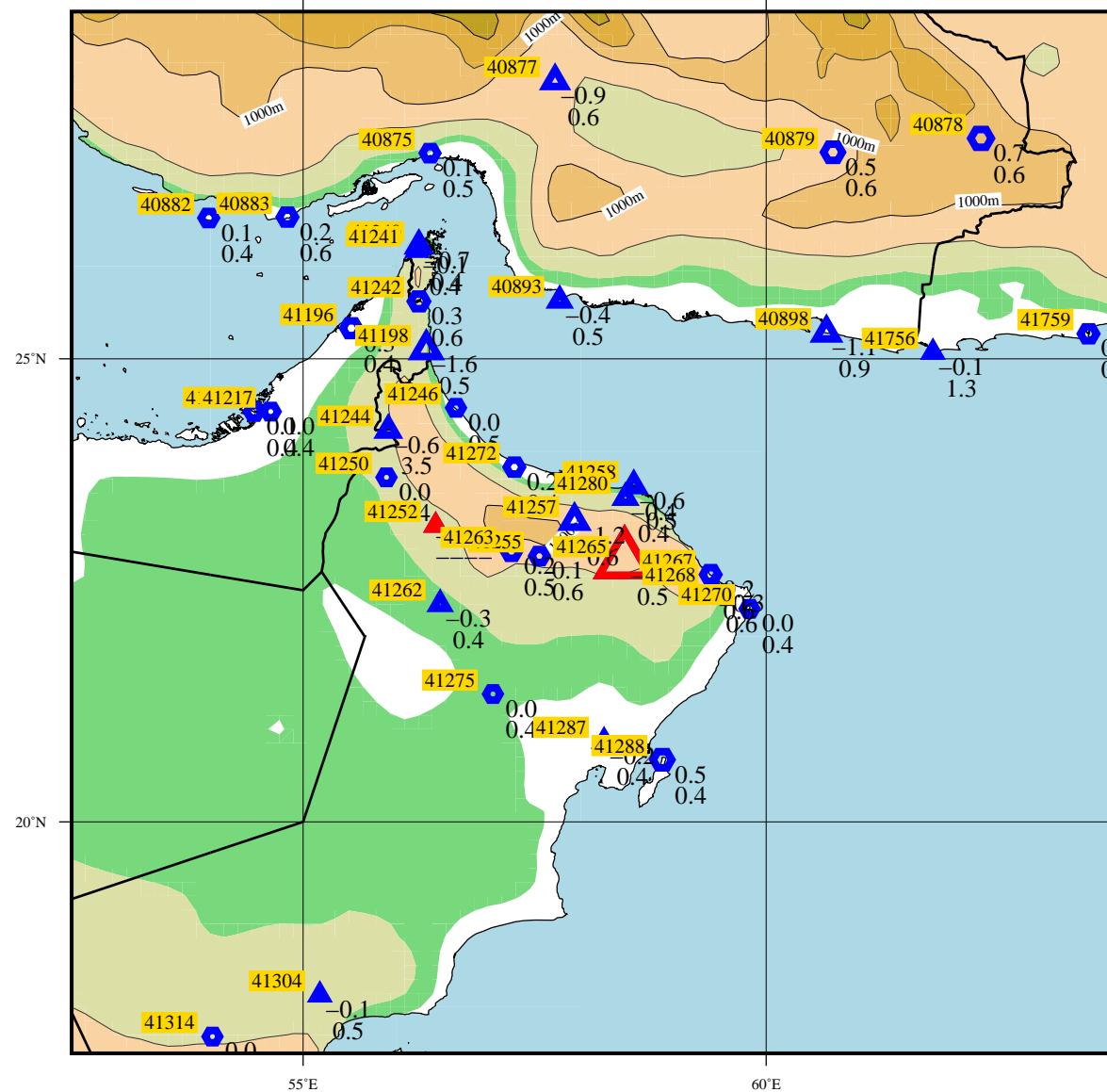


Figure 19 Time-series representation of MSLP Obs minus FirstGuess for station 40877

LEVEL = SUR      ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

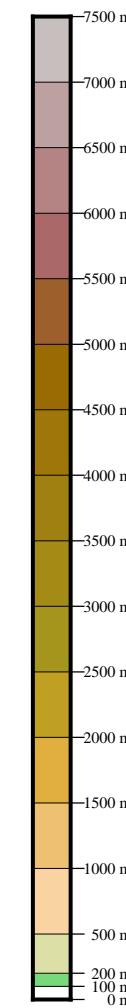


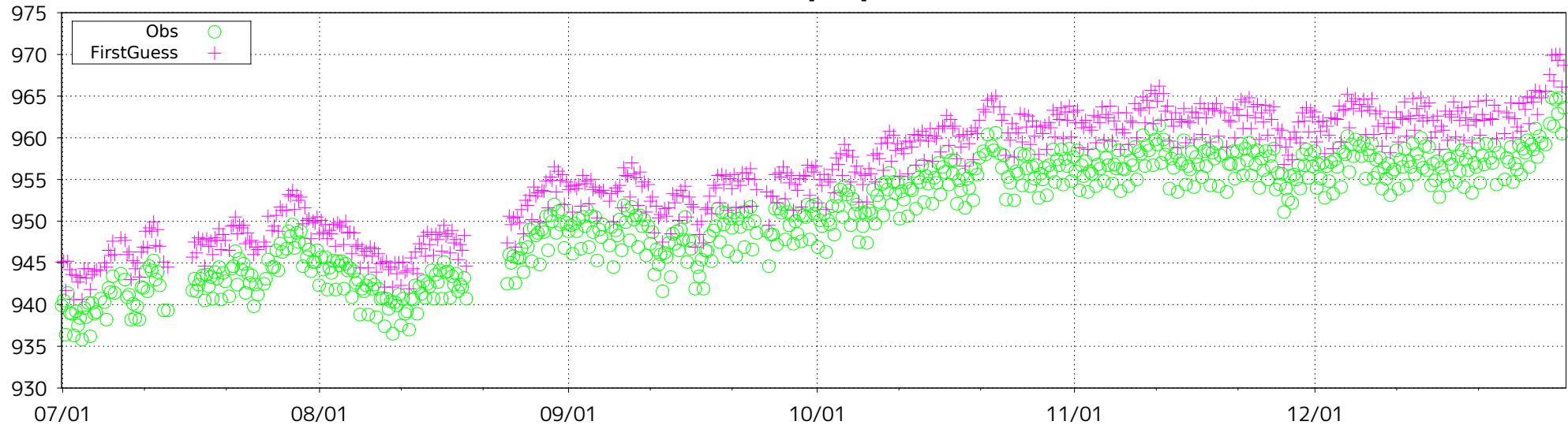
Figure 20 BIAS and SD of SLP for station 41252, 41265 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 41265 (lat: 22.8N, lon: 58.5E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

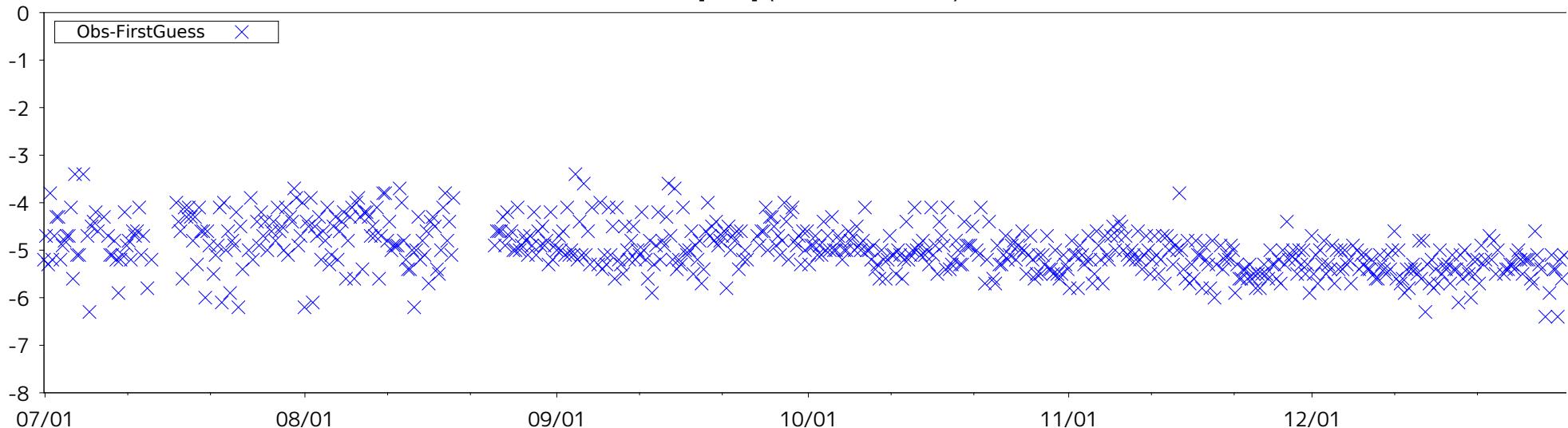
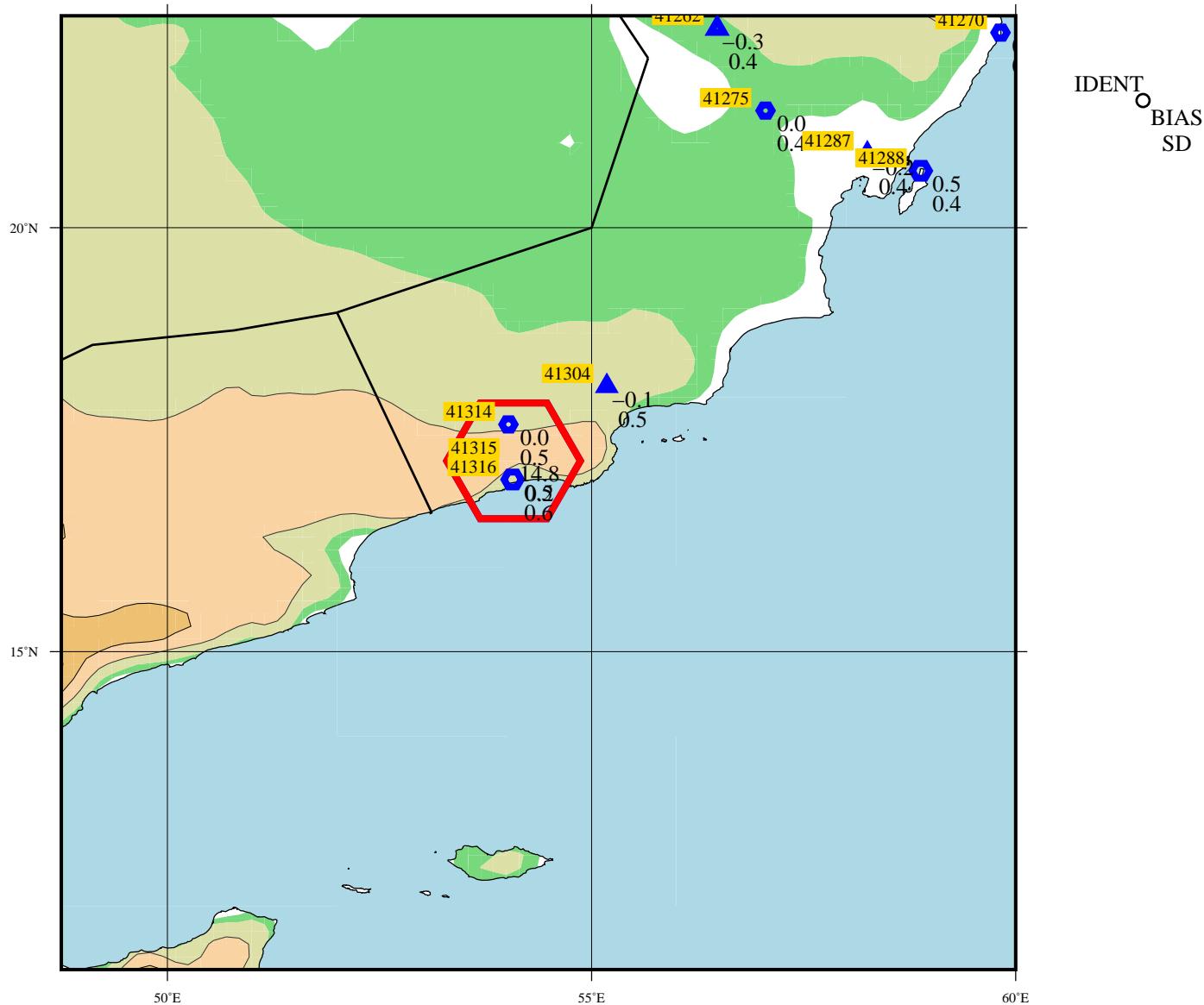


Figure 21 Time-series representation of SLP Obs minus FirstGuess for station 41265

LEVEL = SUR      ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
O BIAS  
SD

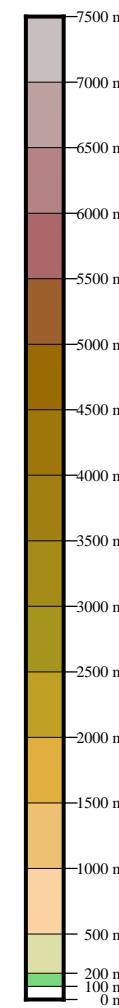
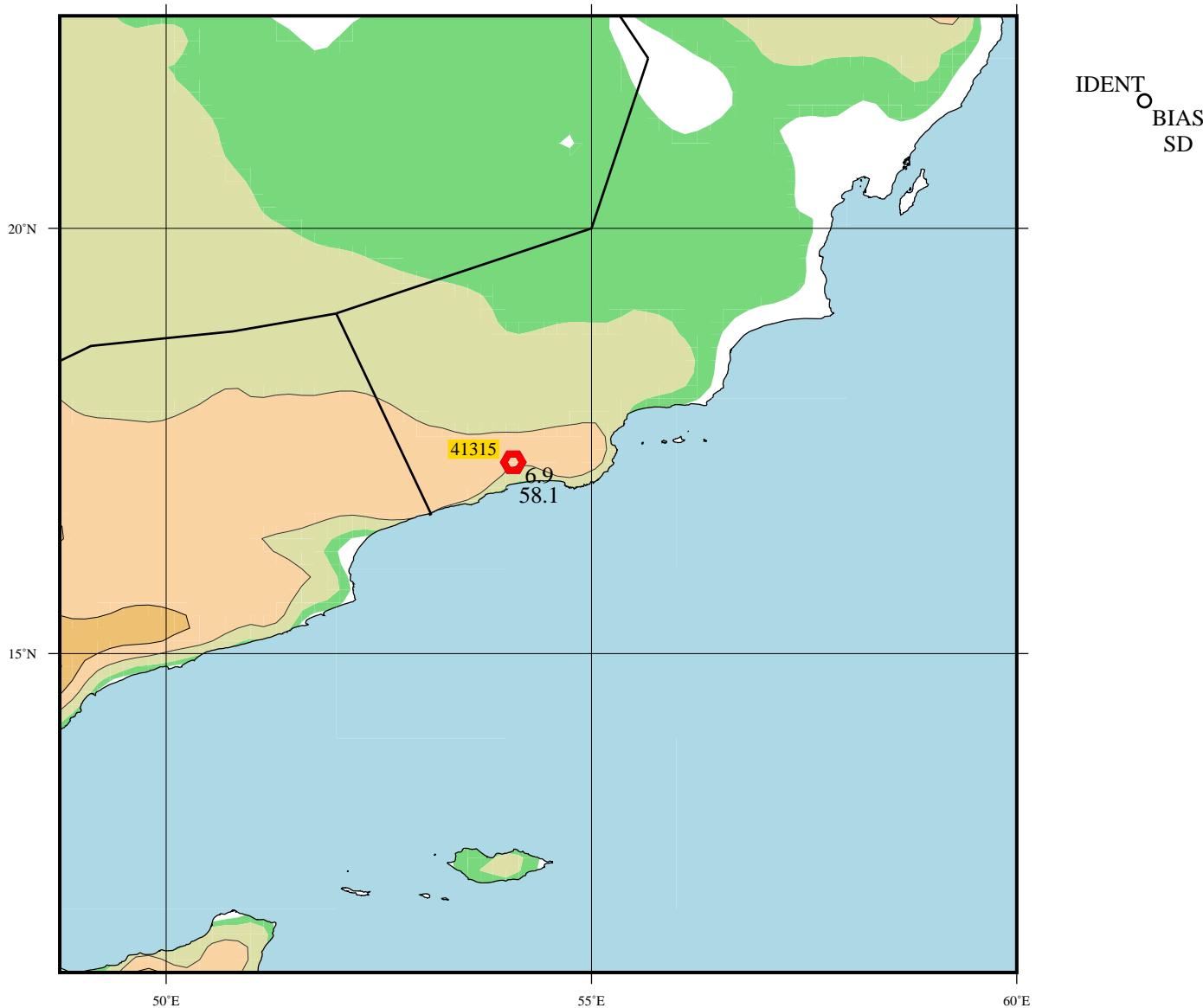


Figure 22 BIAS and SD of SLP for station 41315 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

LEVEL = SUR ELEMENT = GZ  
2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
O BIAS  
SD

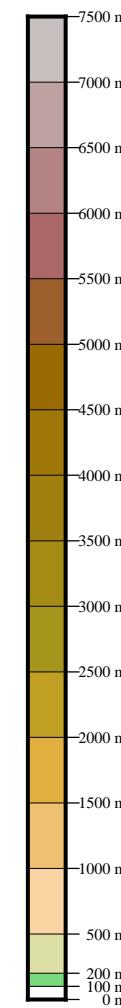


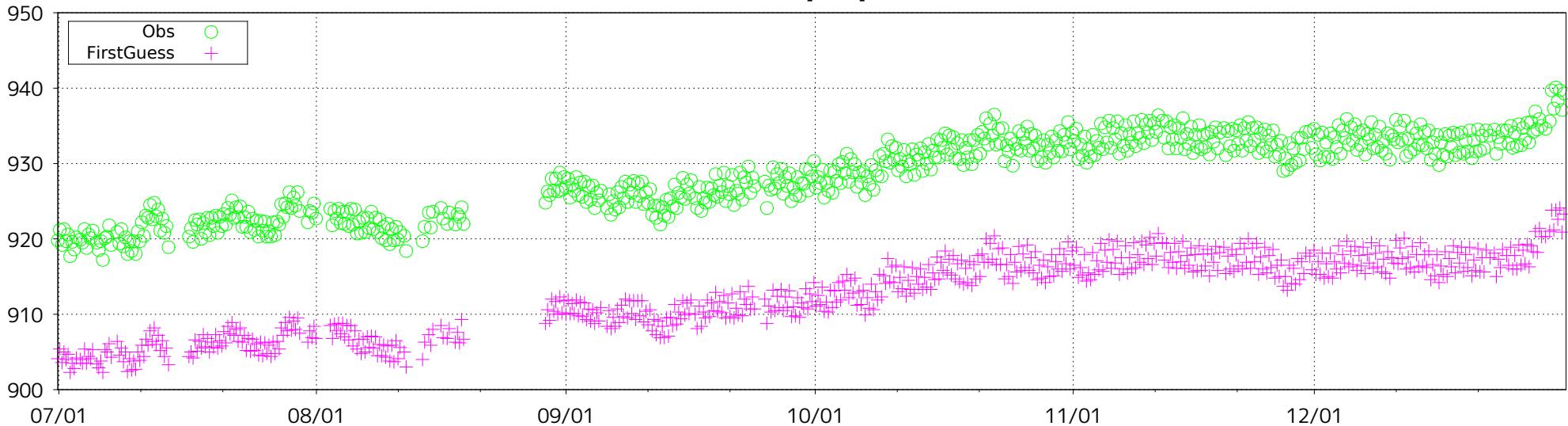
Figure 23 BIAS and SD of GZ for station 41315 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 41315 (lat: 17.3N, lon: 54.1E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

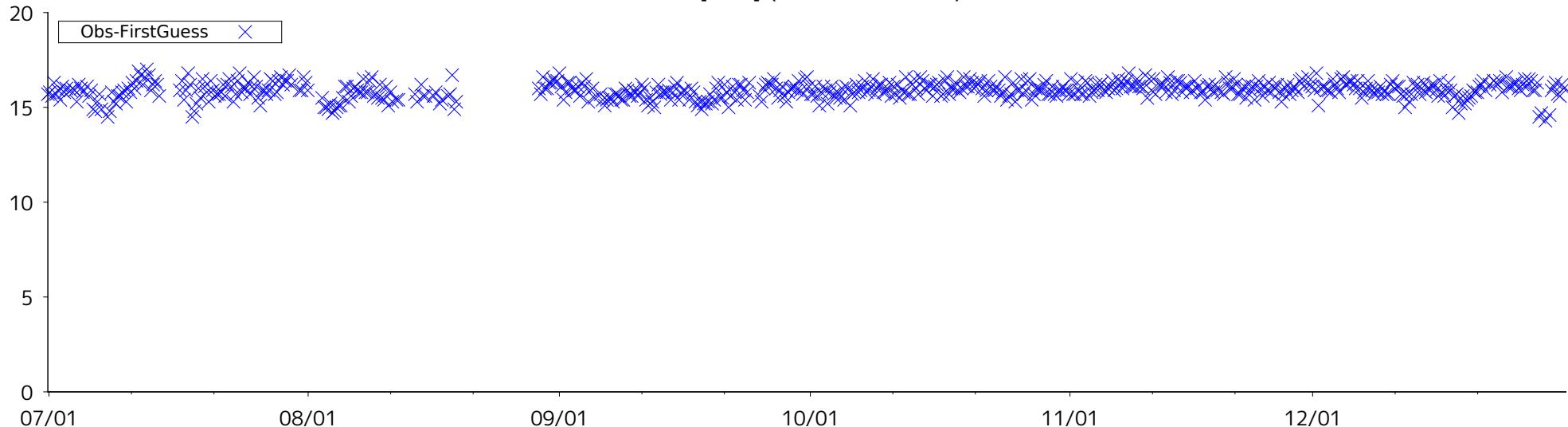
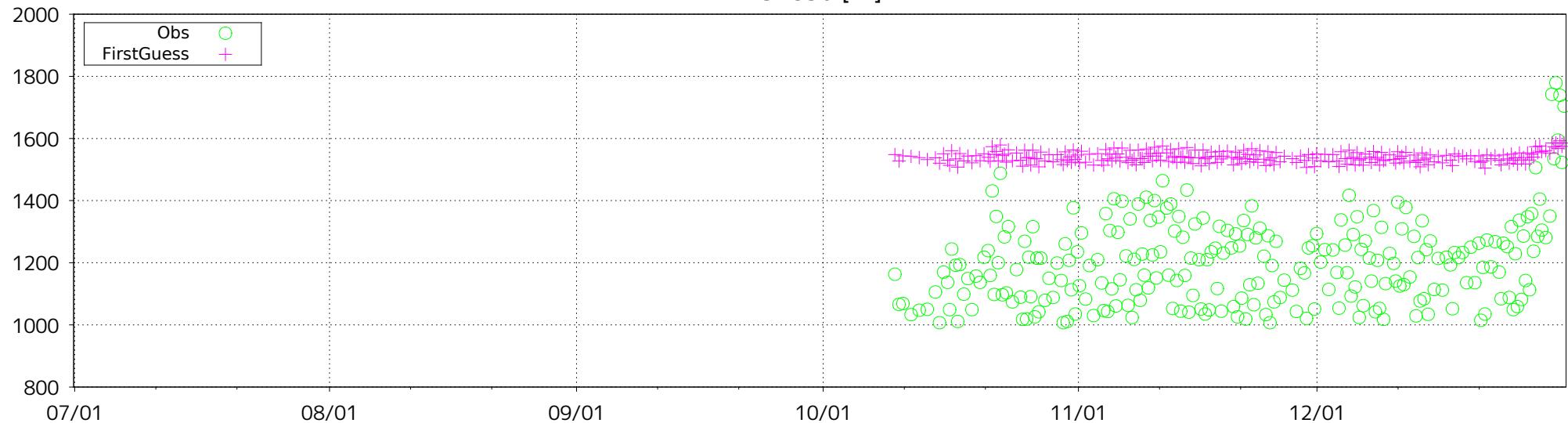


Figure 24(a) Time-series representation of SLP Obs minus FirstGuess for station 41315

ID: 41315 (lat: 17.3N, lon: 54.1E)

GZ850 [m]



GZ850 [m] (Obs-FirstGuess)

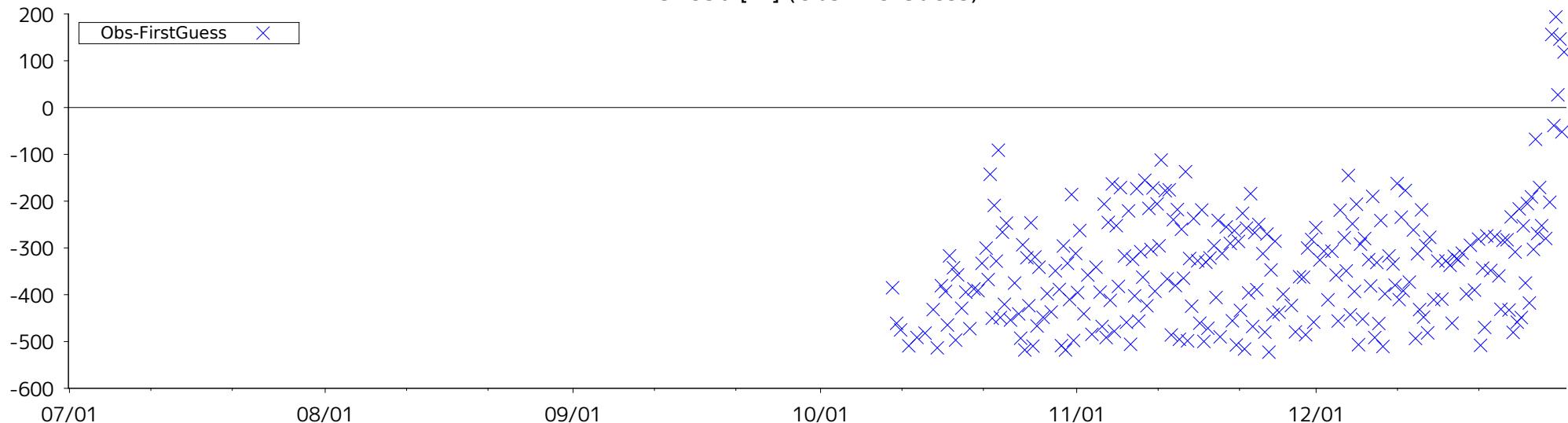


Figure 24(b) Time-series representation of GZ850 Obs minus FirstGuess for station 41315

LEVEL = SUR

ELEMENT = SLP

2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)

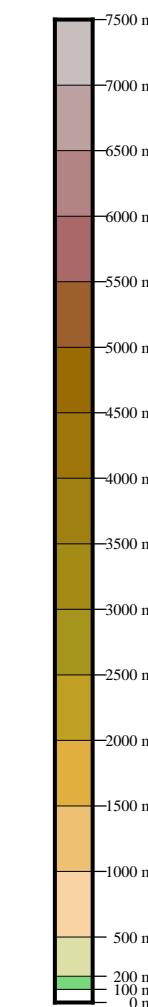
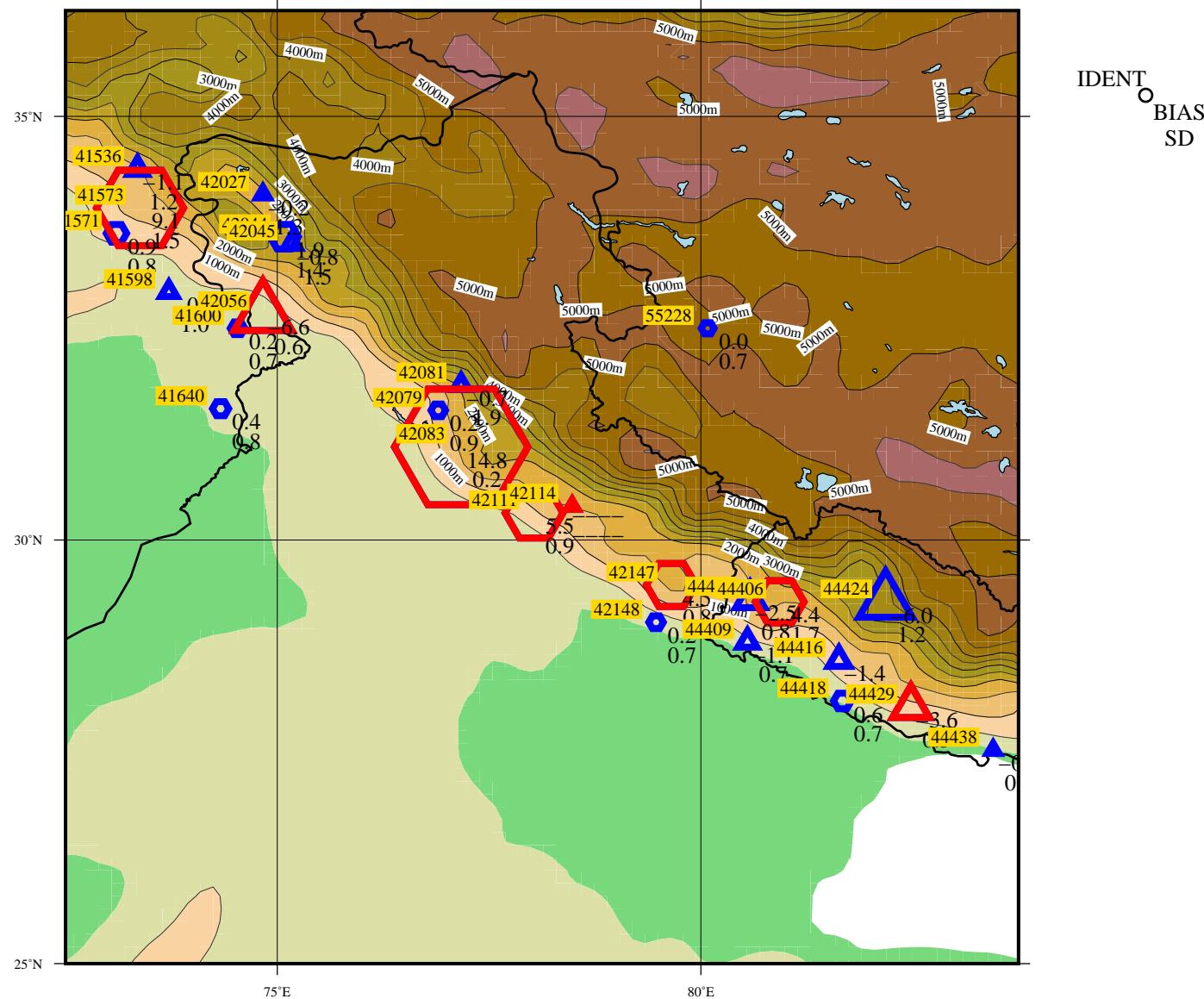


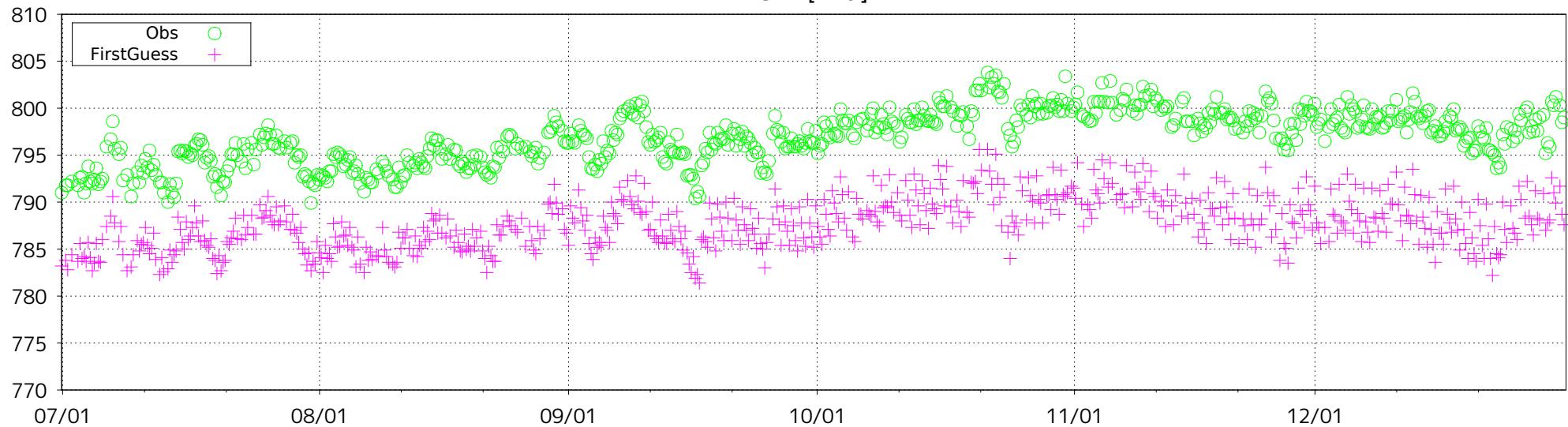
Figure 25 BIAS and SD of SLP for station 41573, 42056, 42083, 42111, 42114, 42147, 44406, 44429 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 41573 (lat: 33.9N, lon: 73.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

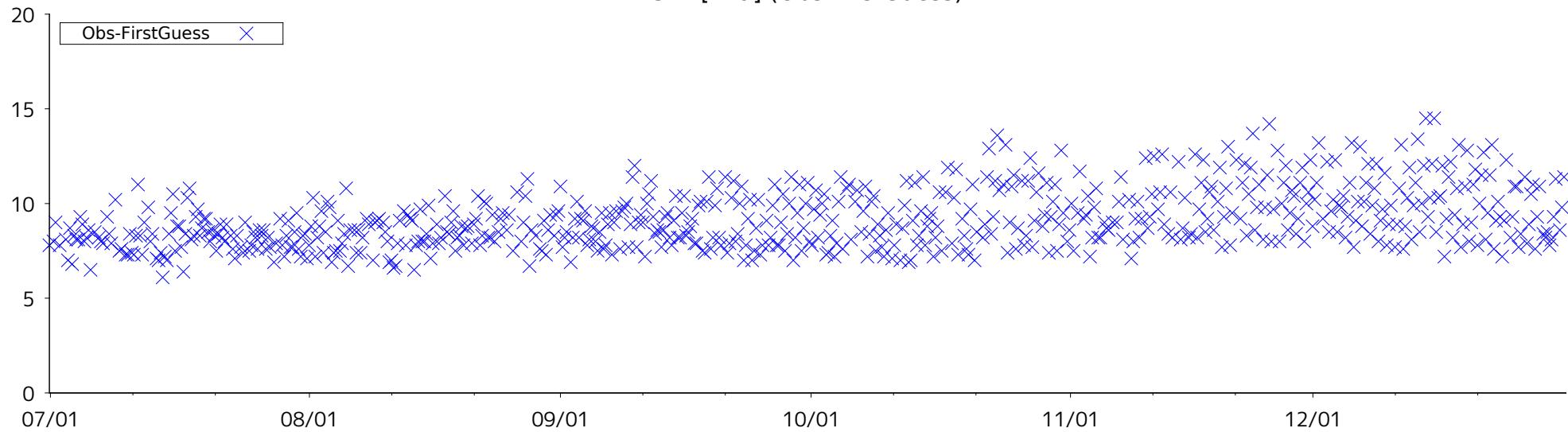
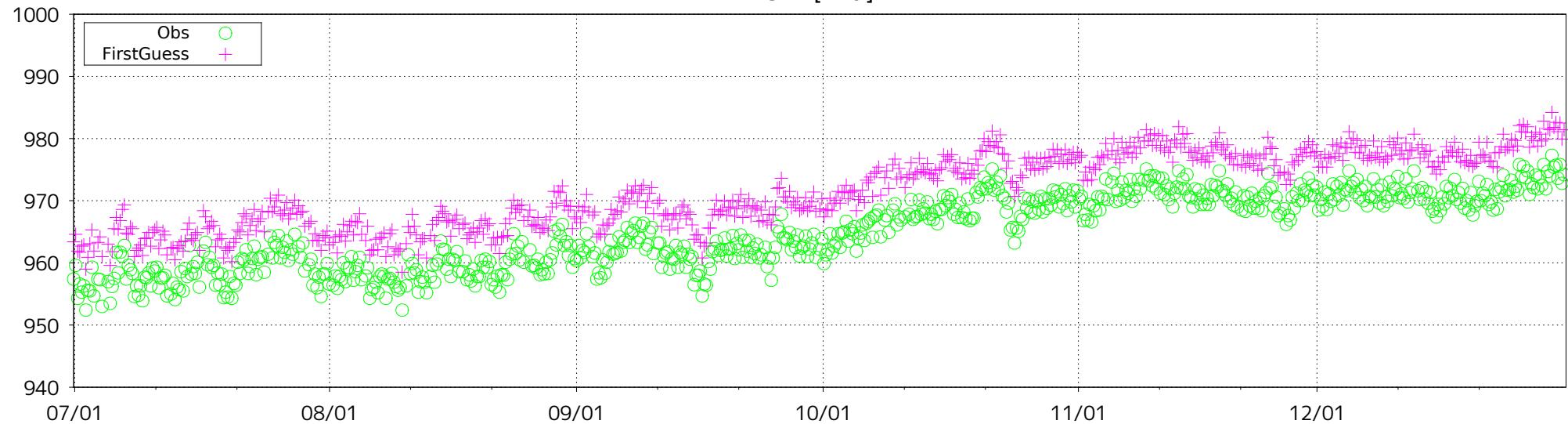


Figure 26 Time-series representation of SLP Obs minus FirstGuess for station 41573

ID: 42056 (lat: 32.7N, lon: 74.8E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

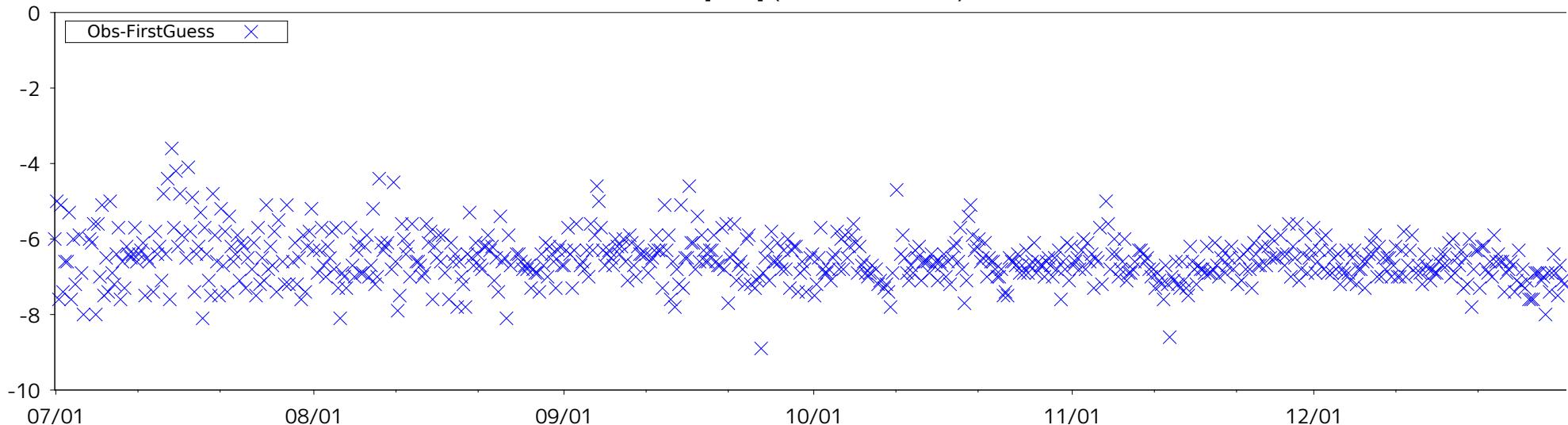
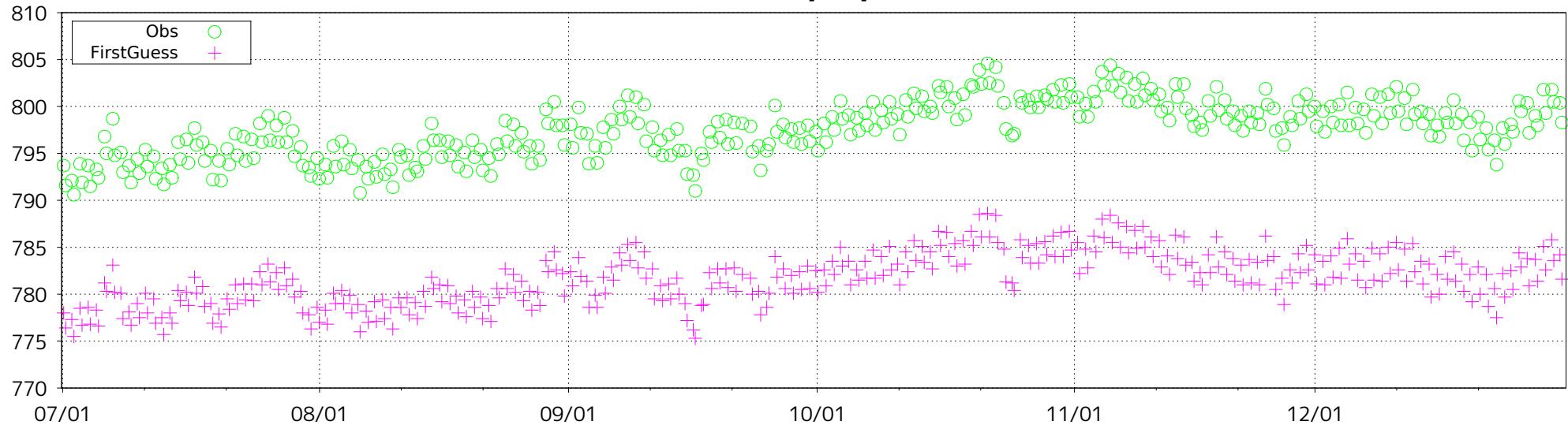


Figure 27 Time-series representation of SLP Obs minus FirstGuess for station 42056

ID: 42083 (lat: 31.1N, lon: 77.2E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

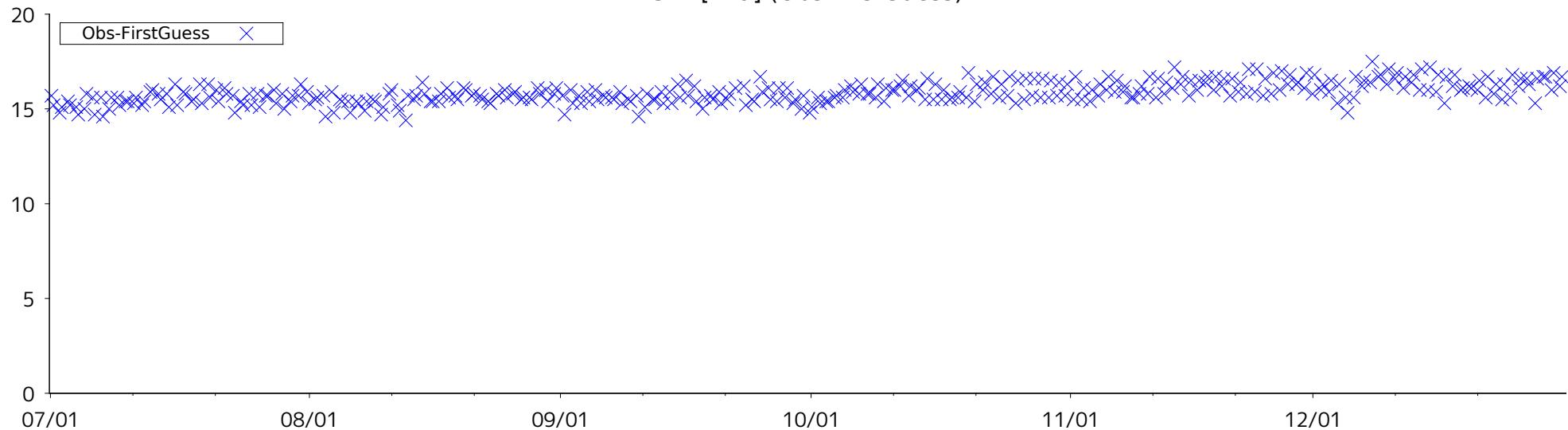
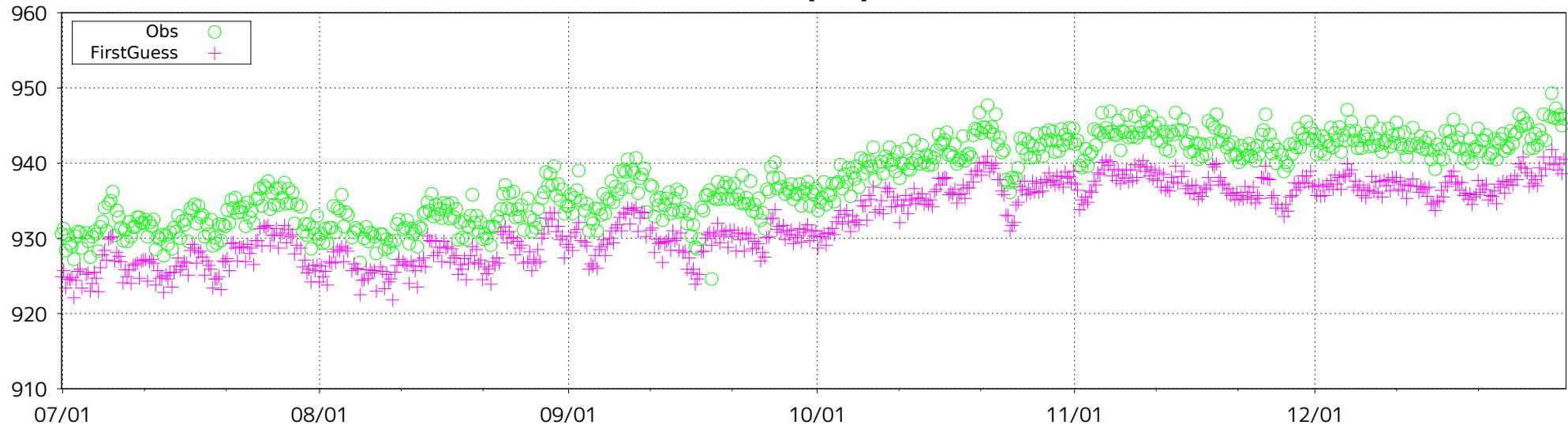


Figure 28 Time-series representation of SLP Obs minus FirstGuess for station 42083

ID: 42111 (lat: 30.3N, lon: 78.0E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

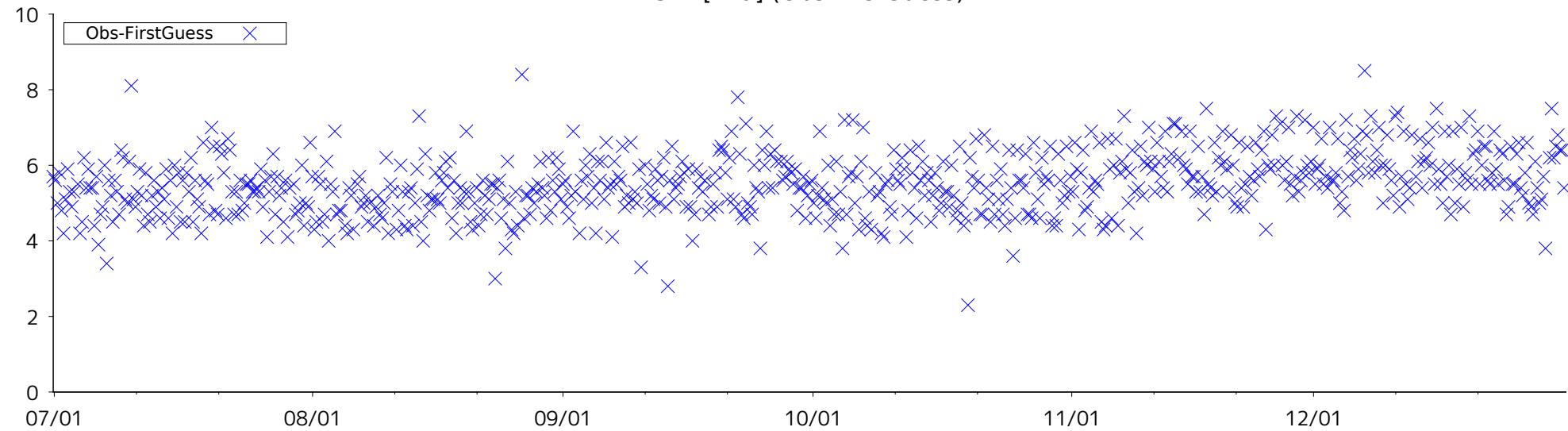
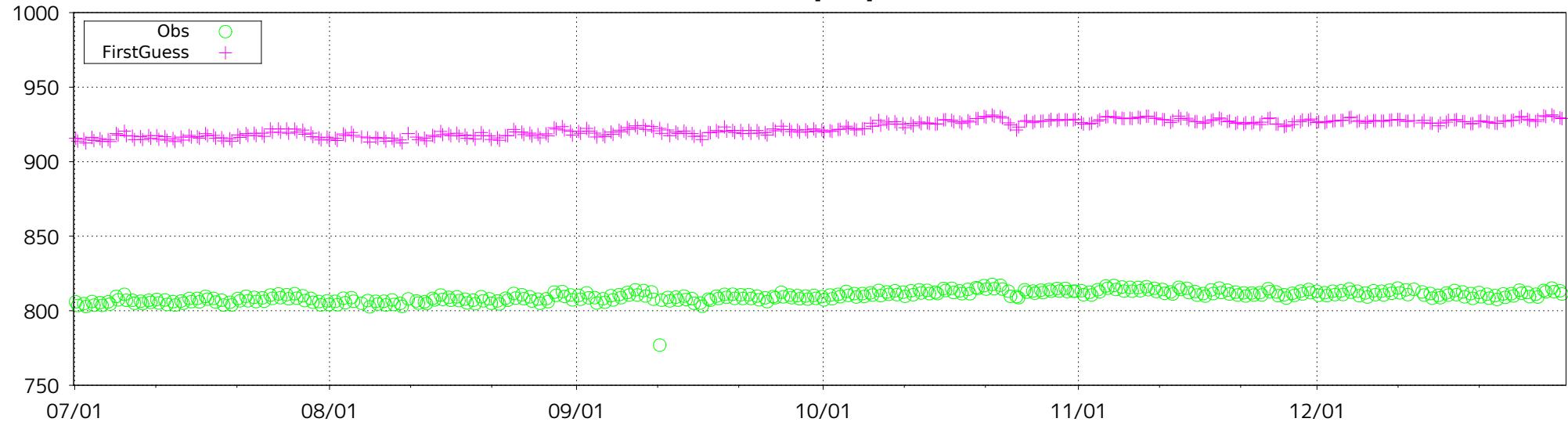


Figure 29 Time-series representation of SLP Obs minus FirstGuess for station 42111

ID: 42114 (lat: 30.4N, lon: 78.5E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

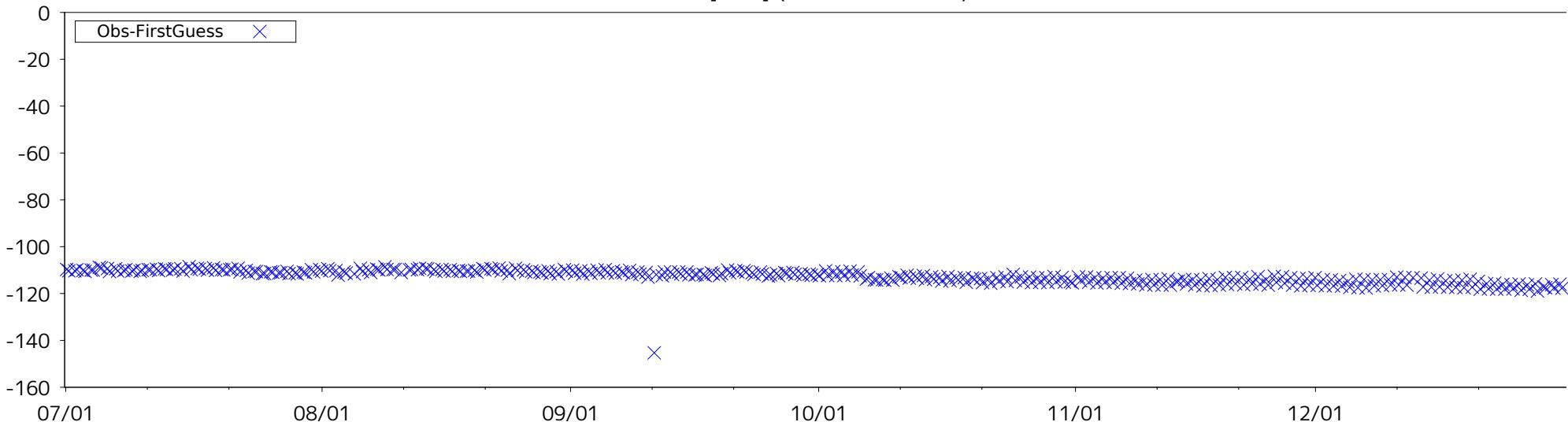
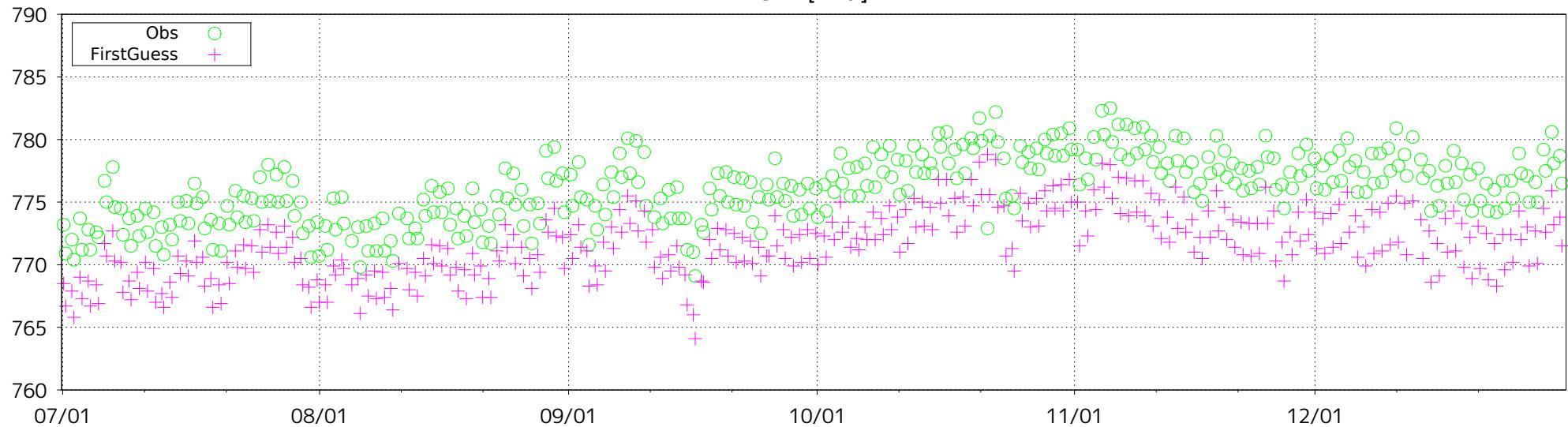


Figure 30 Time-series representation of SLP Obs minus FirstGuess for station 42114

ID: 42147 (lat: 29.5N, lon: 79.7E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

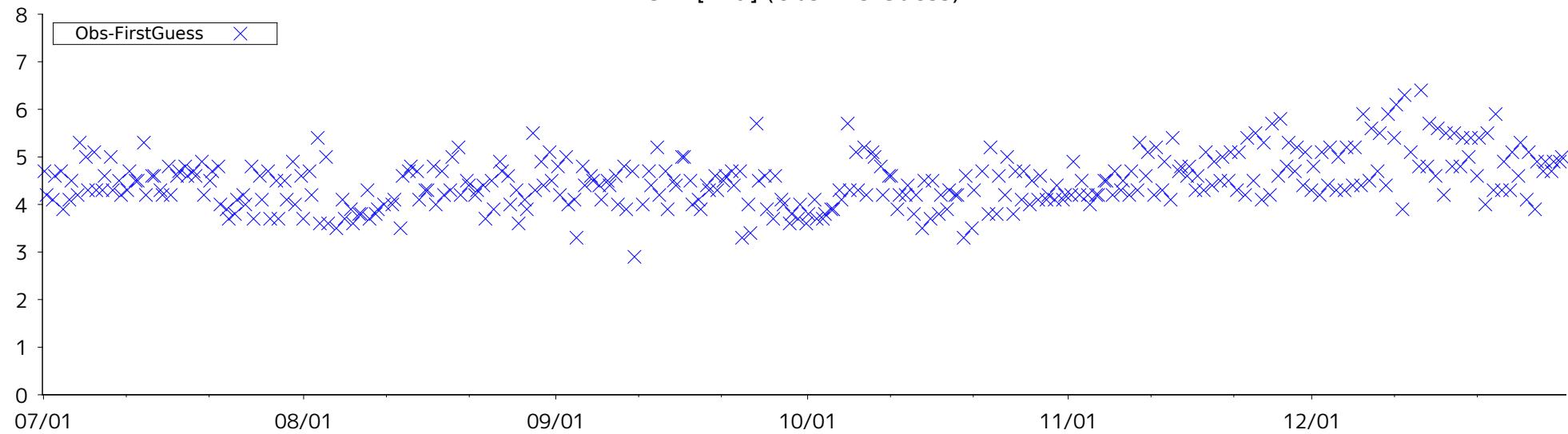
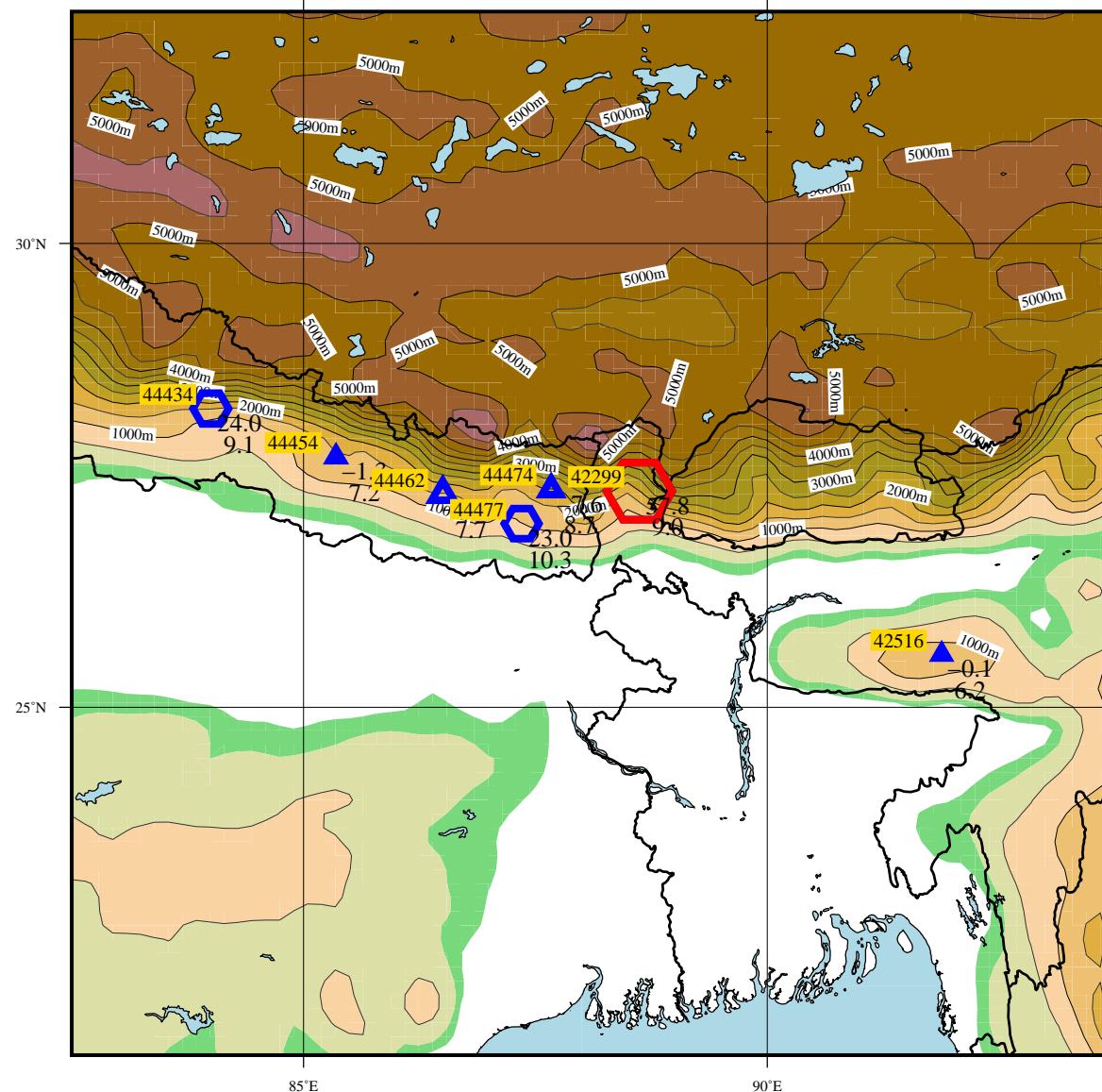


Figure 31 Time-series representation of SLP Obs minus FirstGuess for station 42147

LEVEL = SUR      ELEMENT = GZ  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

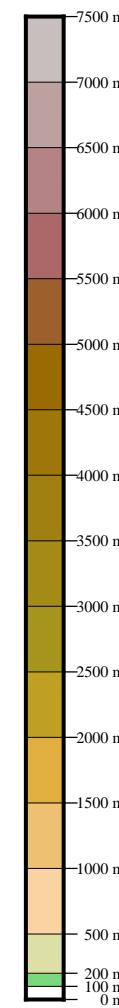


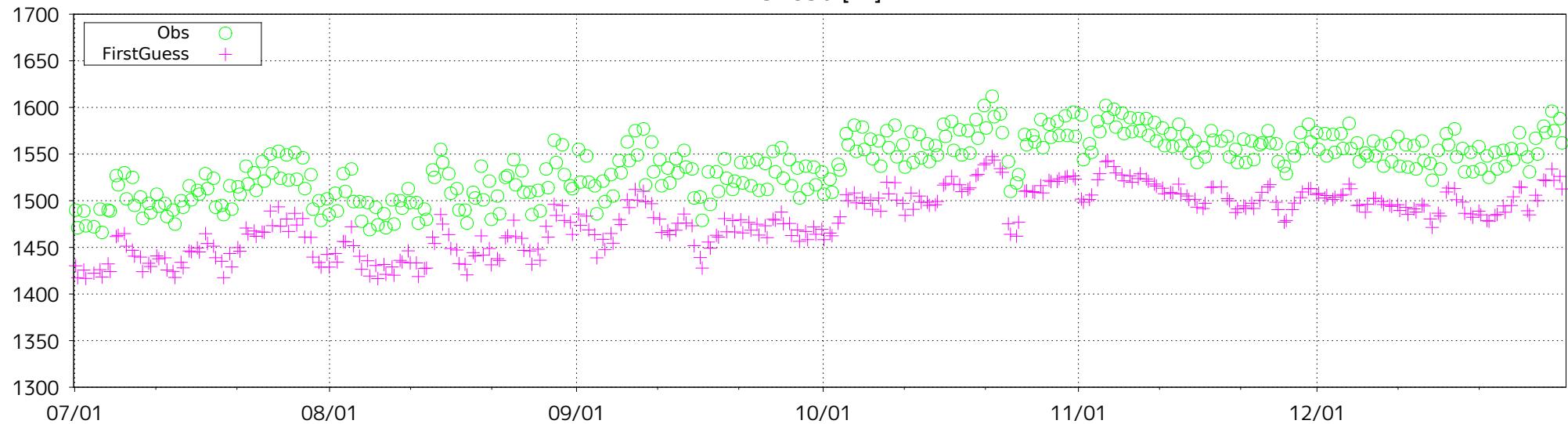
Figure 32 BIAS and SD of GZ for station 42299 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 42299 (lat: 27.3N, lon: 88.6E)

GZ850 [m]



GZ850 [m] (Obs-FirstGuess)

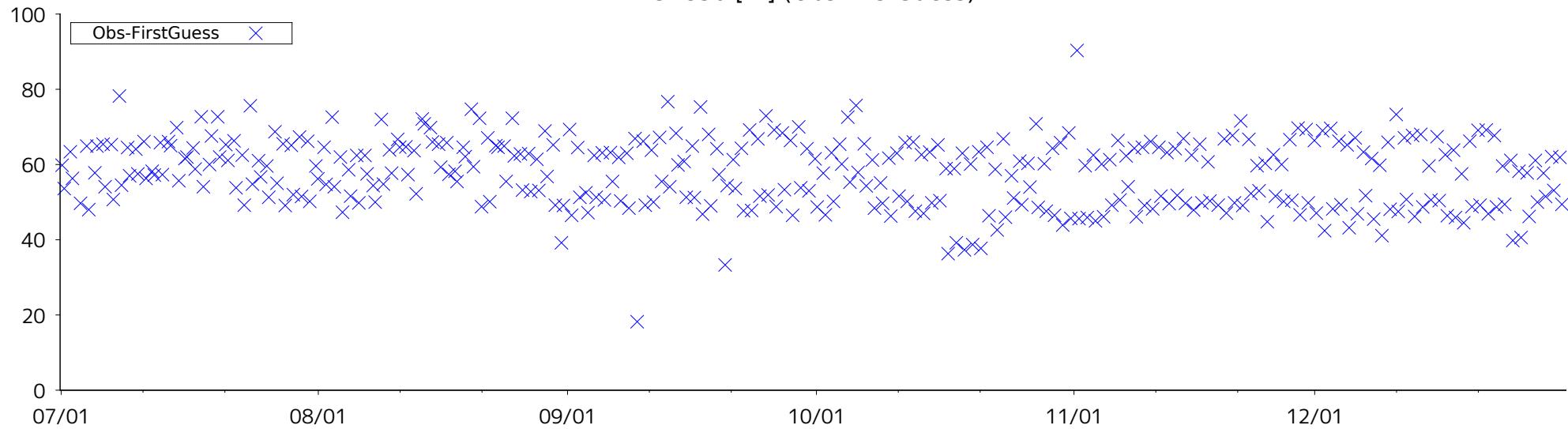
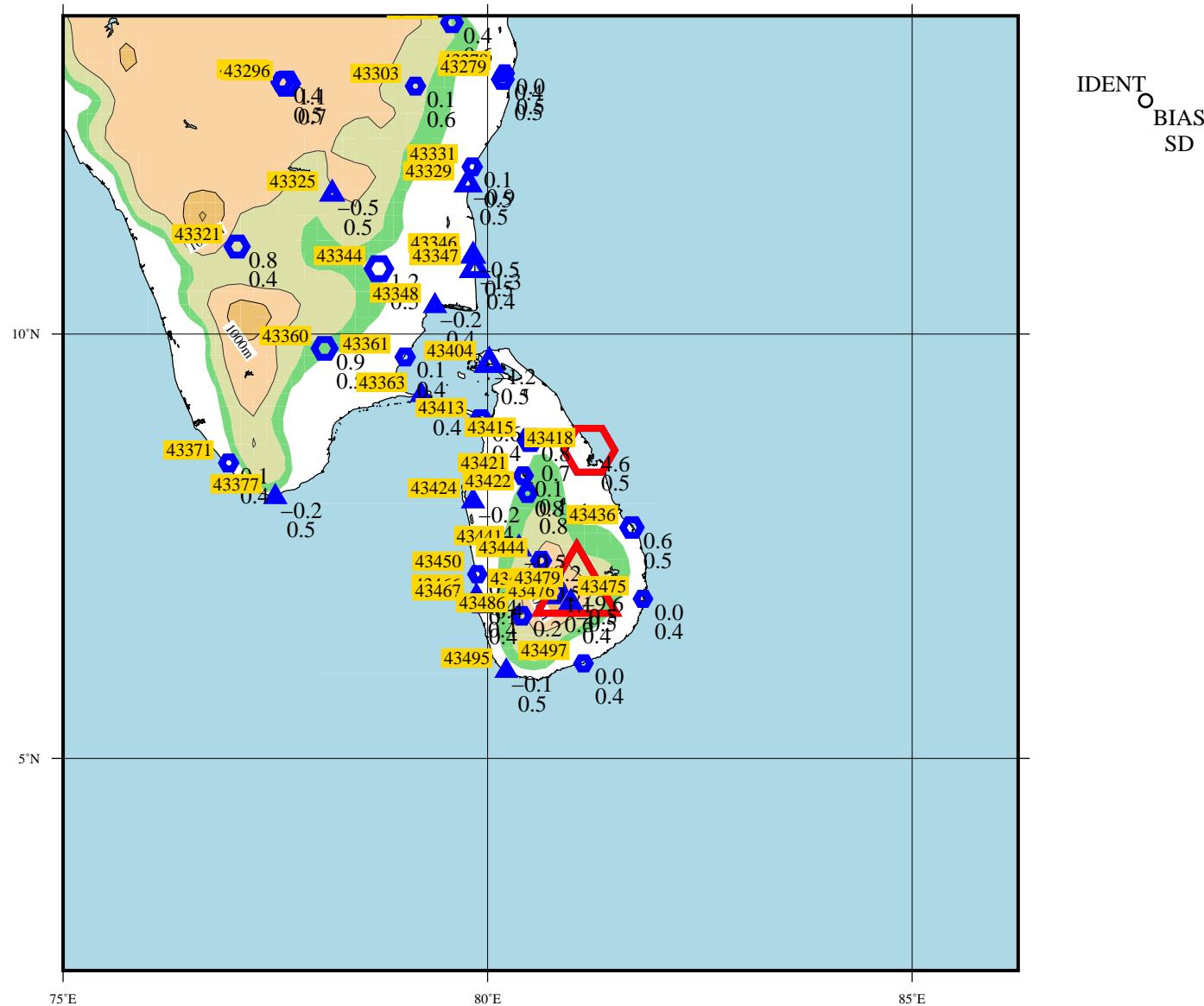


Figure 33 Time-series representation of GZ850 Obs minus FirstGuess for station 42299

LEVEL = SUR      ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

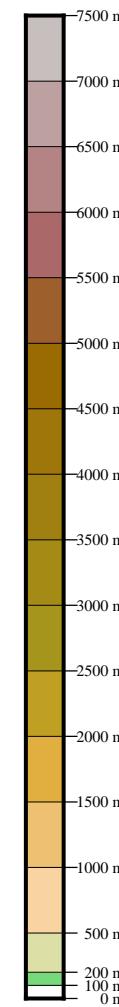


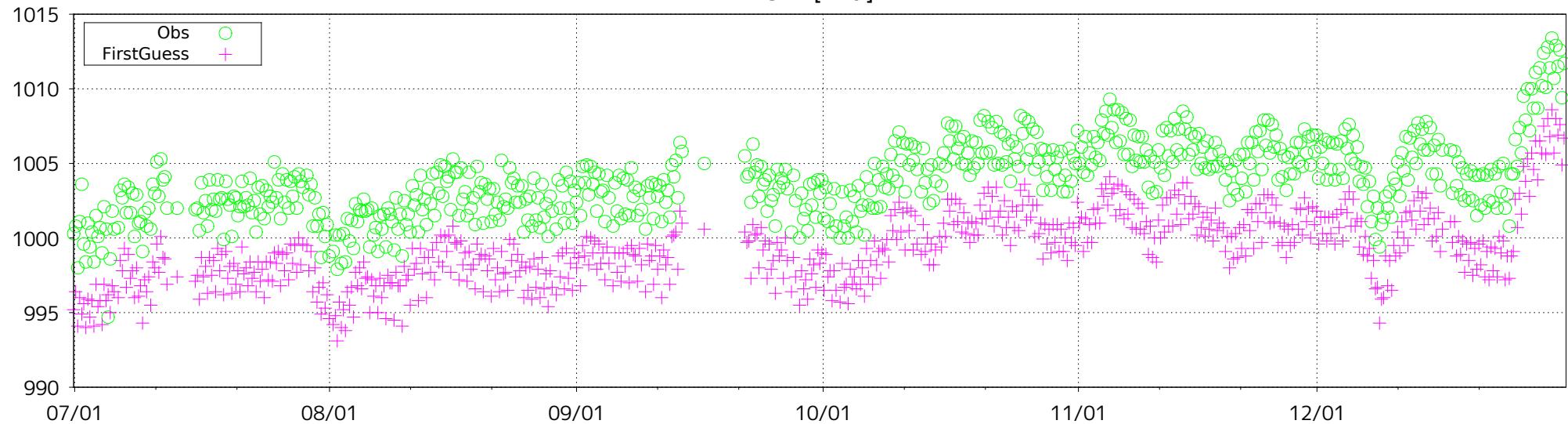
Figure 34 BIAS and SD of SLP for station 43418, 43479 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 43418 (lat: 8.6N, lon: 81.2E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

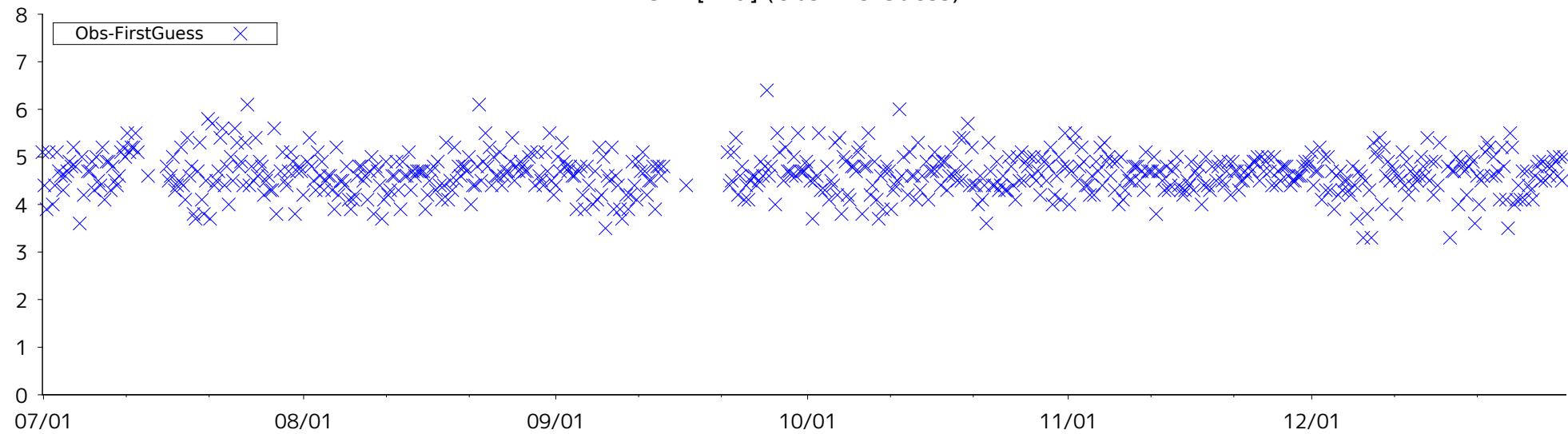
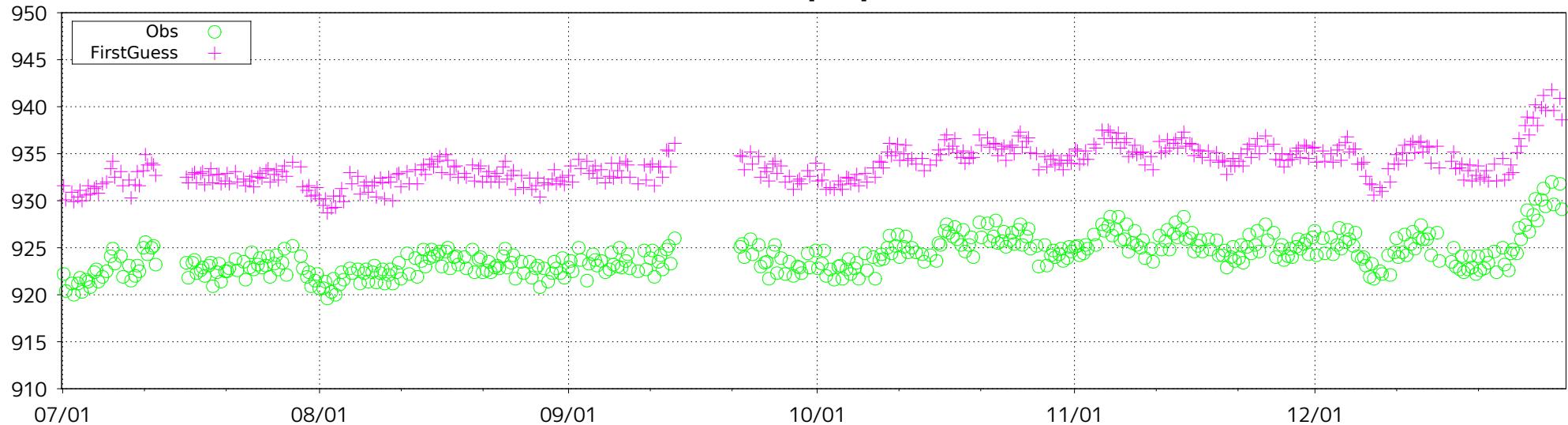


Figure 35 Time-series representation of SLP Obs minus FirstGuess for station 43418

ID: 43479 (lat: 7.0N, lon: 81.1E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

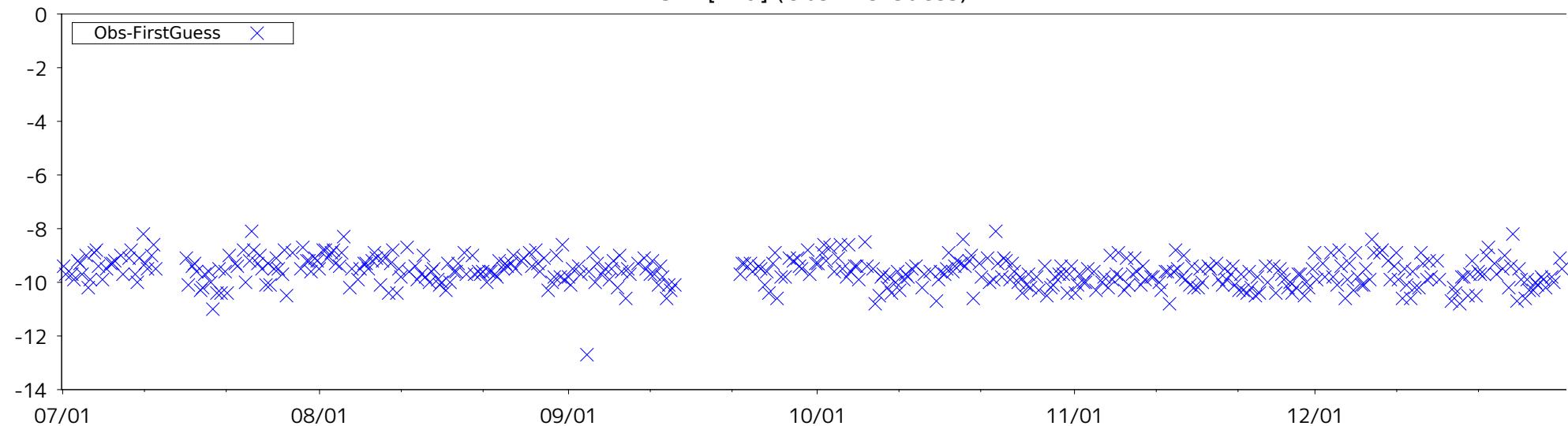
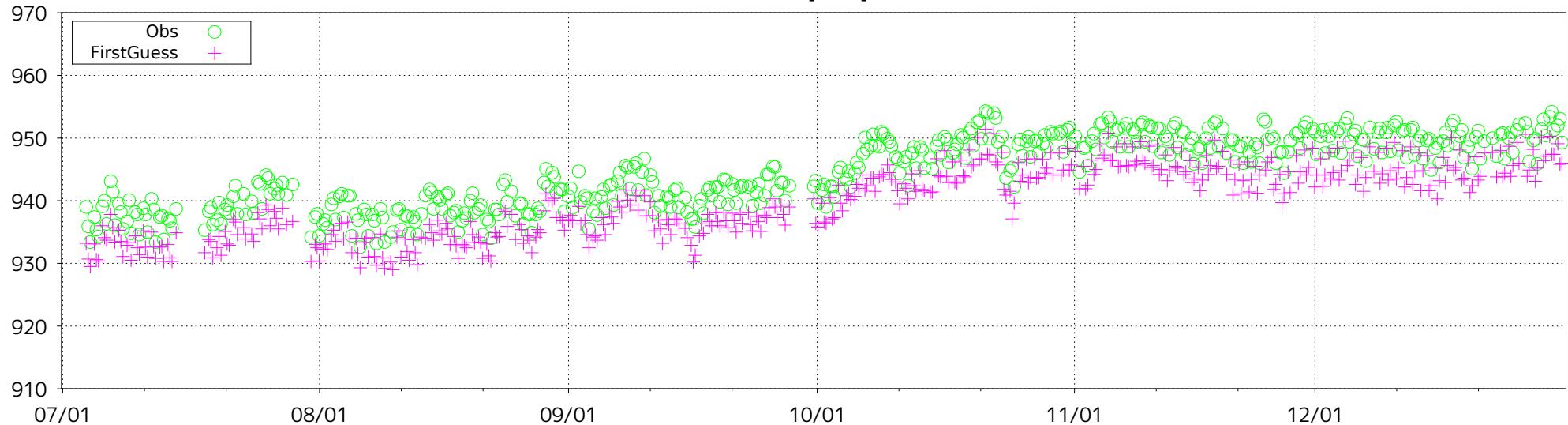


Figure 36 Time-series representation of SLP Obs minus FirstGuess for station 43479

ID: 44406 (lat: 29.3N, lon: 80.9E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

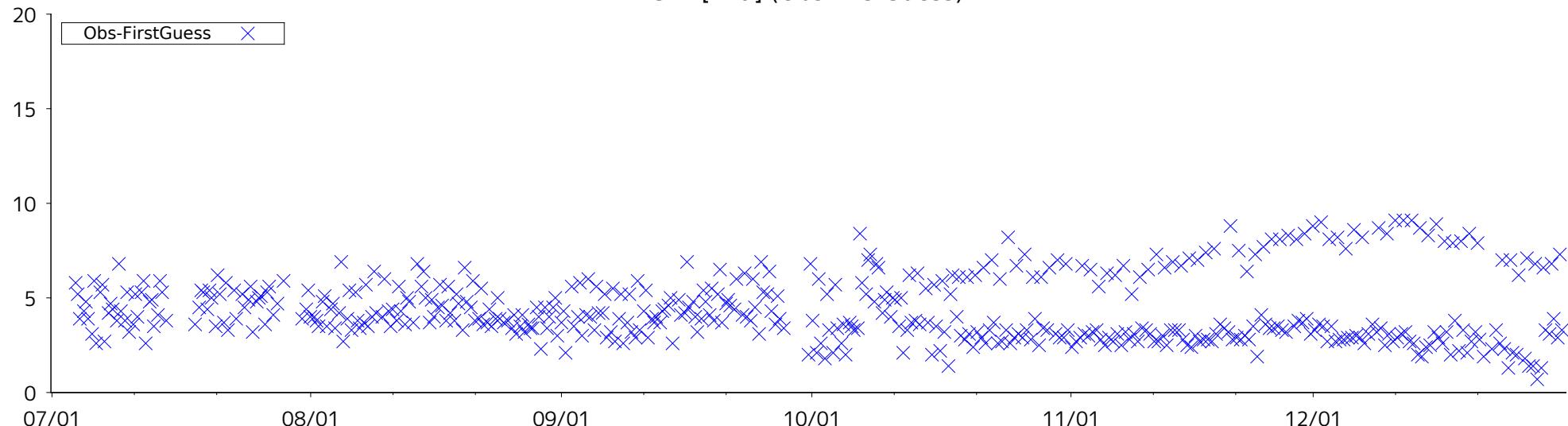
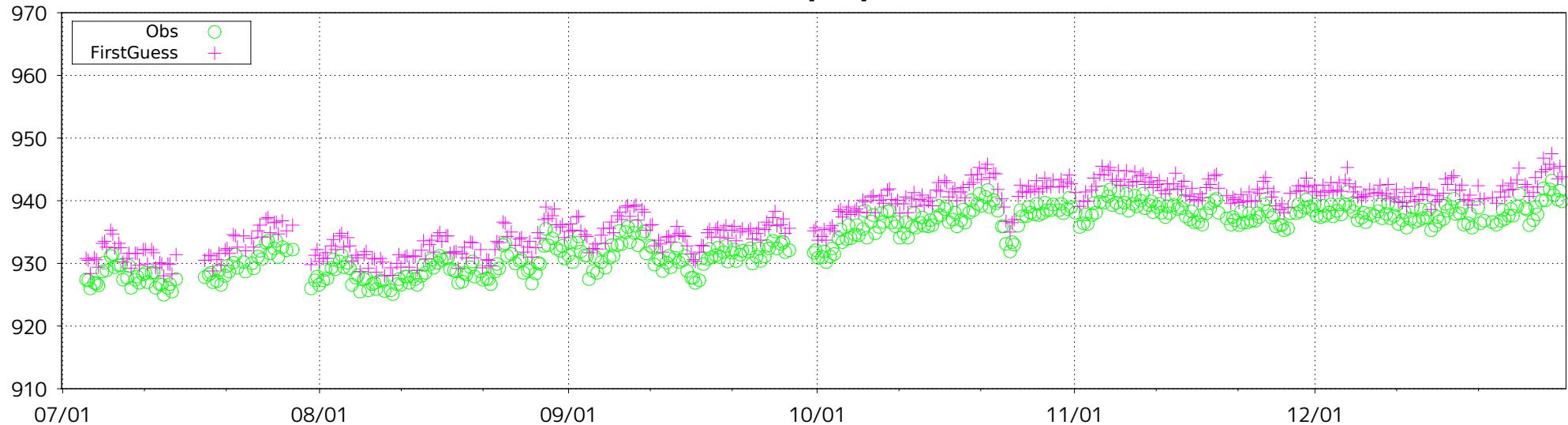


Figure 37 Time-series representation of SLP Obs minus FirstGuess for station 44406

ID: 44429 (lat: 28.0N, lon: 82.5E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

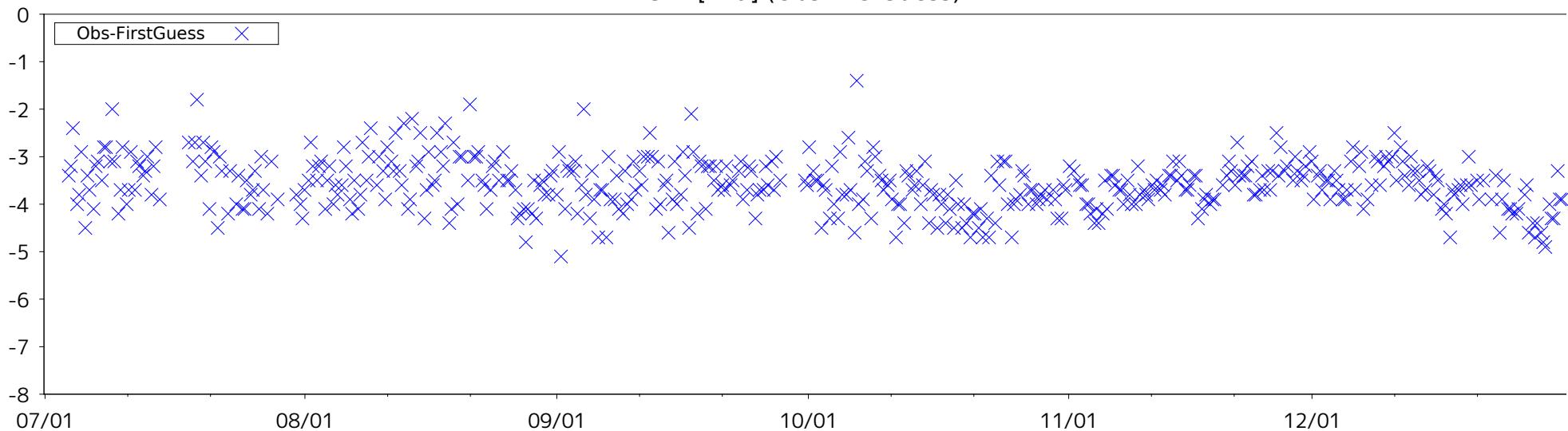


Figure 38 Time-series representation of SLP Obs minus FirstGuess for station 44429

LEVEL = SUR      ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)

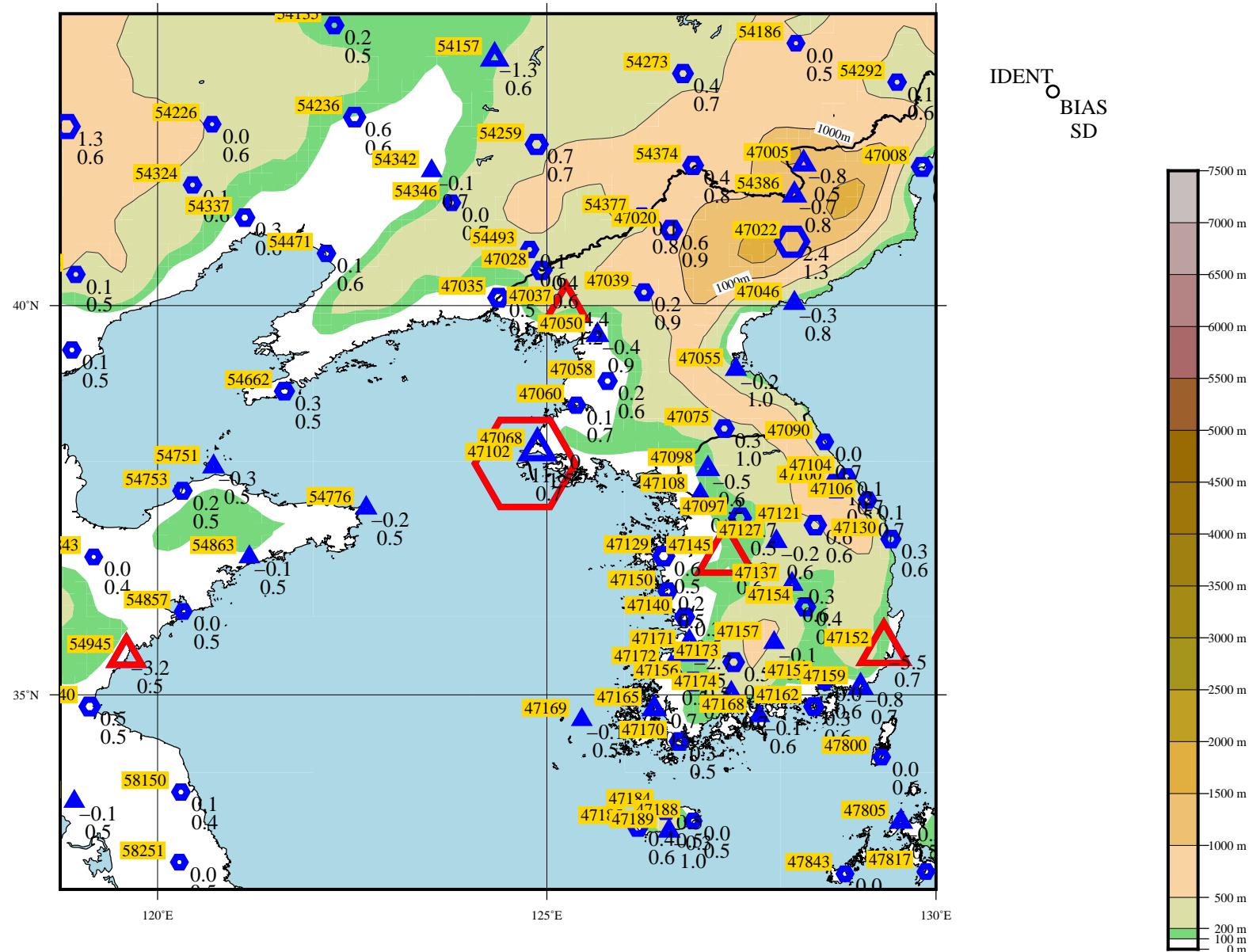
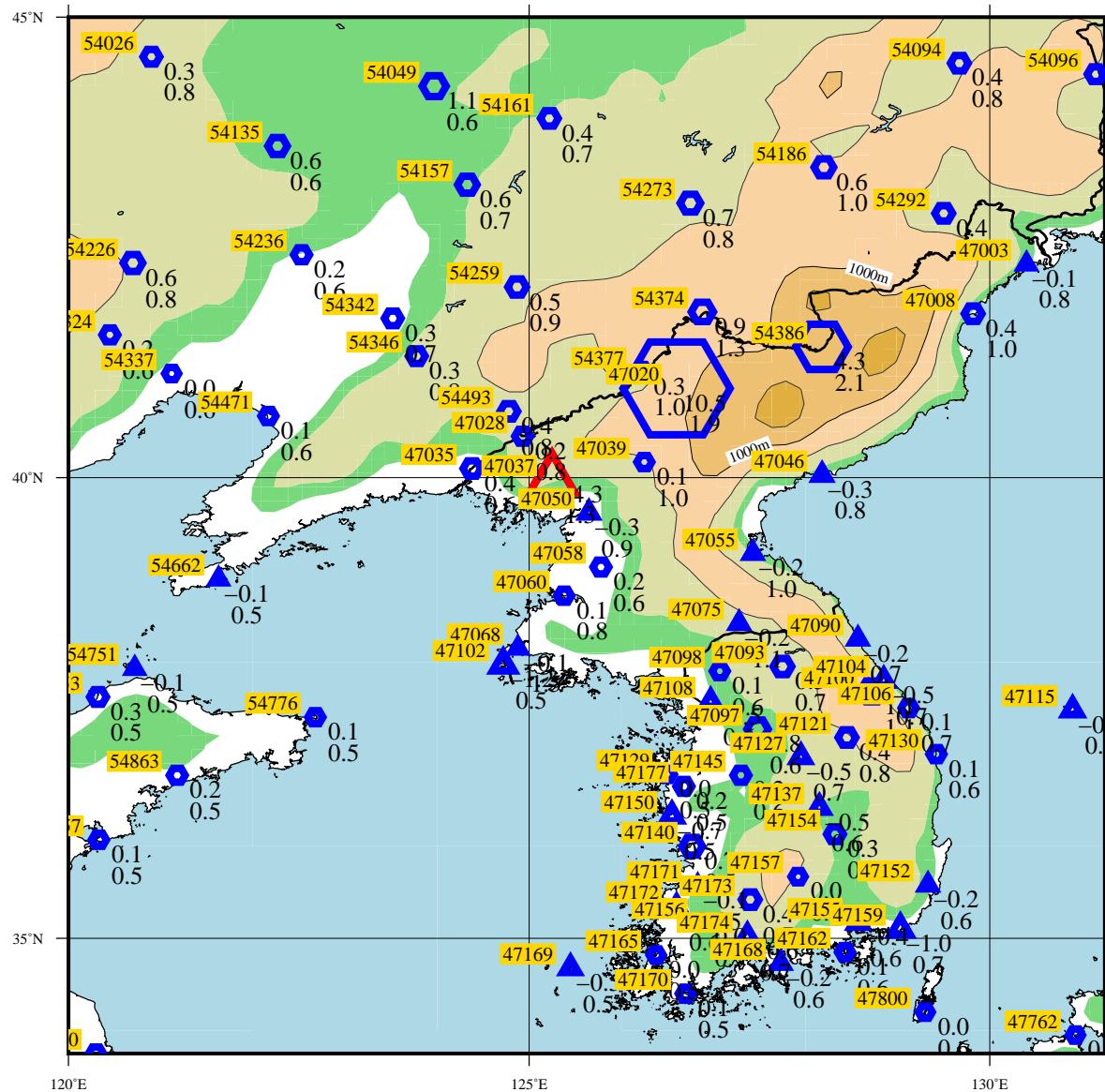


Figure 39 BIAS and SD of SLP for station 47037, 47102, 47145, 47152, 54945 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

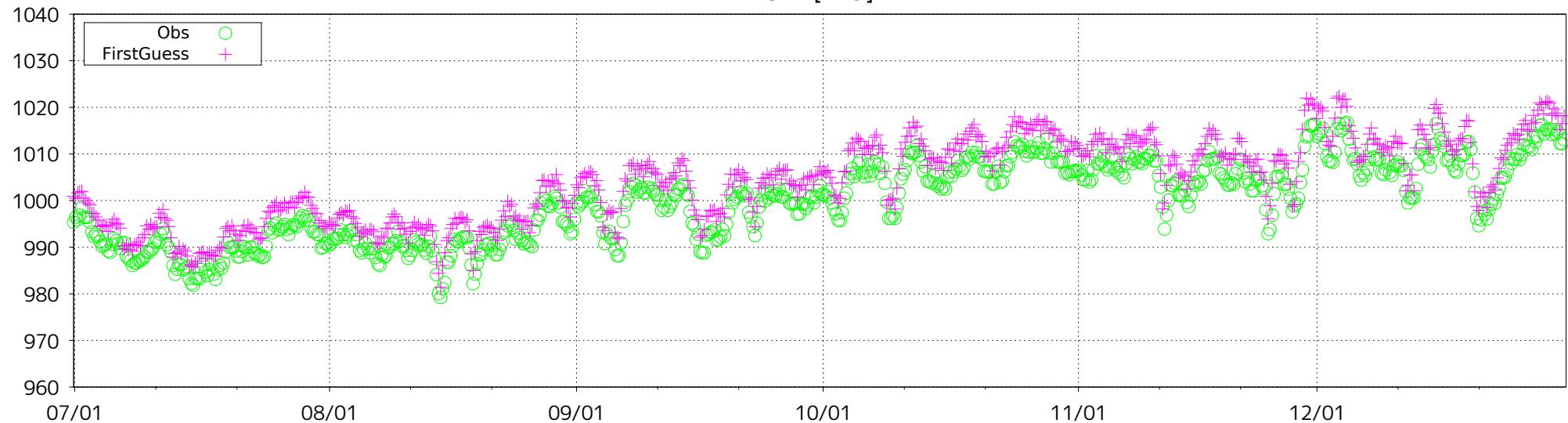
The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

LEVEL = SUR      ELEMENT = MSLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



ID: 47037 (lat: 40.0N, lon: 125.3E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

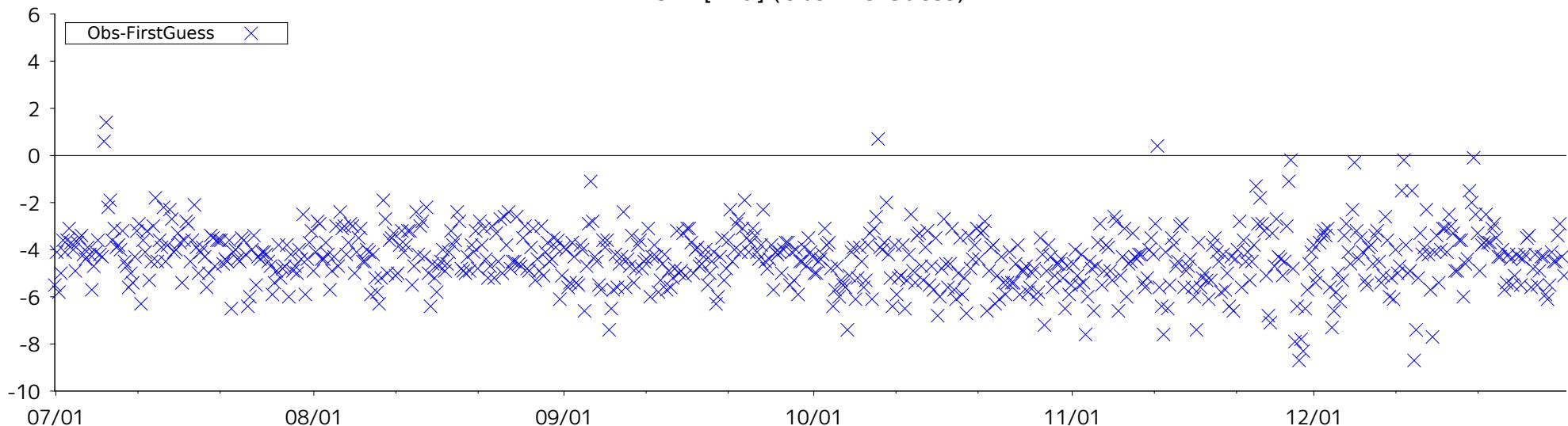
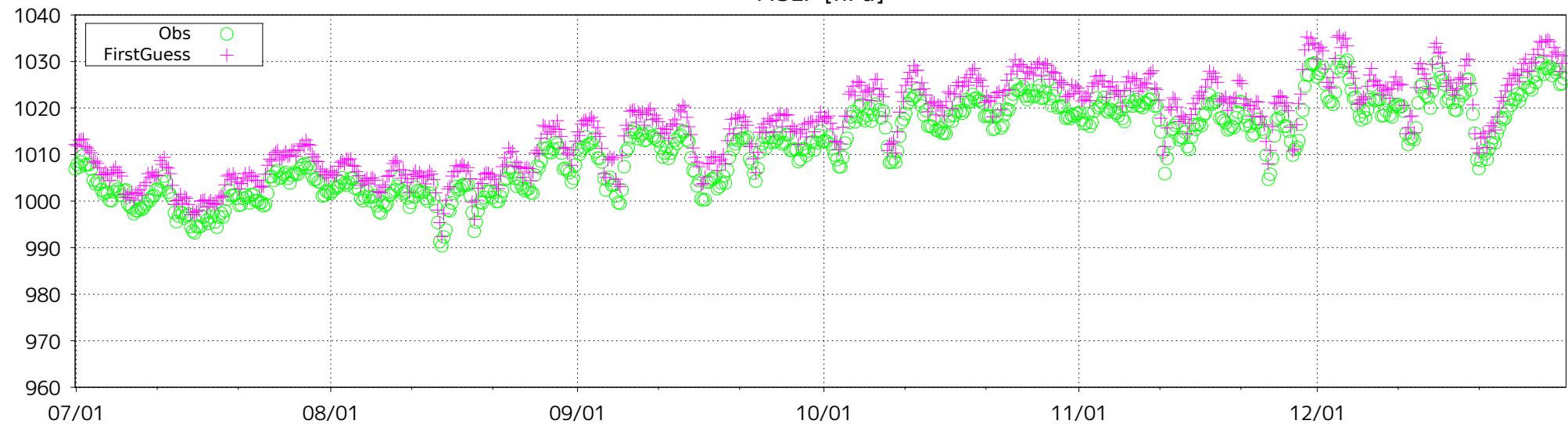


Figure 41(a) Time-series representation of SLP Obs minus FirstGuess for station 47037

ID: 47037 (lat: 40.0N, lon: 125.3E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

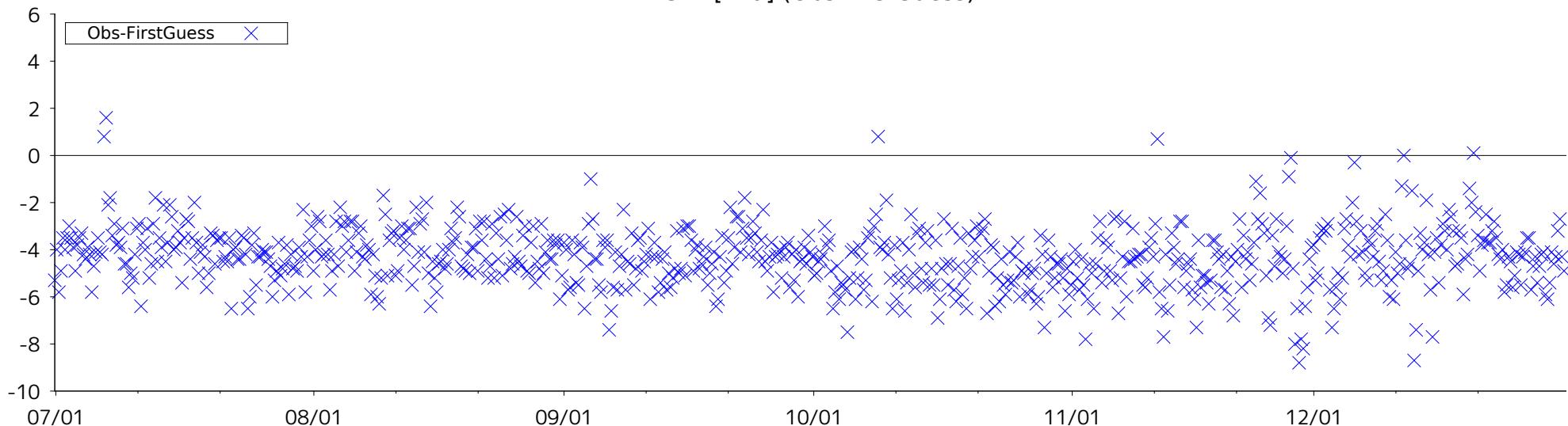
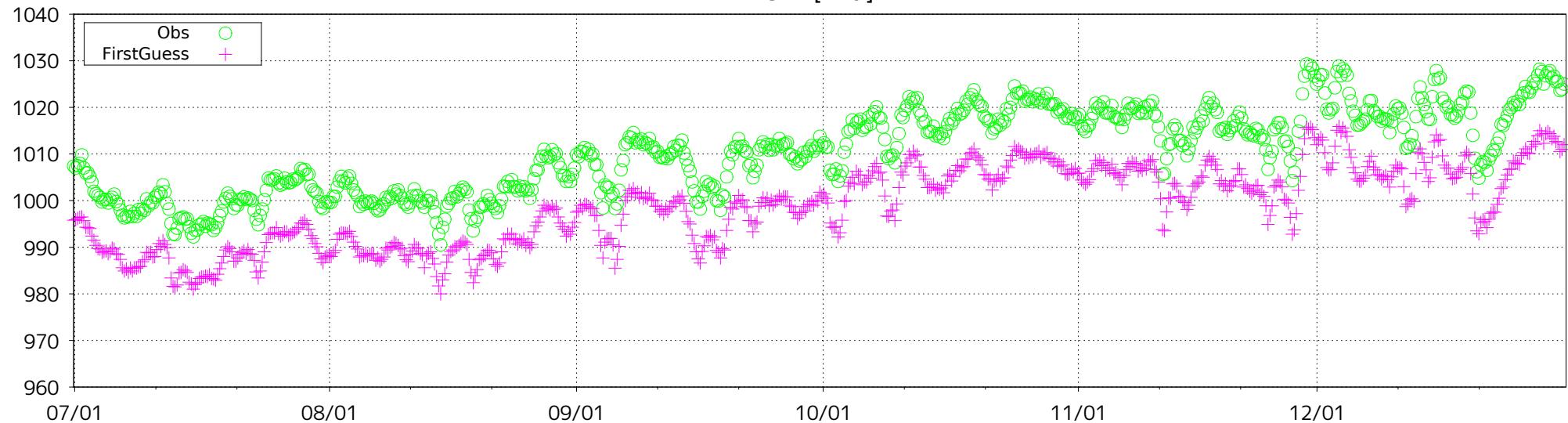


Figure 41(b) Time-series representation of MSLP Obs minus FirstGuess for station 47037

ID: 47102 (lat: 38.0N, lon: 124.7E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

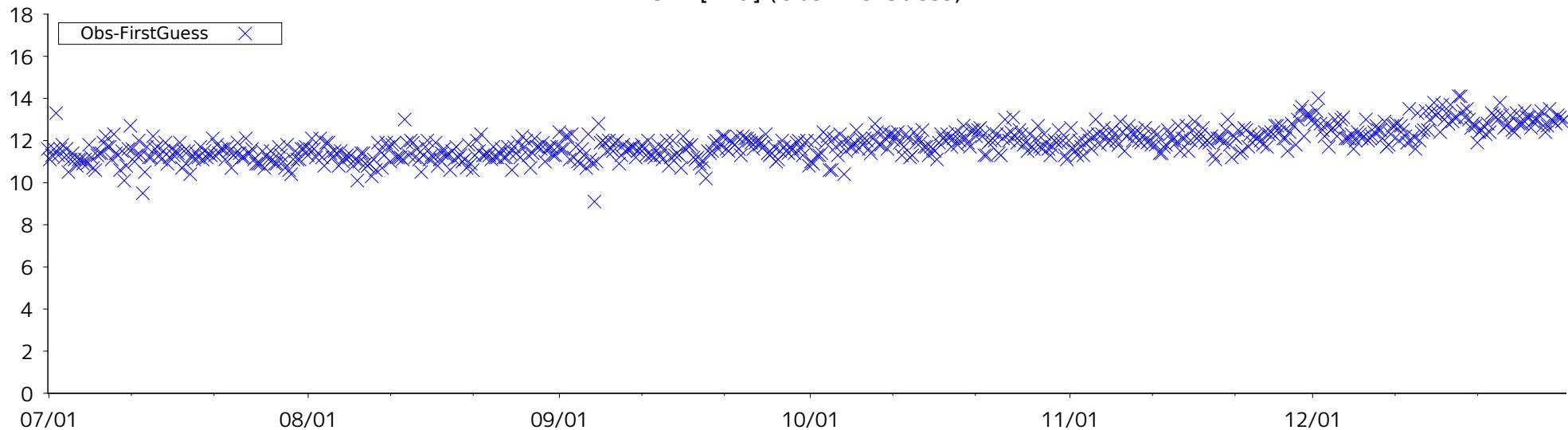
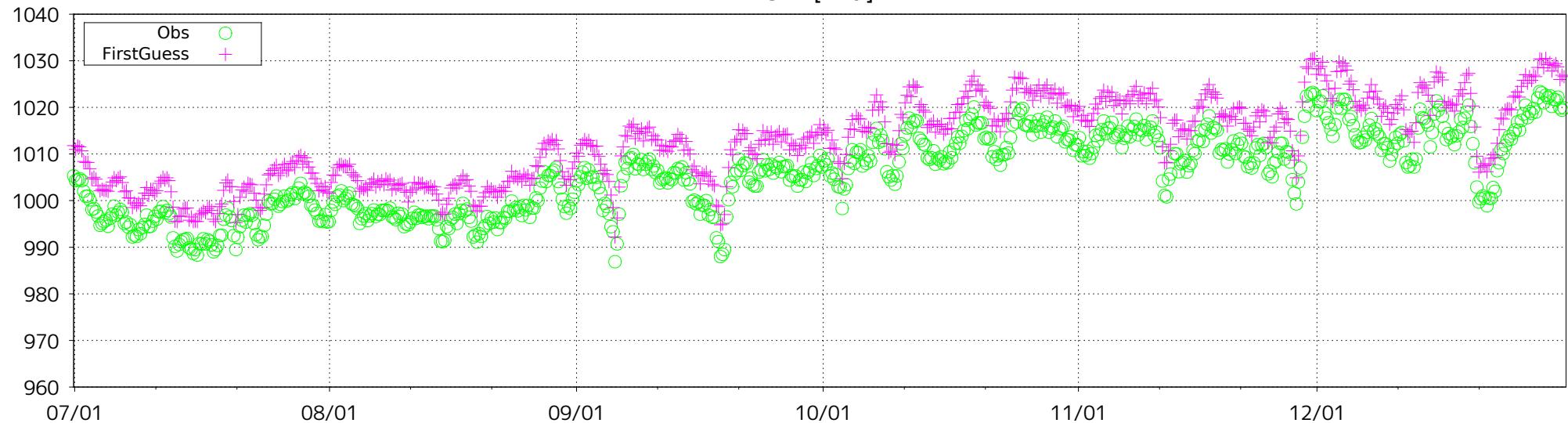


Figure 42 Time-series representation of SLP Obs minus FirstGuess for station 47102

ID: 47145 (lat: 36.8N, lon: 127.3E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

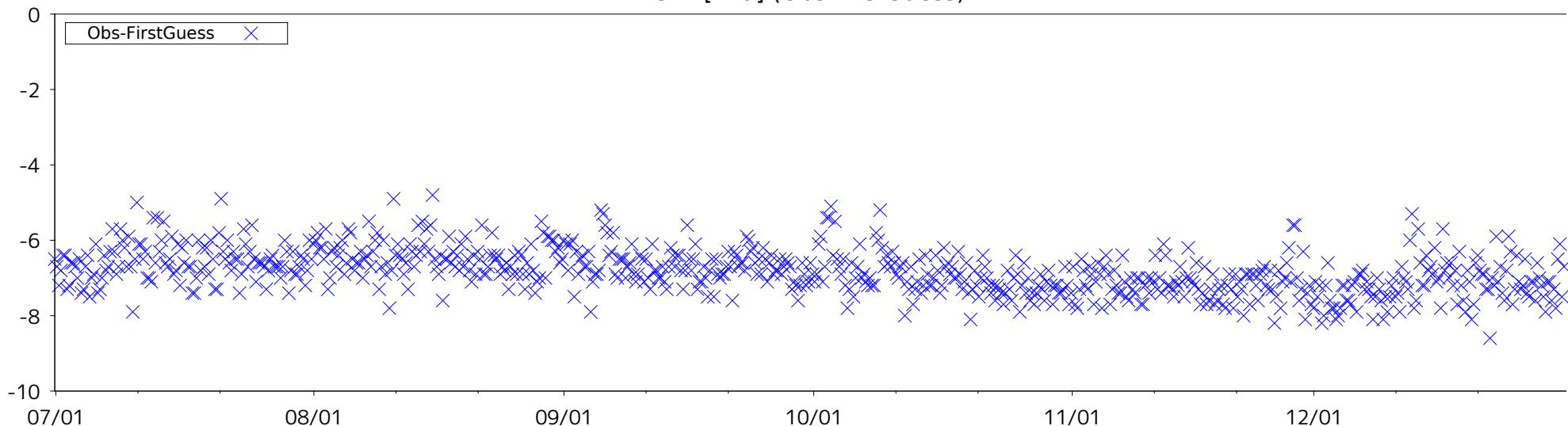
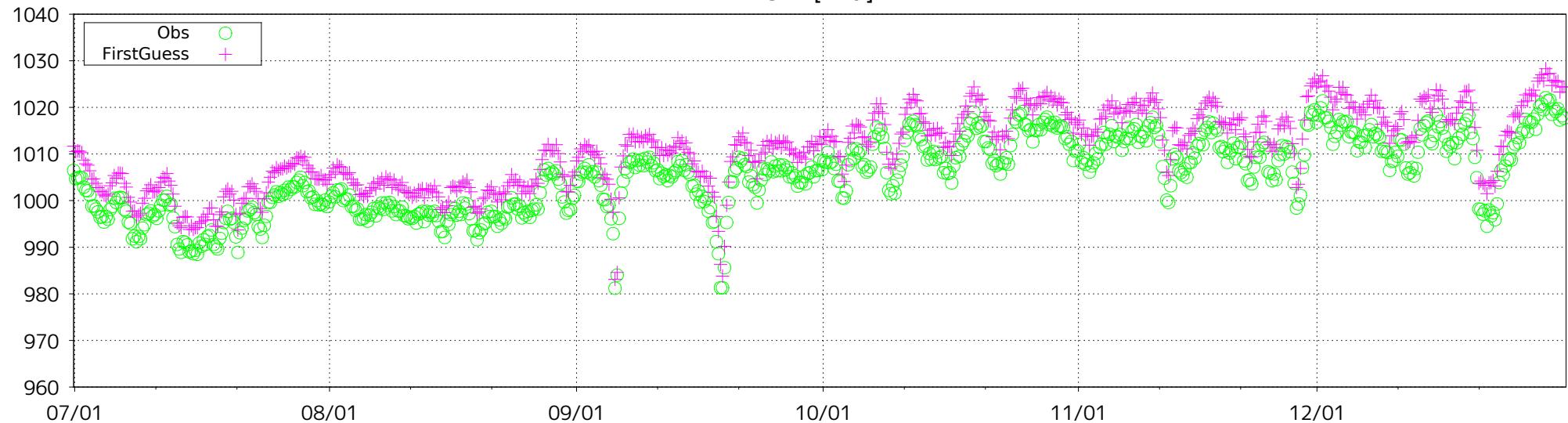


Figure 43 Time-series representation of SLP Obs minus FirstGuess for station 47145

ID: 47152 (lat: 35.6N, lon: 129.3E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

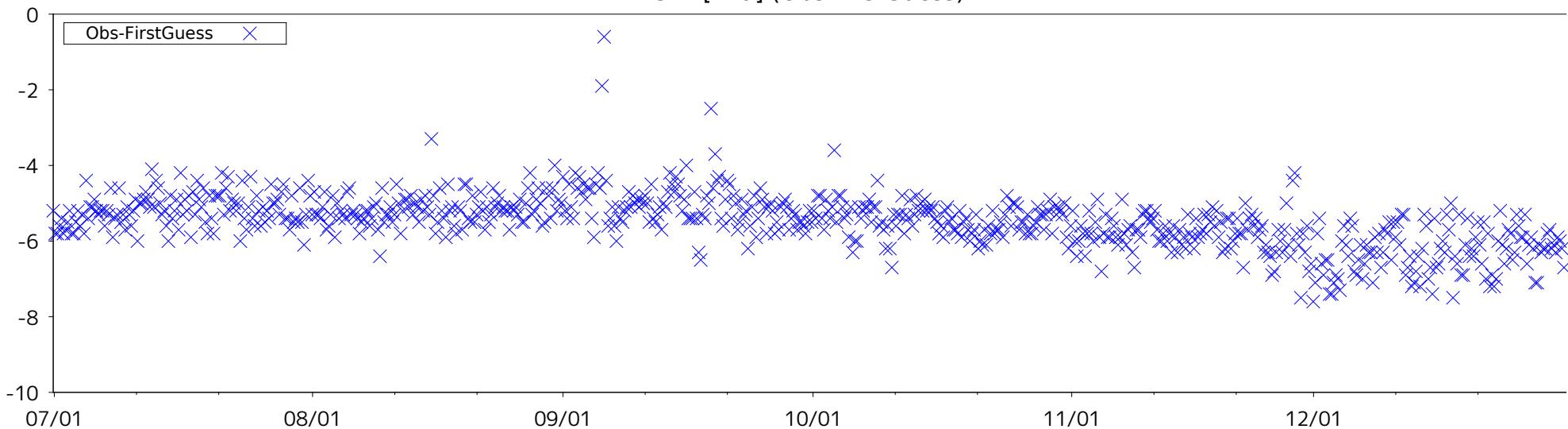


Figure 44 Time-series representation of SLP Obs minus FirstGuess for station 47152

LEVEL = SUR            ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)

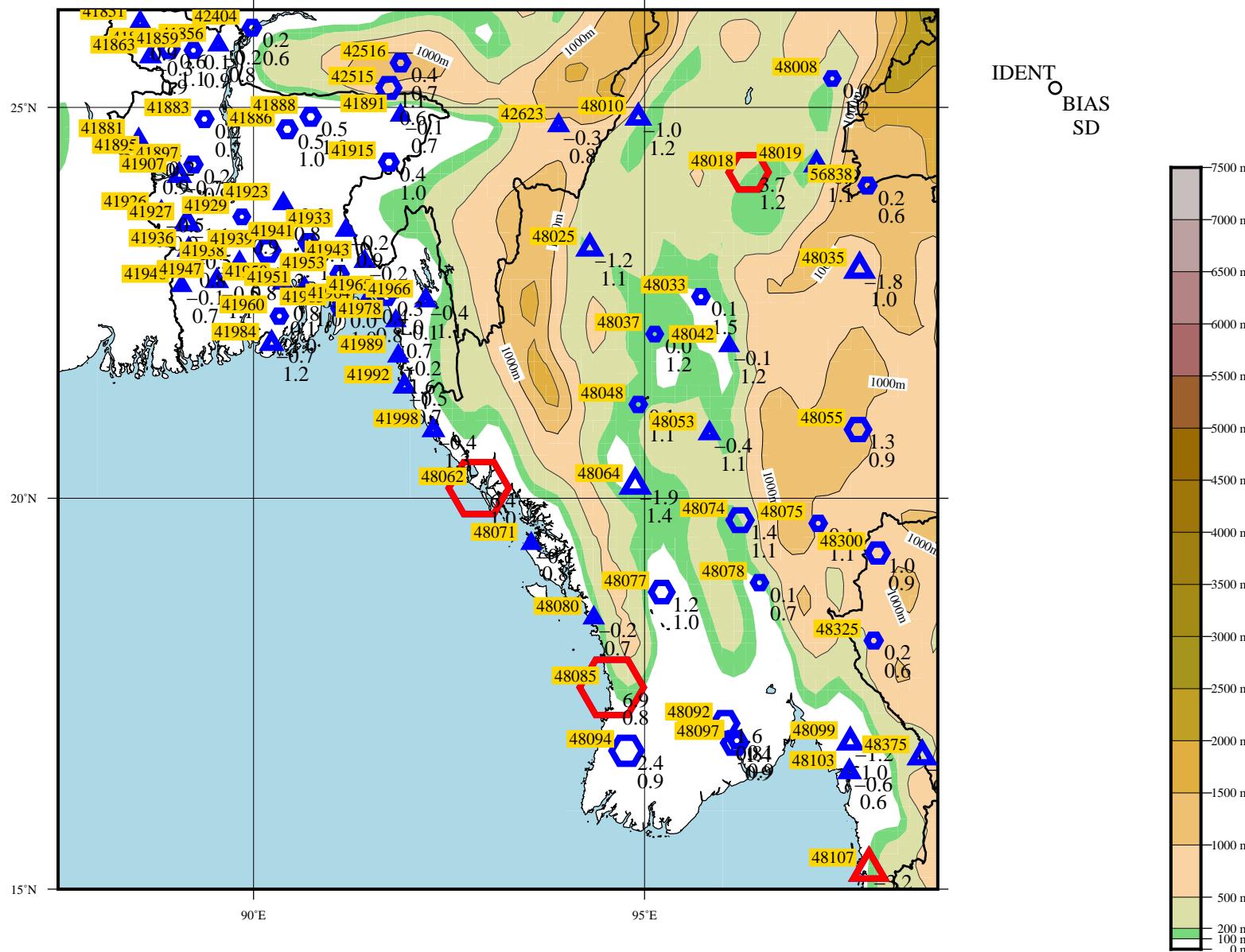


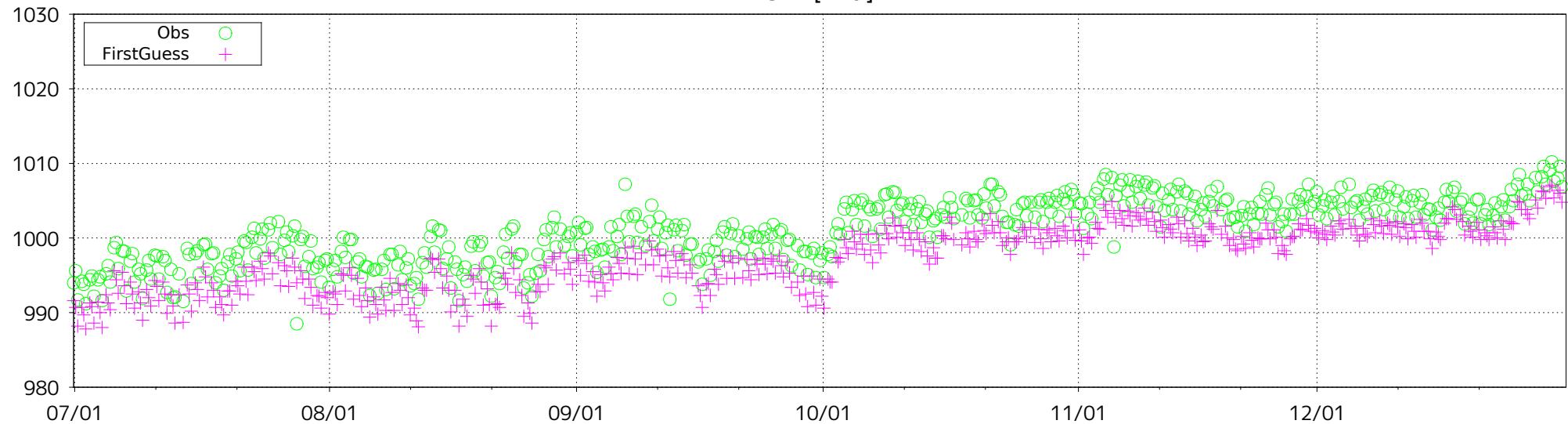
Figure 45 BIAS and SD of SLP for station 48018, 48062, 48085, 48107 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 48018 (lat: 24.2N, lon: 96.3E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

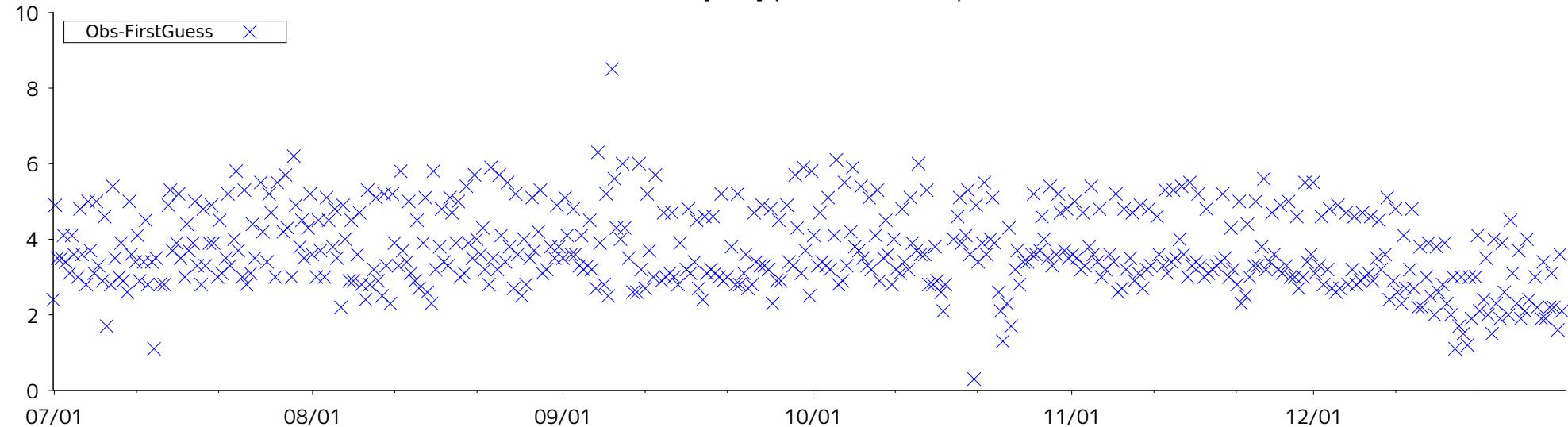
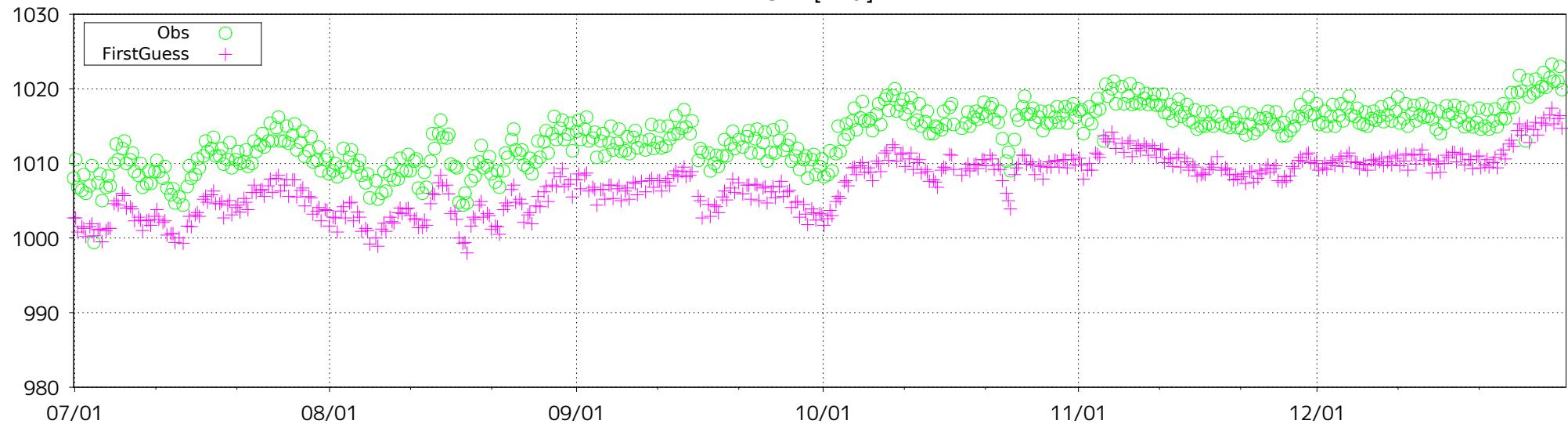


Figure 46 Time-series representation of SLP Obs minus FirstGuess for station 48018

ID: 48062 (lat: 20.1N, lon: 92.9E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

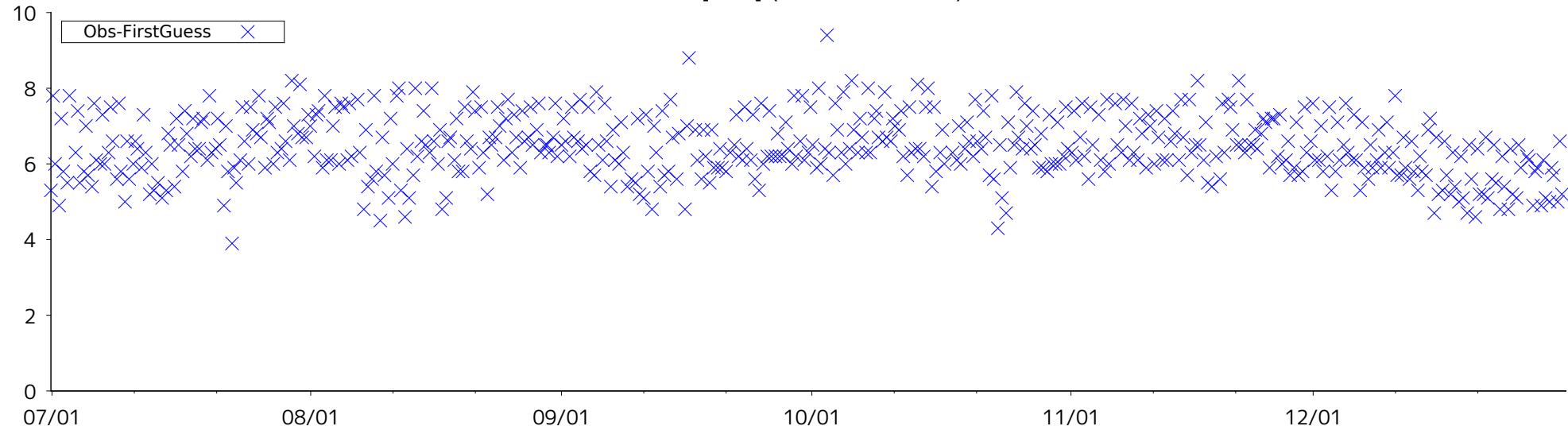
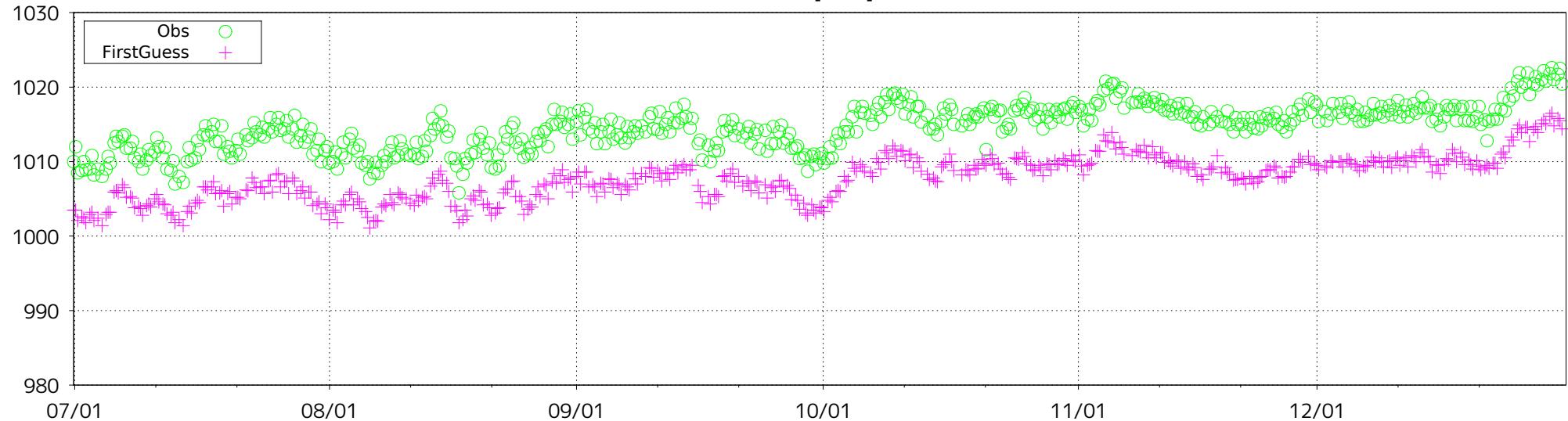


Figure 47 Time-series representation of SLP Obs minus FirstGuess for station 48062

ID: 48085 (lat: 17.6N, lon: 94.6E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

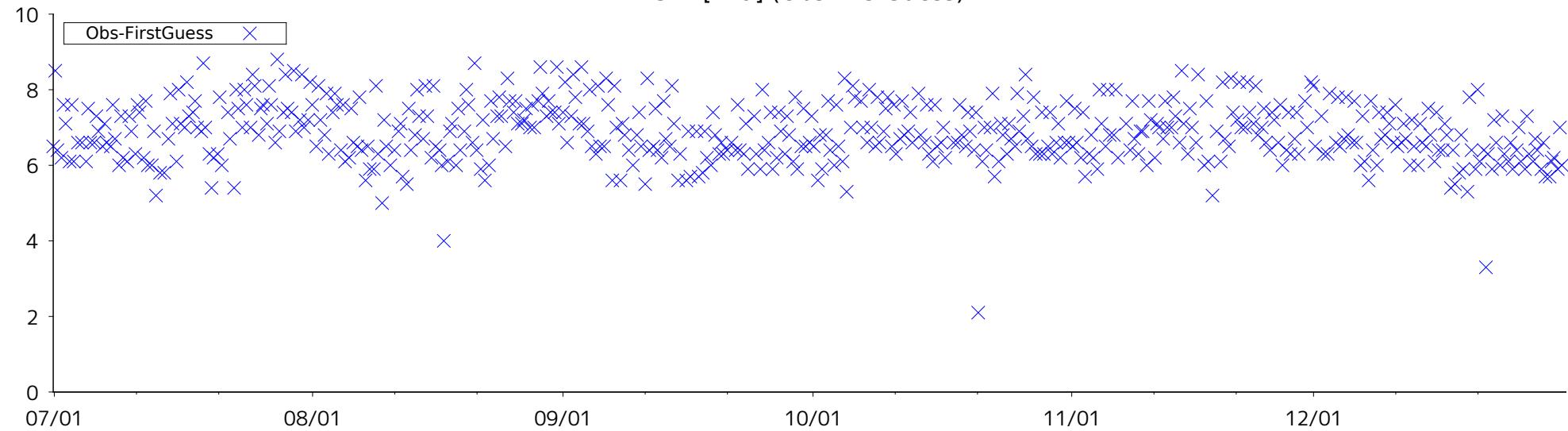
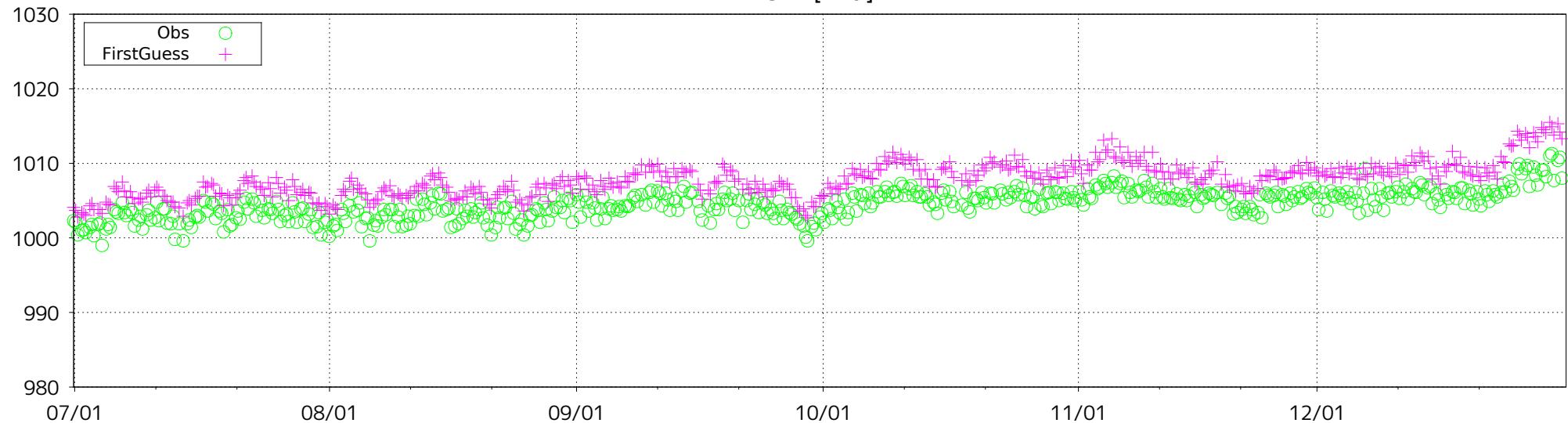


Figure 48 Time-series representation of SLP Obs minus FirstGuess for station 48085

ID: 48107 (lat: 15.3N, lon: 97.9E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

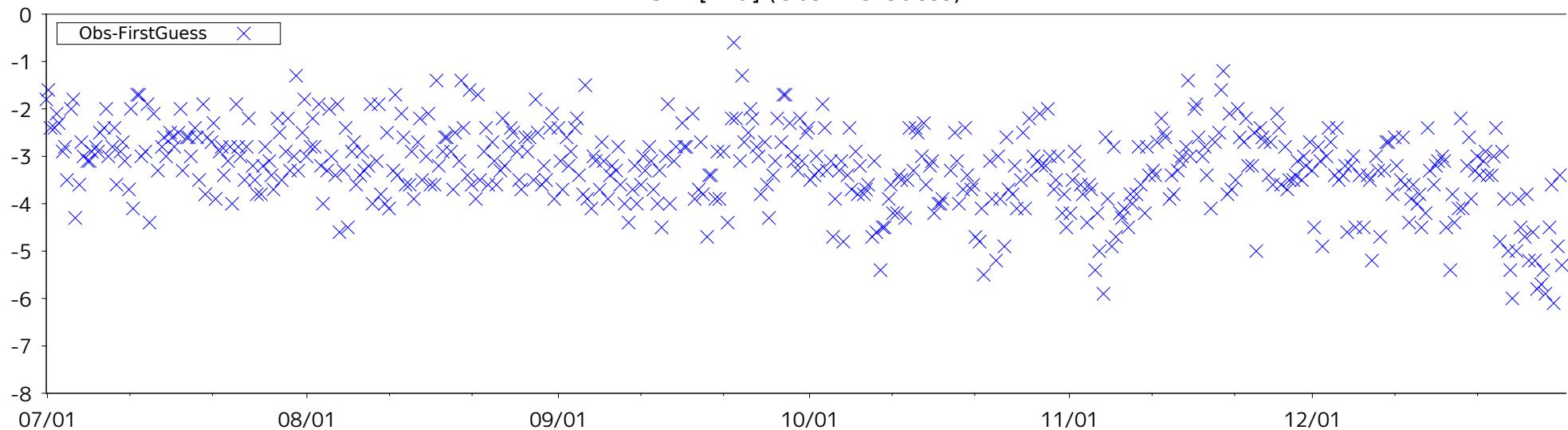
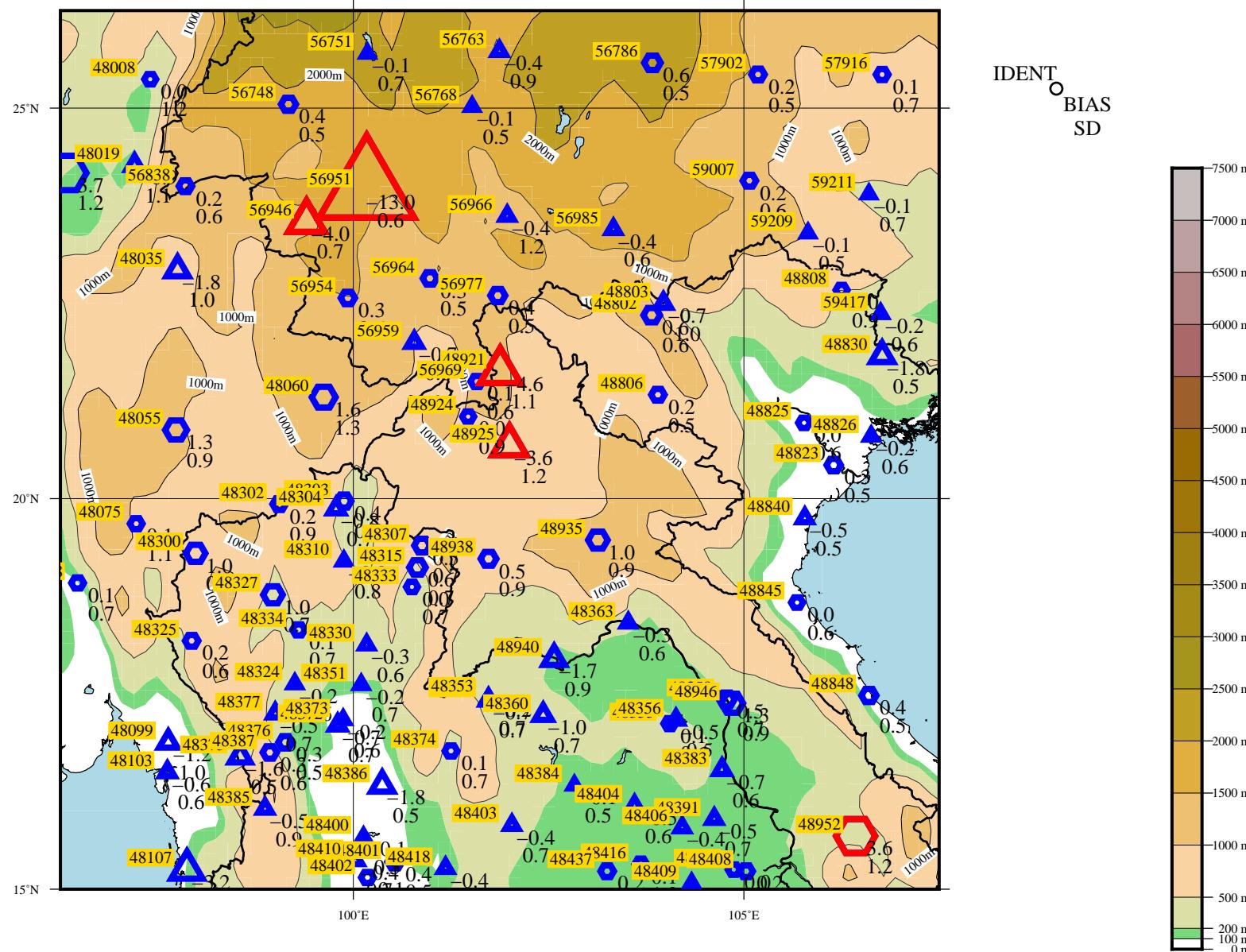
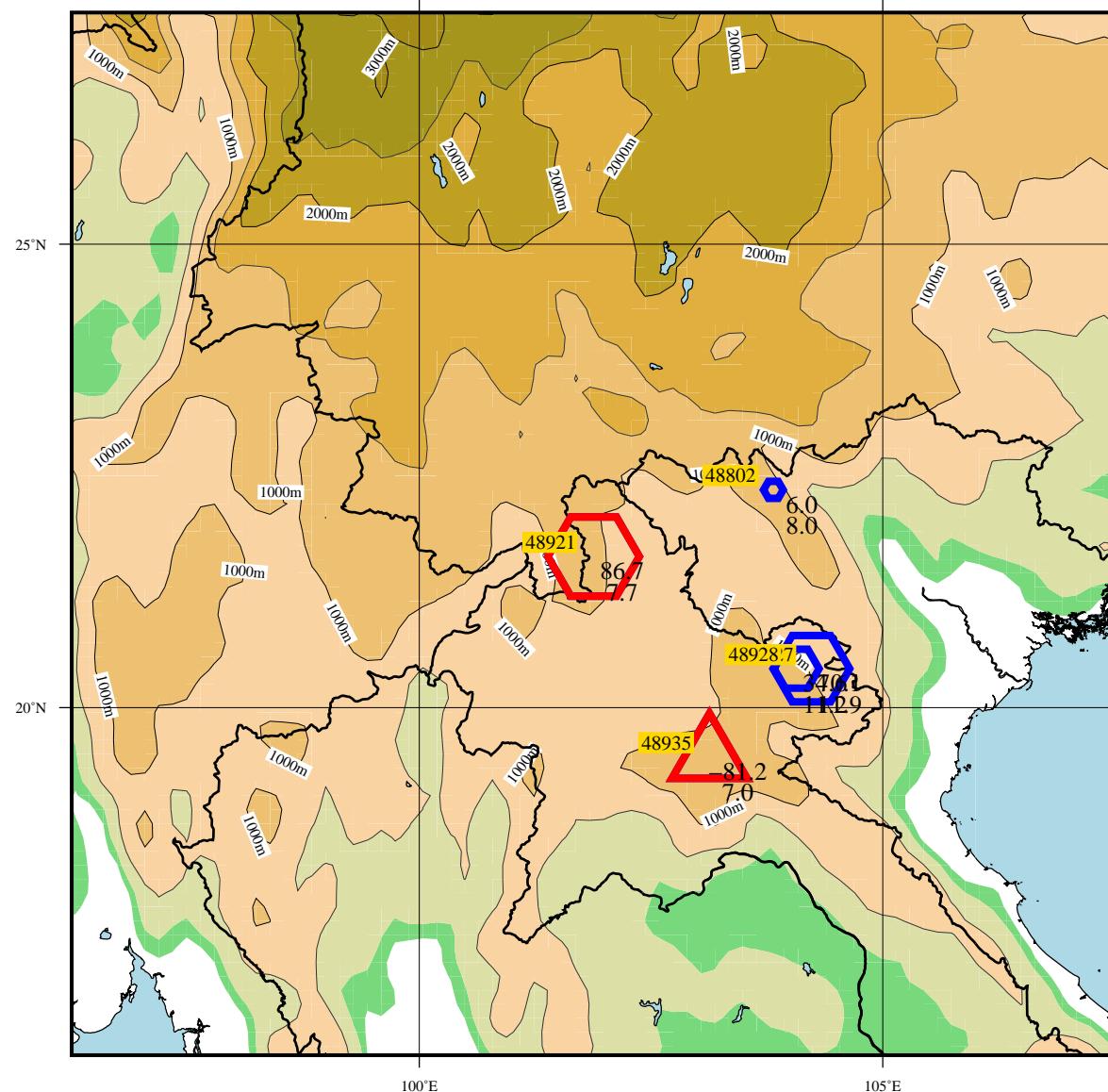


Figure 49 Time-series representation of SLP Obs minus FirstGuess for station 48107

LEVEL = SUR      ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



LEVEL = SUR      ELEMENT = GZ  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
O BIAS  
SD

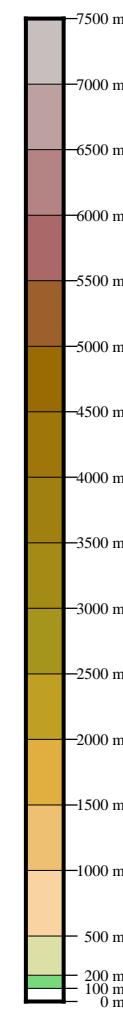


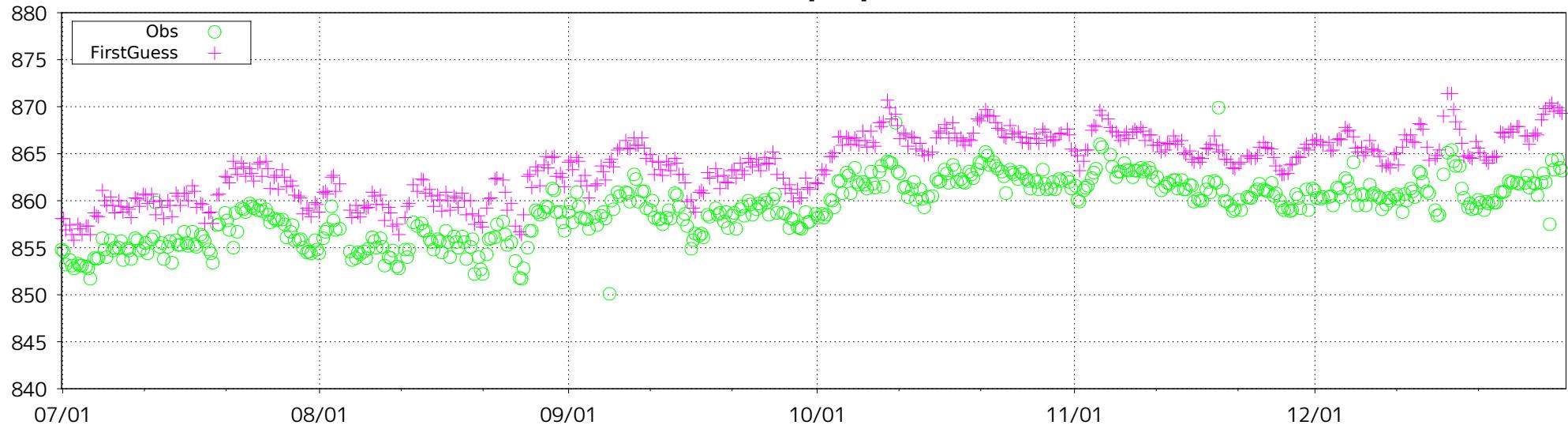
Figure 51 BIAS and SD of GZ for station 48921, 48935 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 48921 (lat: 21.6N, lon: 101.9E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

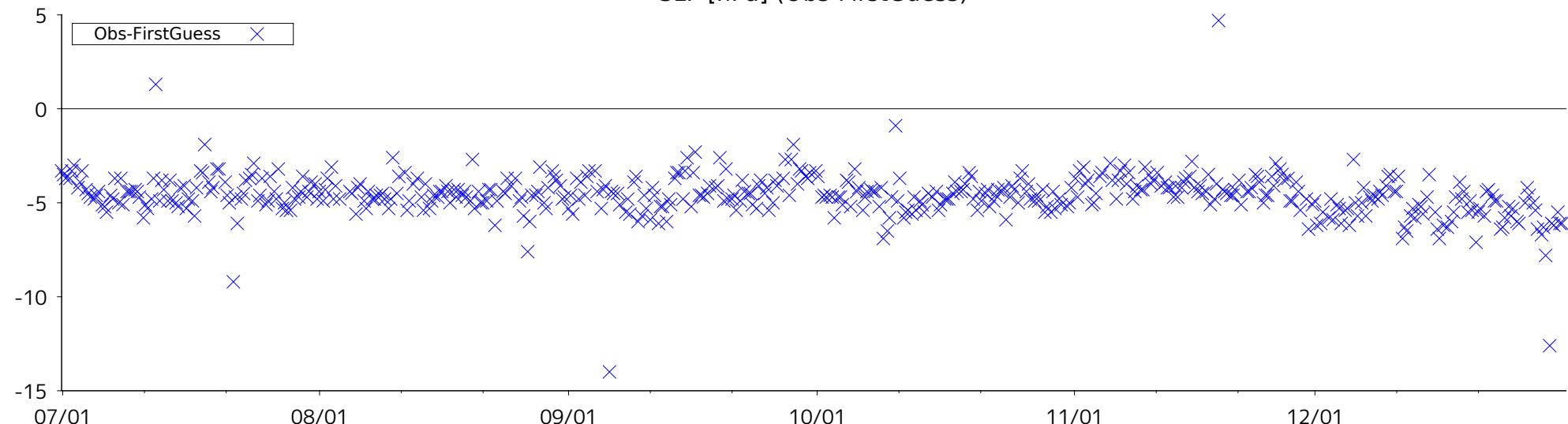
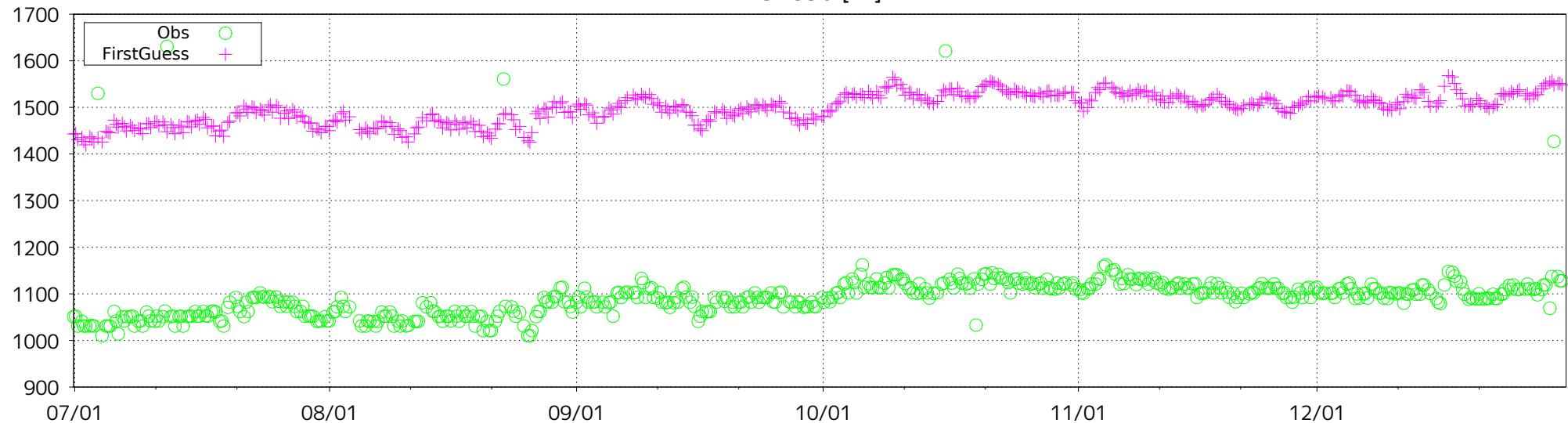


Figure 52(a) Time-series representation of SLP Obs minus FirstGuess for station 48921

ID: 48921 (lat: 21.6N, lon: 101.9E)

GZ850 [m]



GZ850 [m] (Obs-FirstGuess)

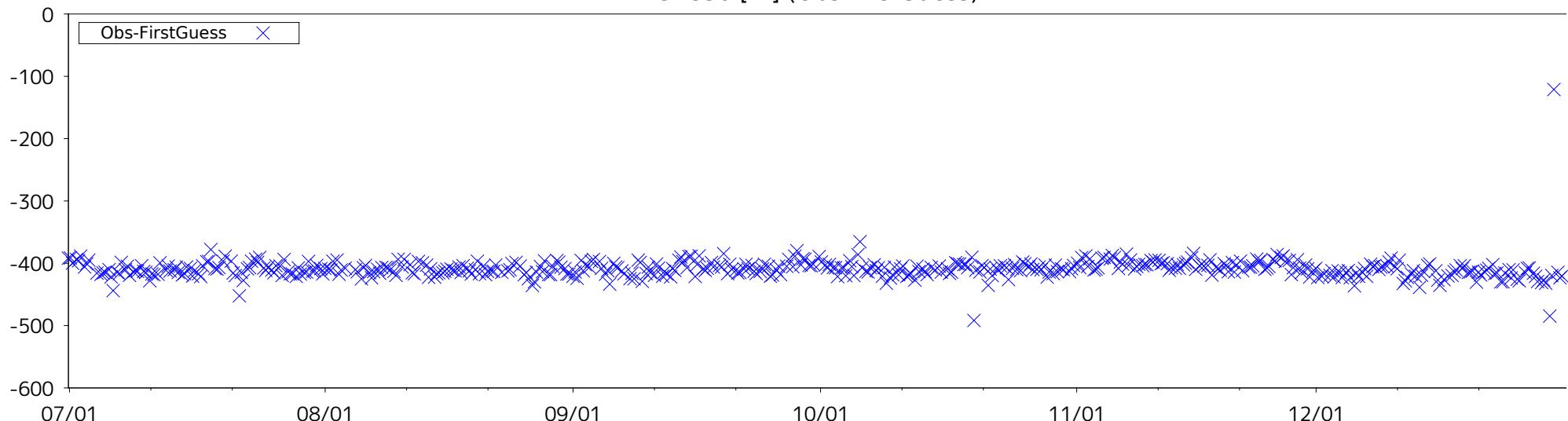
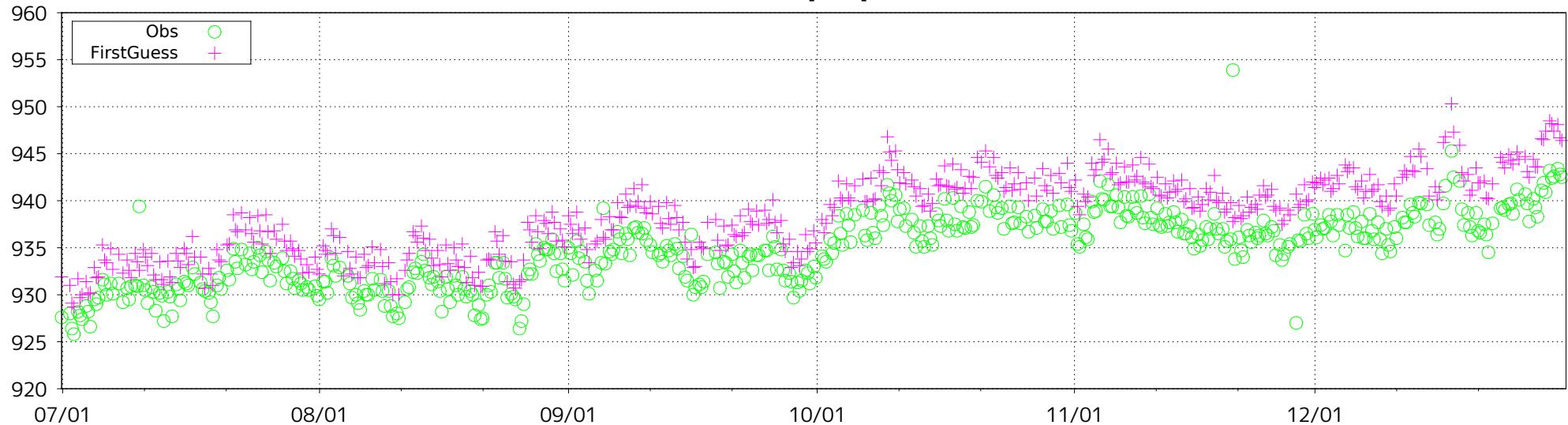


Figure 52(b) Time-series representation of GZ850 Obs minus FirstGuess for station 48921

ID: 48925 (lat: 20.7N, lon: 102.0E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

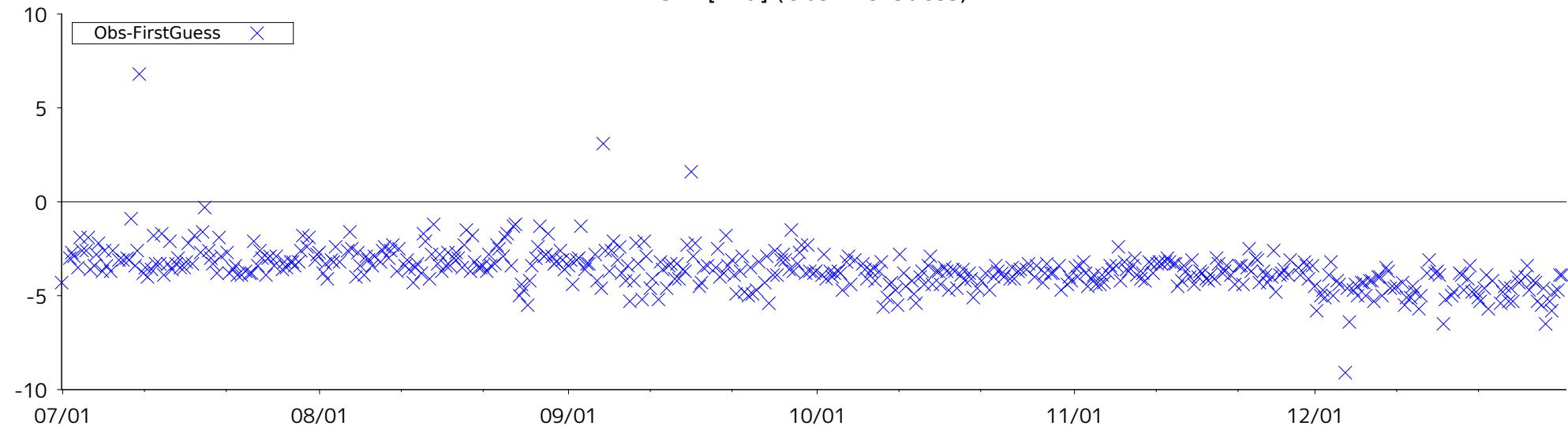
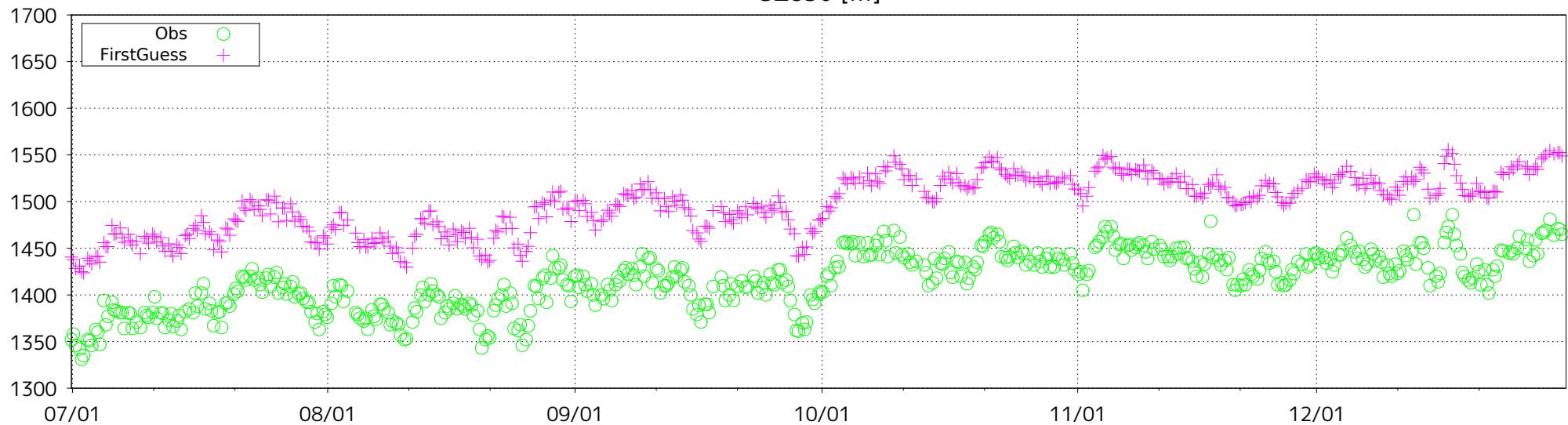


Figure 53 Time-series representation of SLP Obs minus FirstGuess for station 48925

ID: 48935 (lat: 19.5N, lon: 103.1E)

GZ850 [m]



GZ850 [m] (Obs-FirstGuess)

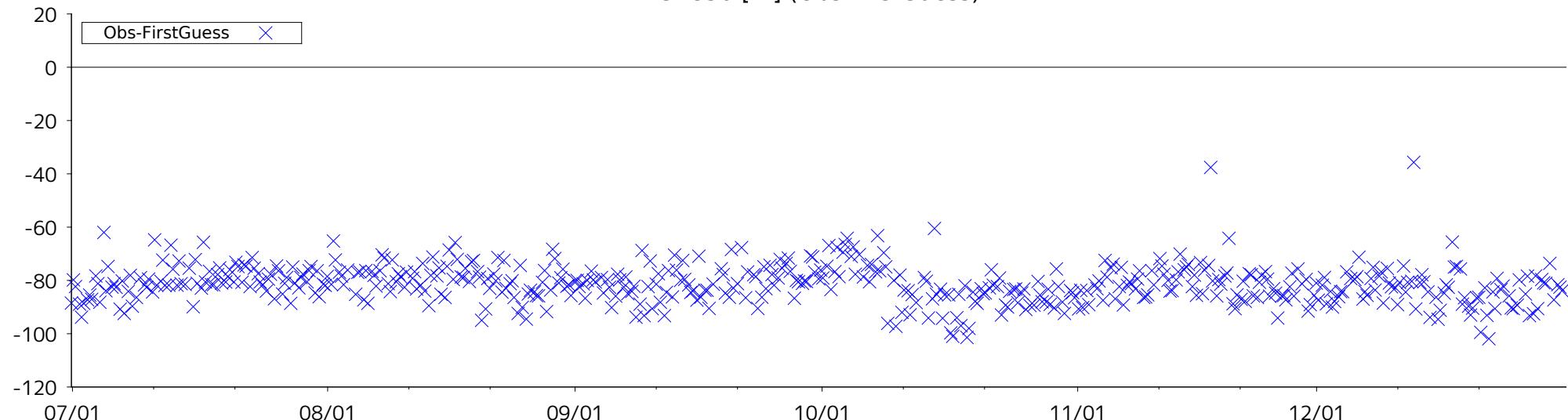
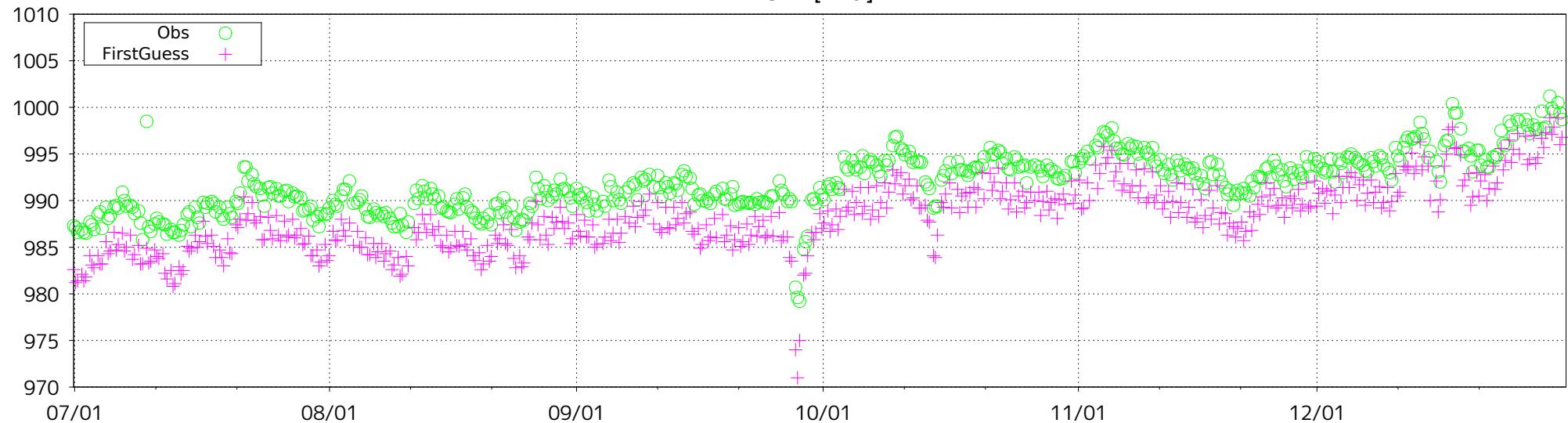


Figure 54 Time-series representation of GZ850 Obs minus FirstGuess for station 48935

ID: 48952 (lat: 15.7N, lon: 106.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

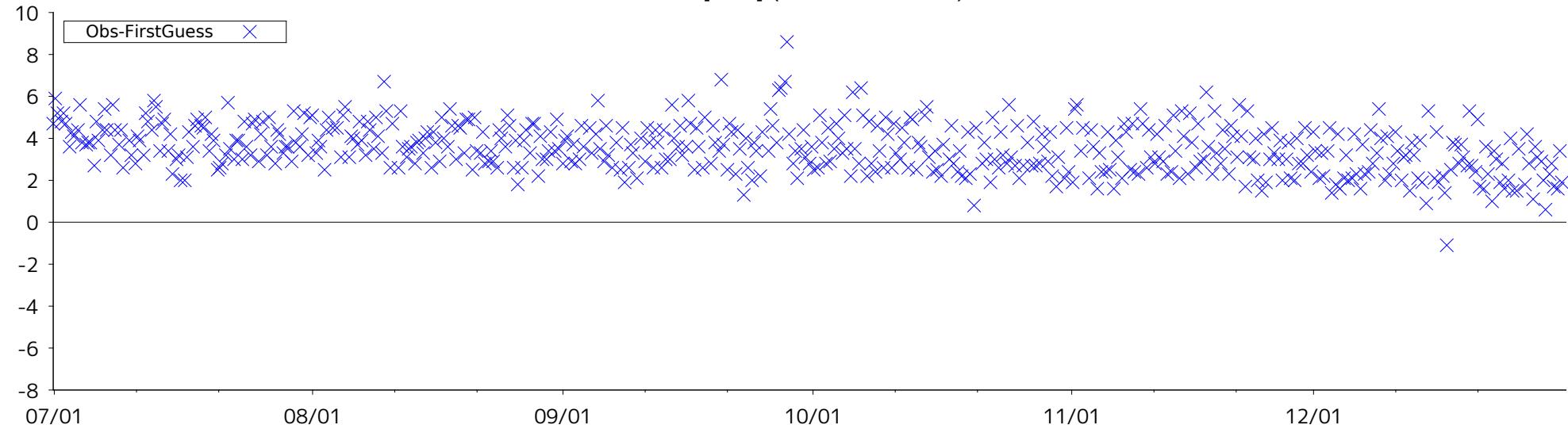
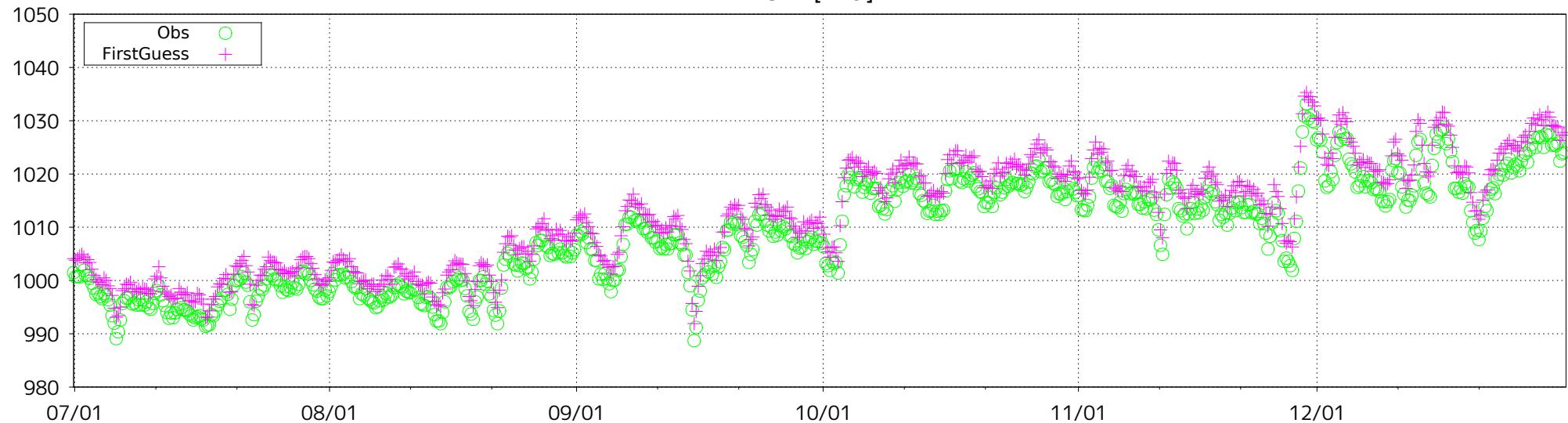


Figure 55 Time-series representation of SLP Obs minus FirstGuess for station 48952

ID: 54945 (lat: 35.5N, lon: 119.6E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

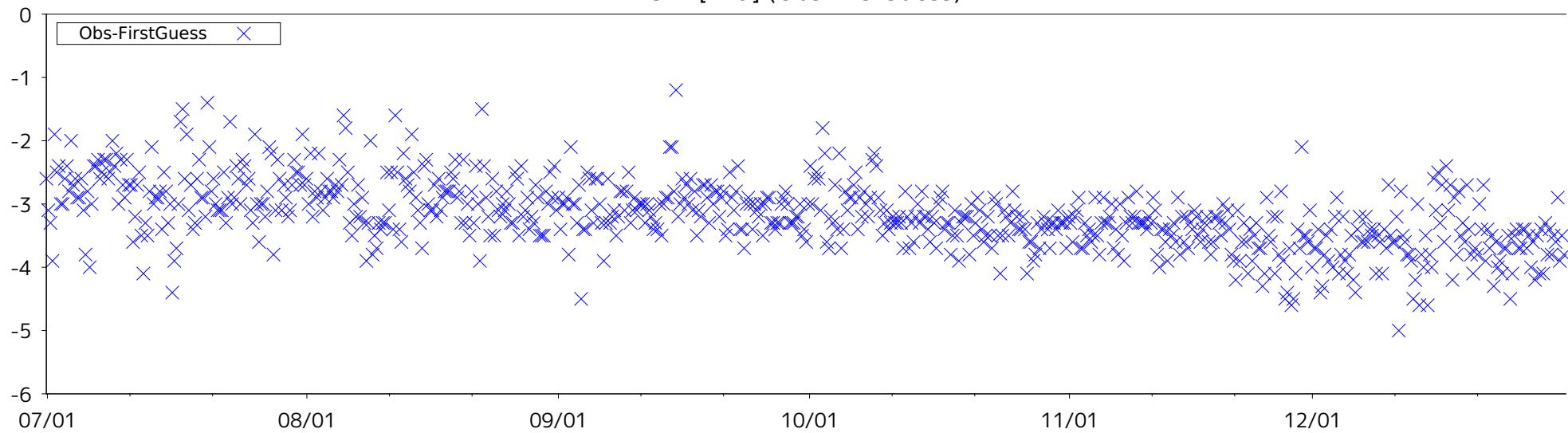
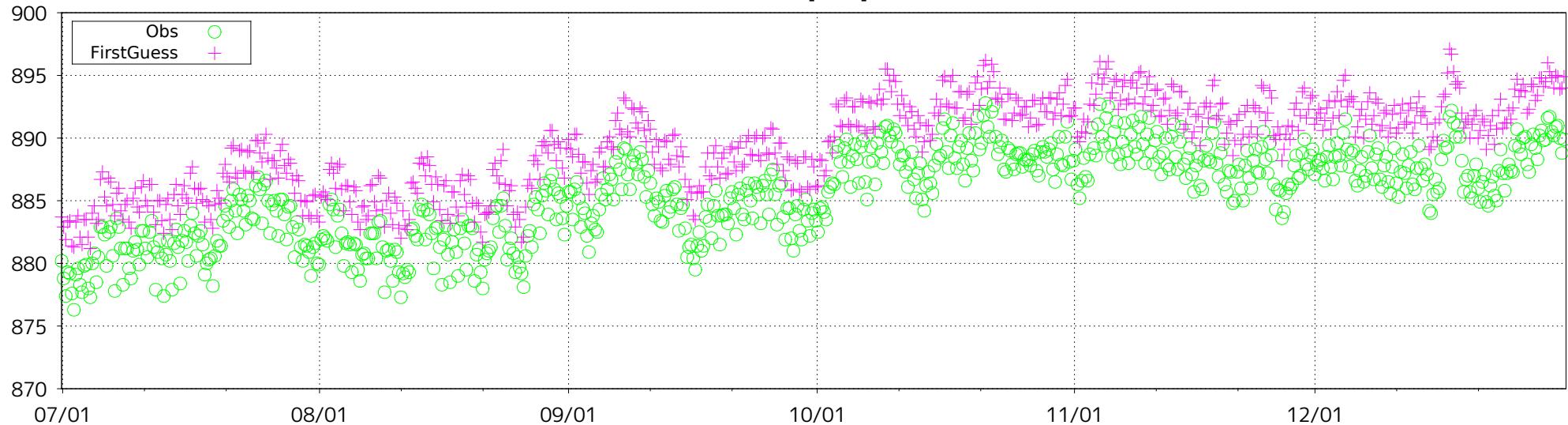


Figure 56 Time-series representation of SLP Obs minus FirstGuess for station 54945

ID: 56946 (lat: 23.6N, lon: 99.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

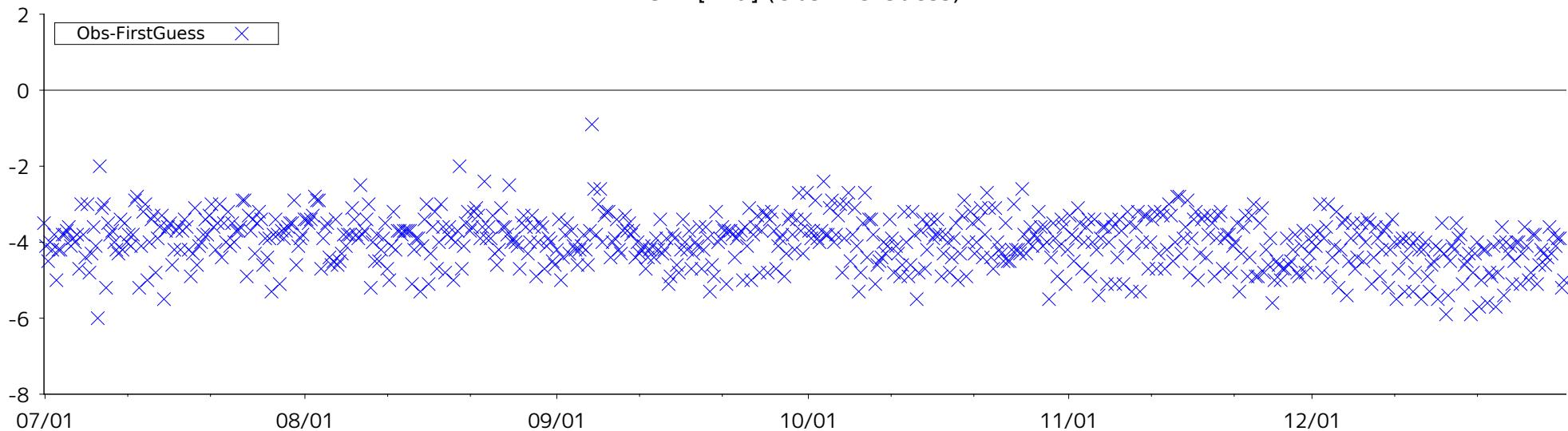
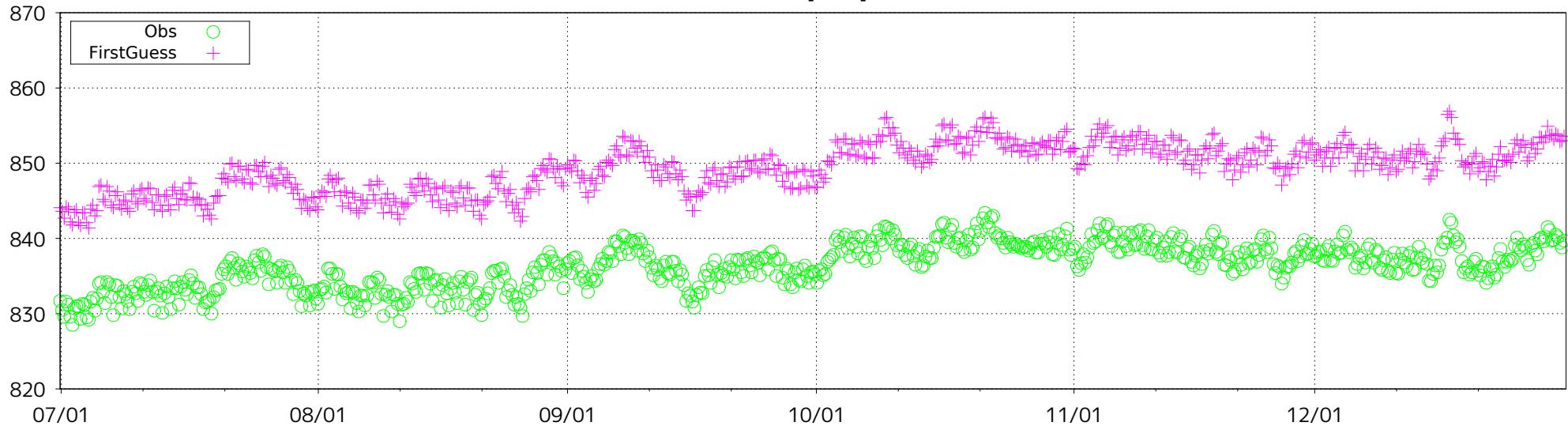


Figure 57 Time-series representation of SLP Obs minus FirstGuess for station 56946

ID: 56951 (lat: 24.0N, lon: 100.2E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

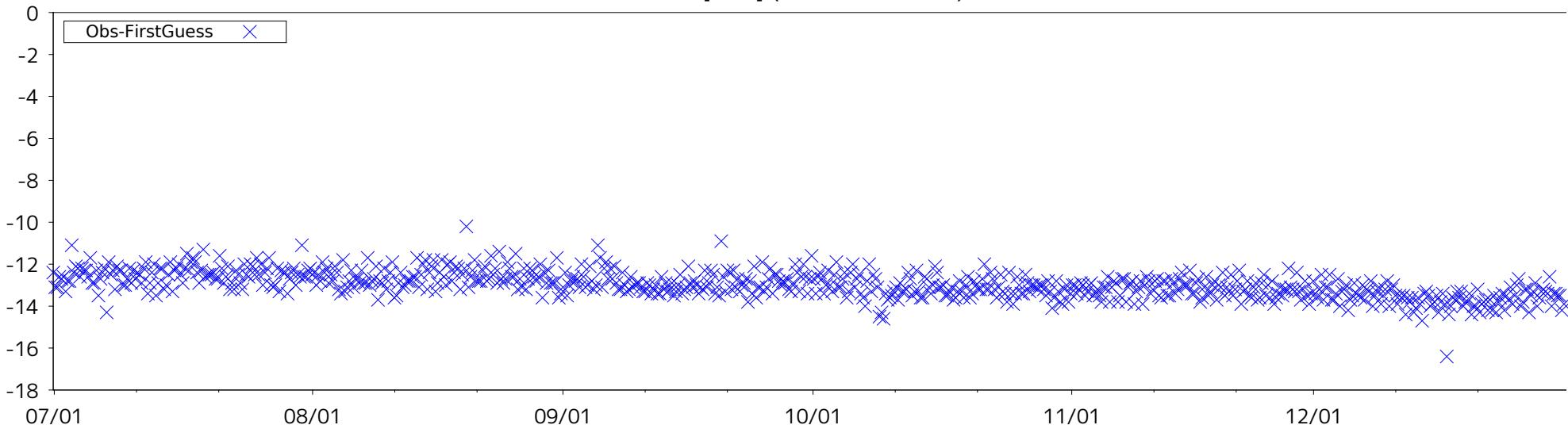
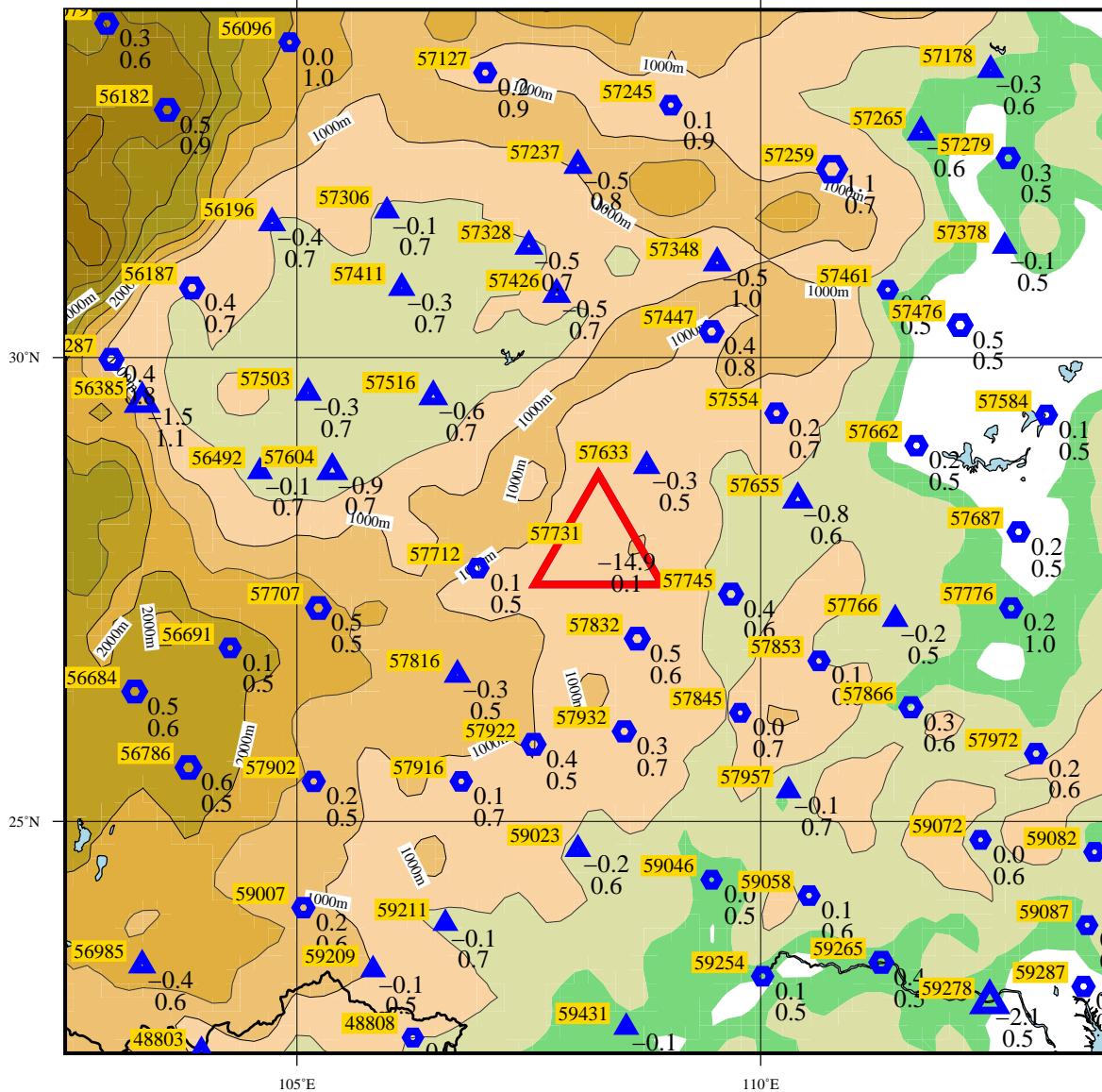


Figure 58 Time-series representation of SLP Obs minus FirstGuess for station 56951

LEVEL = SUR

ELEMENT = SLP

2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

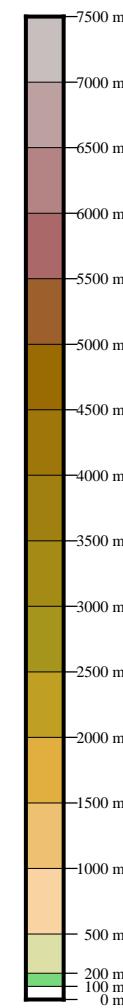


Figure 59 BIAS and SD of SLP for station 57731 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

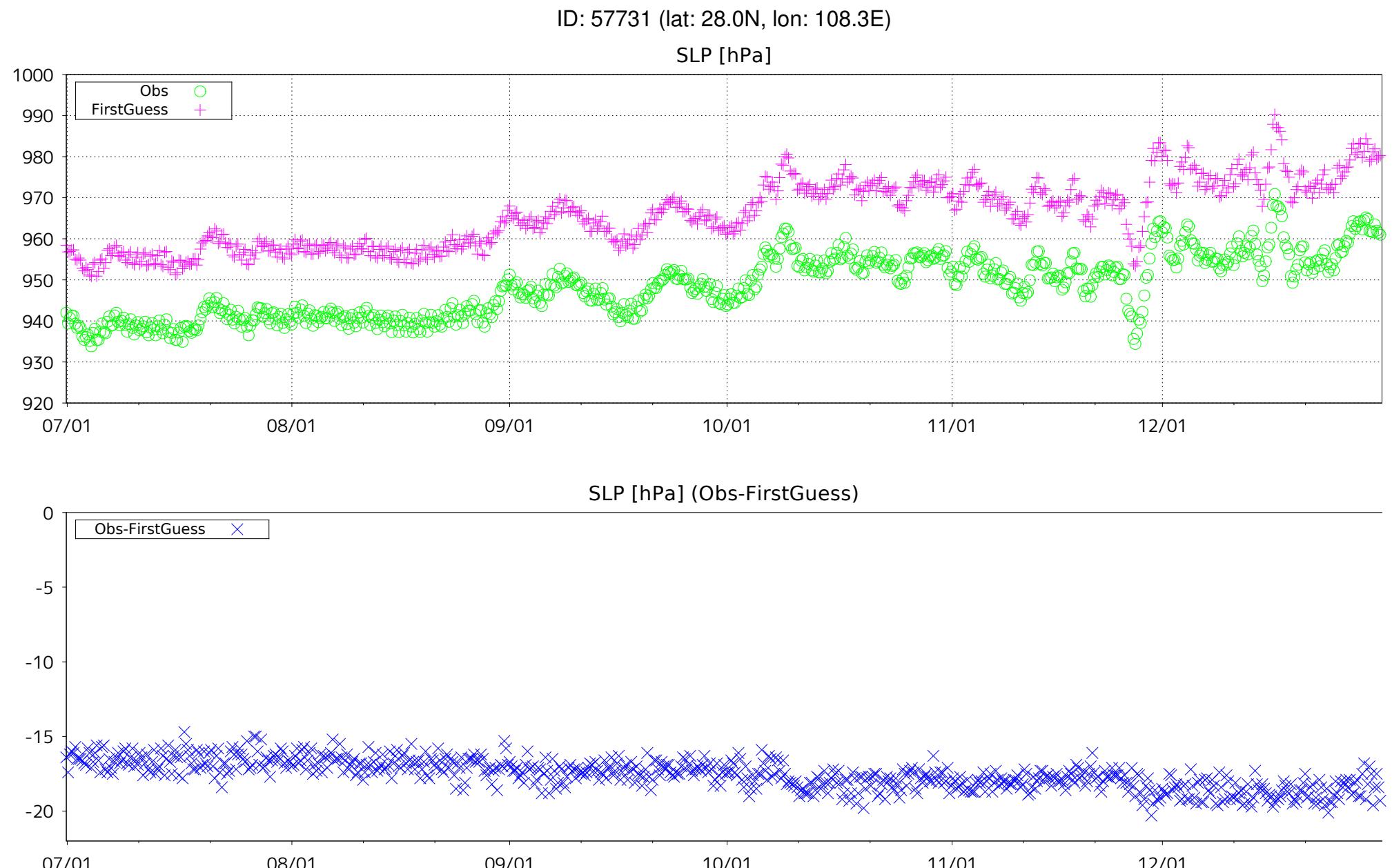
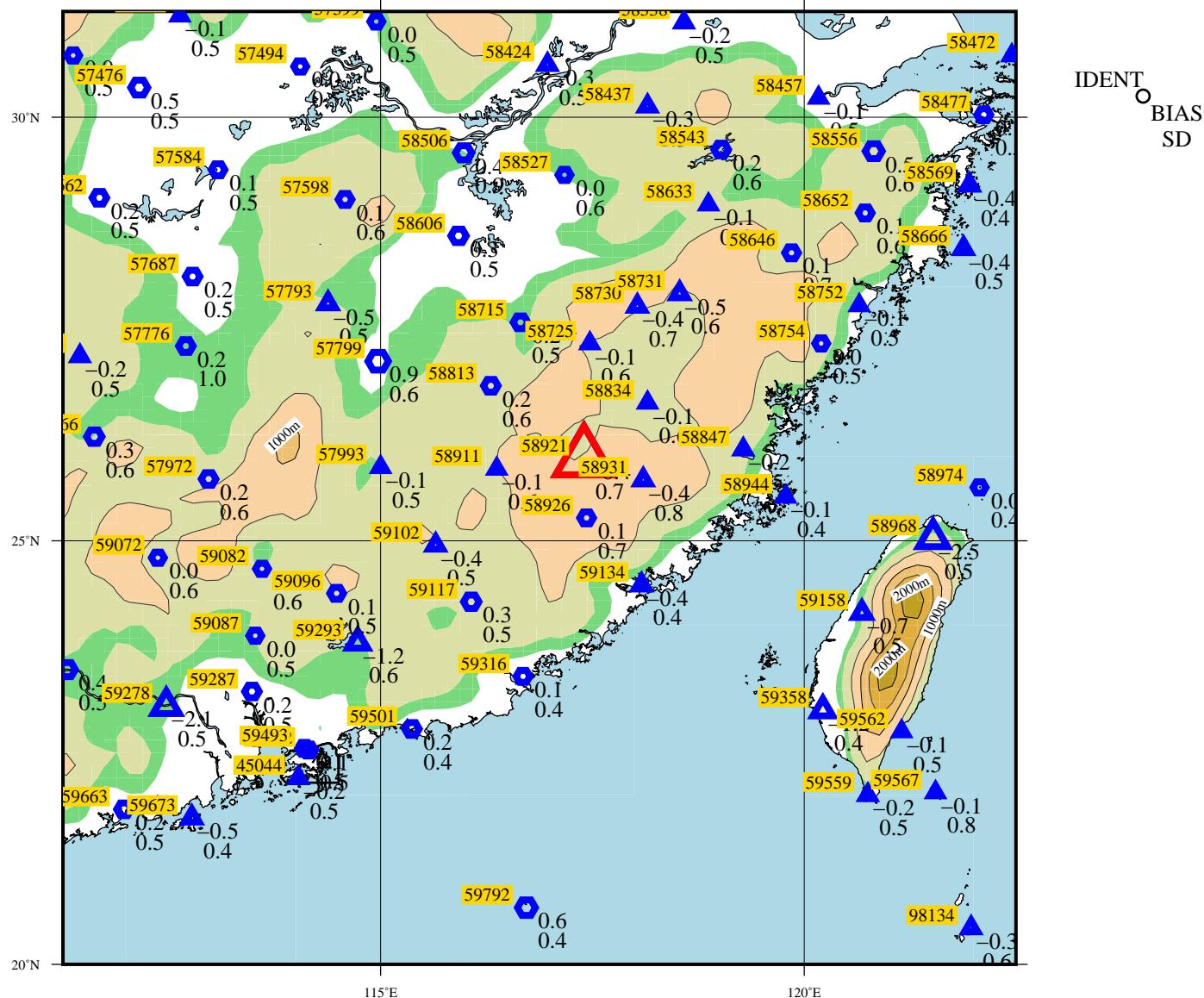


Figure 60 Time-series representation of SLP Obs minus FirstGuess for station 57731

LEVEL = SUR

ELEMENT = SLP

2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
O BIAS  
SD

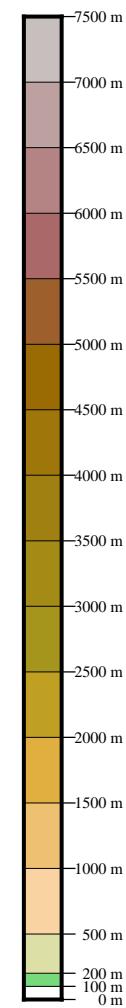


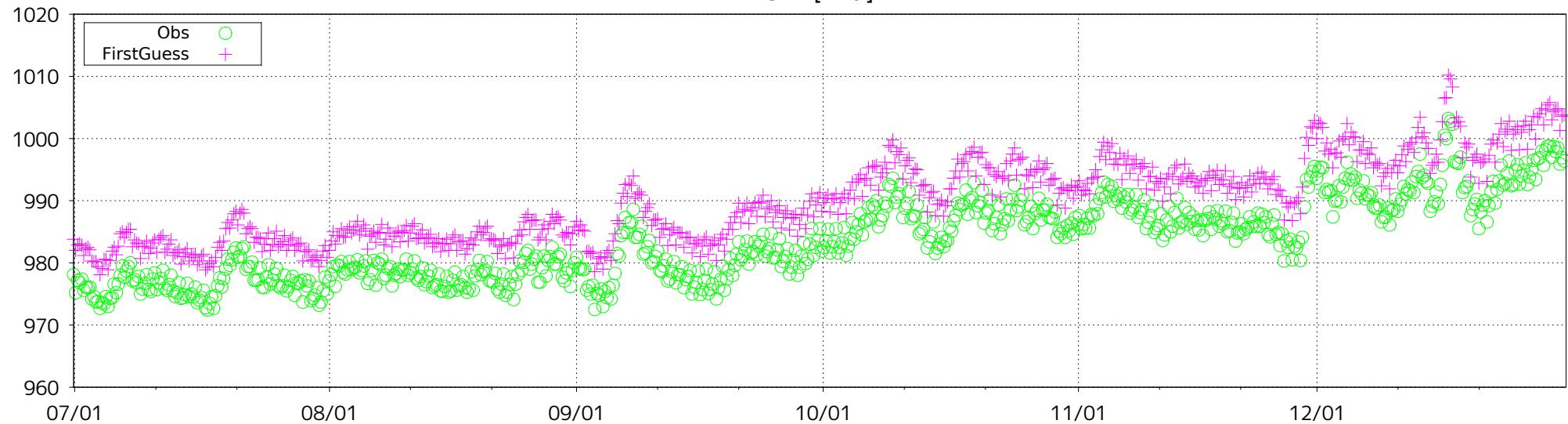
Figure 61 BIAS and SD of SLP for station 58921 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 58921 (lat: 26.0N, lon: 117.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

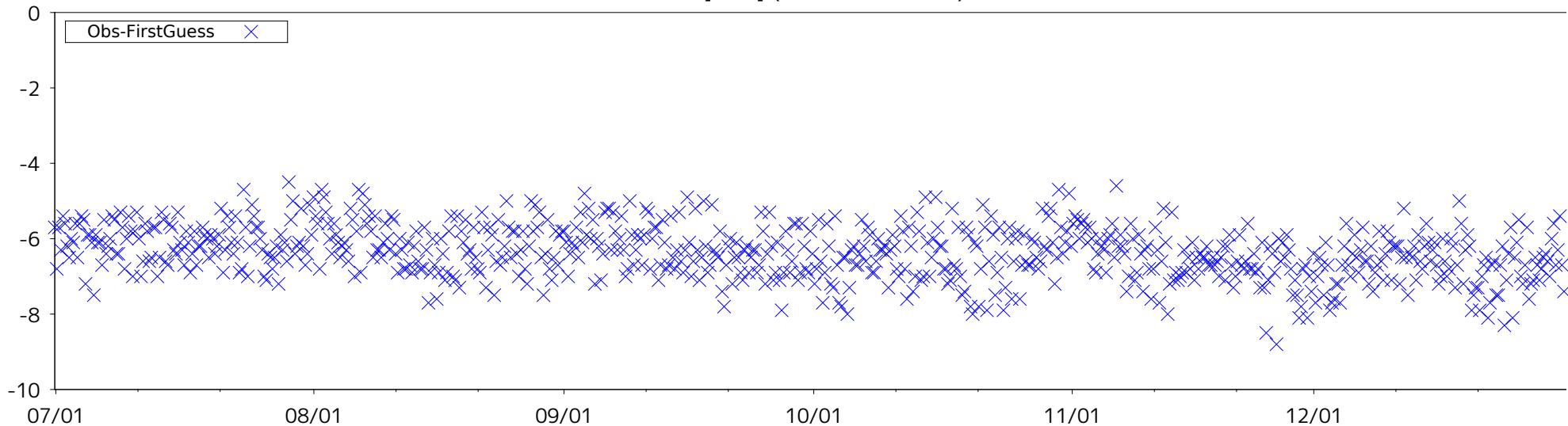
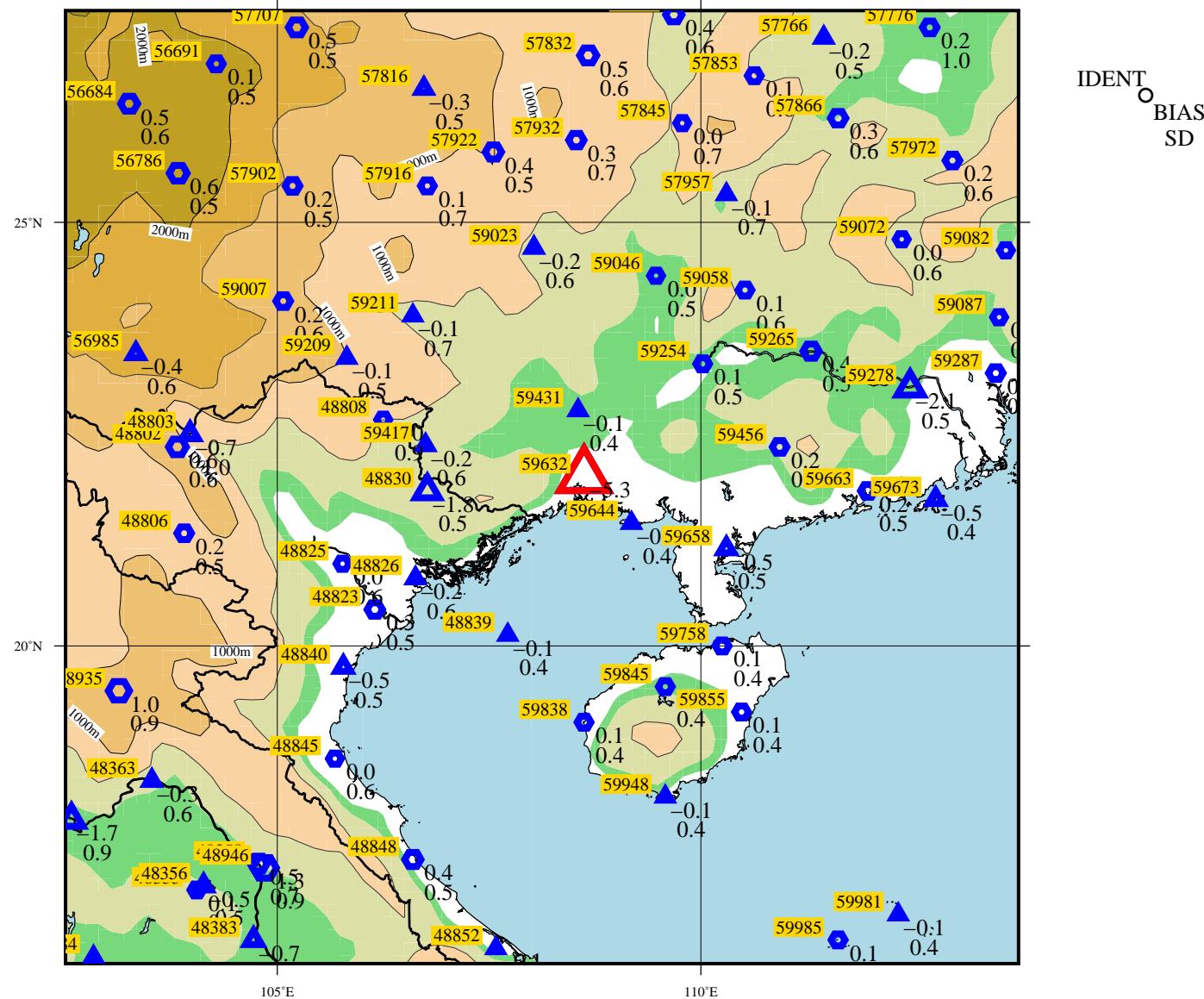


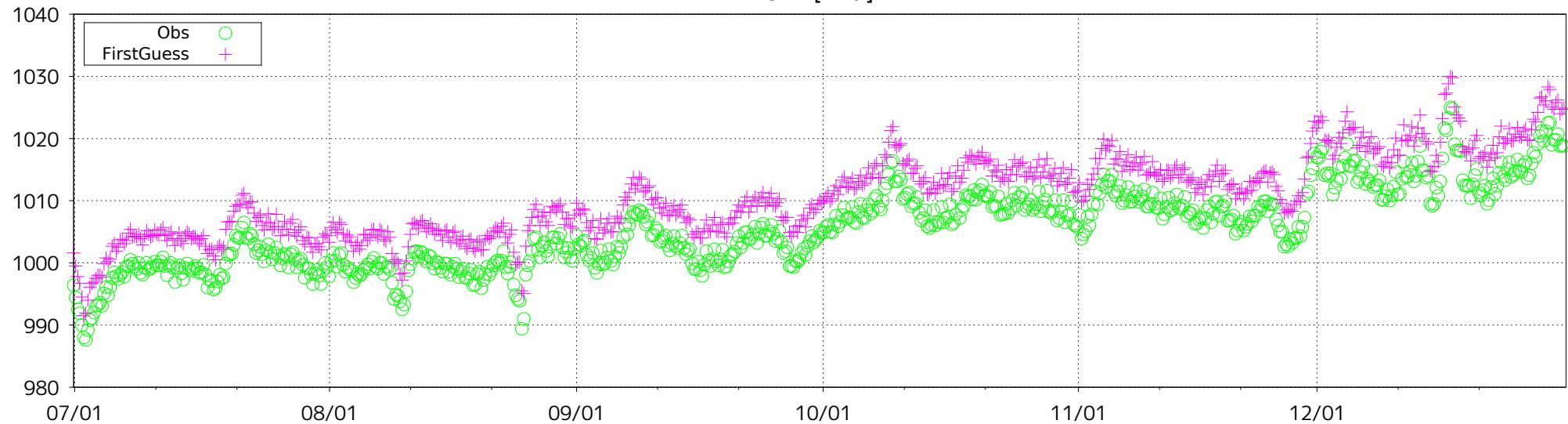
Figure 62 Time-series representation of SLP Obs minus FirstGuess for station 58921

LEVEL = SUR                    ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



ID: 59632 (lat: 22.0N, lon: 108.6E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

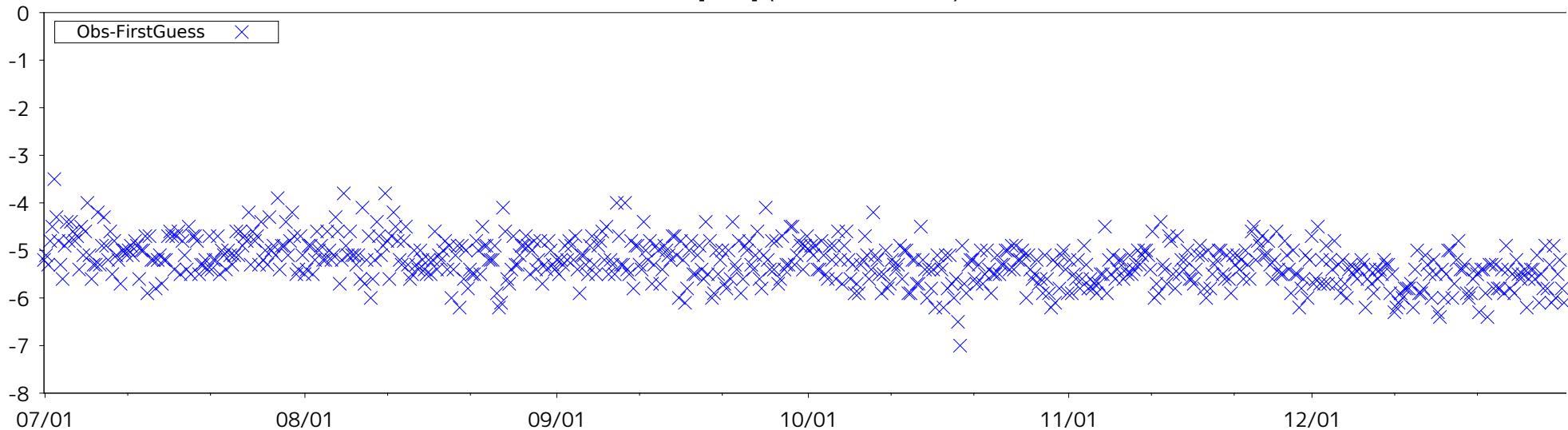
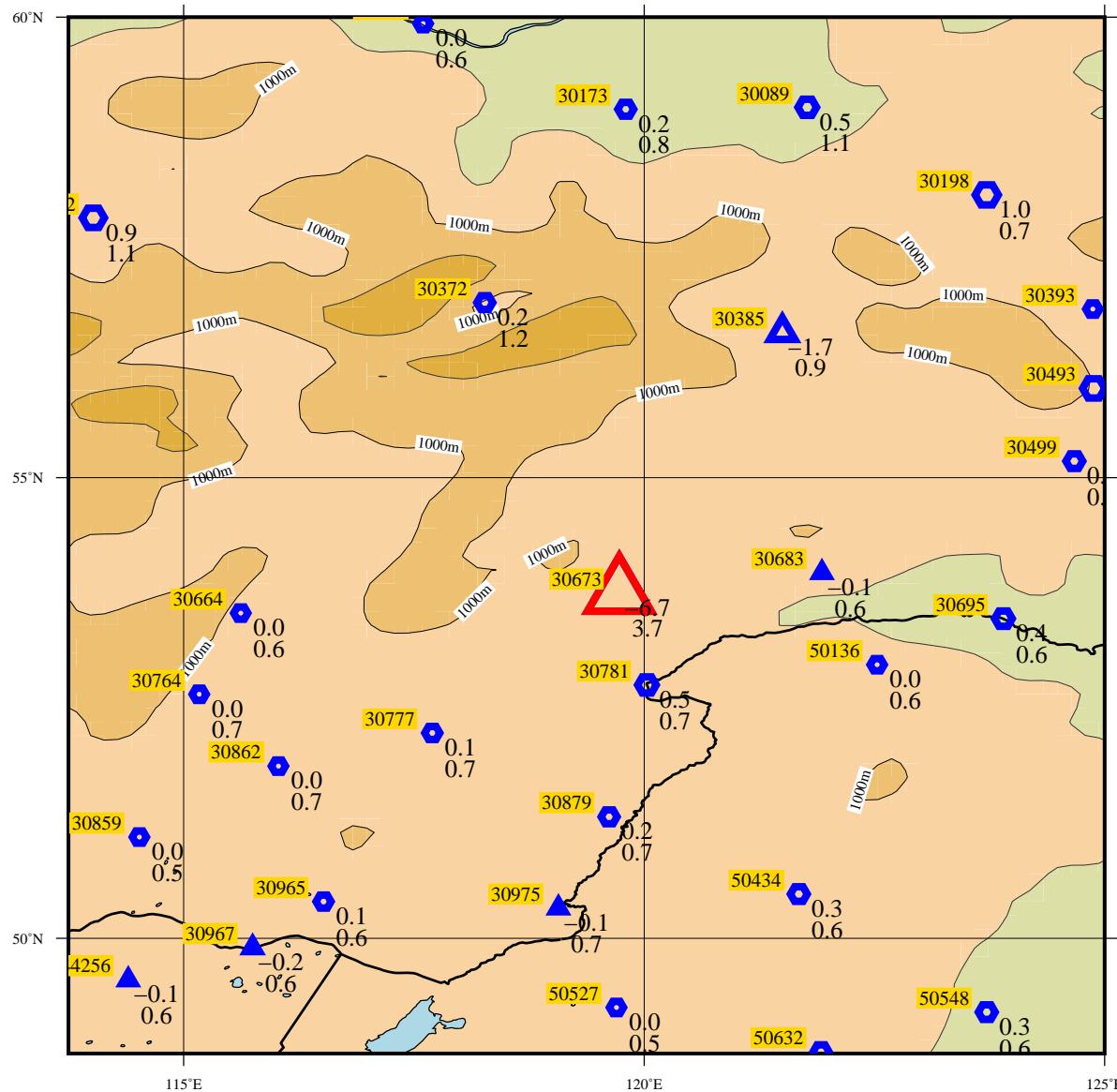


Figure 64 Time-series representation of SLP Obs minus FirstGuess for station 59632

LEVEL = SUR      ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

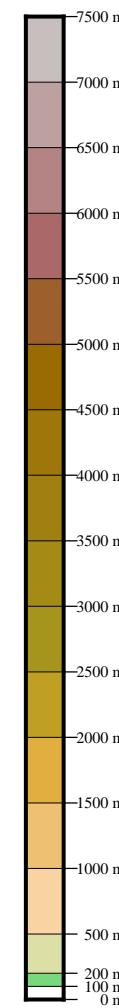


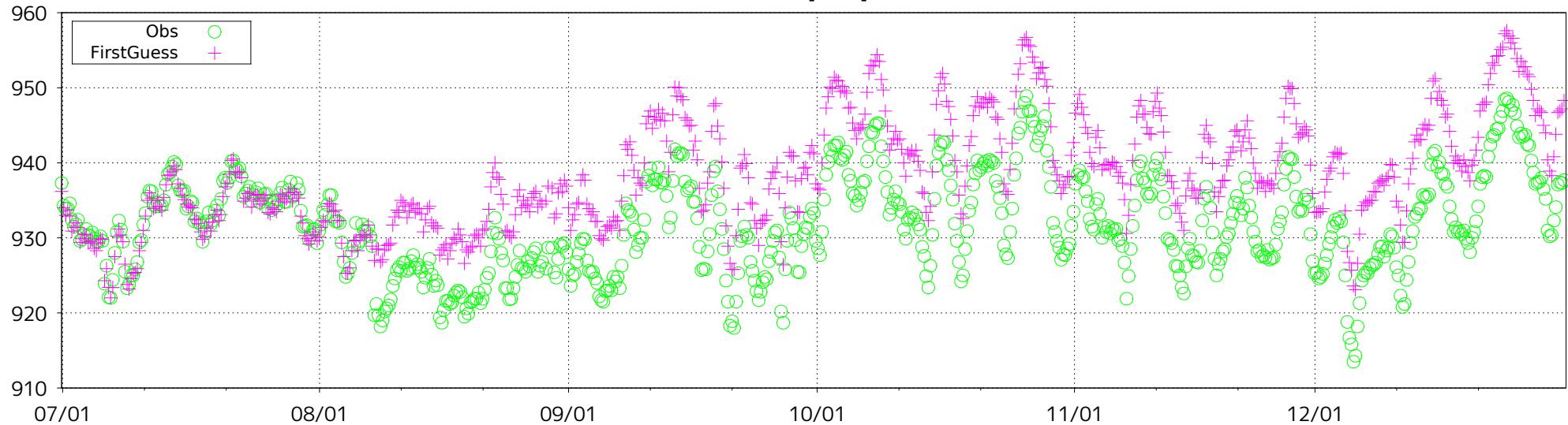
Figure 65 BIAS and SD of SLP for station 30673 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 30673 (lat: 53.8N, lon: 119.7E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

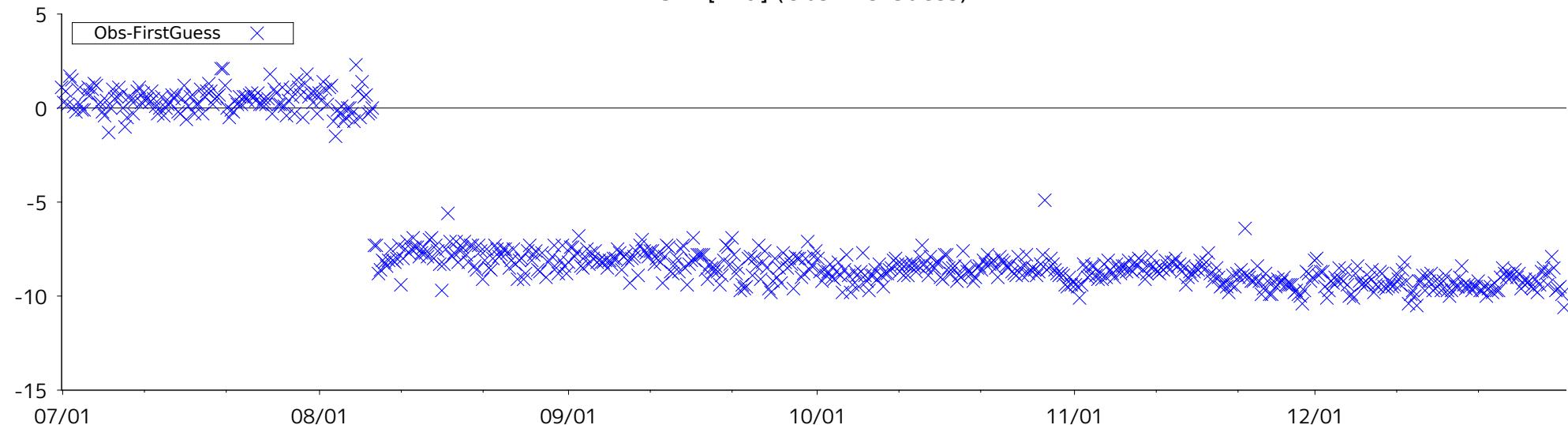
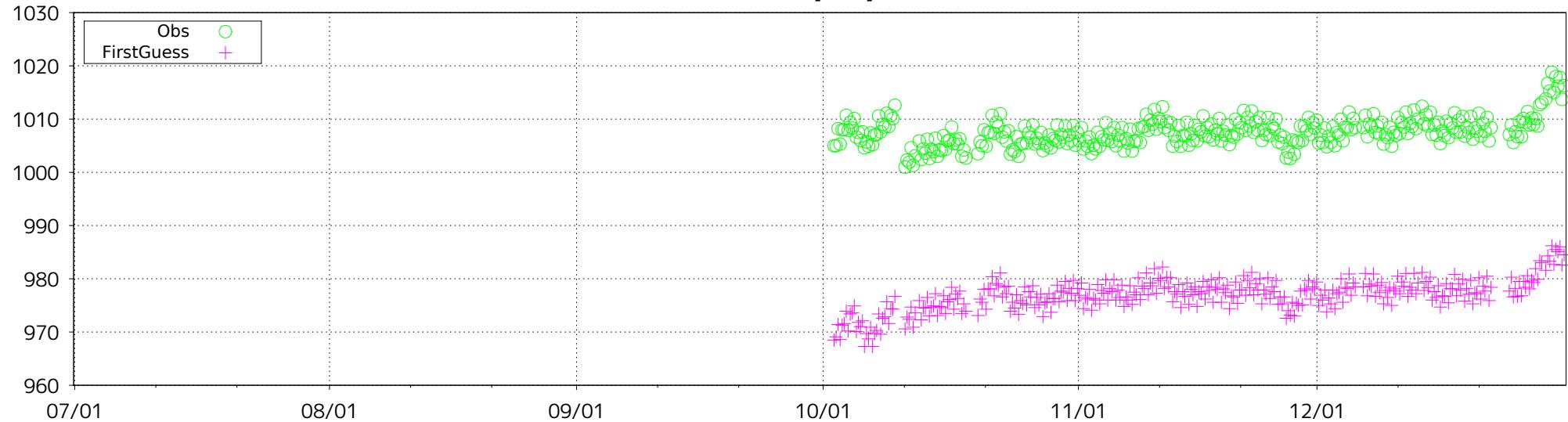


Figure 66 Time-series representation of SLP Obs minus FirstGuess for station 30673

ID: 41252 (lat: 23.2N, lon: 56.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

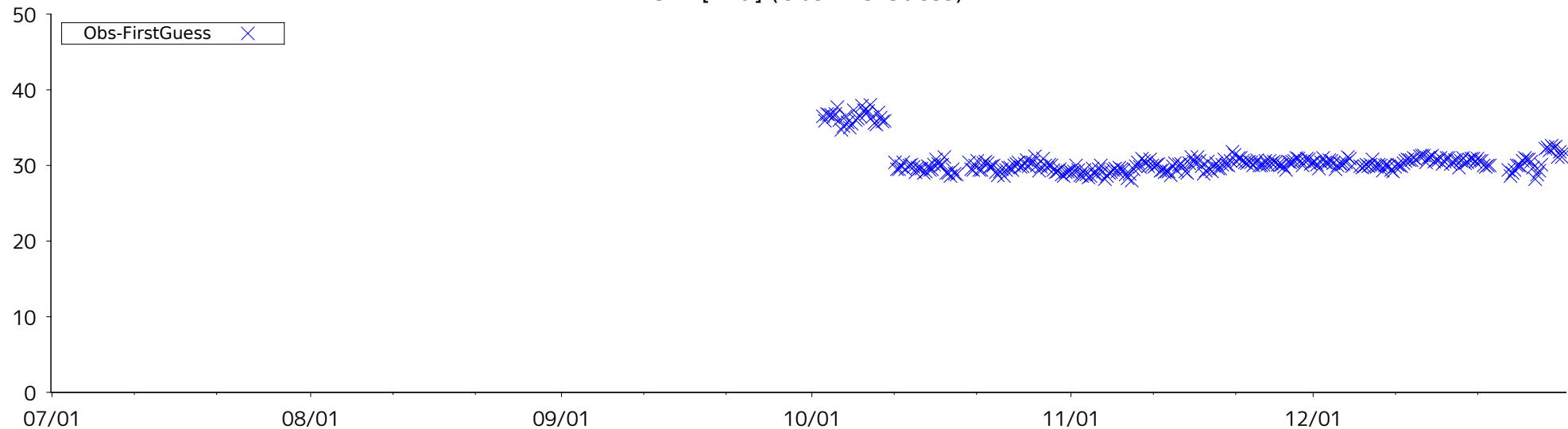
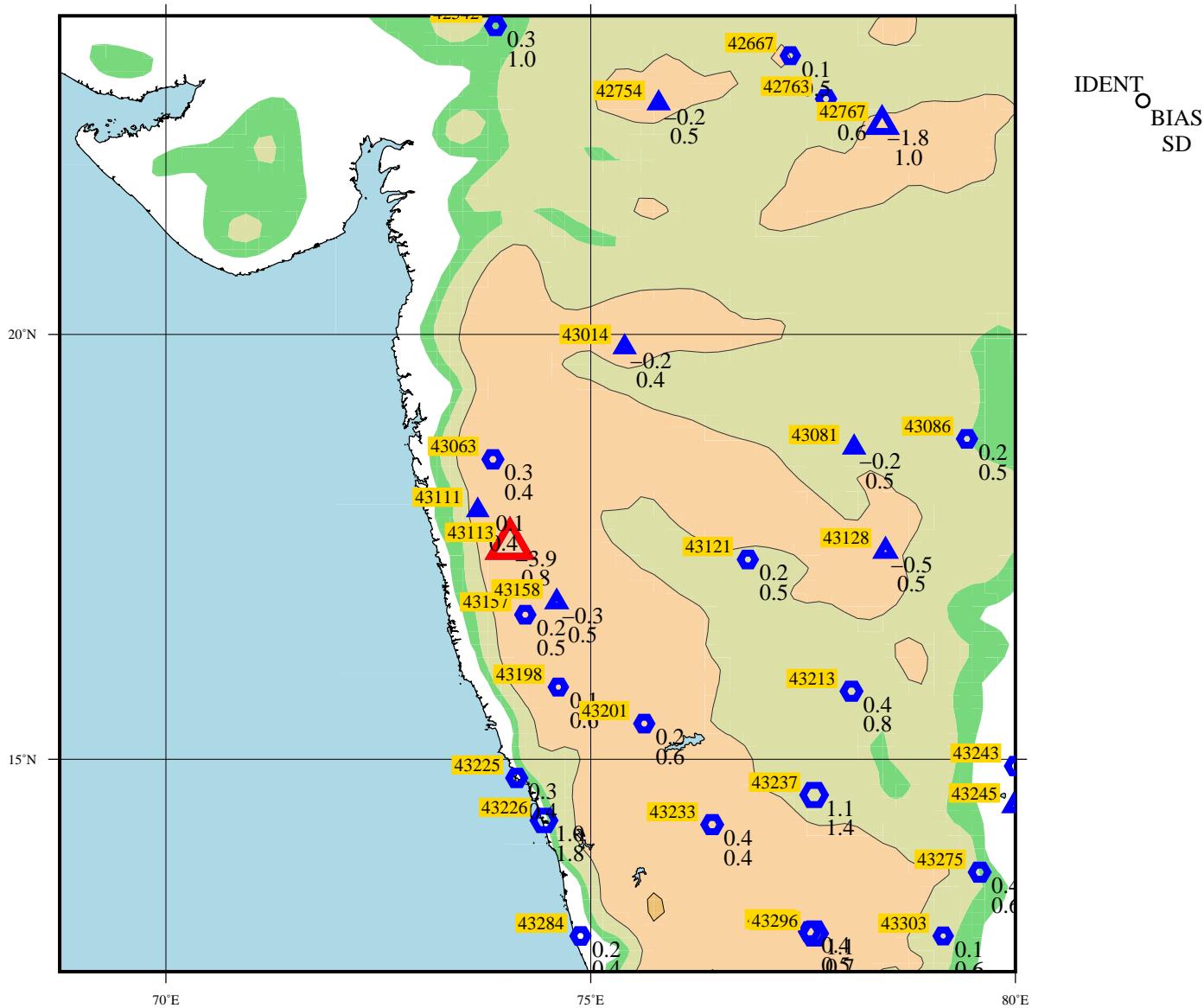


Figure 67 Time-series representation of SLP Obs minus FirstGuess for station 41252

LEVEL = SUR      ELEMENT = SLP  
 2022 07 01 00 UTC → 2022 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

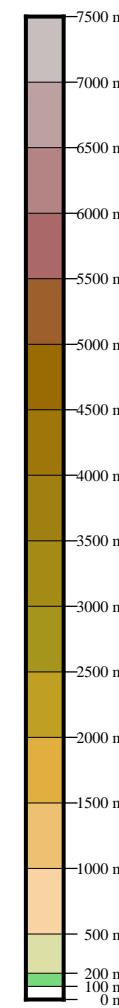


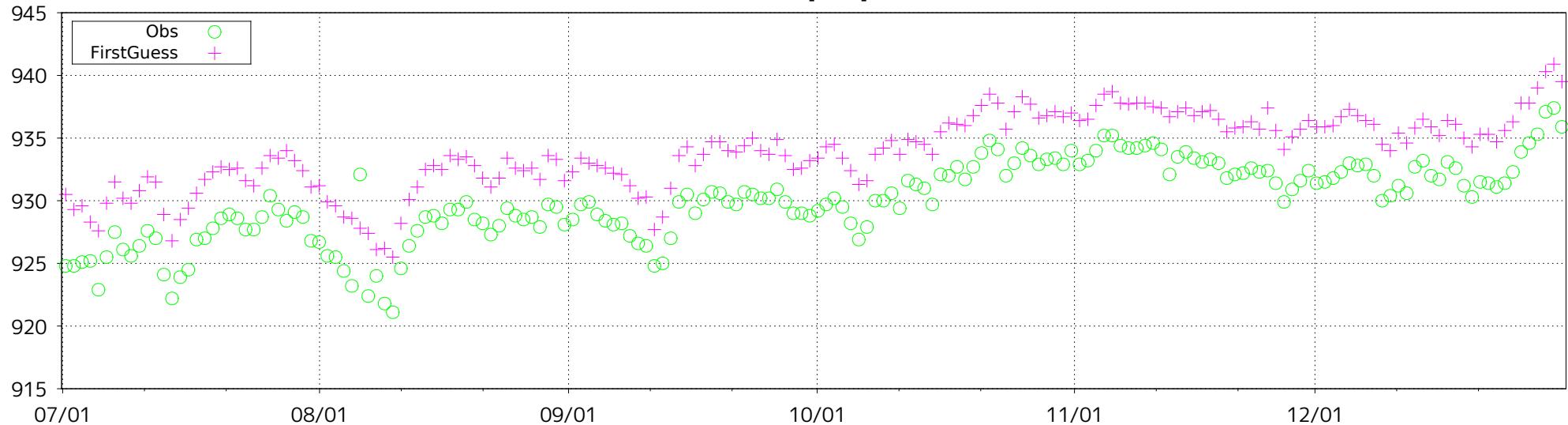
Figure 68 BIAS and SD of SLP for station 43113 (red) and surrounding stations (blue).

The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

ID: 43113 (lat: 17.5N, lon: 74.1E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

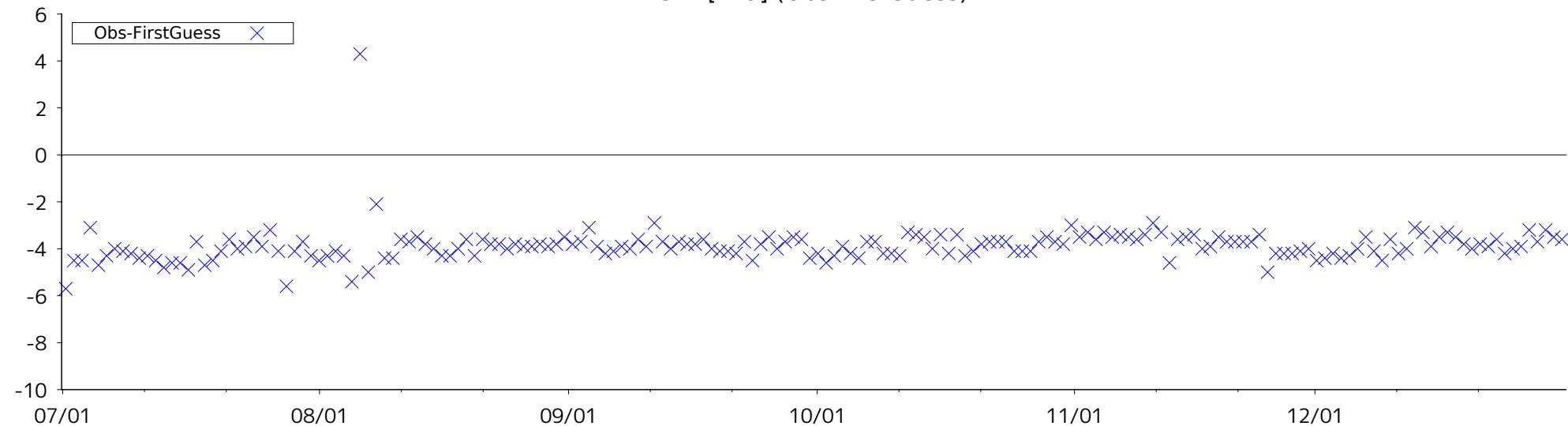
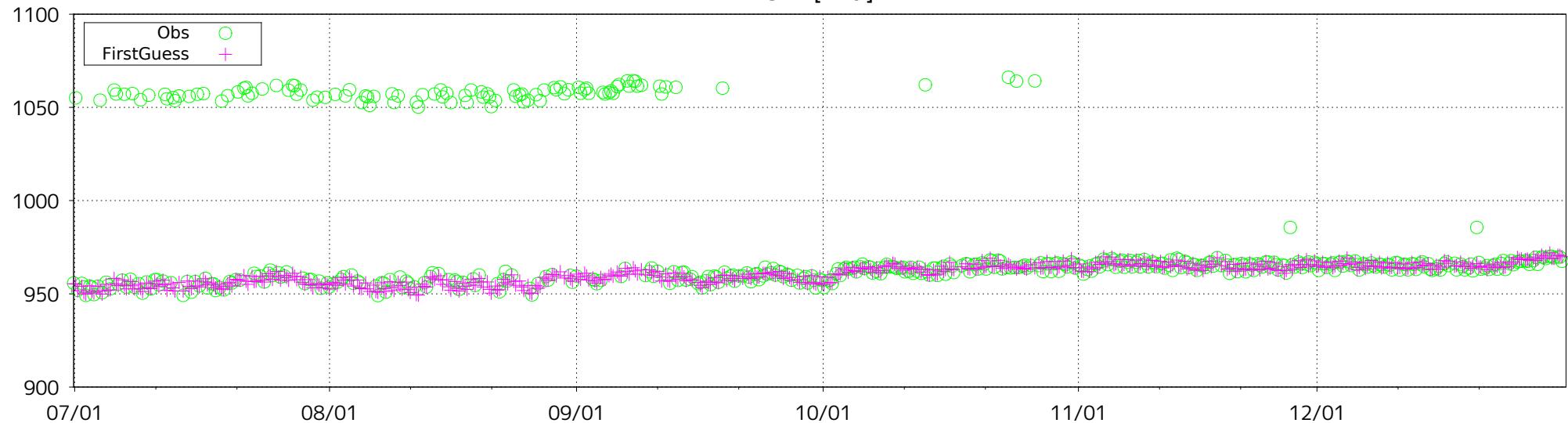


Figure 69 Time-series representation of SLP Obs minus FirstGuess for station 43113

ID: 48001 (lat: 27.3N, lon: 97.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

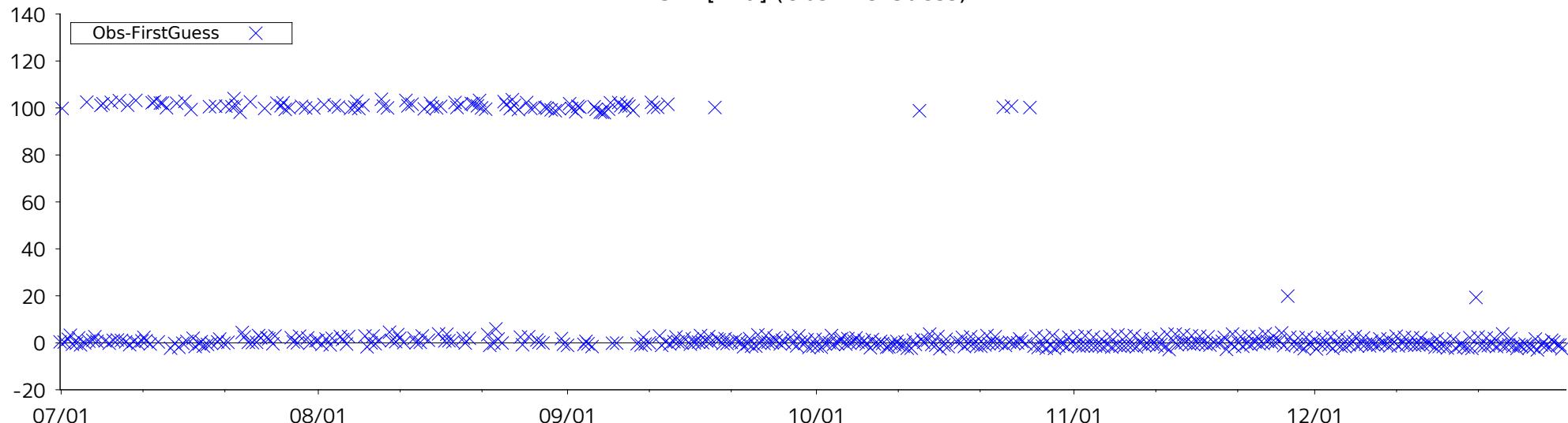
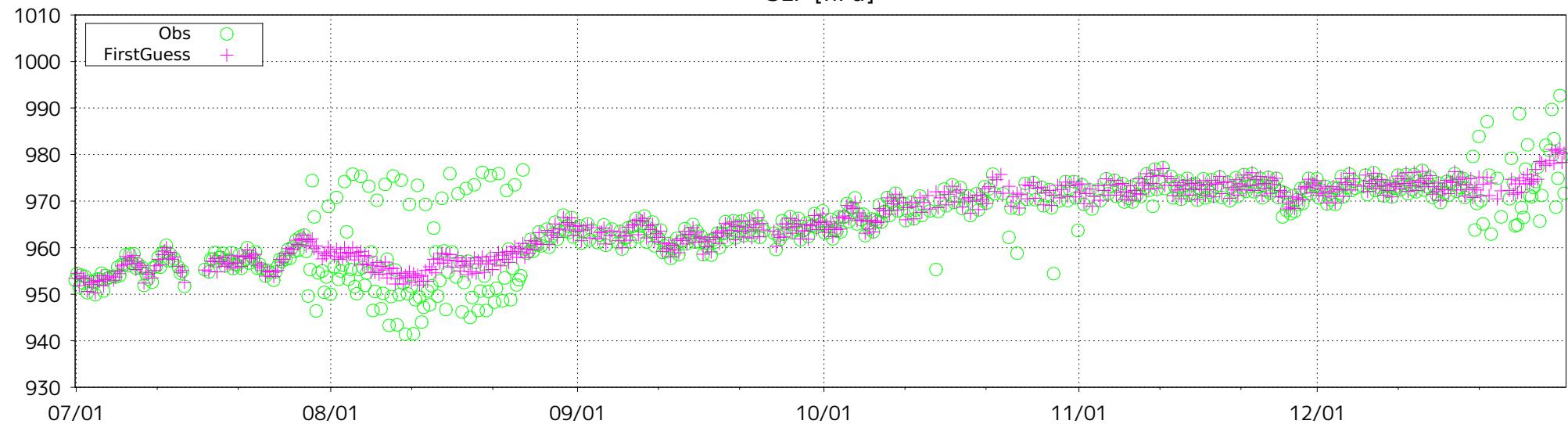


Figure 70 Time-series representation of SLP Obs minus FirstGuess for station 48001

ID: 41244 (lat: 24.2N, lon: 55.9E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

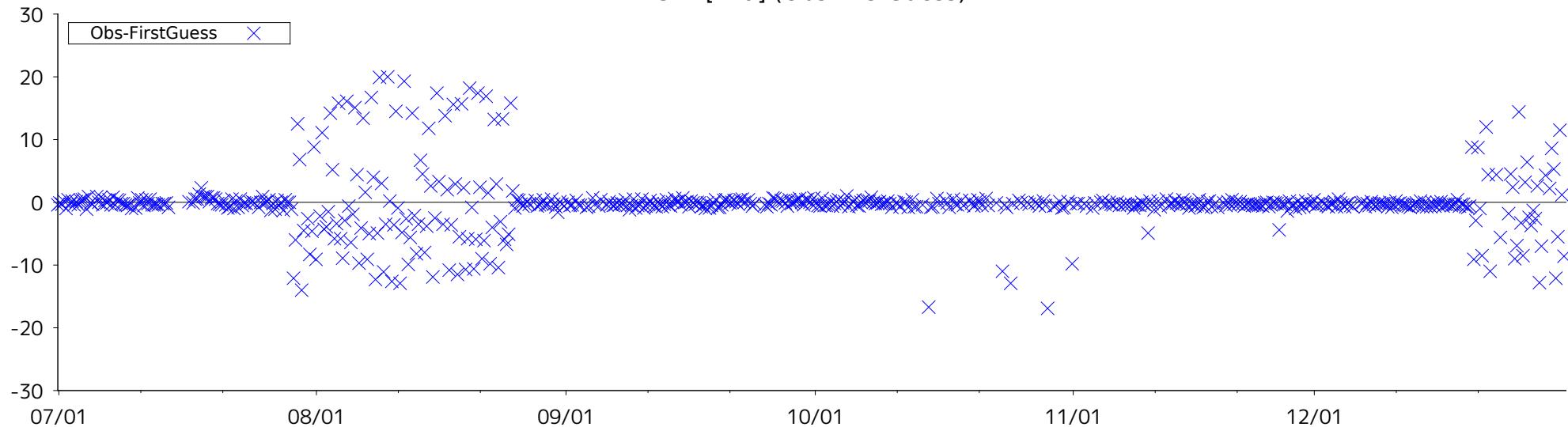
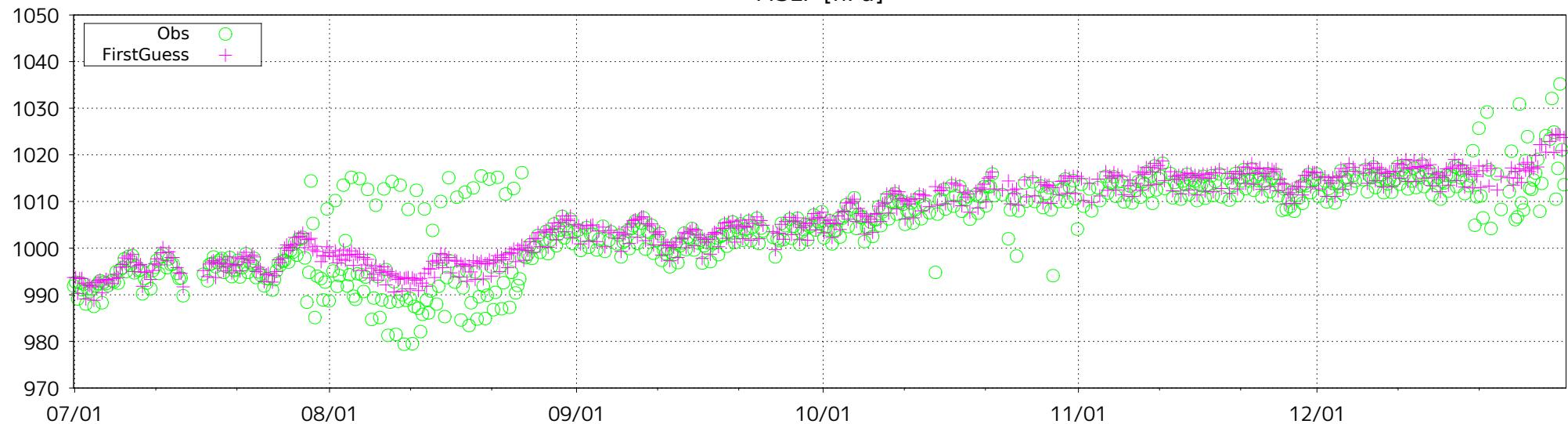


Figure 71(a) Time-series representation of SLP Obs minus FirstGuess for station 41244

ID: 41244 (lat: 24.2N, lon: 55.9E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

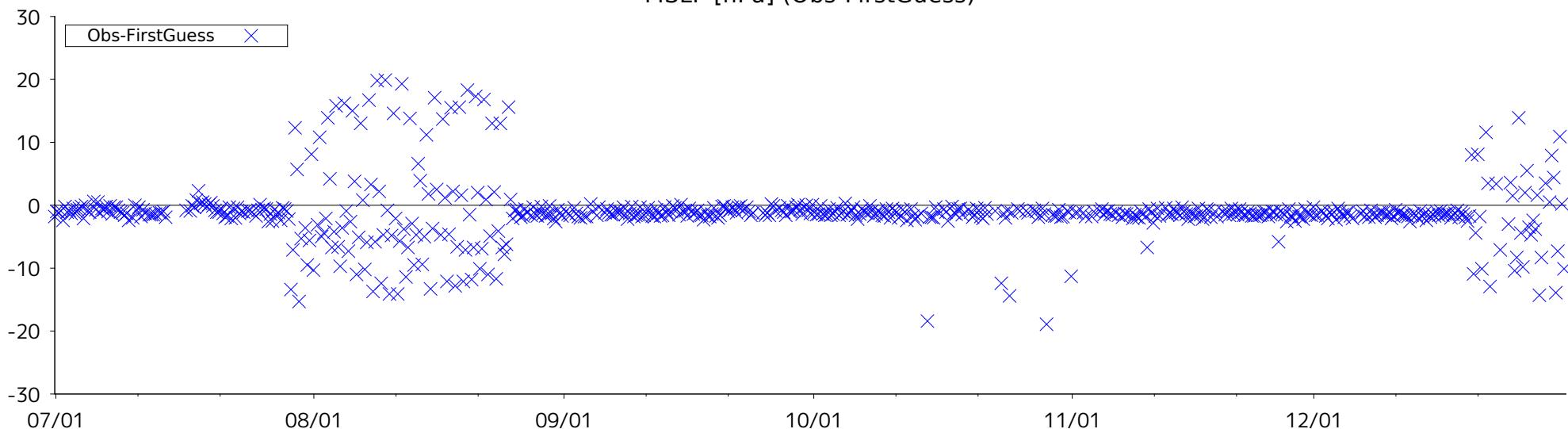


Figure 71(b) Time-series representation of MSLP Obs minus FirstGuess for station 41244