

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

**July – December 2024**

**No. 68**

**March 2025**

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

**Japan Meteorological Agency  
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Japan**

**Report on the Quality of Land Surface Observations in Region II  
(No. 68)  
July – December 2024**

## **Summary**

In its role as a Lead Center, RSMC Tokyo has issued the 68th report on the land surface observation quality monitoring for the period from July to December 2024. The report includes a consolidated list of stations suspected of producing low-quality observation data.

(1) SLP

As a result of monitoring, one station (53923) was excluded from the consolidated lists of the previous report (January – June 2024), and four stations (41757, 42045, 48973, 48986) were newly added to the lists.

(2) MSLP

As a result of monitoring, two stations (38318, 48966) were excluded from the consolidated lists of the previous report (January – June 2024), and one station (48973) was newly added to the lists.

(3) GZ

As a result of monitoring, one station (42045) was newly added to the lists.

## **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	1935
MSLP	2016
GZ	104

### 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 2024

WMO IDENT	LAT (N)	LON (E)	H (m)	HM (m)	ELEM	NOBS	PGE (%)	SD	BIAS	RMS
30673	53.8	119.7	625	747	SLP	735	0	0.8	-8.3	8.3
					MSLP	735	0	1.4	0.6	1.5
31445	51.5	128.1	200	195	SLP	281	0	0.5	0.5	0.7
					MSLP	281	0	0.7	10.1	10.1
35284	50.6	70.0	384	330	SLP	736	0	0.6	6.6	6.6
					MSLP	736	0	0.7	0.7	1.0
35615	47.6	53.3	-21	-16	SLP	681	0	0.5	0.3	0.6
					MSLP	681	0	0.5	5.2	5.2
35701	47.2	51.0	-27	-24	SLP	708	0	0.4	0.1	0.4
					MSLP	708	0	0.5	6.5	6.5
38262	43.0	59.8	93	64	SLP	736	0	0.8	3.6	3.7
					MSLP	736	0	0.7	0.4	0.8
38313	43.7	69.0	405	737	SLP	708	81	1.0	13.9	13.9
					MSLP	708	0	2.6	-0.8	2.7
38318	42.1	68.1	183	214	SLP	337	0	0.7	-3.6	3.7
					MSLP	337	0	0.7	1.0	1.2
38567	40.1	65.4	340	407	SLP	735	0	1.4	-6.9	7.0
					MSLP	735	0	1.5	-7.0	7.2
38836	38.6	68.7	800	1034	SLP	722	1	1.1	-3.3	3.5
					MSLP	721	0	1.5	-4.2	4.5
38875	39.0	73.6	3930	4259	SLP	334	100	*****	*****	*****
					-	-	-	-	-	-
38880	38.0	58.4	312	199	SLP	735	0	1.5	11.8	11.9
					MSLP	735	0	0.9	0.2	0.9
38944	37.5	69.4	447	622	SLP	728	0	1.1	-5.3	5.4
					MSLP	728	0	1.3	-5.4	5.6
41249	23.9	56.2	633	784	SLP	724	0	0.4	-0.6	0.7
					GZ850	500	86	52.6	-1.7	52.6
41265	22.8	58.5	469	585	SLP	664	1	0.5	-5.0	5.0
					MSLP	676	1	1.2	-2.0	2.3
41315	17.3	54.1	881	641	SLP	735	98	0.4	14.5	14.5
					GZ850	678	79	56.7	7.0	57.1
41396	16.0	49.0	700	801	SLP	663	0	0.6	6.3	6.3
					MSLP	671	1	1.1	0.2	1.1
41437	14.5	46.9	1067	1292	SLP	360	0	0.8	-6.4	6.4
					GZ850	360	0	6.7	12.5	14.2
41573	33.9	73.4	2127	1411	SLP	729	0	1.4	9.0	9.1

## 4. MONITORING RESULTS

WMO IDENT	LAT (N)	LON (E)	H (m)	HM (m)	ELEM	NOBS	PGE (%)	SD	BIAS	RMS
					GZ850	730	1	8.9	0.0	8.9
42056	32.7	74.8	323	295	SLP	736	0	0.6	-6.7	6.7
					-	-	-	-	-	-
42083	31.1	77.2	2202	1552	SLP GZ850	355 11	86 100	0.6 *****	14.6 *****	14.6 *****
42111	30.3	78.1	683	851	SLP MSLP	733 733	0 0	0.8 1.1	5.9 -1.4	6.0 1.8
42114	30.4	78.4	770	1482	SLP	368	100	*****	*****	*****
					-	-	-	-	-	-
42147	29.5	79.7	2311	1687	SLP	368	0	0.5	4.4	4.4
					-	-	-	-	-	-
42299	27.3	88.6	1756	1964	SLP GZ850	368 368	0 0	0.6 7.6	0.5 58.1	0.8 58.6
44406	29.3	80.9	617	1459	SLP MSLP	402 402	0 0	1.6 2.8	4.2 -3.0	4.5 4.1
47020	41.0	126.6	306	677	SLP MSLP	736 736	0 0	0.8 2.0	0.2 10.3	0.8 10.5
47037	40.0	125.3	99	217	SLP MSLP	736 736	0 0	1.7 1.8	-4.1 -4.0	4.4 4.4
48001	27.3	97.4	434	555	SLP MSLP	476 476	33 1	1.6 2.0	0.7 -0.6	1.7 2.1
48018	24.2	96.3	95	204	SLP MSLP	204 204	0 0	1.3 1.2	3.9 -0.6	4.1 1.3
48921	21.6	101.9	1360	1049	SLP GZ850	488 486	1 100	1.0 0.0	-4.5 52.4	4.6 52.4
48925	20.7	102.0	636	960	SLP MSLP	438 437	1 0	0.9 1.4	-3.7 -1.9	3.8 2.4
48935	19.5	103.1	1094	1204	SLP GZ850	479 479	0 6	0.8 7.6	0.4 -86.7	0.9 87.0
48944	18.3	102.6	185	226	SLP MSLP	358 358	100 0	0.0 3.5	3.9 -5.8	3.9 6.8
48952	15.7	106.4	180	288	SLP MSLP	491 491	1 0	1.3 1.2	3.5 2.3	3.7 2.6
48961	14.2	103.5	23	42	SLP MSLP	675 675	1 1	1.6 1.5	1.5 4.3	2.2 4.6
48963	12.8	102.6	170	353	SLP MSLP	209 209	99 100	0.2 *****	13.6 *****	13.6 *****
48986	11.6	103.0	13	69	SLP MSLP	267 243	46 40	4.8 5.2	3.4 2.2	5.9 5.6

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)

### RUSSIAN FEDERATION IN ASIA

**30673** - Negative bias of O-G at the station level (Figures 2 and 3)

**31445** - Positive bias of O-G at the mean sea level (Figures 4 and 5)

### KAZAKHSTAN

**35284** - Positive bias of O-G at the station level (Figures 6 and 7)

**35615** - Positive bias of O-G at the mean sea level (Figures 8 and 9)

**35701** - Positive bias of O-G at the mean sea level (Figures 8 and 10)

**38313** - Positive bias of O-G at the station level (Figures 13 and 14)

**38318** - Negative bias of O-G at the station level (Figures 13 and 15)

### UZBEKISTAN

**38262** - Positive bias of O-G at the station level (Figures 11 and 12)

**38567** - Negative bias of O-G at the station level and at the mean sea level (Figures 13, 16 and 17)

### TAJIKISTAN

**38836** - Negative bias of O-G at the mean sea level (Figures 16 and 18)

**38875** - Positive bias of O-G at the station level (Figure 19)

**38944** - Negative bias of O-G at the station level and at the mean sea level (Figures 13, 16 and 21)

### TURKMENISTAN

**38880** - Positive bias of O-G at the station level (Figures 11 and 20)

### OMAN

**41249** - Mostly negative bias of O-G at 850 hPa or 700 hPa (Figure 22)

**41265** - Negative bias of O-G at the station level (Figures 23 and 24)

**41315** - Positive bias of O-G at the station level and negative bias of O-G at 850 hPa or 700 hPa since September 2024 (Figures 25 and 26)

### YEMEN

**41396** - Positive bias of O-G at the station level (Figures 25 and 27)

**41437** - Negative bias of O-G at the station level (Figures 25 and 28)

#### **PAKISTAN**

**41573** - Positive bias of O-G at the station level (Figures 29 and 30)

#### **INDIA**

**42056** - Negative bias of O-G at the station level (Figures 29 and 31)

**42083** - Positive bias of O-G at the station level (Figures 29 and 32)

**42111** - Positive bias of O-G at the station level (Figures 29 and 33)

**42114** - Negative bias of O-G at the station level (Figure 34)

**42147** - Positive bias of O-G at the station level (Figures 29 and 35)

**42299** - Positive bias of O-G at 850 hPa (Figures 36 and 37)

#### **NEPAL**

**44406** - Positive bias of O-G at the station level (Figures 29 and 38)

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

**47020** - Positive bias of O-G at the mean sea level (Figures 39 and 40)

**47037** - Negative bias of O-G at the station level and at the mean sea level (Figures 39, 41 and 42)

#### **MYANMAR**

**48001** - Intermittent positive bias of O-G at the station level (Figure 43)

**48018** - Positive bias of O-G at the station level (Figures 44 and 45)

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

**48921** - Negative bias of O-G at the station level and at 850 hPa (Figures 46 and 47)

**48925** - Negative bias of O-G at the station level (Figures 46 and 48)

**48935** - Negative bias of O-G at 850 hPa (Figures 49 and 50)

**48944** - Negative bias of O-G at the station level and at the mean sea level (Figures 51 and 52)

**48952** - Positive bias of O-G at the station level (Figures 46 and 53)

#### **CAMBODIA**

**48961** - Positive bias of O-G at the mean sea level (Figures 51 and 54)

**48963** - Positive bias of O-G at the station level and at the mean sea level (Figures 55 and 56)

**48986** - Positive bias of O-G at the mean sea level since August 2024 (Figure 57)

## 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
41757	25.1	62.3	96	-6	SLP	193	0	0.7	10.3	10.3
					MSLP	193	0	0.6	0.4	0.7
42045	33.5	75.2	1630	2356	SLP	552	0	2.3	-5.2	5.7
					GZ850	552	0	22.8	-55.3	59.8
48973	13.7	107.0	330	230	SLP	319	99	0.3	2.1	2.1
					MSLP	319	99	0.3	-0.1	0.3
48986	11.6	103.0	13	69	SLP	267	46	4.8	3.4	5.9
					MSLP	243	40	5.2	2.2	5.6

**PAKISTAN**

**41757** - Positive bias of O-G at the station level (Figures 58 and 59)

**INDIA**

**42045** - Negative bias of O-G at the station level and at 850 hPa since late July 2024 (Figures 29, 60 and 61)

**CAMBODIA**

**48973** - Positive bias of O-G at the station level and at the mean sea level (Figure 62)

**48986** - Intermittent negative bias of O-G at the station level (Figure 63)

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

**KAZAKHSTAN**

**38318** - Quality has improved at the mean sea level. (Figure 64)

**CHINA**

**53923** - Quality has improved with a metadata update in OSCAR/Surface. (Figure omitted)

### 4.4 Stations removed from the previous consolidated list

**CAMBODIA**

**48966** - Although station 48966 still displays positive biases of O-G at the mean sea level, it was removed from the consolidated list because the number of reports (52) was insufficient for quality checking. (Figure 65)

## 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.

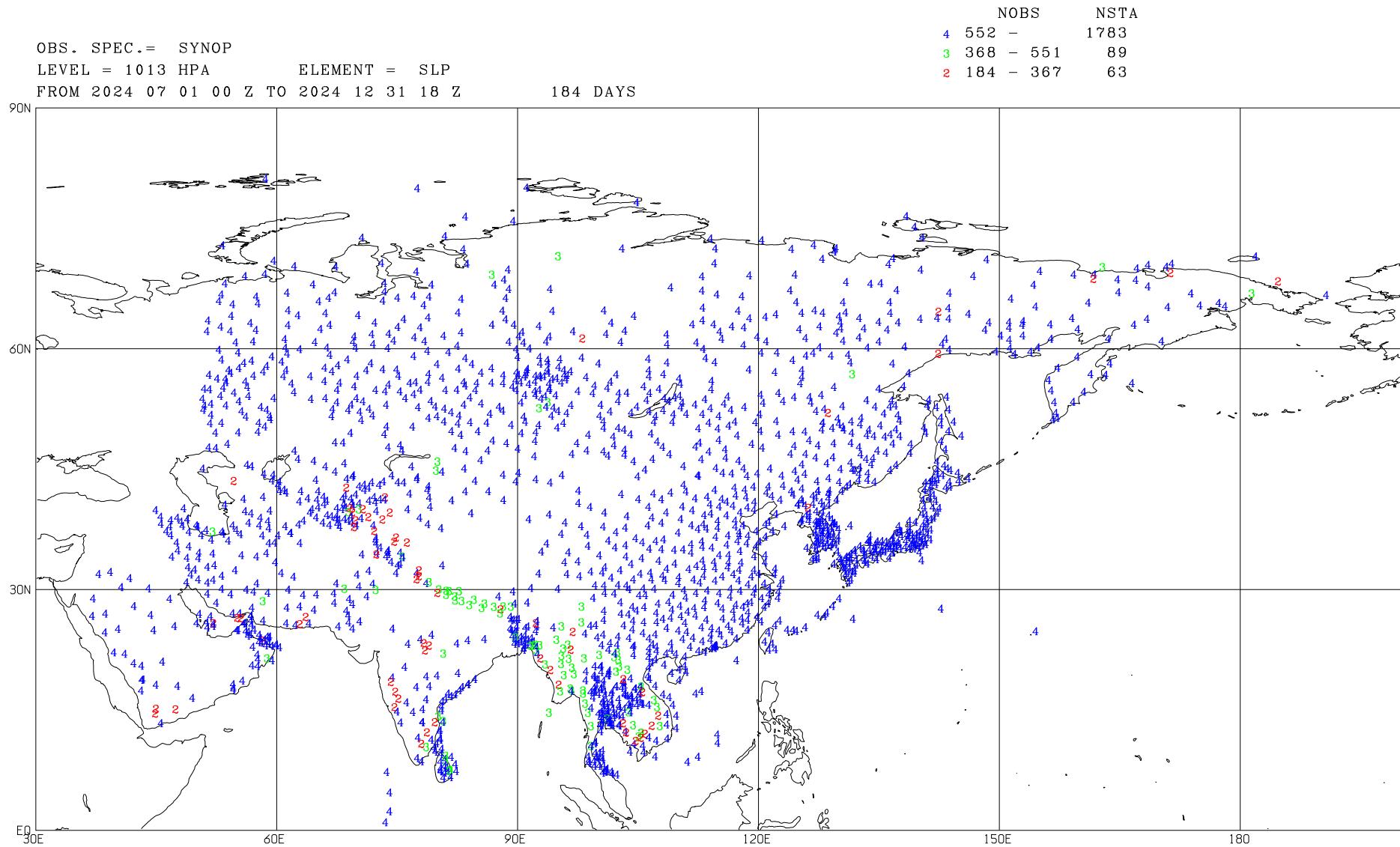


Figure 1(a) Location of all land surface stations reporting station level pressure (SLP) observations in Region II over the six-month period from July to December 2024. Numbers (2, 3, 4) show the total number of observations (NOBS) received at RSMC Tokyo. The total numbers of stations (NSTA) reporting SLP are shown at the top of the figure.

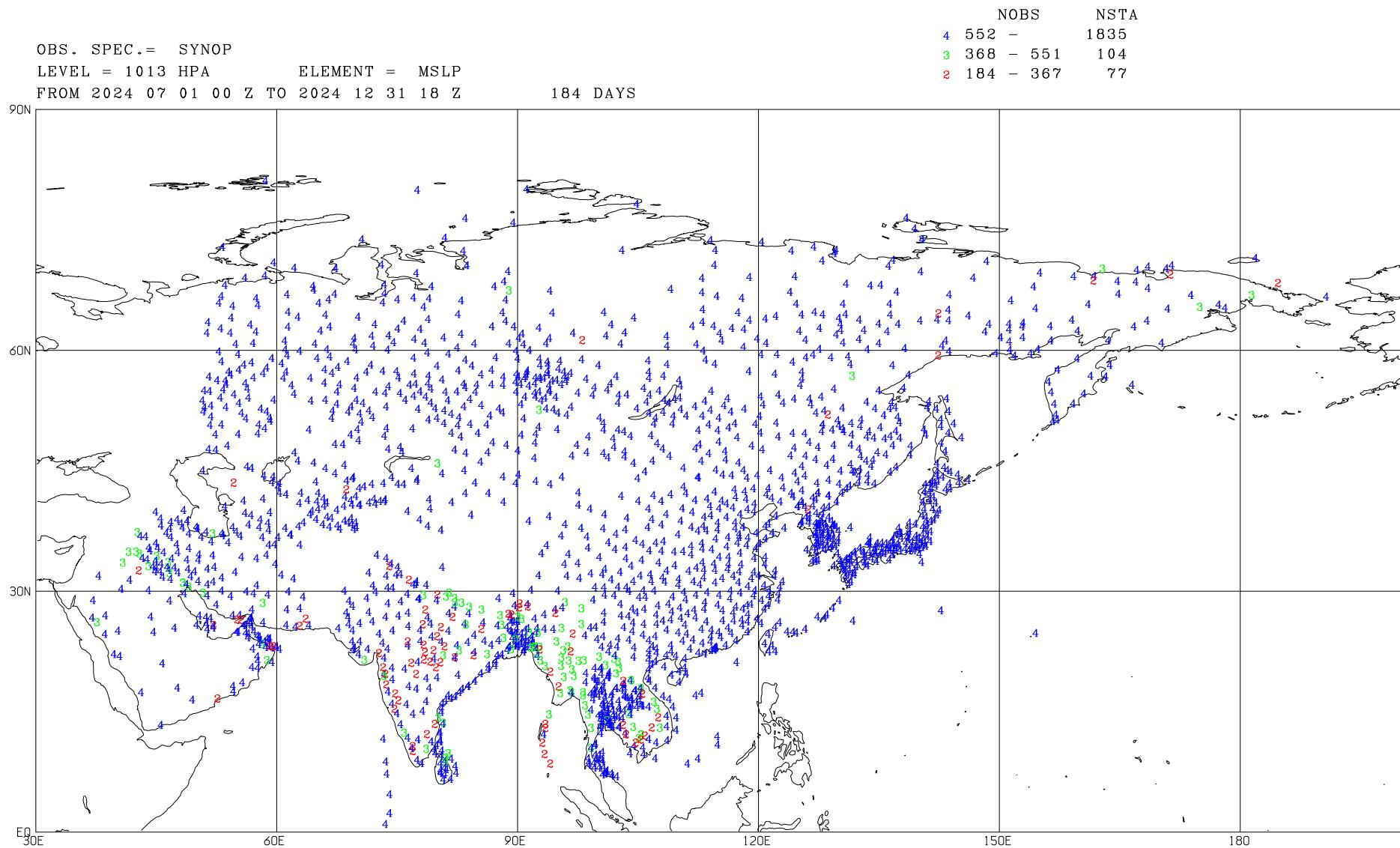


Figure 1(b) Location of all land surface stations reporting mean sea level pressure (MSLP) observations in Region II over the six-month period from July to December 2024. Numbers (2, 3, 4) show the total number of observations (NOBS) received at RSMC Tokyo. The total numbers of stations (NSTA) reporting MSLP are shown at the top of the figure.

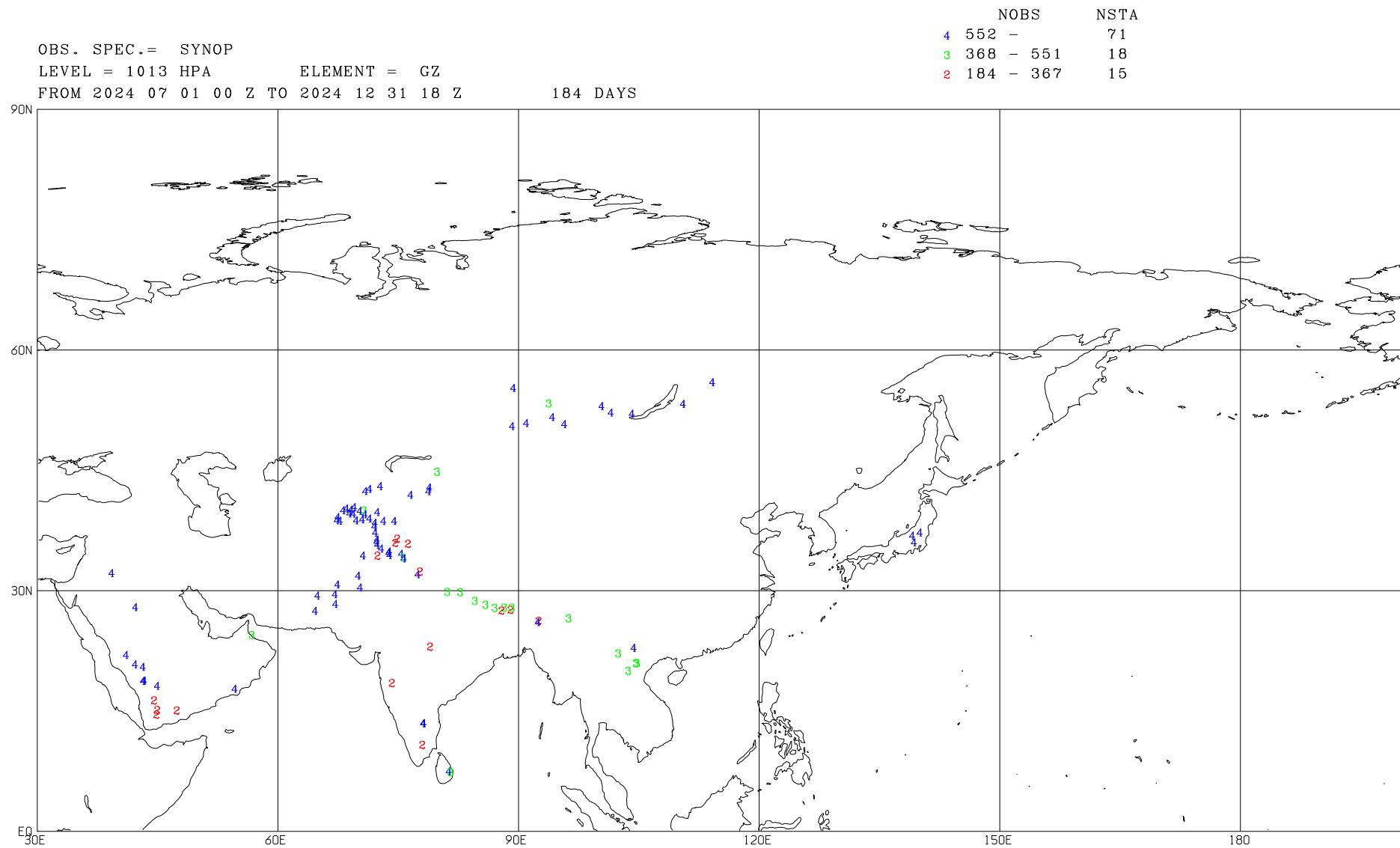
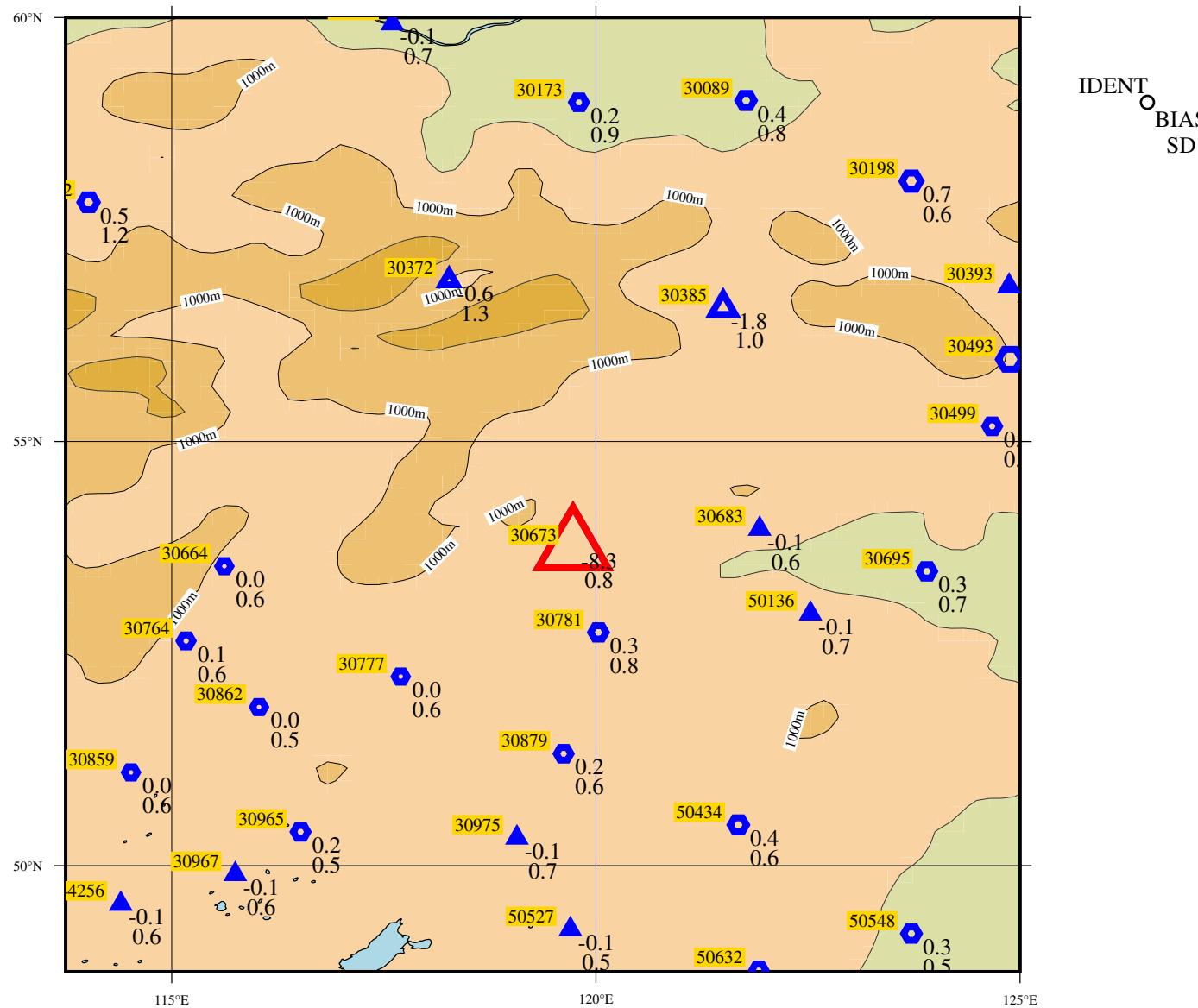


Figure 1(c) Location of all land surface stations reporting geopotential height (GZ) observations in Region II over the six-month period from July to December 2024. Numbers (2, 3, 4) show the total number of observations (NOBS) received at RSMC Tokyo. The total numbers of stations (NSTA) reporting GZ are shown at the top of the figure.

LEVEL = SUR      ELEMENT = SLP  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

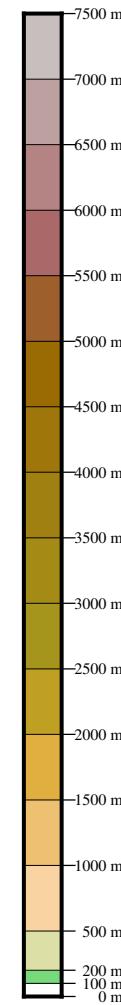


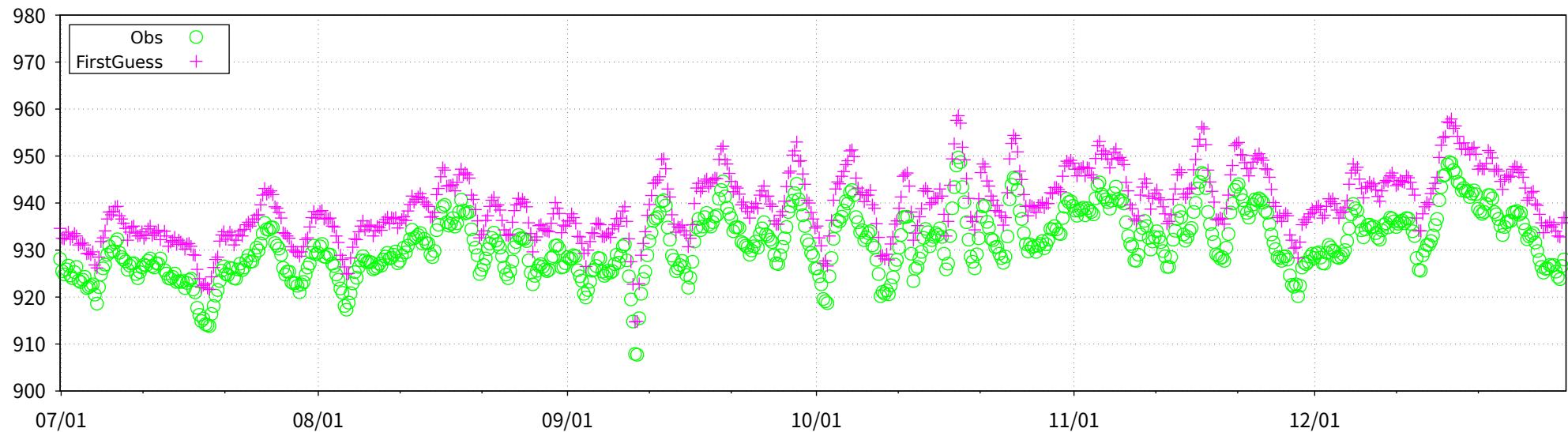
Figure 2 BIAS and SD of SLP for station 30673 (red) and surrounding stations (blue).

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)

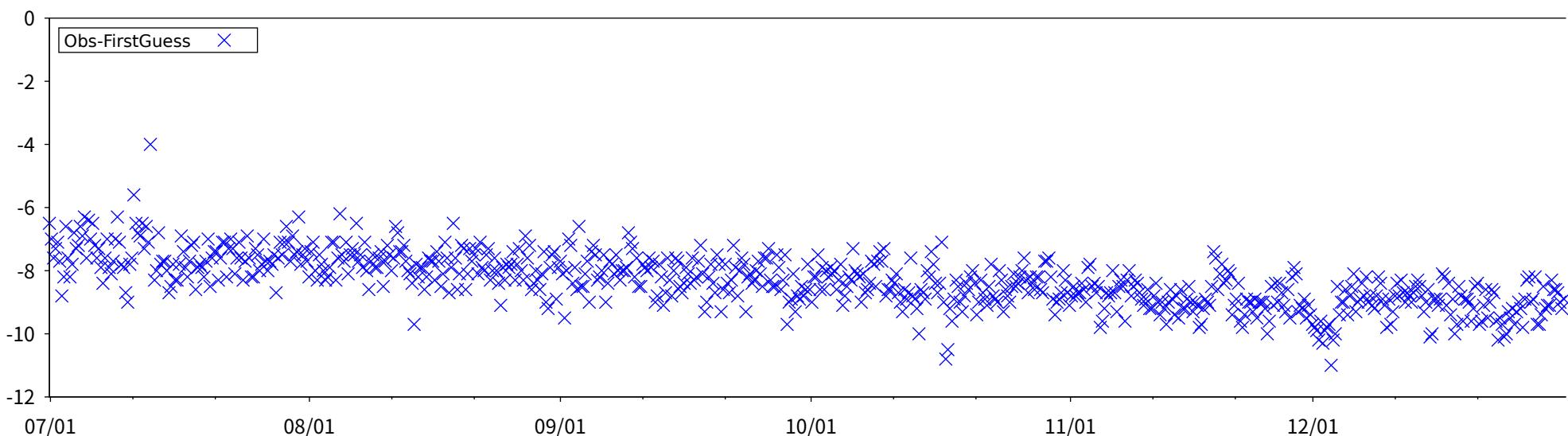
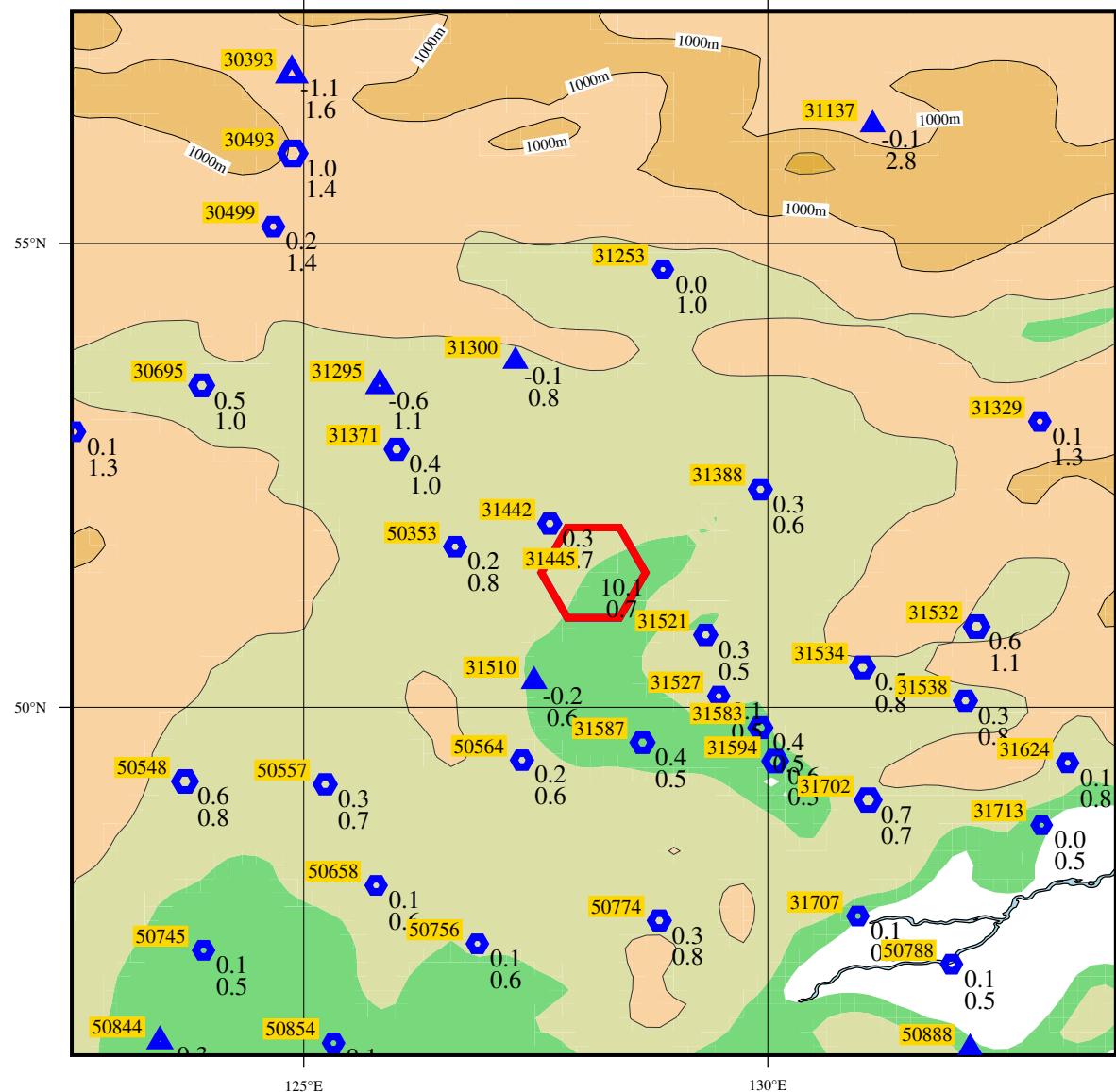


Figure 3 Time-series representation of SLP Obs minus FirstGuess for station 30673

LEVEL = SUR

ELEMENT = MSLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

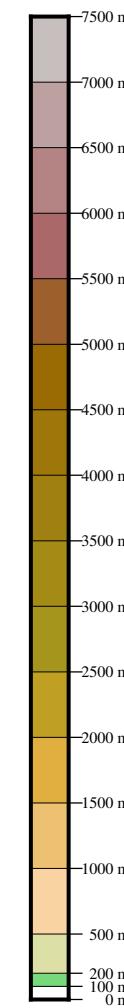


Figure 4 BIAS and SD of MSLP for station 31445 (red) and surrounding stations (blue).

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.

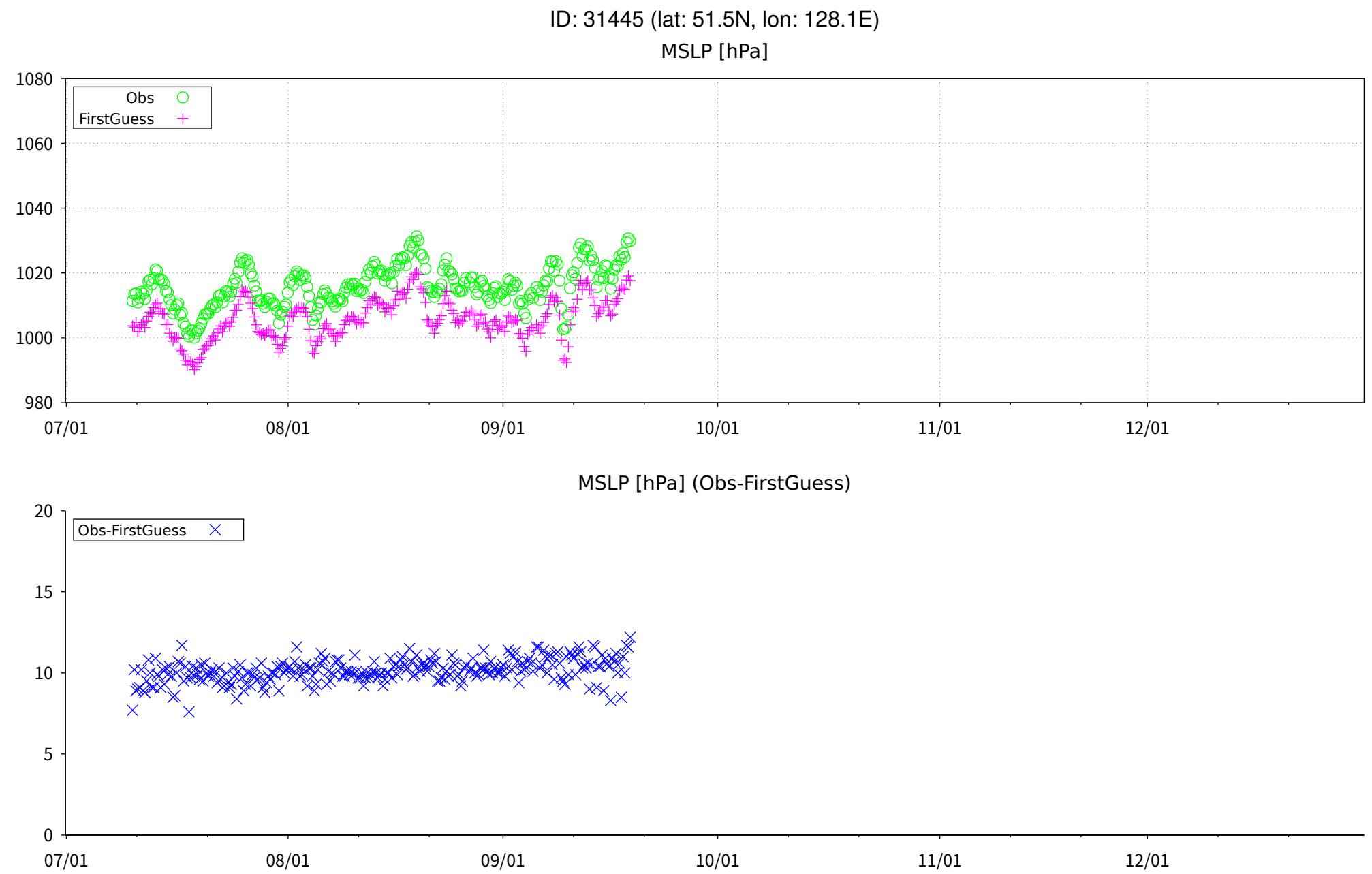


Figure 5 Time-series representation of MSLP Obs minus FirstGuess for station 31445

LEVEL = SUR            ELEMENT = SLP  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)

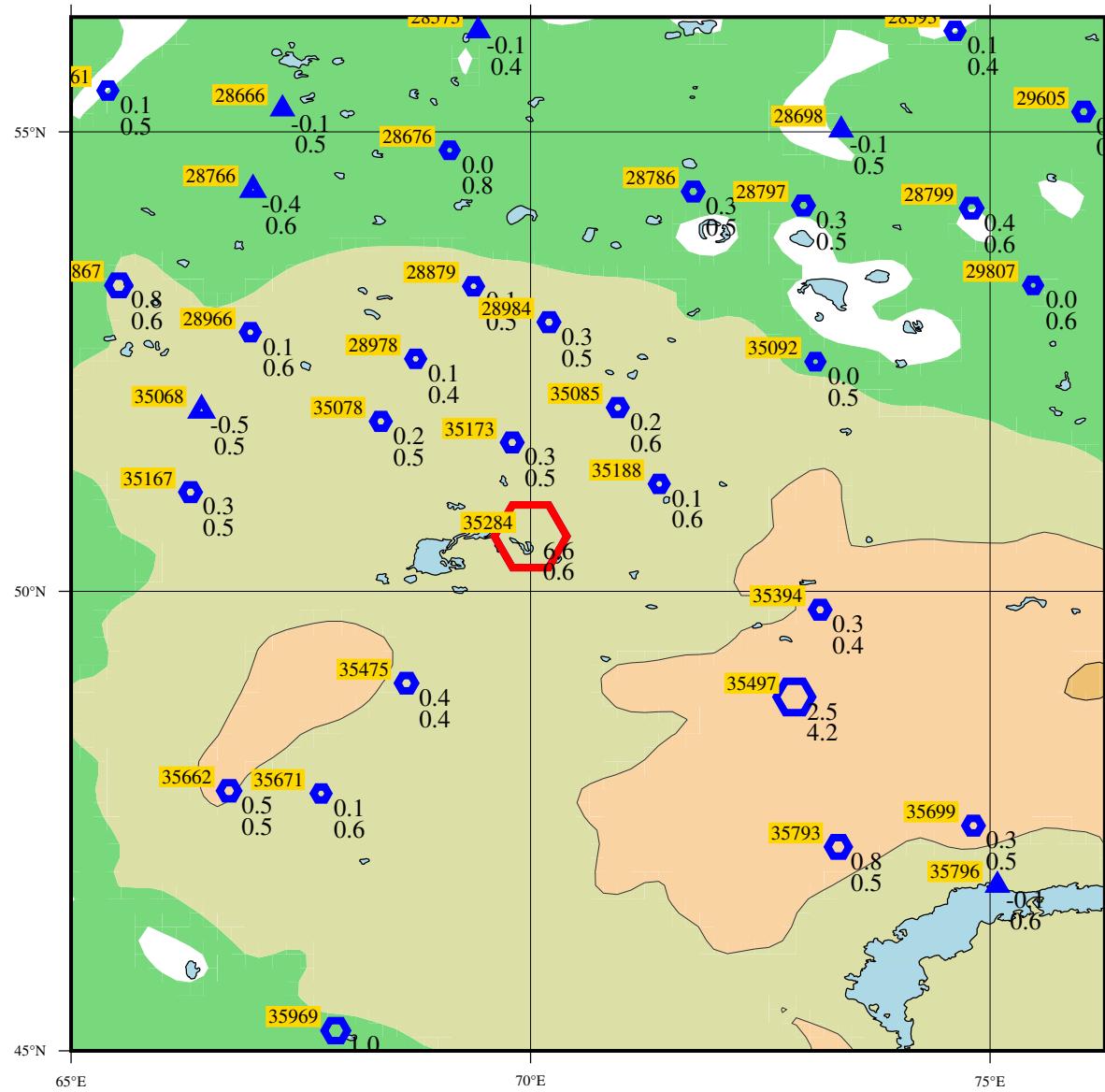
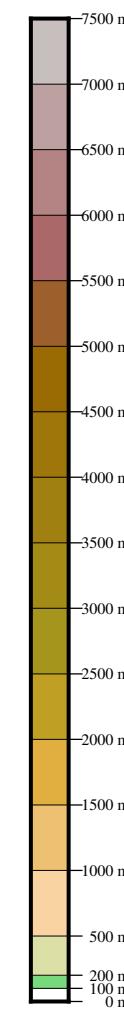


Figure 6 BIAS and SD of SLP for station 35284 (red) and surrounding stations (blue).

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.

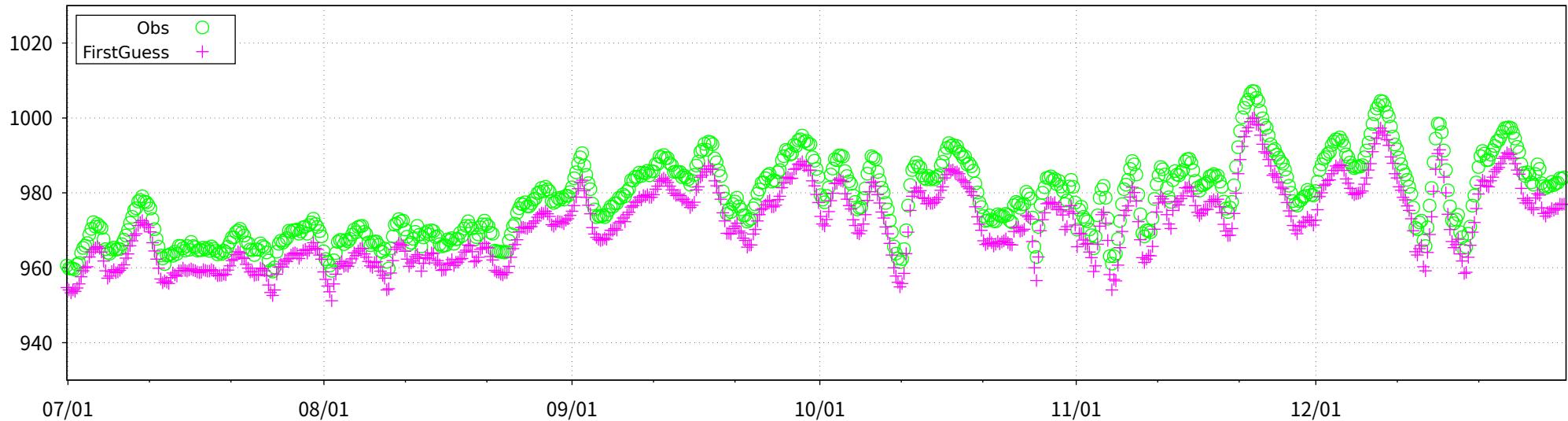
The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

IDENT  
BIAS  
SD



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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

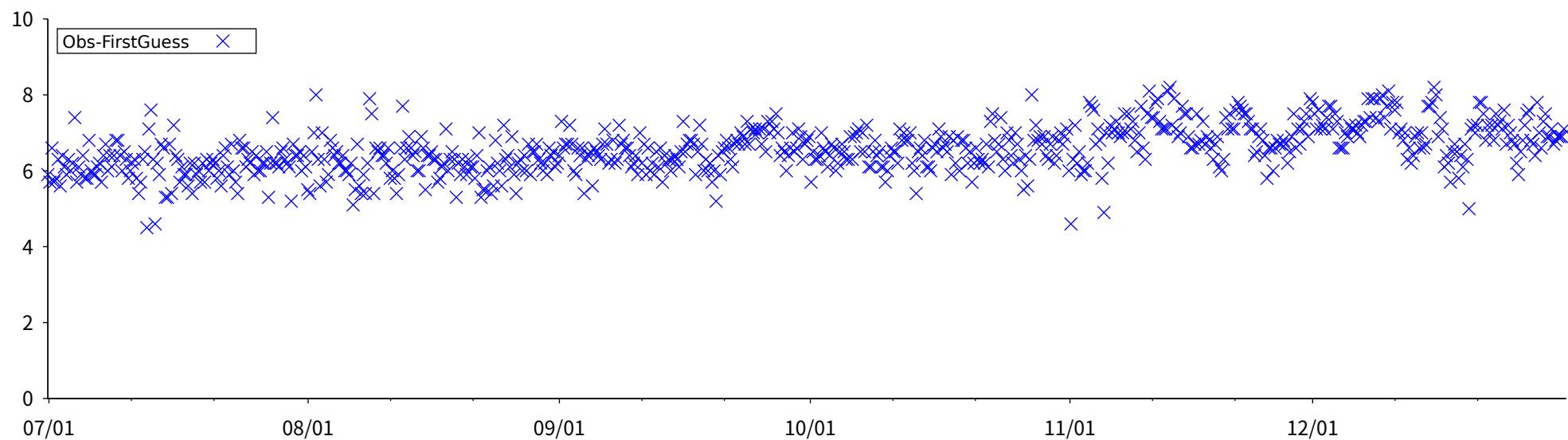


Figure 7 Time-series representation of SLP Obs minus FirstGuess for station 35284

LEVEL = SUR

ELEMENT = MSLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)

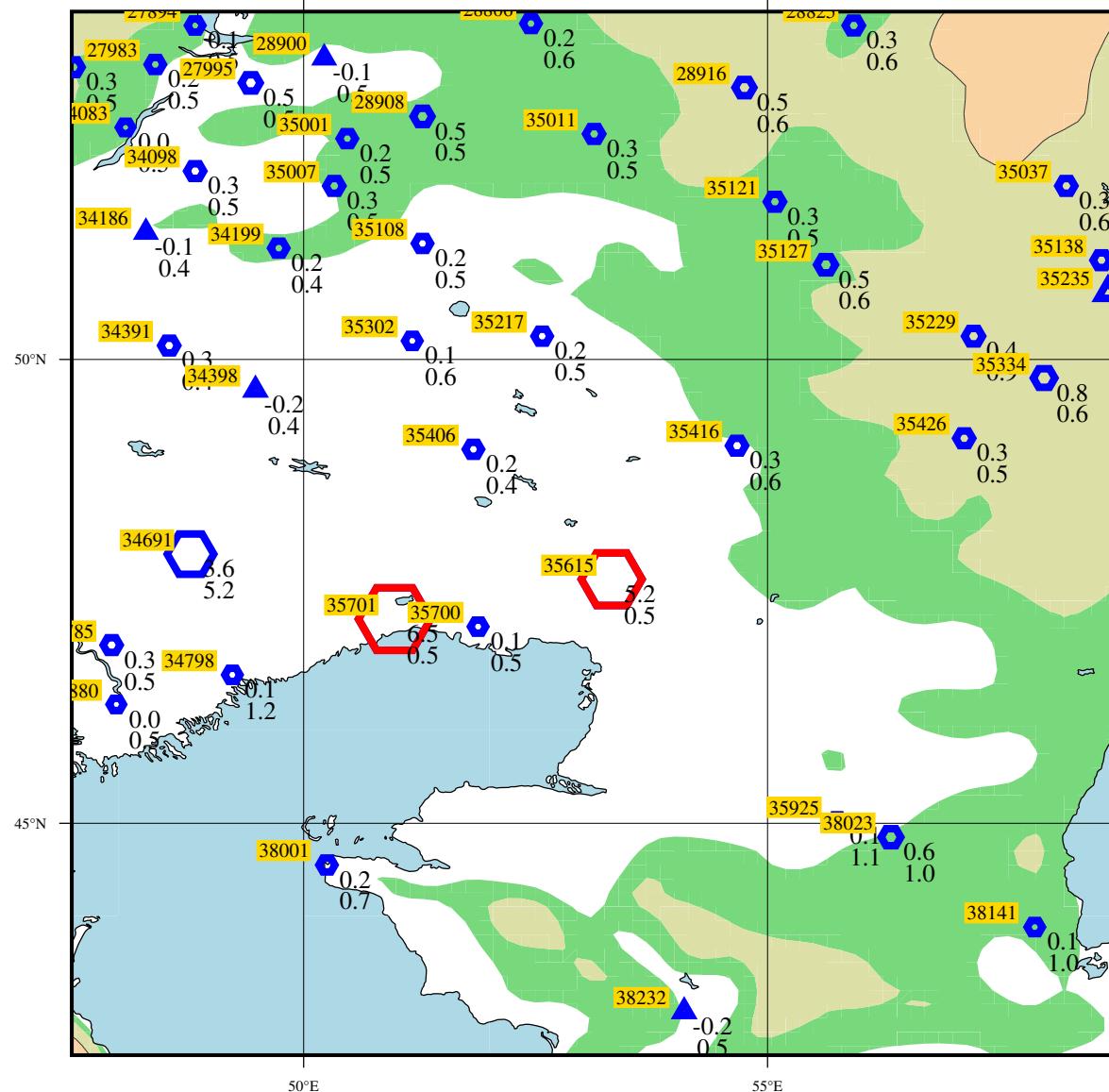
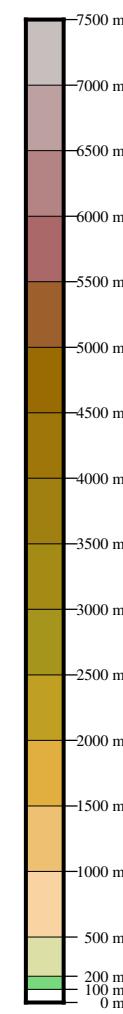


Figure 8 BIAS and SD of MSLP for station 35615, 35701 (red) and surrounding stations (blue).

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.

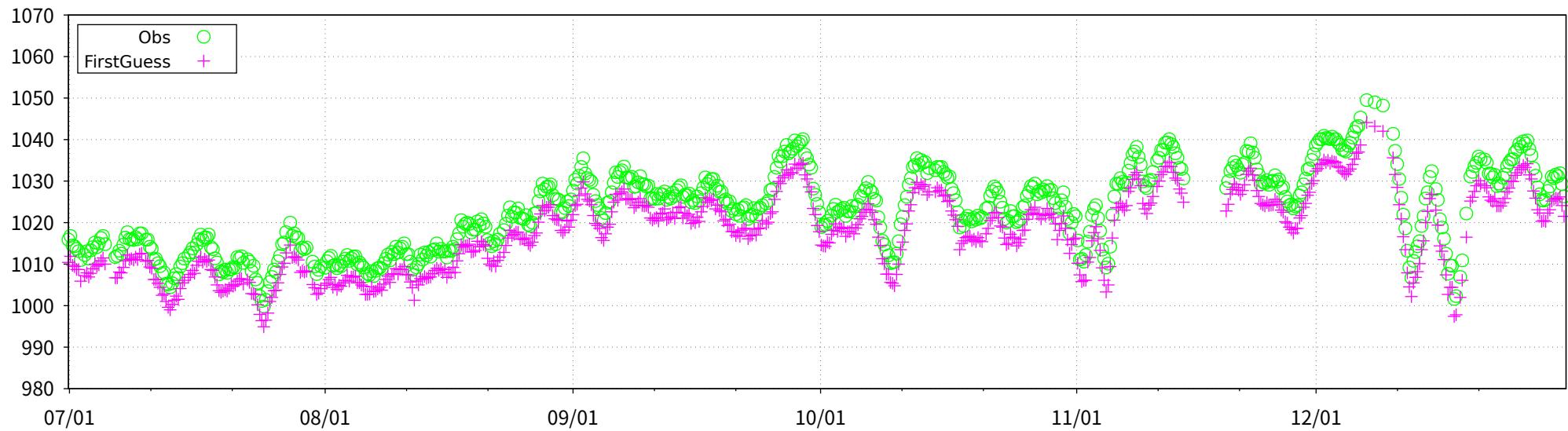
The size of each symbol is proportional to the value of BIAS, with hexagonal forms representing positive bias and triangular forms representing negative bias.

IDENT  
BIAS  
SD



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

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

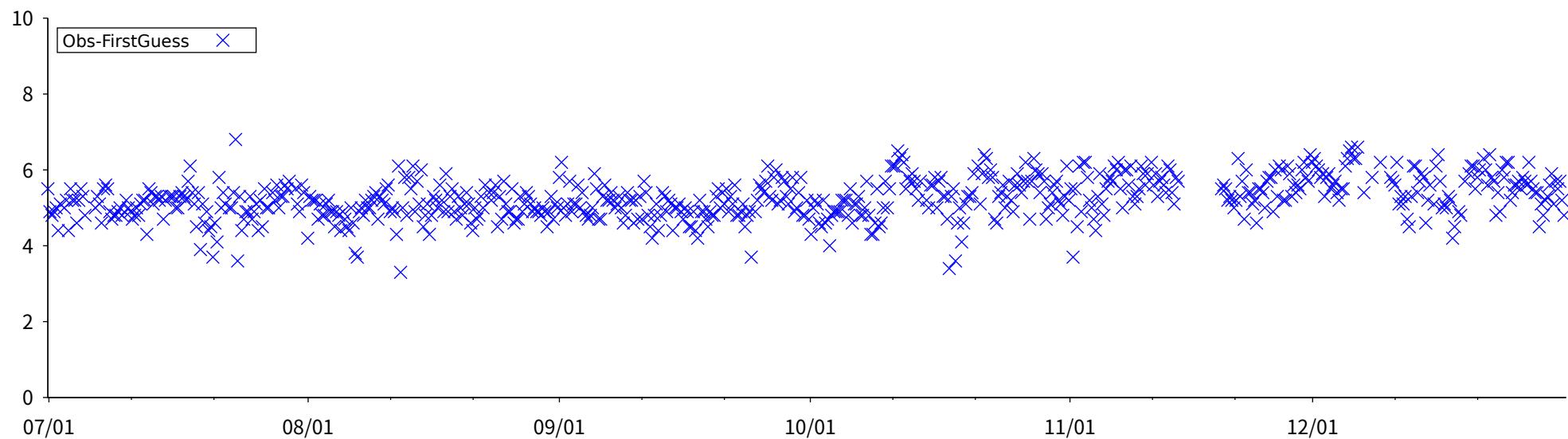


Figure 9 Time-series representation of MSLP Obs minus FirstGuess for station 35615

ID: 35701 (lat: 47.2N, lon: 51.0E)  
MSLP [hPa]

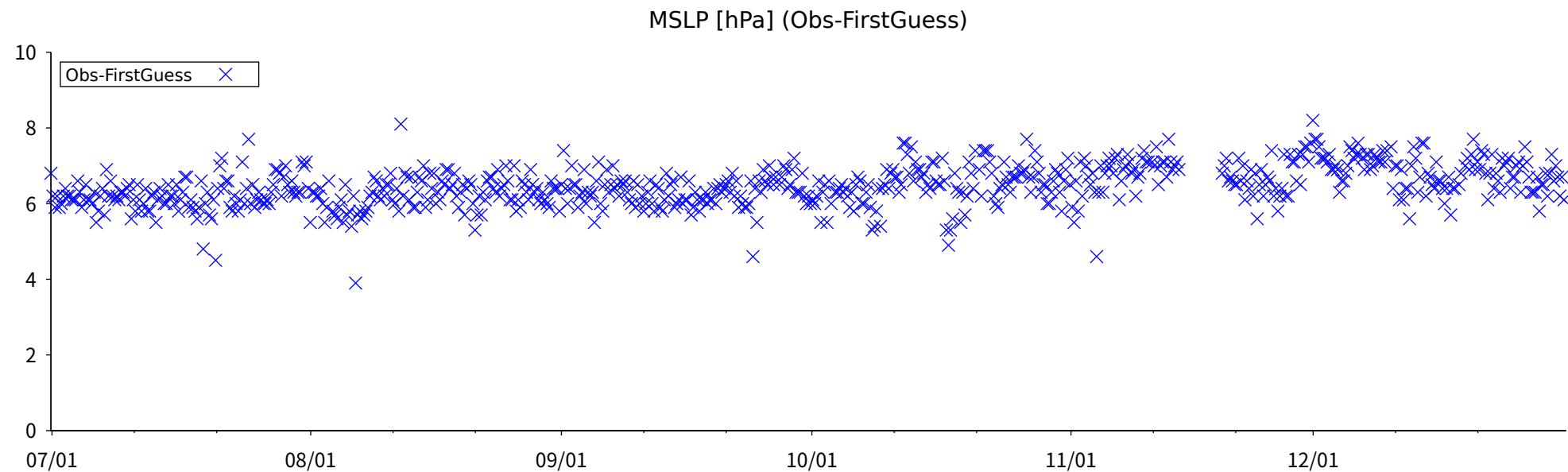
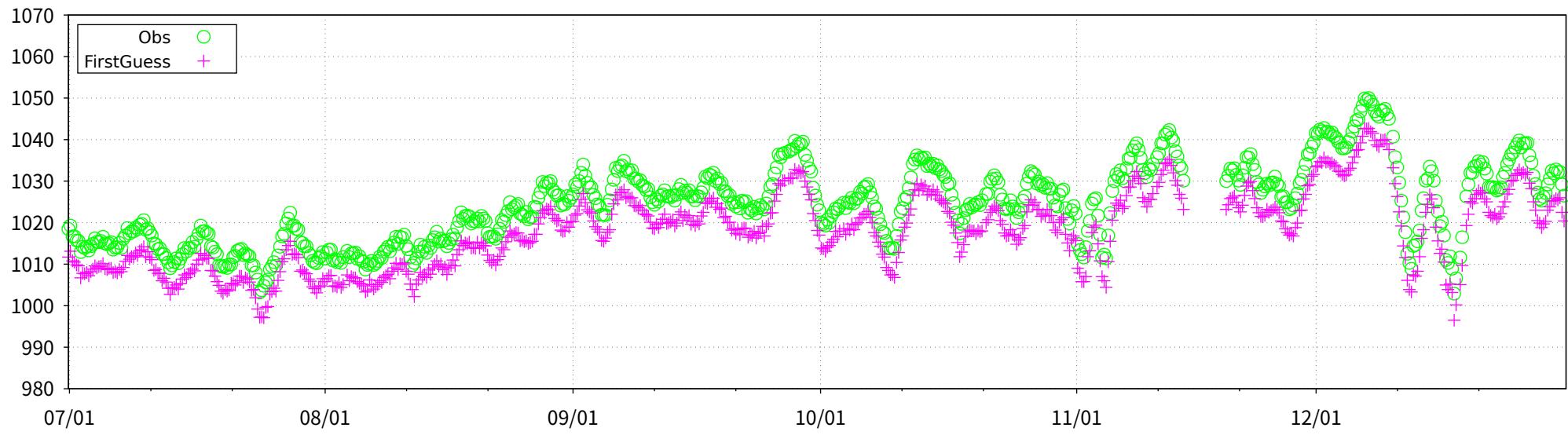


Figure 10 Time-series representation of MSLP Obs minus FirstGuess for station 35701

LEVEL = SUR

ELEMENT = SLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)

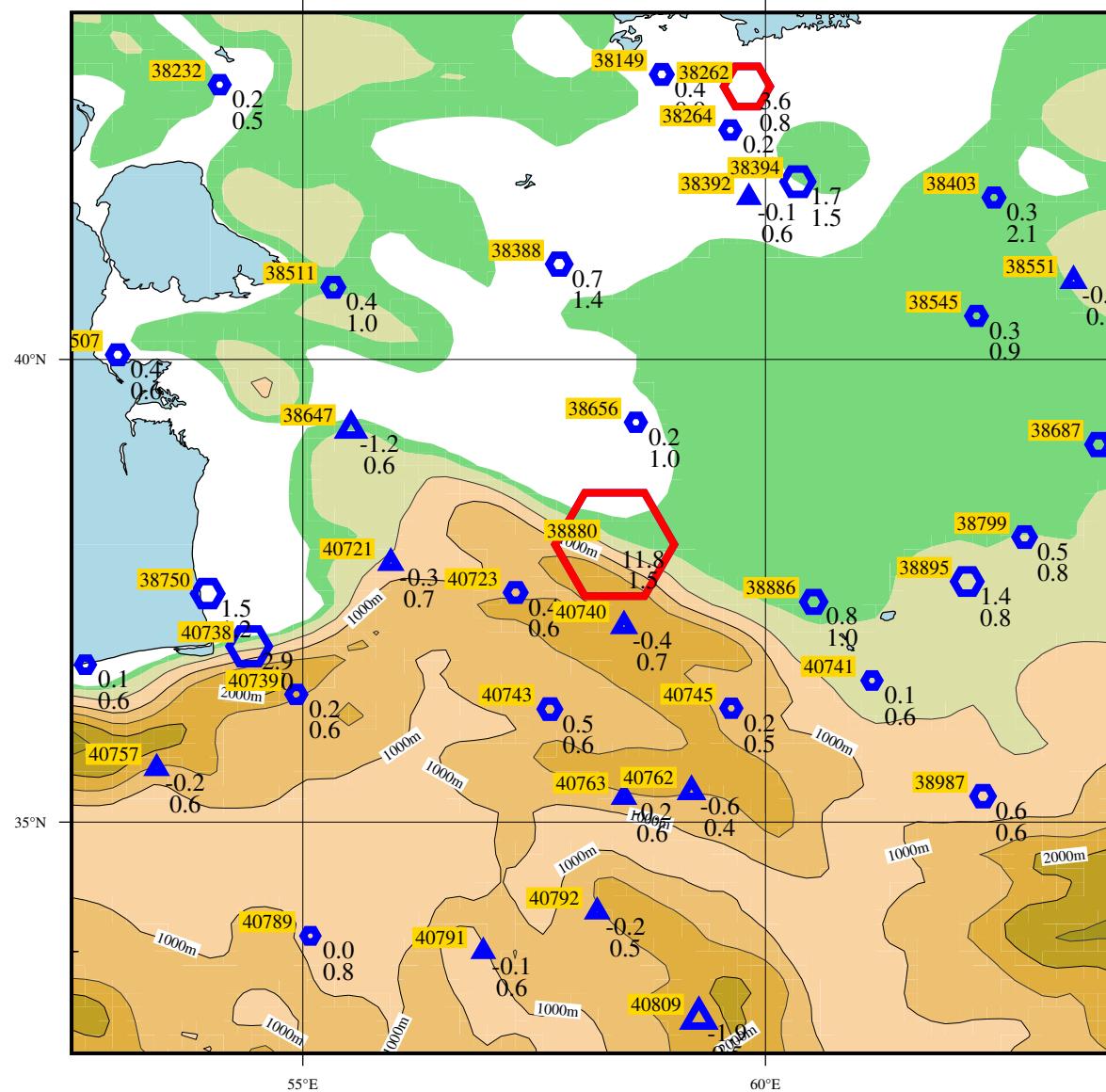
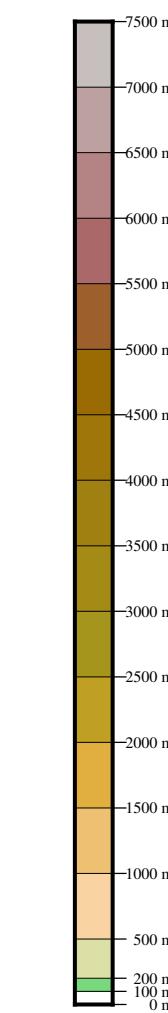


Figure 11 BIAS and SD of SLP for station 38262, 38880 (red) and surrounding stations (blue).

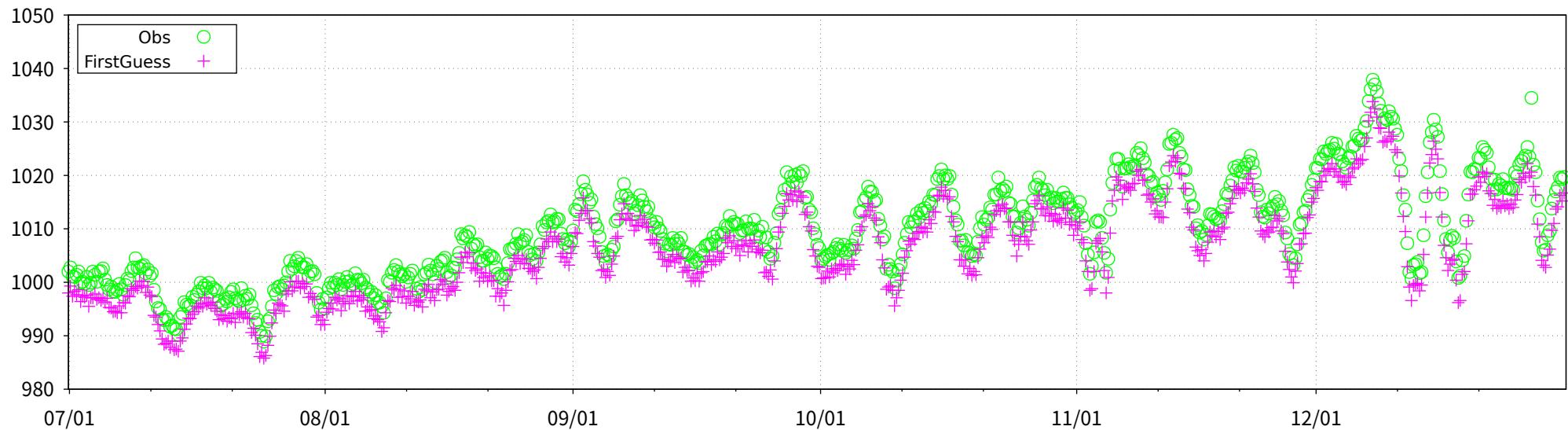
The number to the upper left of each symbol is the WMO IDENT, and those to the lower right are the values of BIAS and SD.

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)

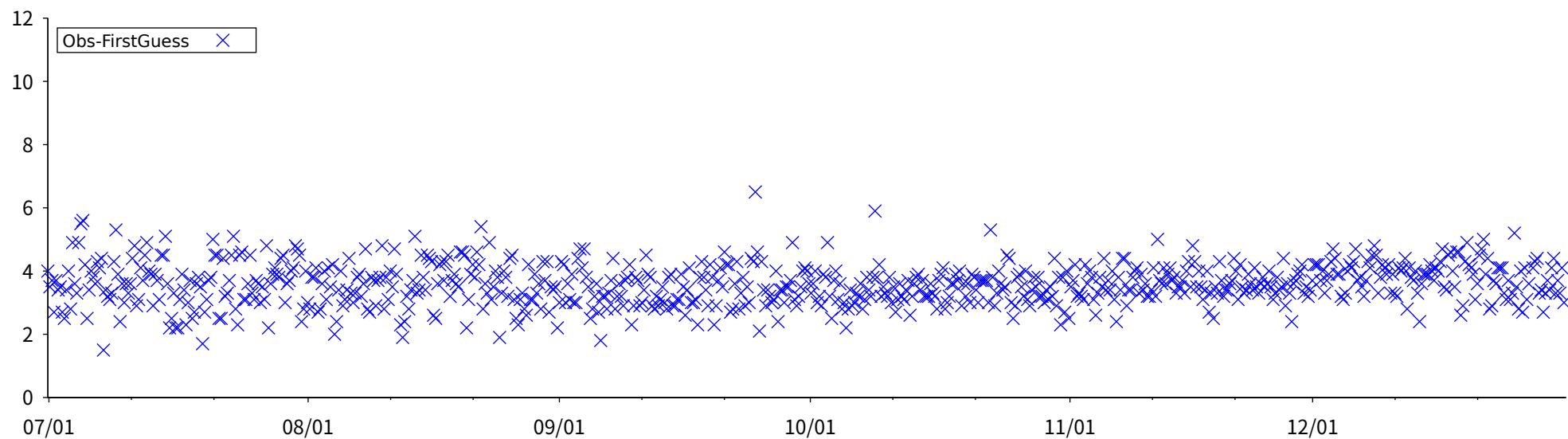
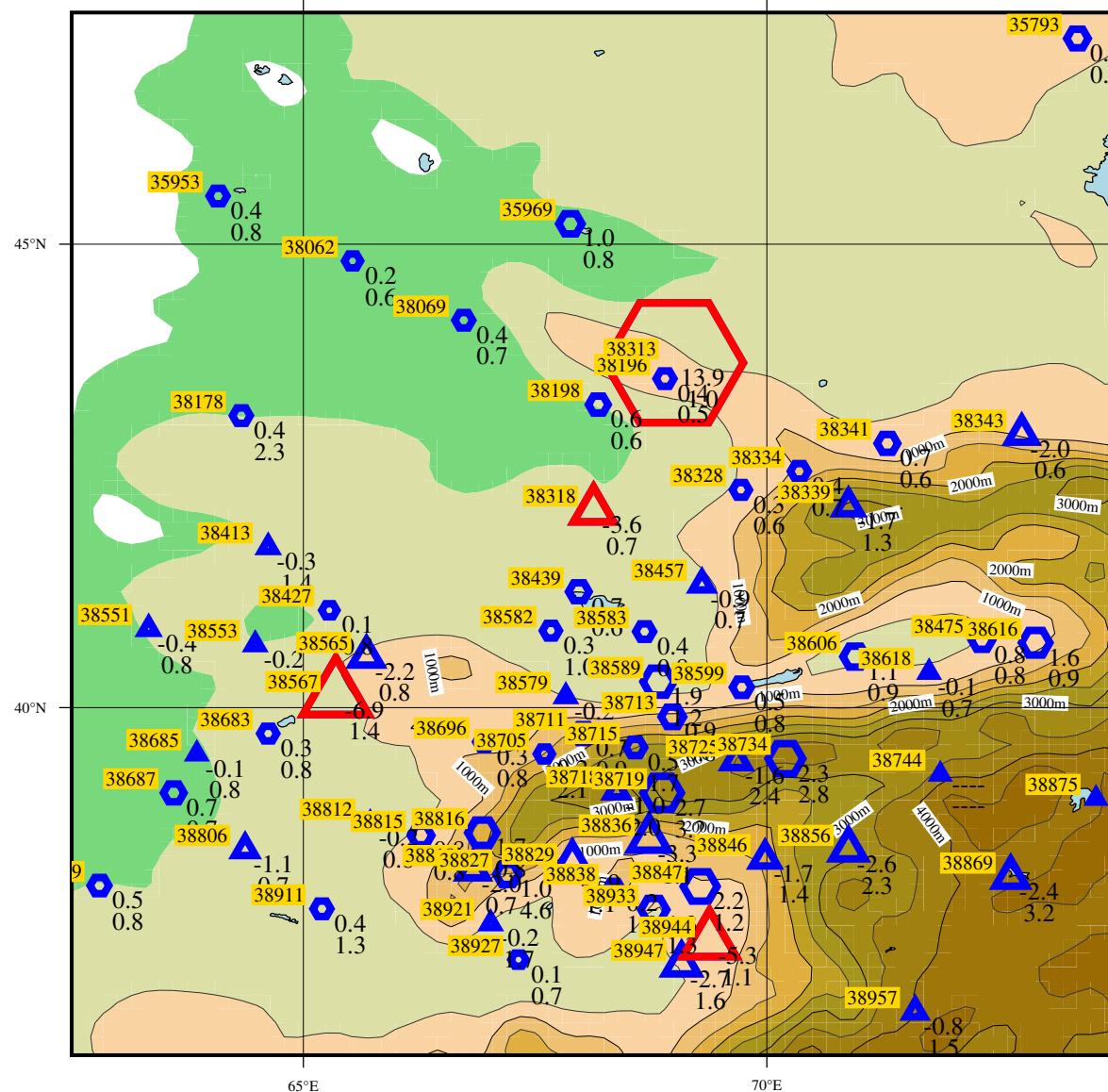


Figure 12 Time-series representation of SLP Obs minus FirstGuess for station 38262

LEVEL = SUR

ELEMENT = SLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

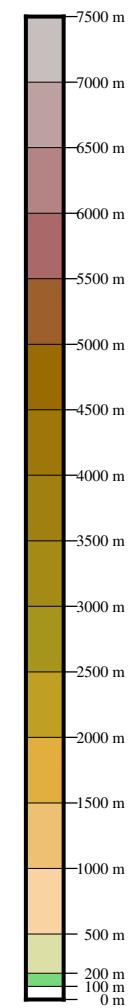


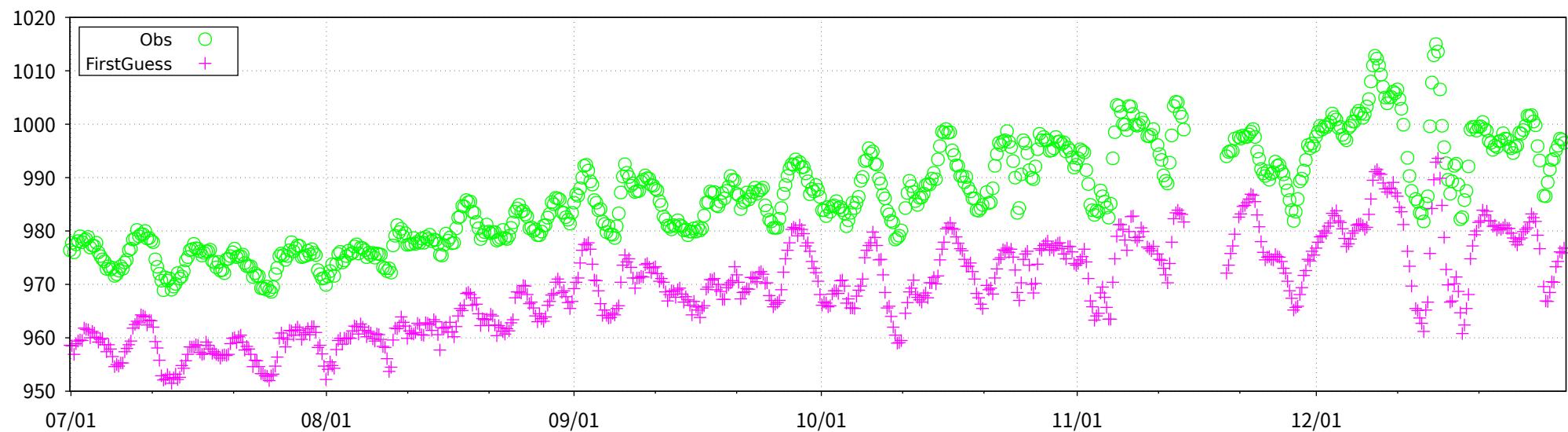
Figure 13 BIAS and SD of SLP for station 38313, 38318, 38567, 38944 (red) and surrounding stations (blue).

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

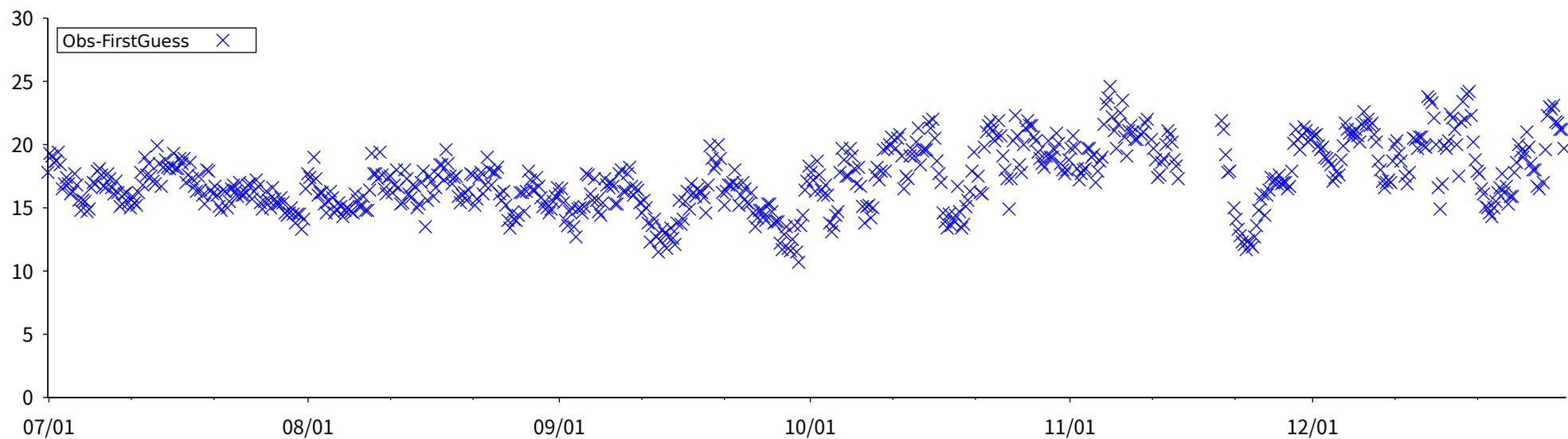
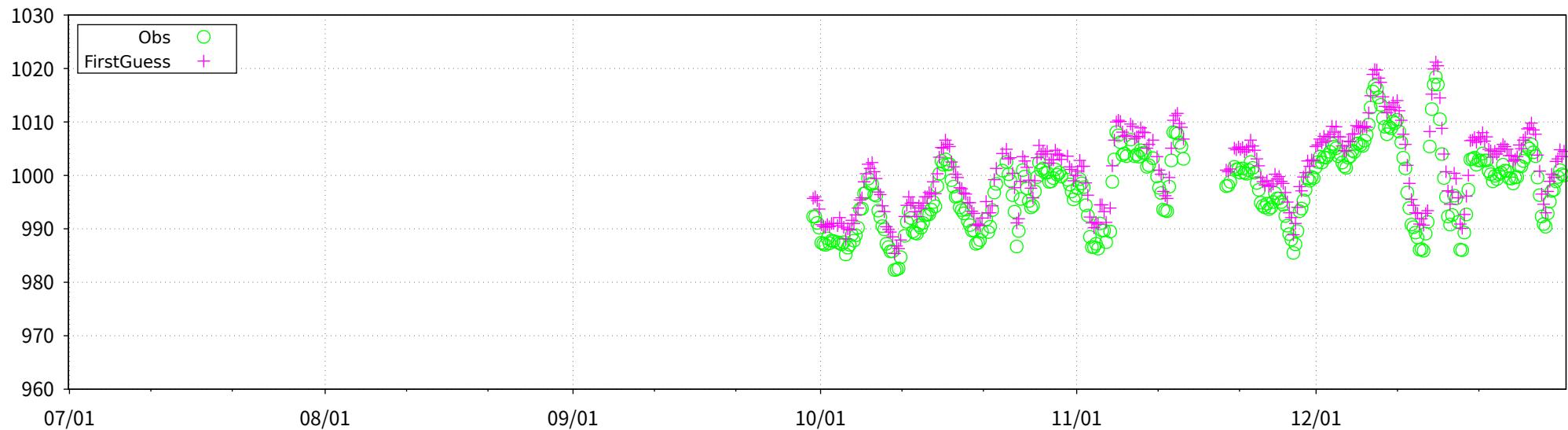


Figure 14 Time-series representation of SLP Obs minus FirstGuess for station 38313

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

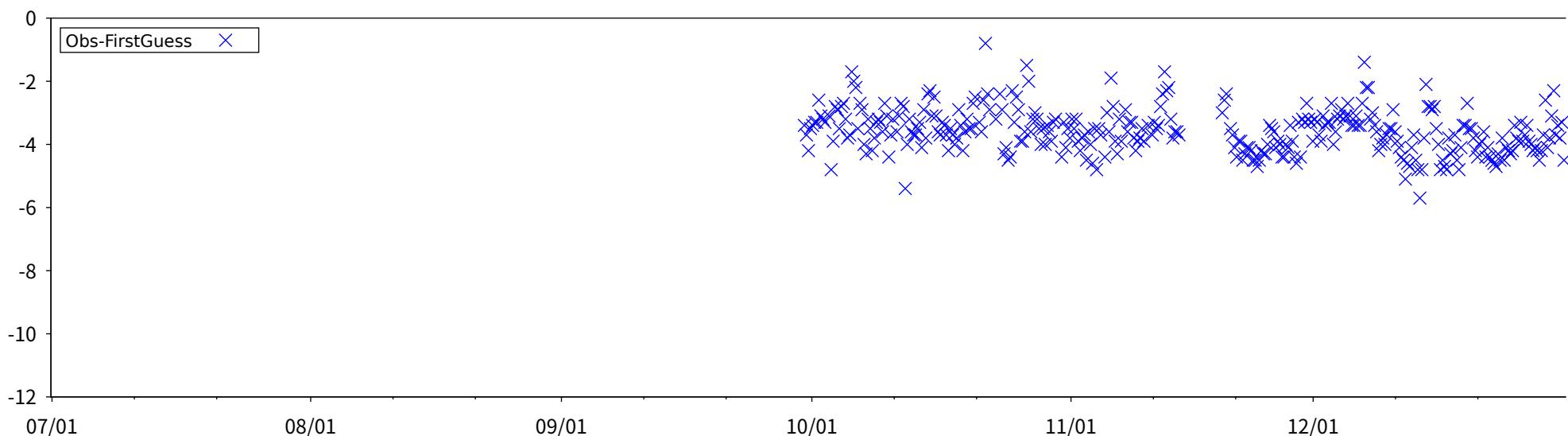
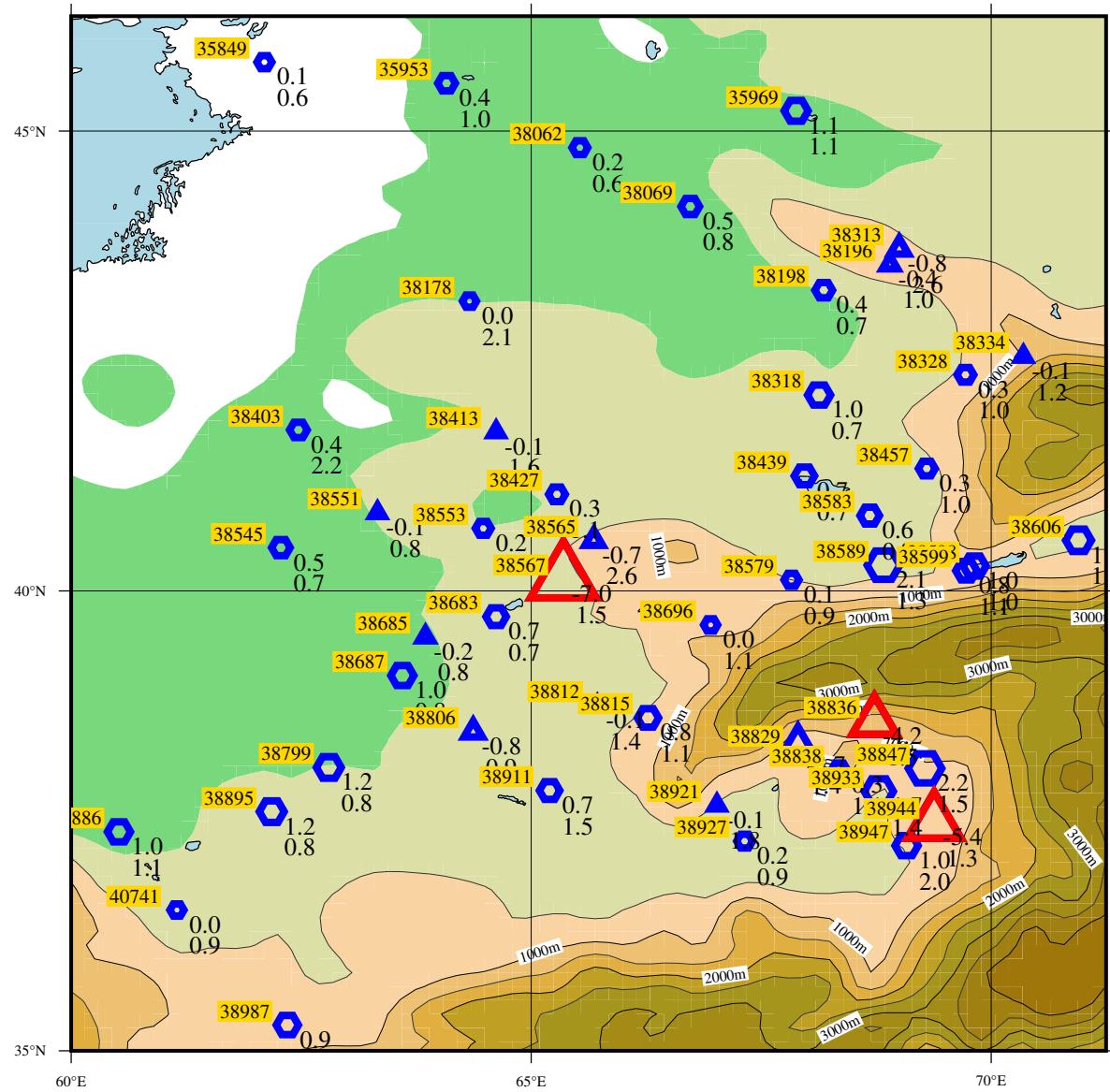


Figure 15 Time-series representation of SLP Obs minus FirstGuess for station 38318

LEVEL = SUR

ELEMENT = MSLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

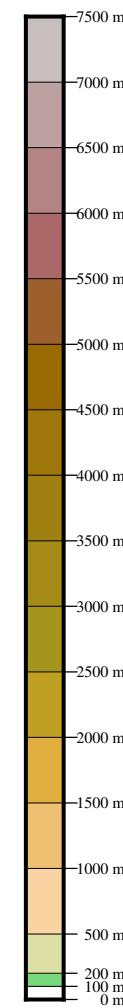


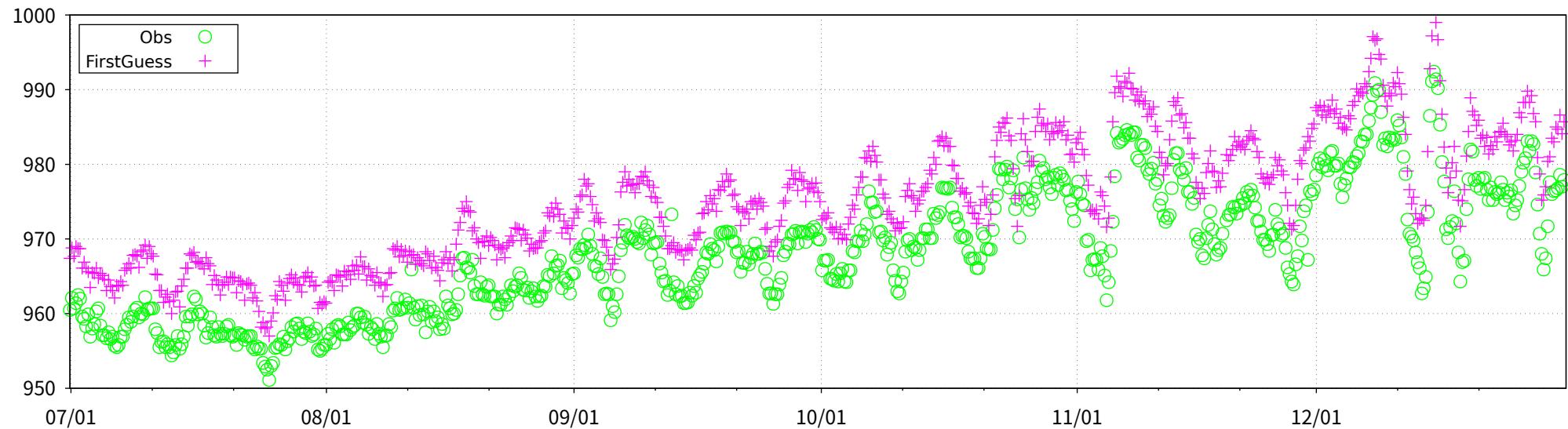
Figure 16 BIAS and SD of MSLP for station 38567, 38836, 38944 (red) and surrounding stations (blue).

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: 38567 (lat: 40.1N, lon: 65.4E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

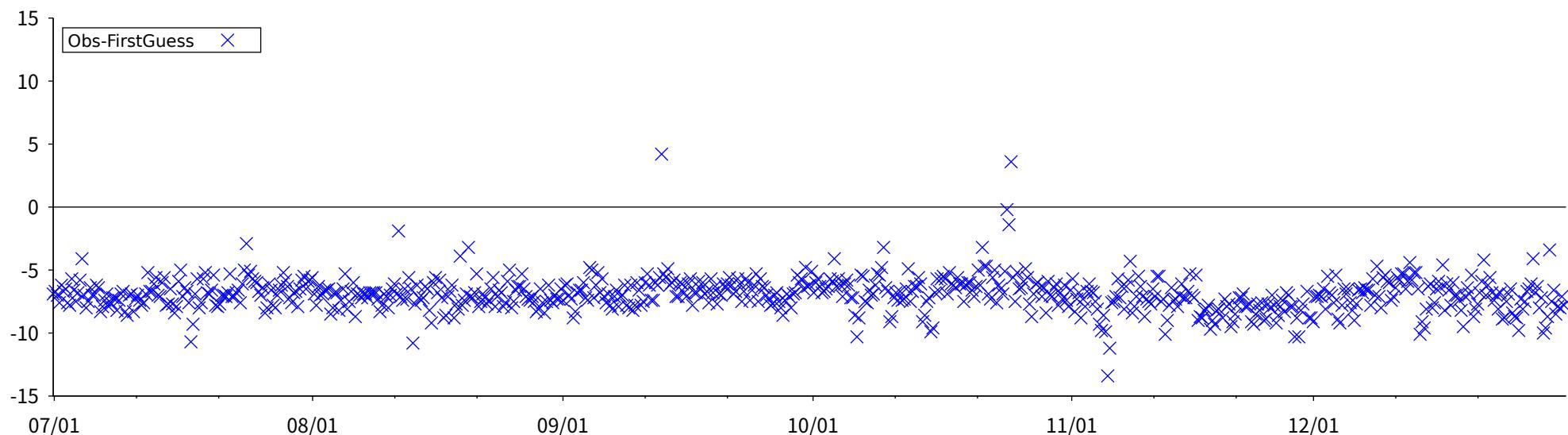
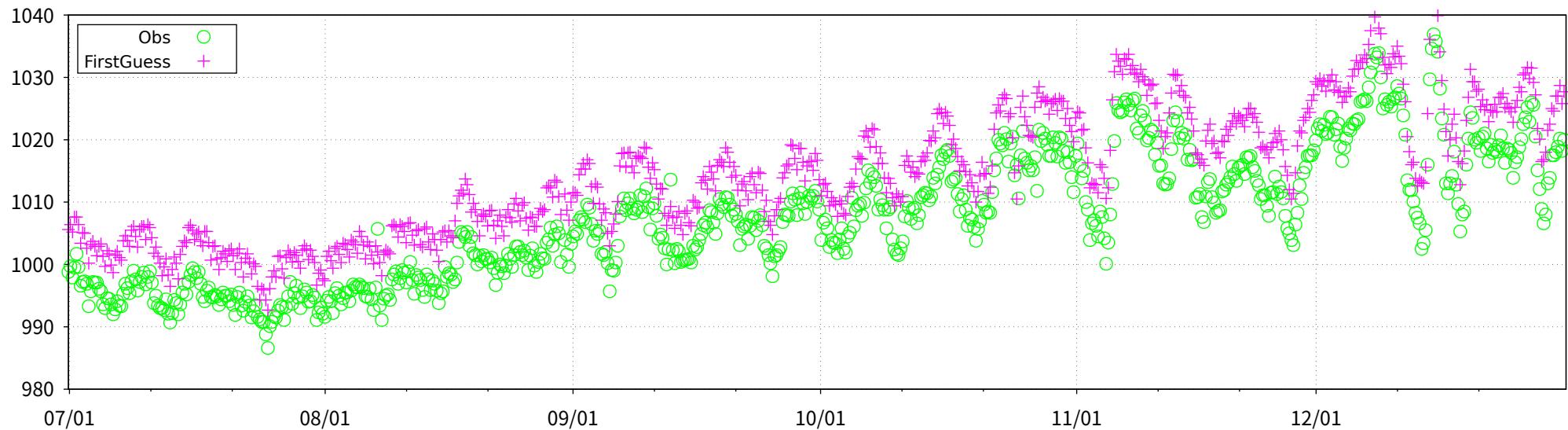


Figure 17(a) Time-series representation of SLP Obs minus FirstGuess for station 38567

ID: 38567 (lat: 40.1N, lon: 65.4E)  
MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

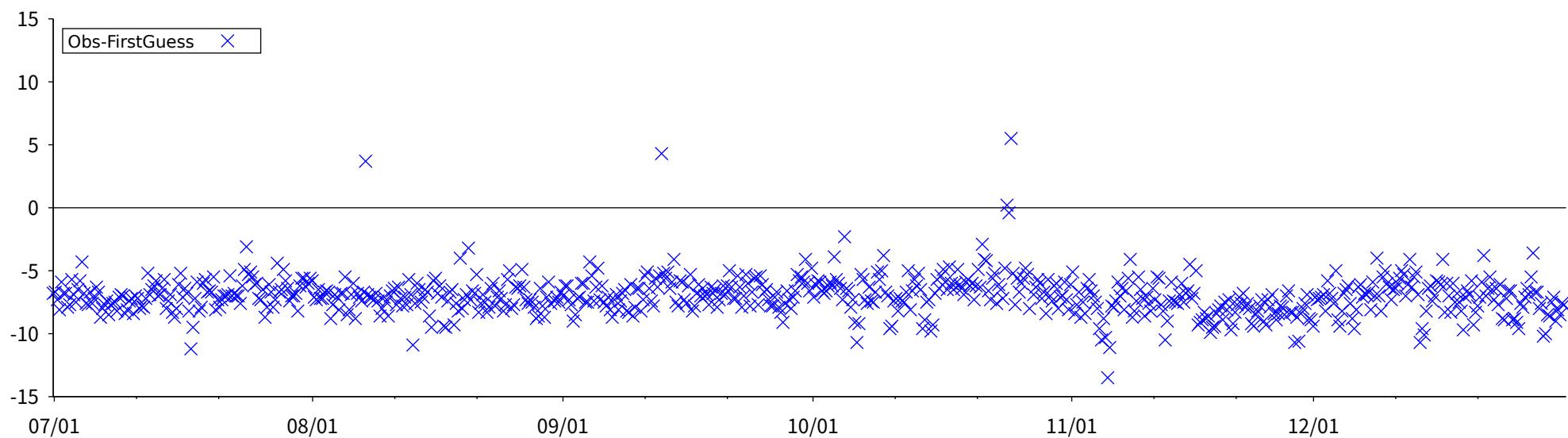
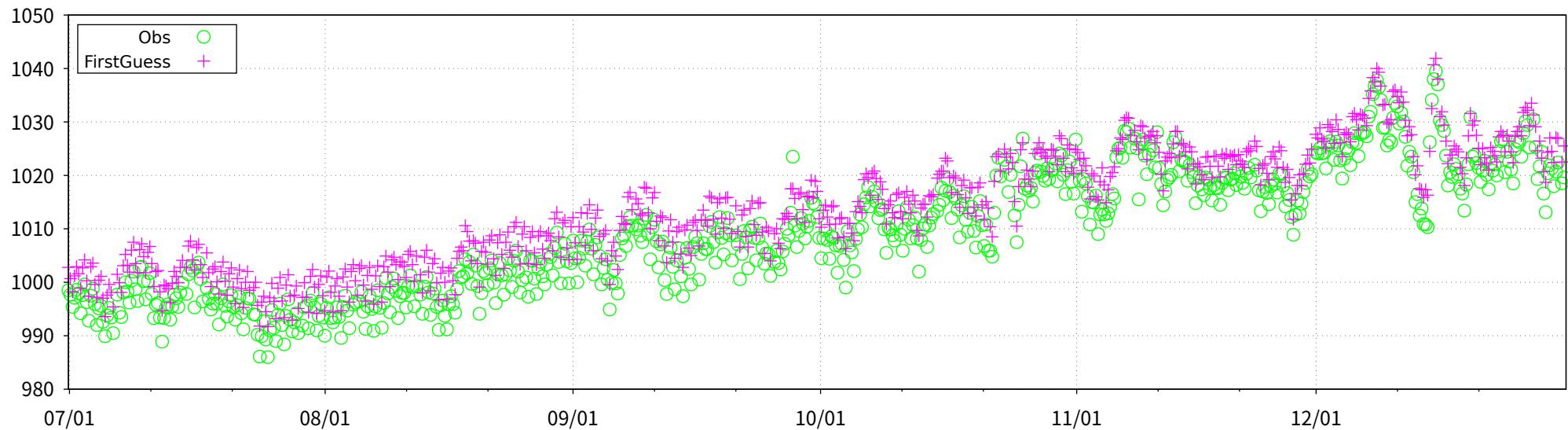


Figure 17(b) Time-series representation of MSLP Obs minus FirstGuess for station 38567

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

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

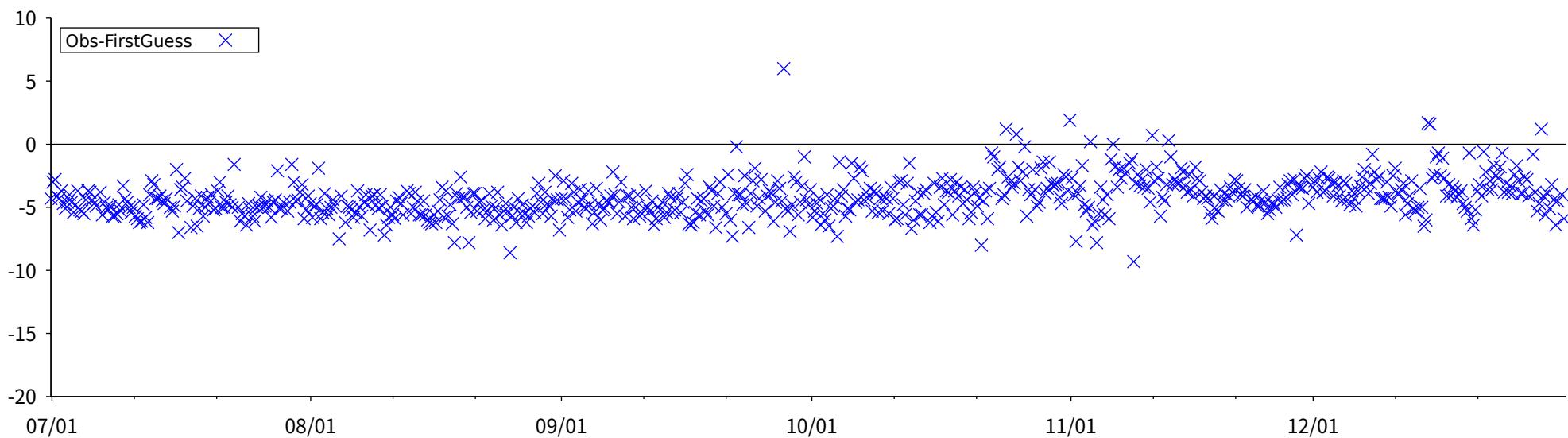
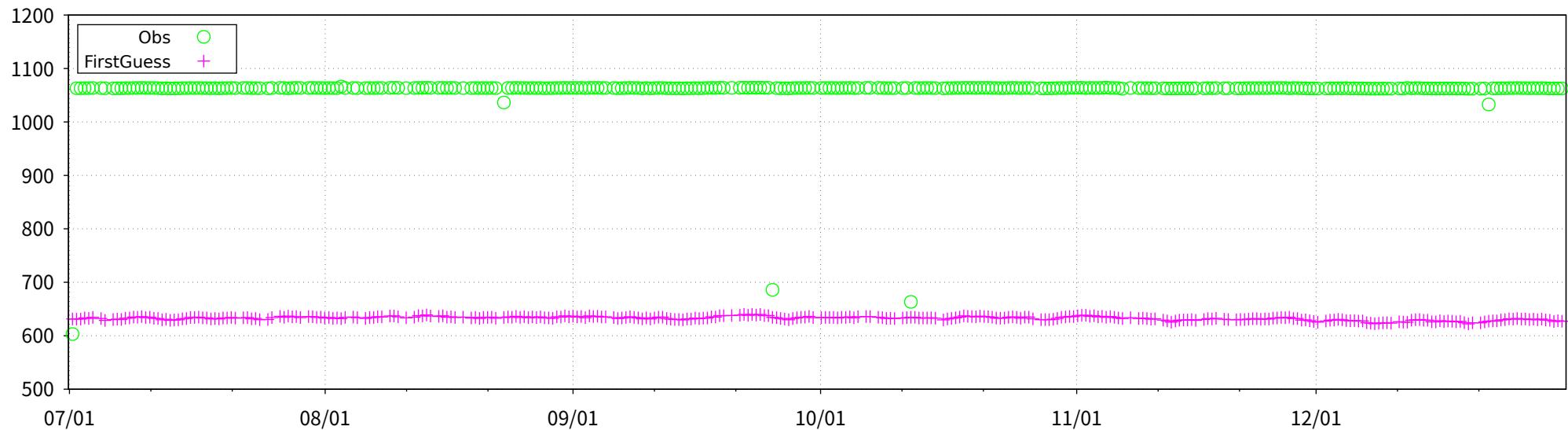


Figure 18 Time-series representation of MSLP Obs minus FirstGuess for station 38836

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

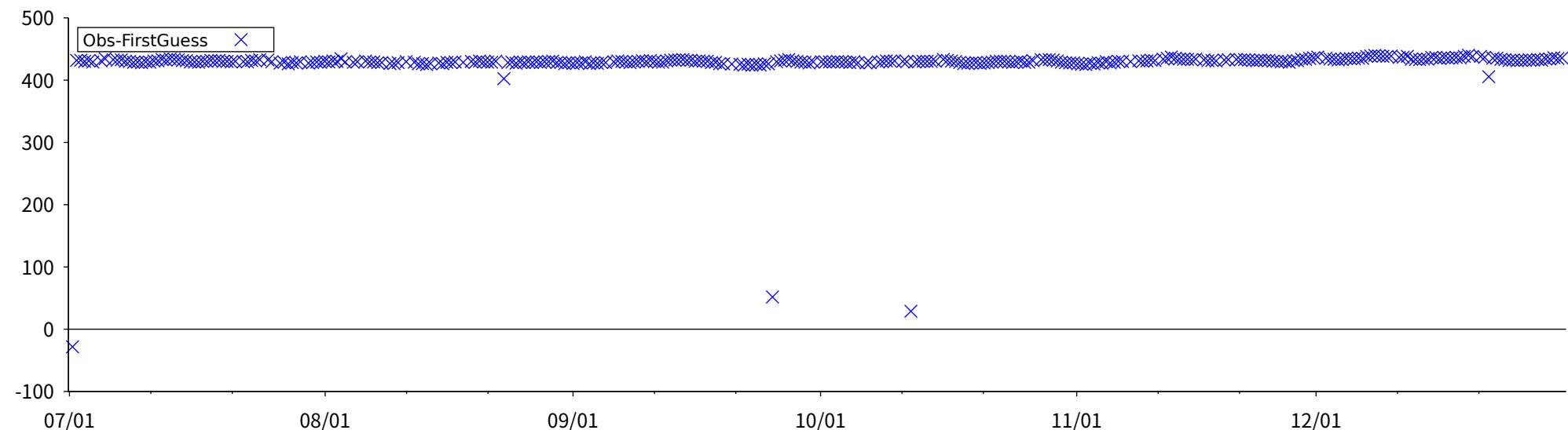
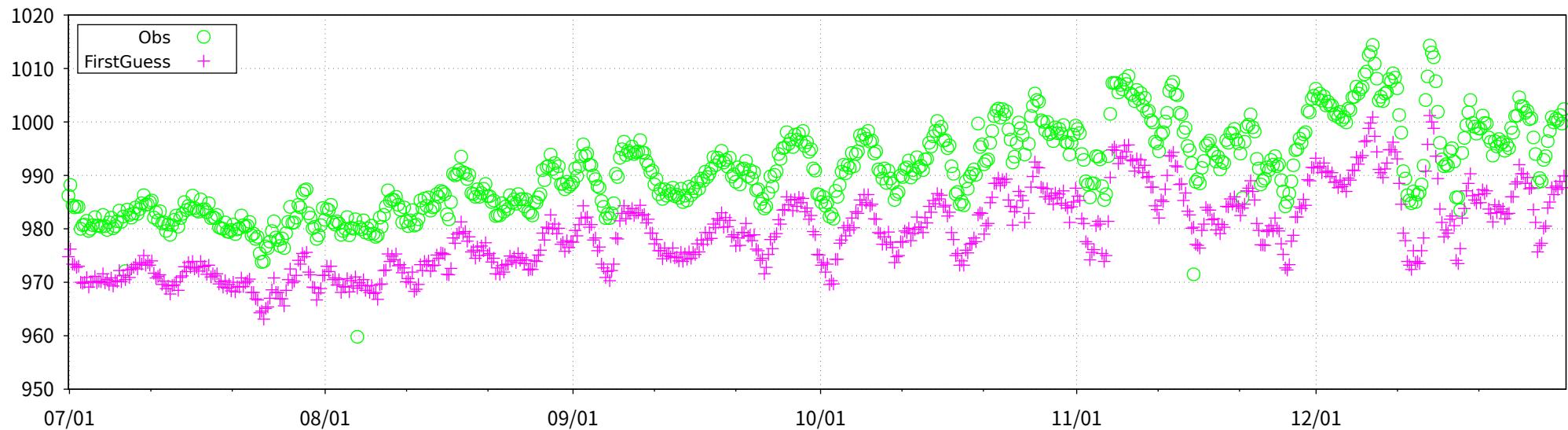


Figure 19 Time-series representation of SLP Obs minus FirstGuess for station 38875

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

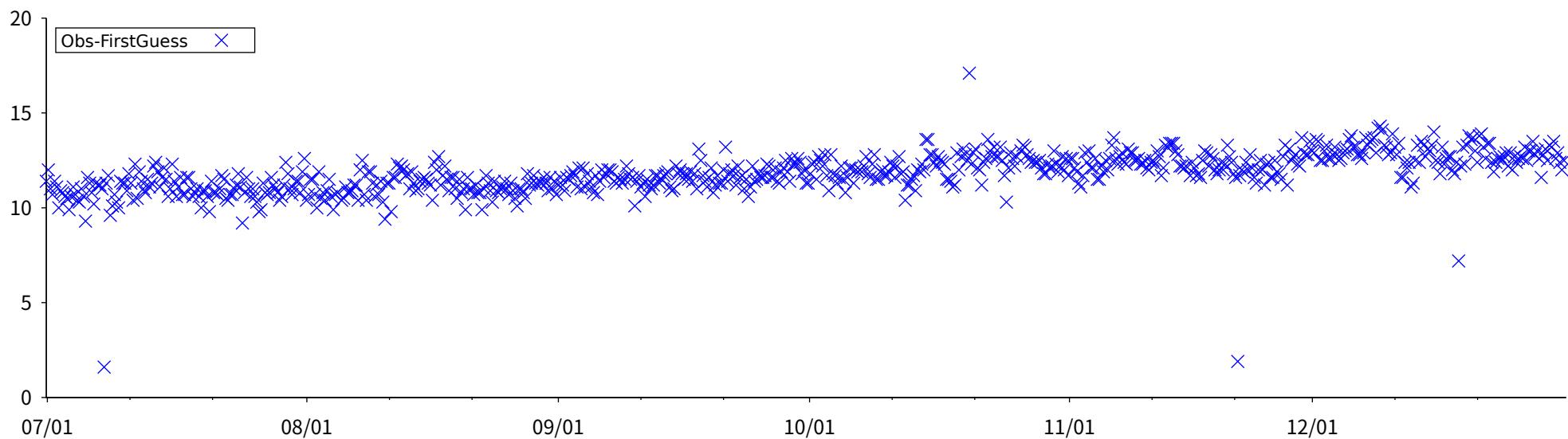
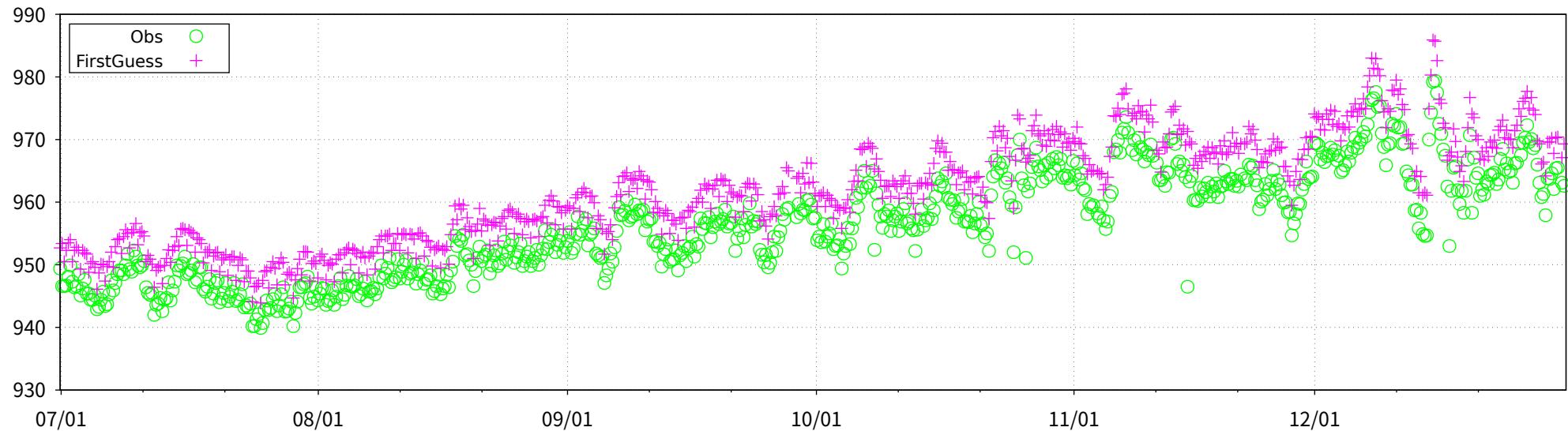


Figure 20 Time-series representation of SLP Obs minus FirstGuess for station 38880

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

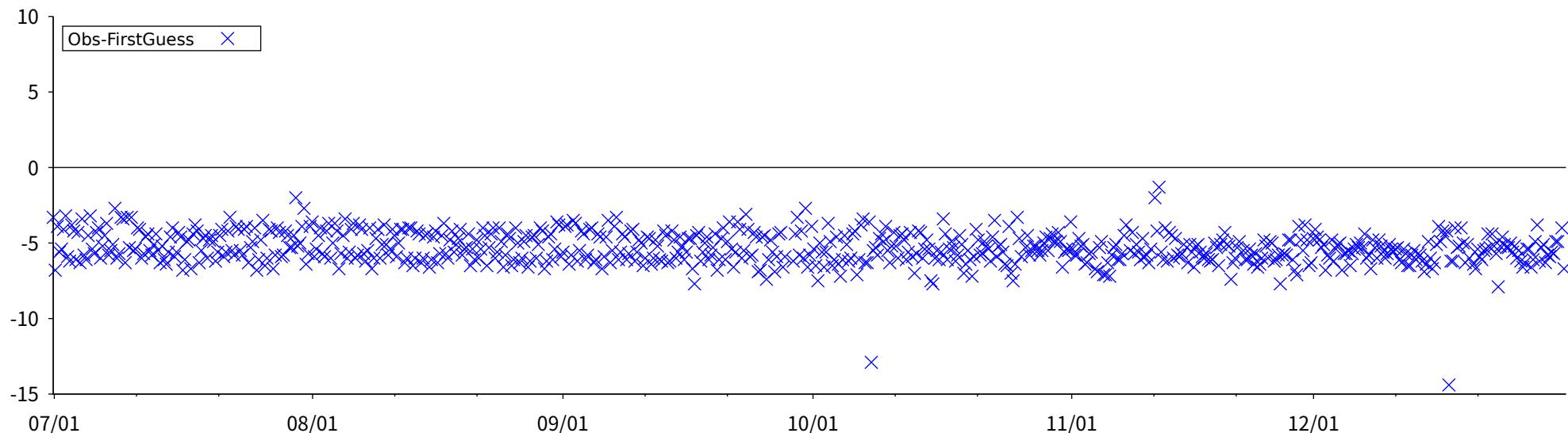


Figure 21(a) Time-series representation of SLP Obs minus FirstGuess for station 38944

ID: 38944 (lat: 37.5N, lon: 69.4E)  
MSLP [hPa]

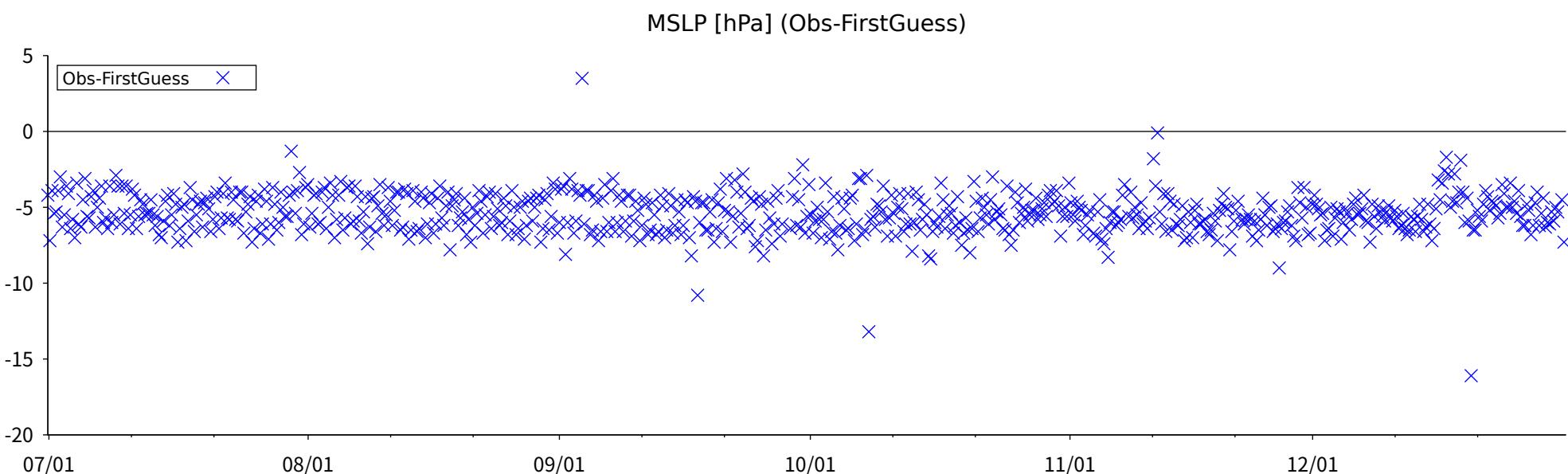
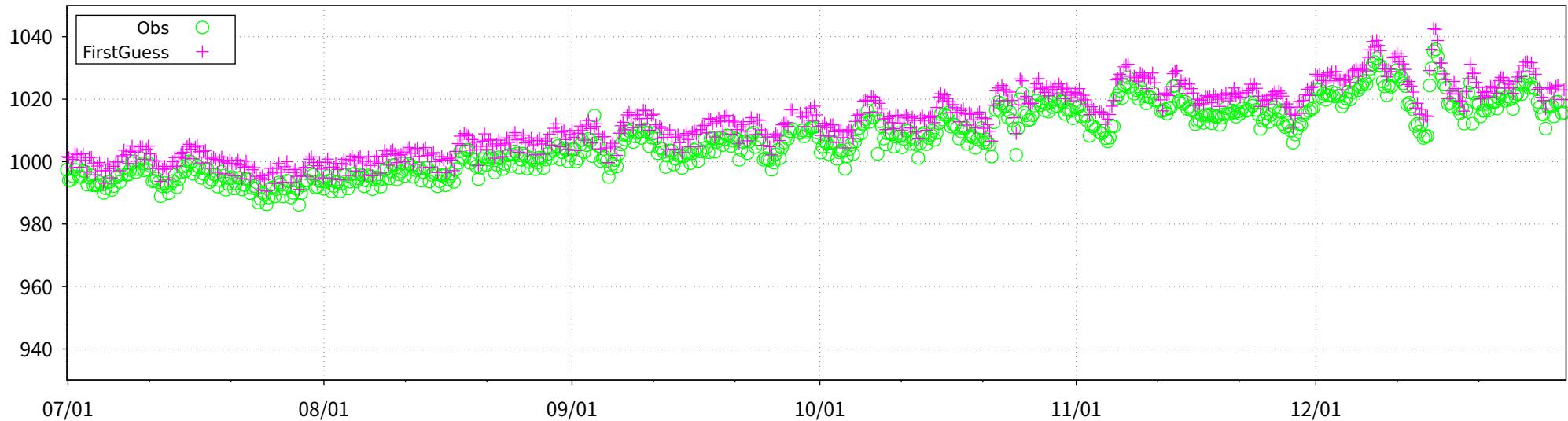
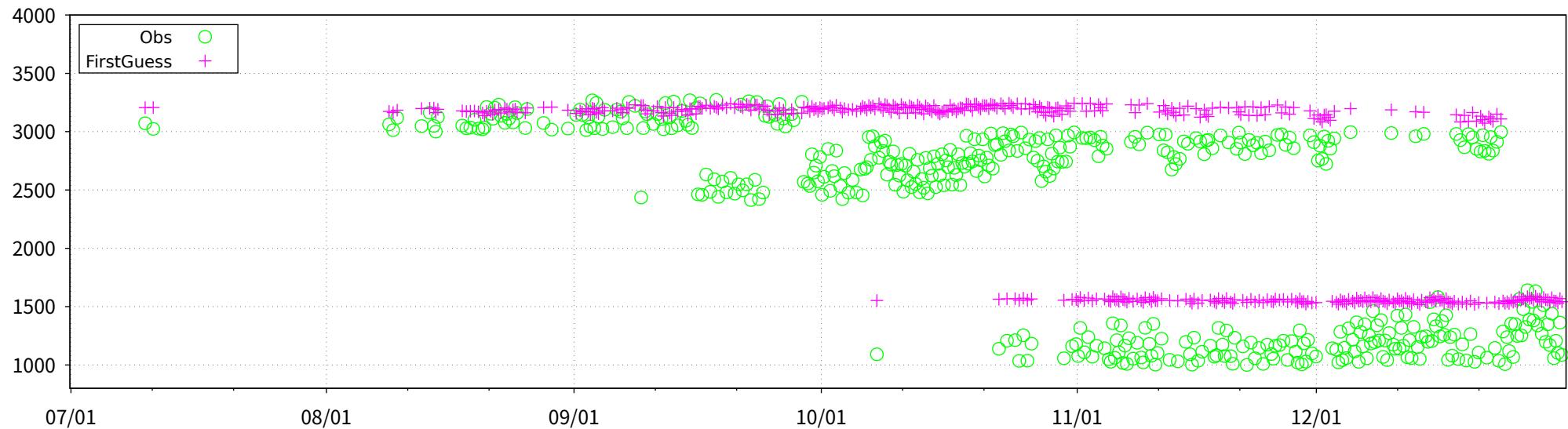


Figure 21(b) Time-series representation of MSLP Obs minus FirstGuess for station 38944

ID: 41249 (lat: 23.9N, lon: 56.2E)

GZ850 or GZ700 [m]



GZ850 or GZ700 [m] (Obs-FirstGuess)

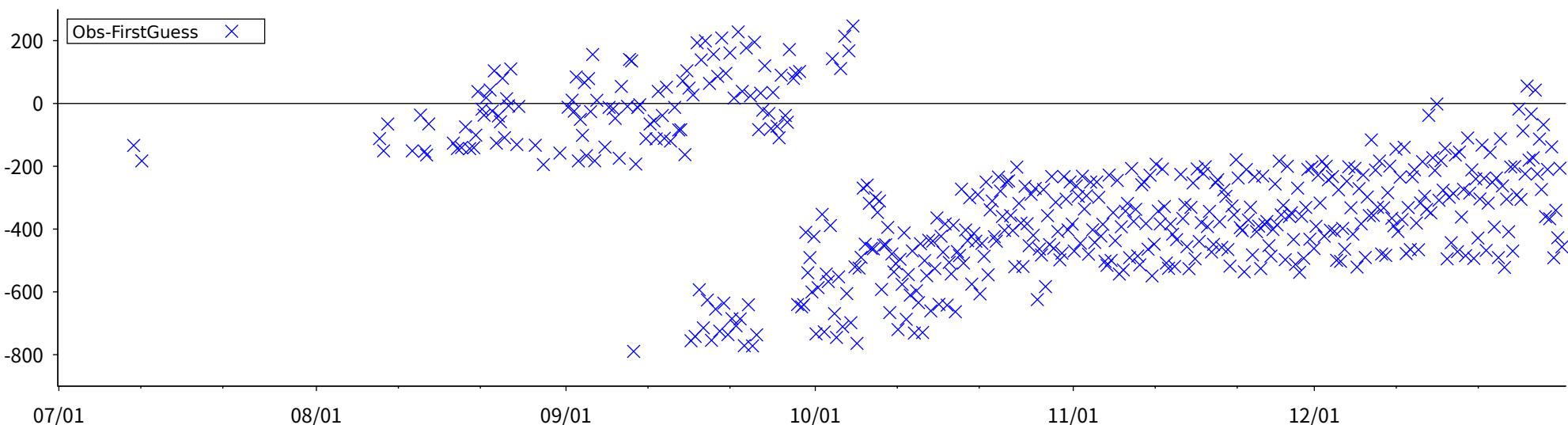
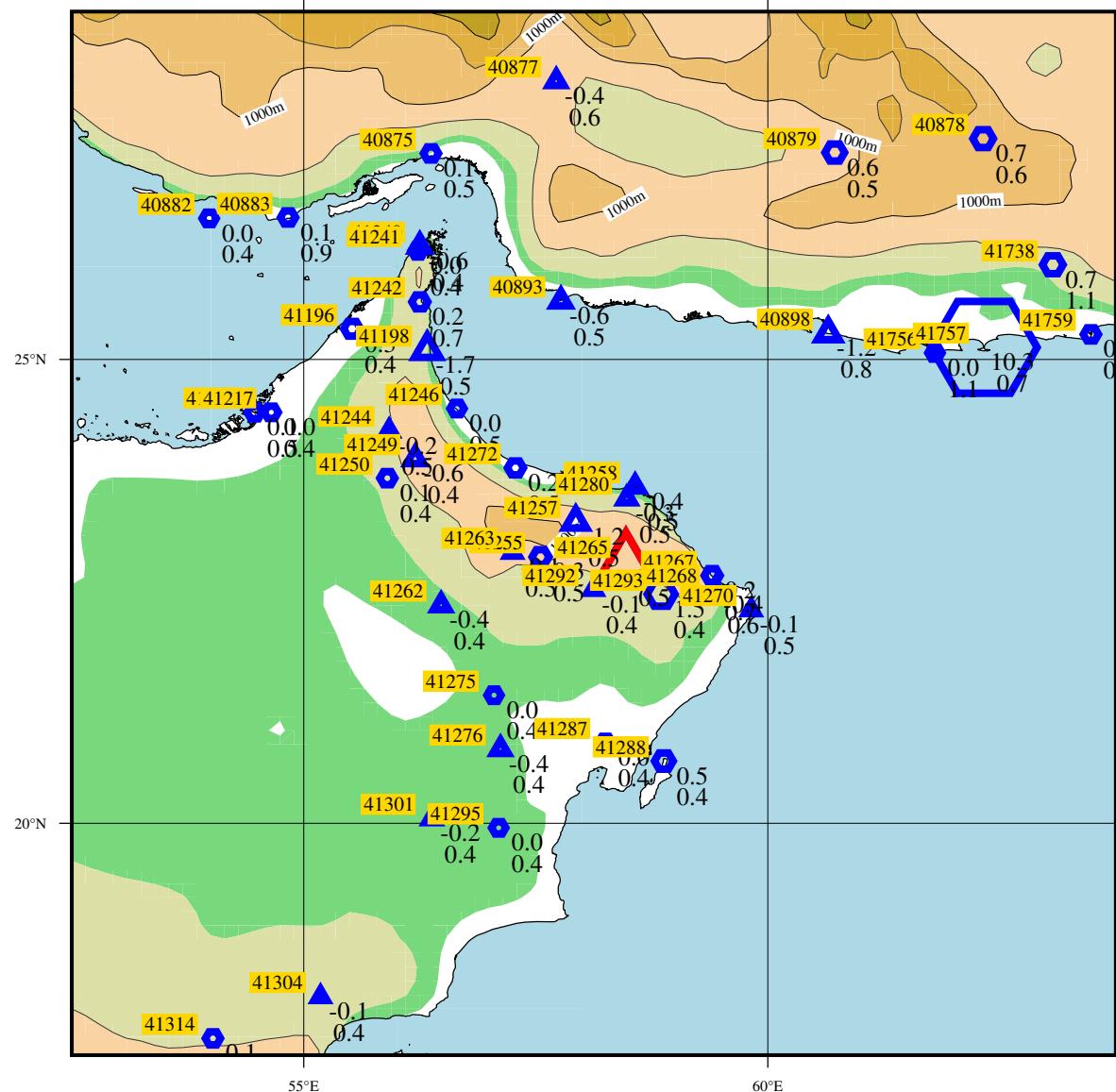


Figure 22 Time-series representation of GZ850 or GZ700 Obs minus FirstGuess for station 41249

LEVEL = SUR      ELEMENT = SLP  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

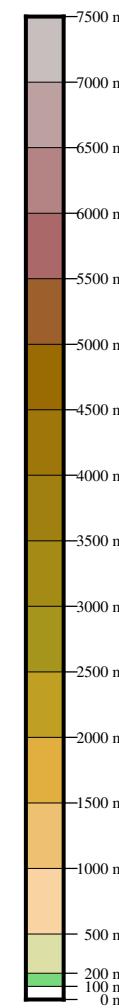


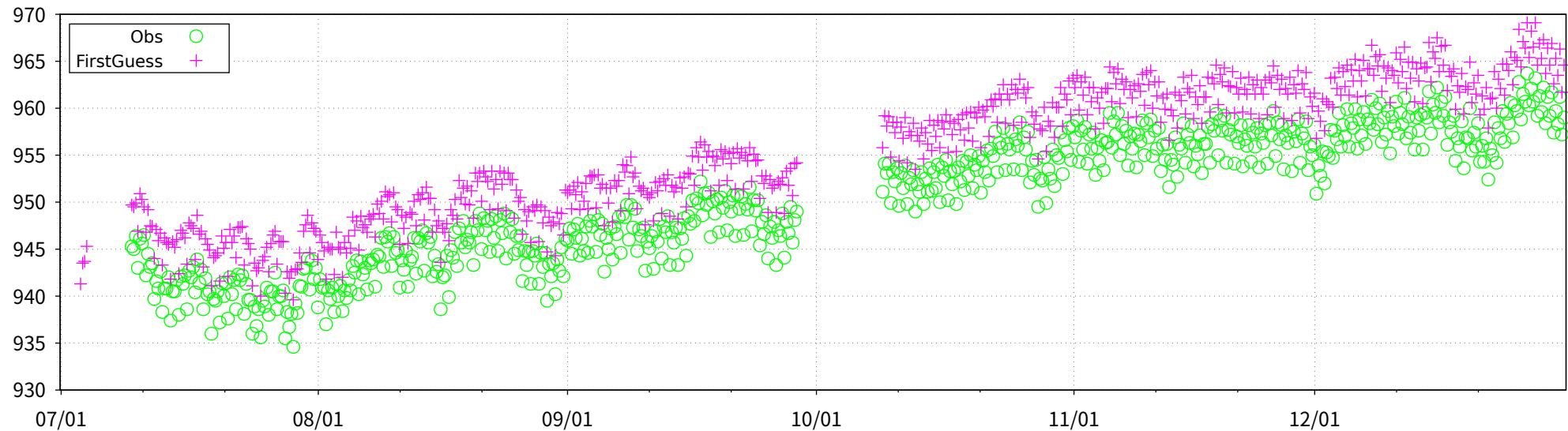
Figure 23 BIAS and SD of SLP for station 41265 (red) and surrounding stations (blue).

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)

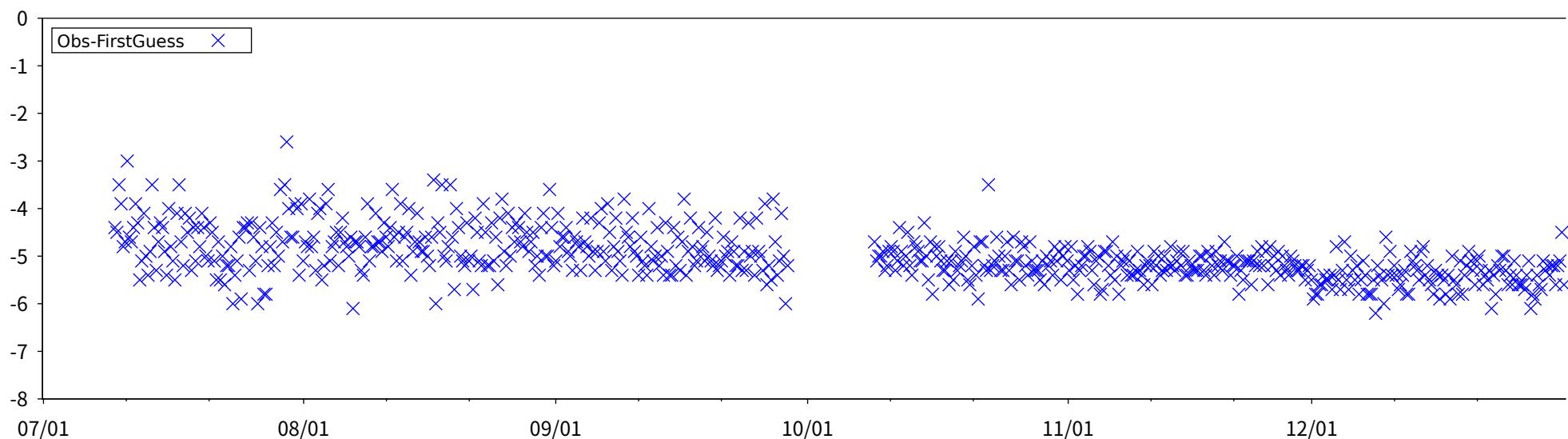
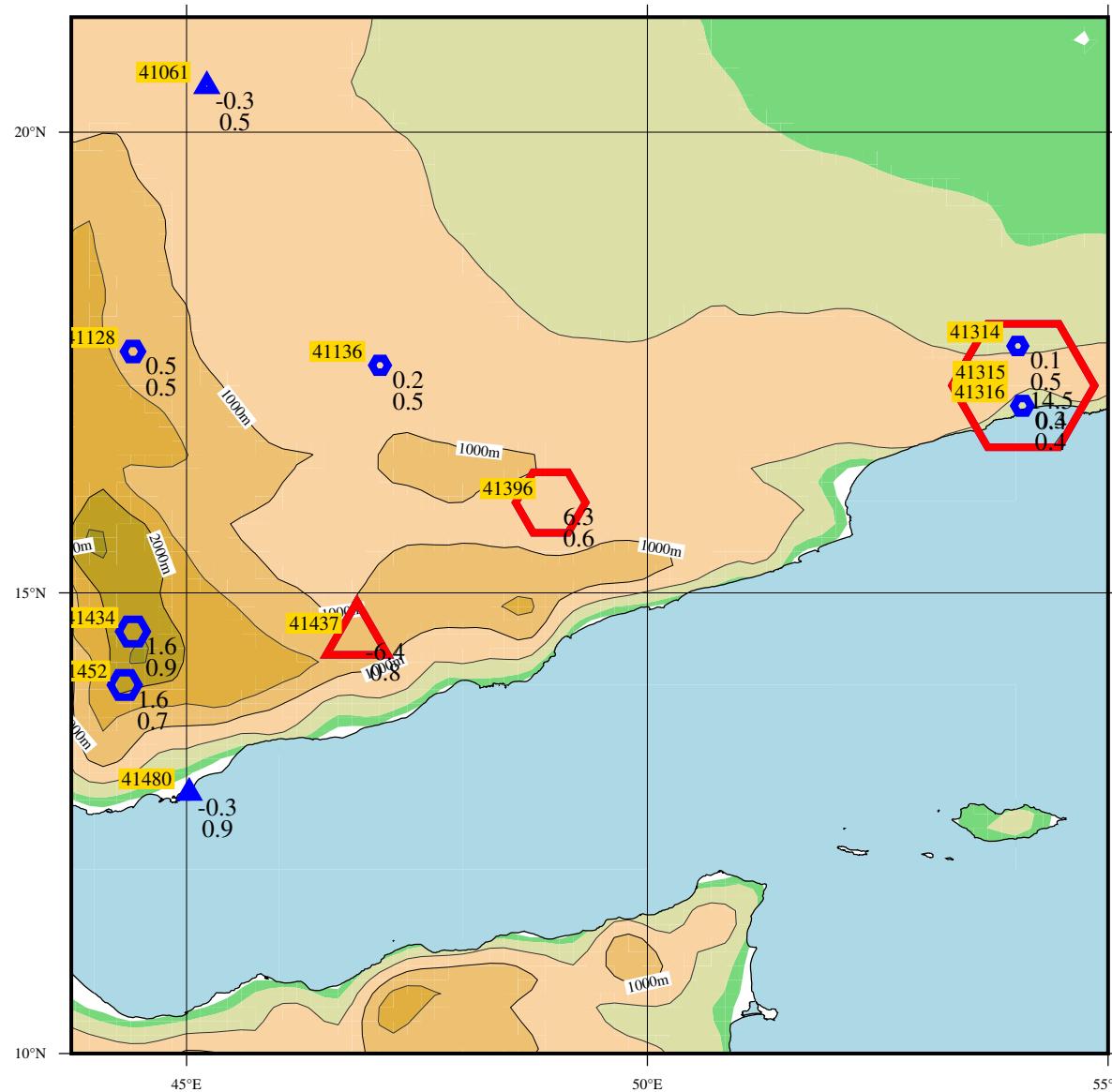


Figure 24 Time-series representation of SLP Obs minus FirstGuess for station 41265

LEVEL = SUR      ELEMENT = SLP  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
O BIAS  
SD

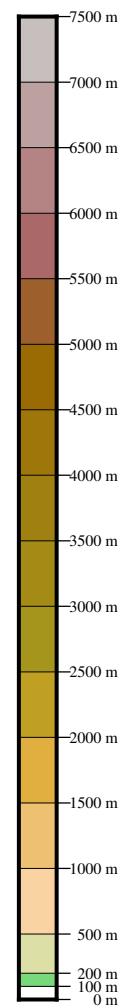


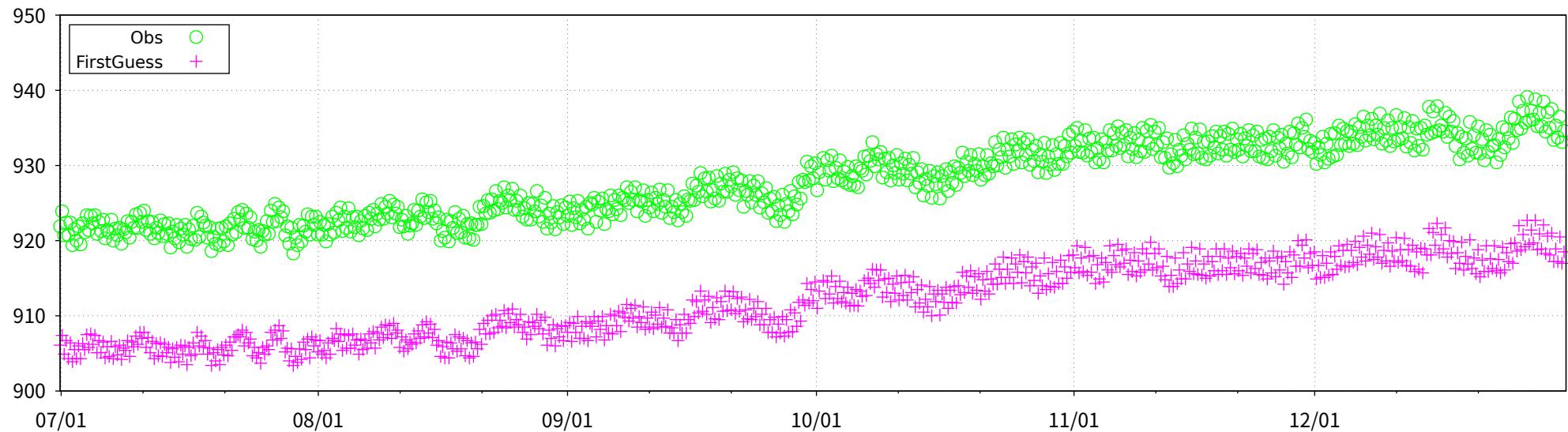
Figure 25 BIAS and SD of SLP for station 41315, 41396, 41437 (red) and surrounding stations (blue).

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)

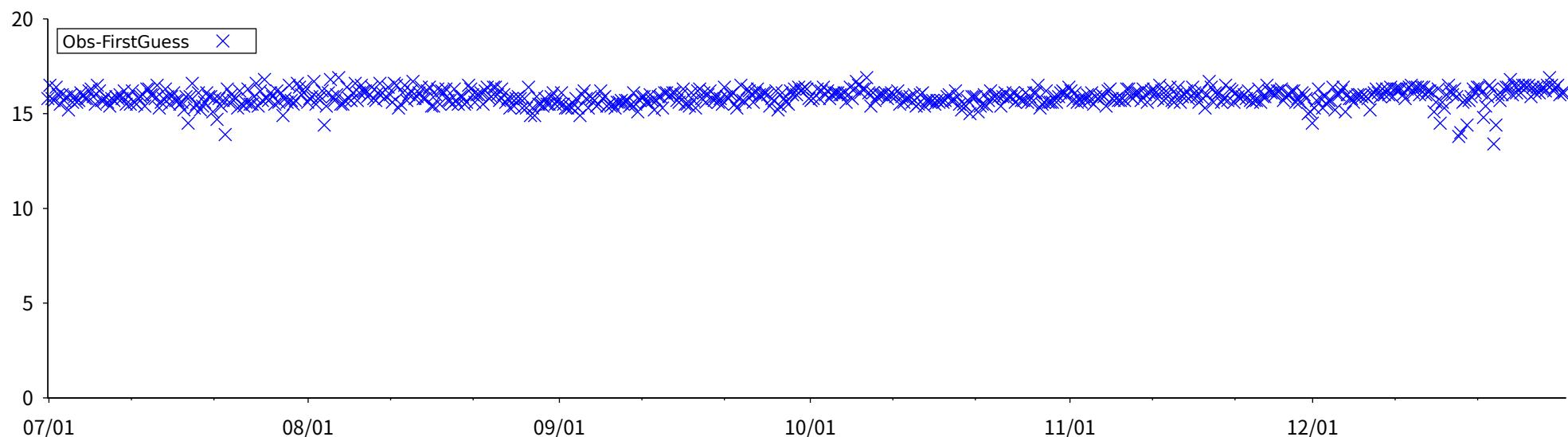
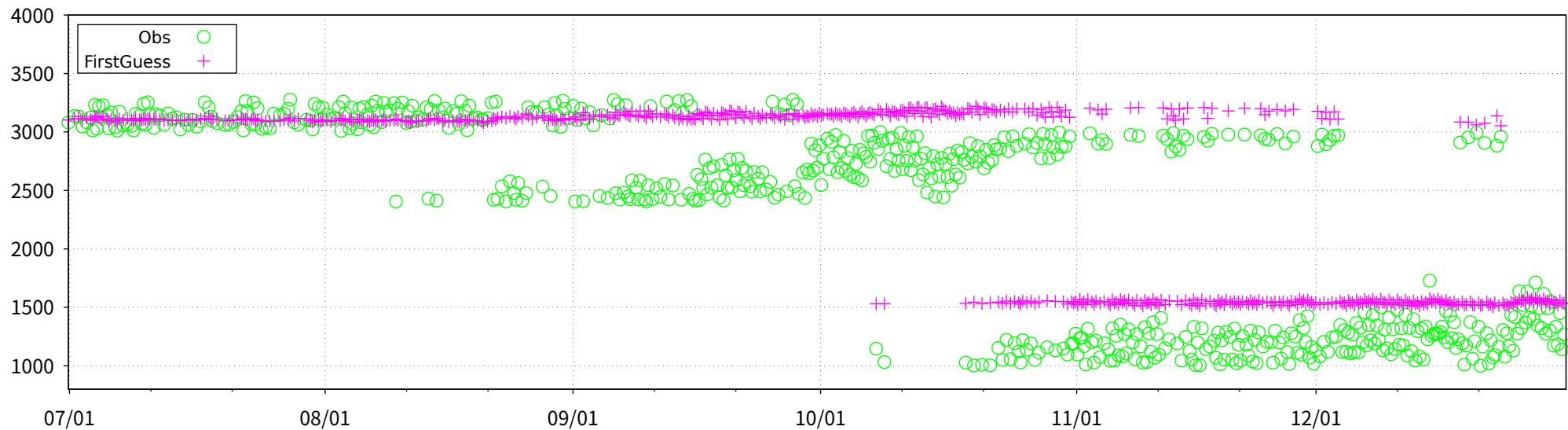


Figure 26(a) Time-series representation of SLP Obs minus FirstGuess for station 41315

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

GZ850 or GZ700 [m]



GZ850 or GZ700 [m] (Obs-FirstGuess)

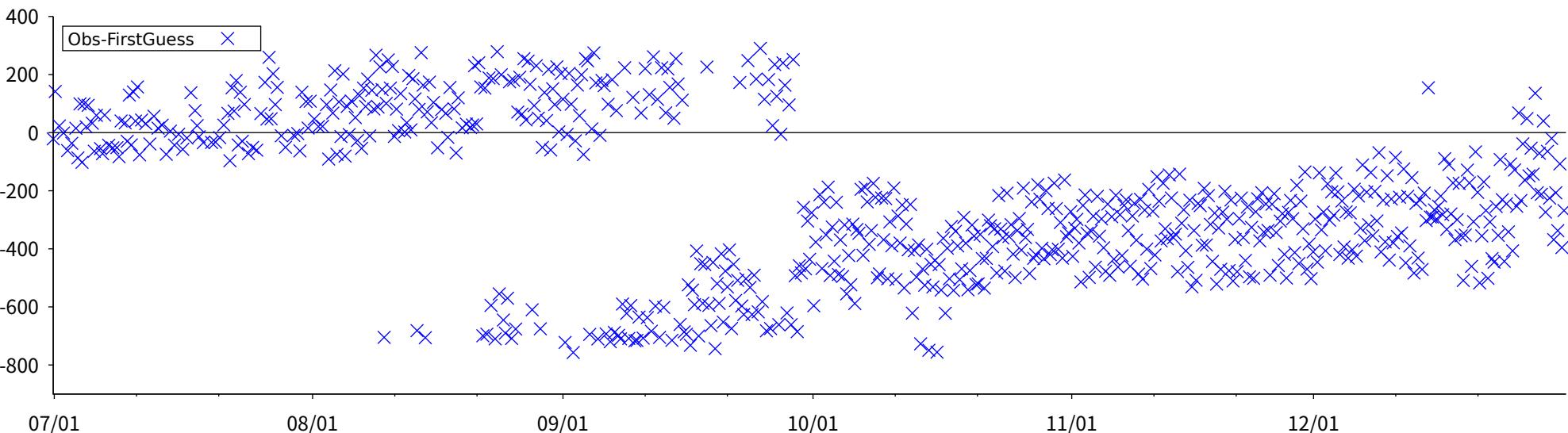
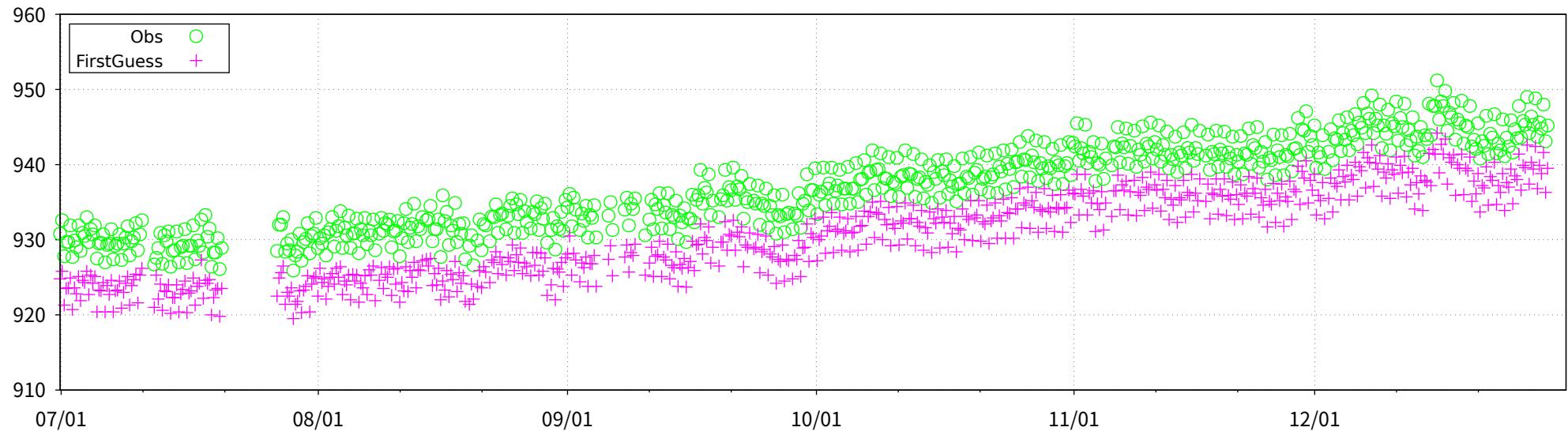


Figure 26(b) Time-series representation of GZ850 or GZ700 Obs minus FirstGuess for station 41315

ID: 41396 (lat: 16.0N, lon: 49.0E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

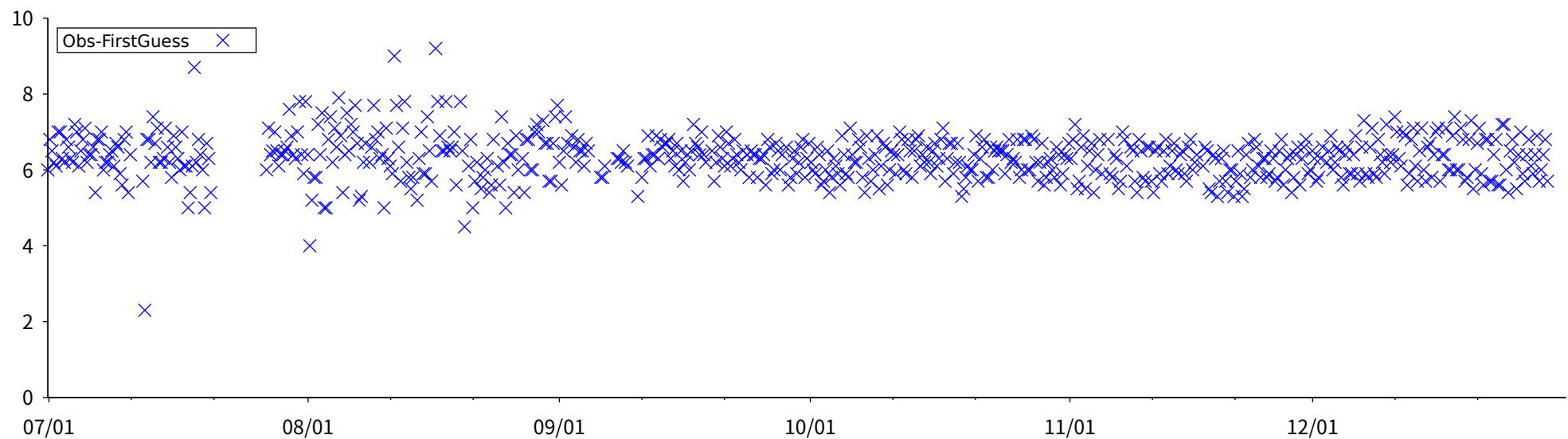
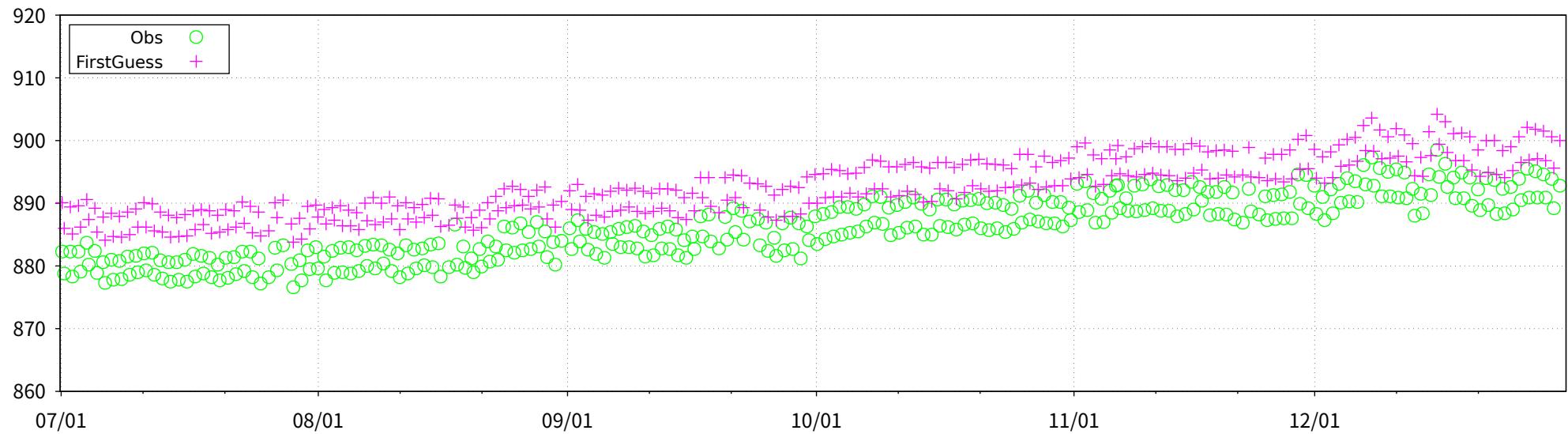


Figure 27 Time-series representation of SLP Obs minus FirstGuess for station 41396

ID: 41437 (lat: 14.5N, lon: 46.9E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

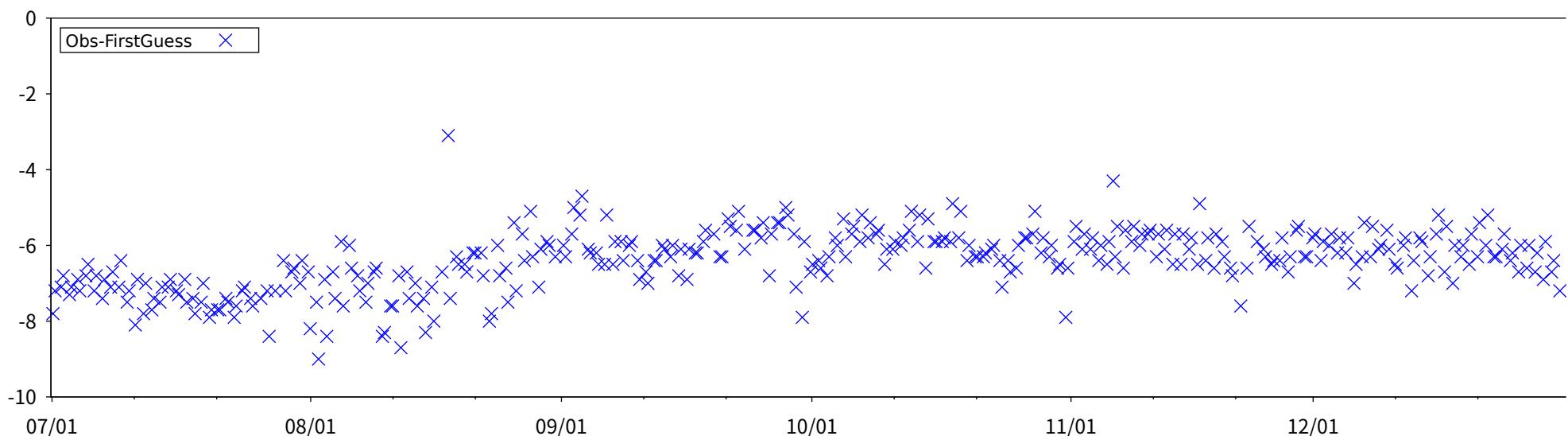
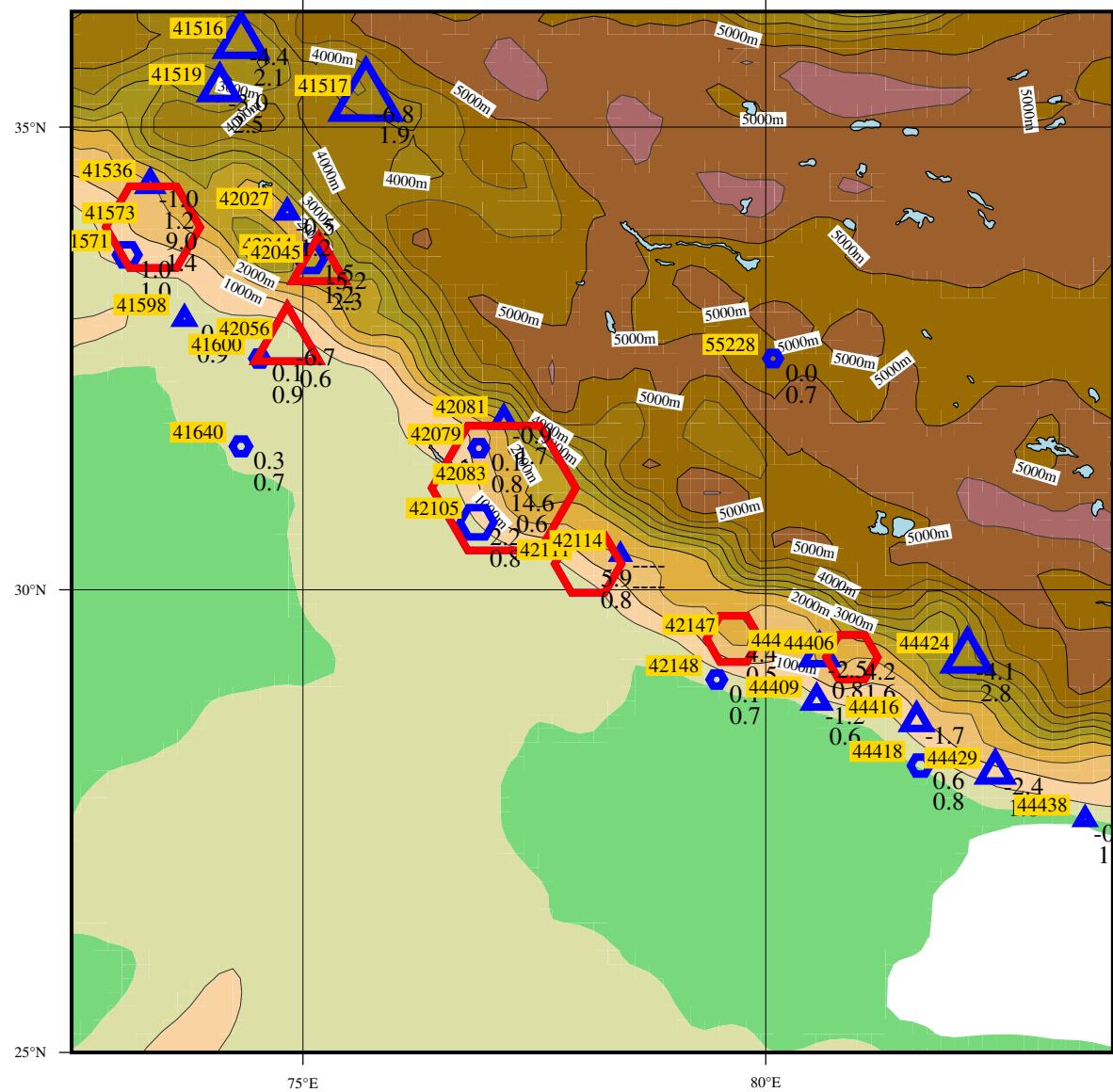


Figure 28 Time-series representation of SLP Obs minus FirstGuess for station 41437

LEVEL = SUR

ELEMENT = SLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
O BIAS  
SD

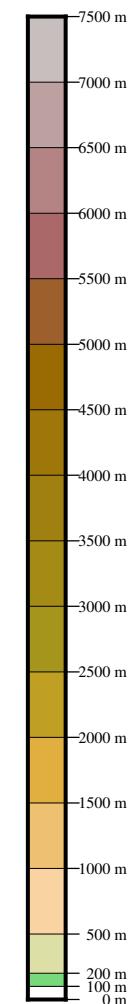


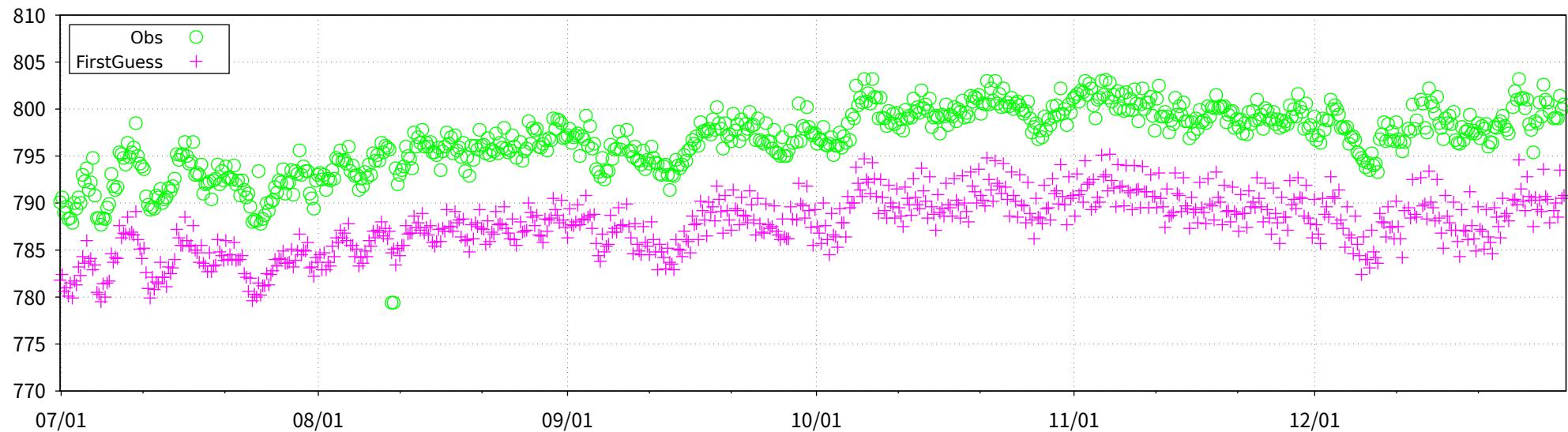
Figure 29 BIAS and SD of SLP for station 41573, 42045, 42056, 42083, 42111, 42147, 44406 (red) and surrounding stations (blue).

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)

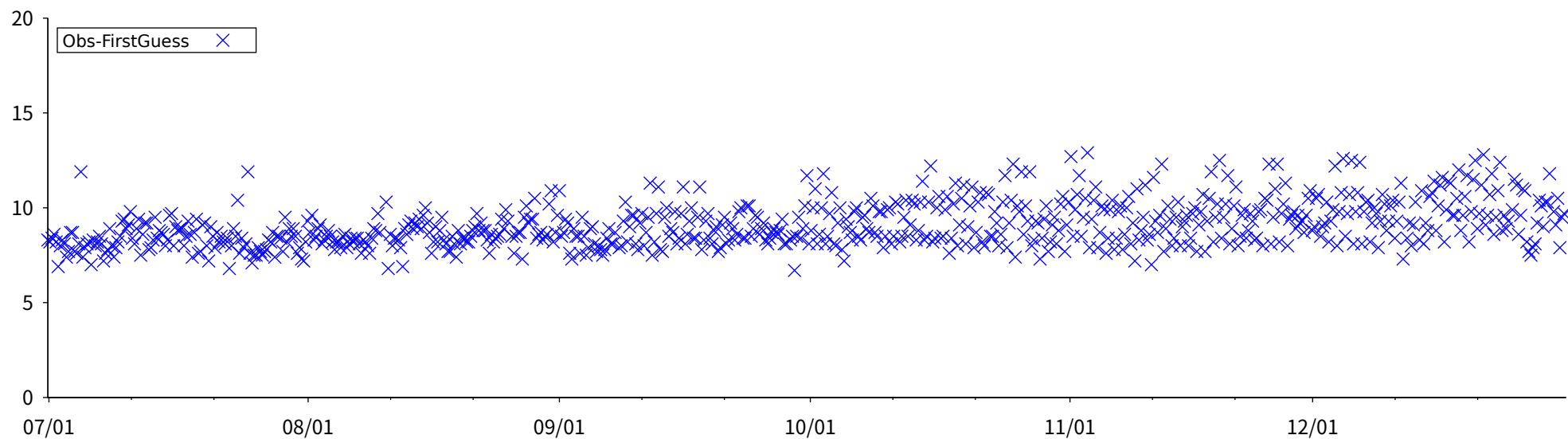
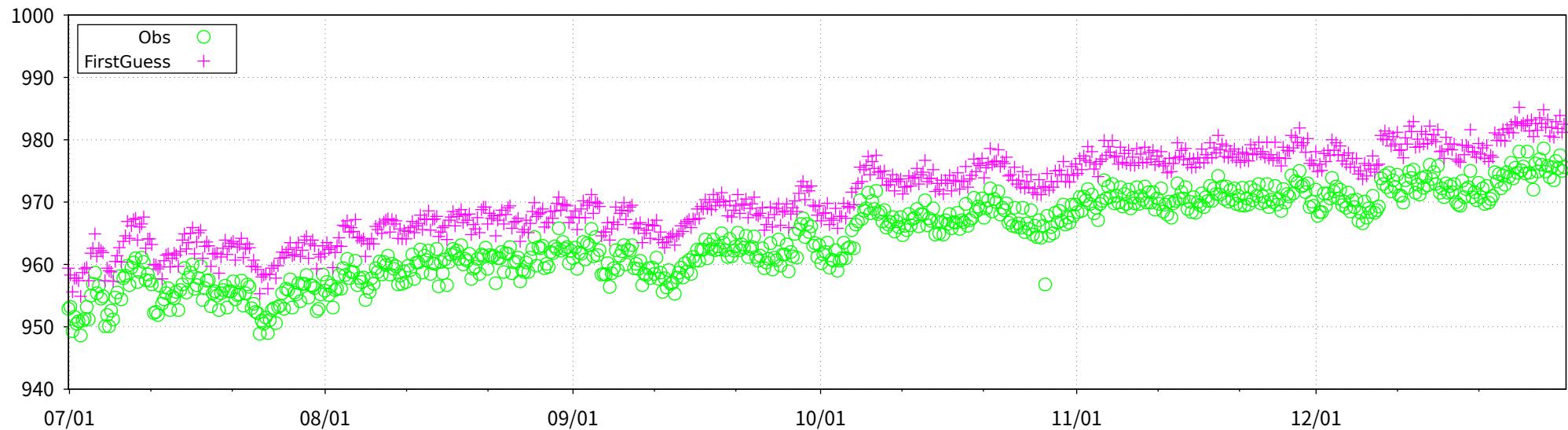


Figure 30 Time-series representation of SLP Obs minus FirstGuess for station 41573

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

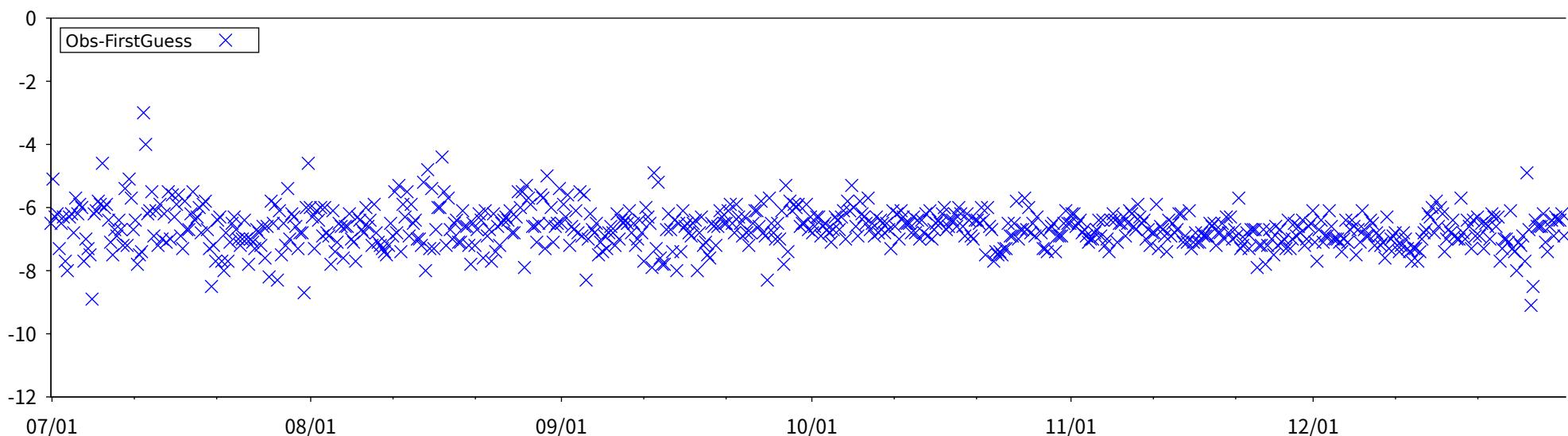
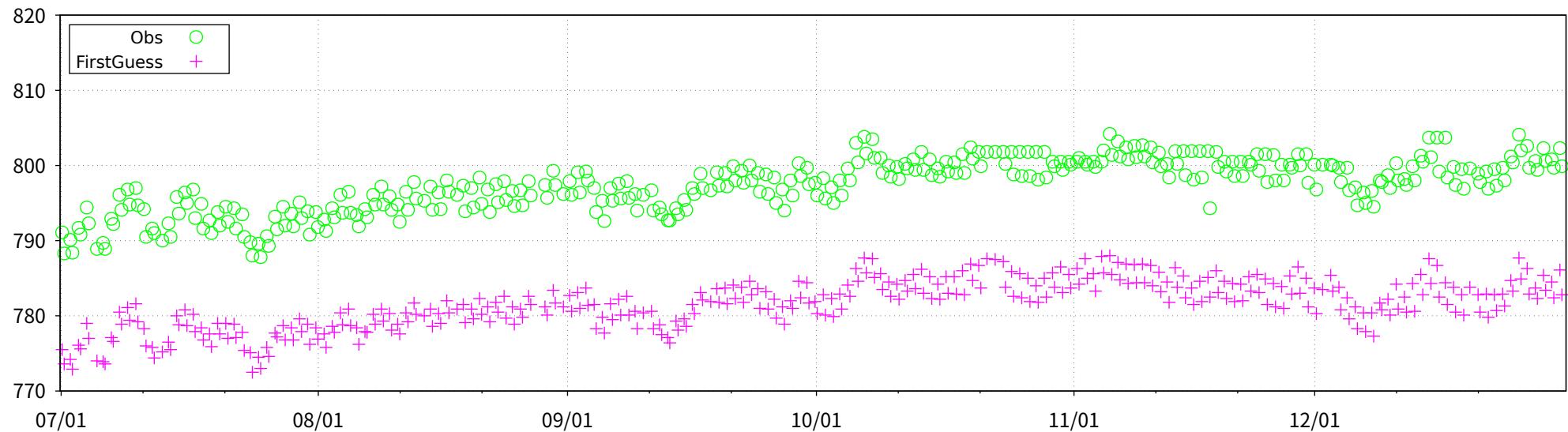


Figure 31 Time-series representation of SLP Obs minus FirstGuess for station 42056

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

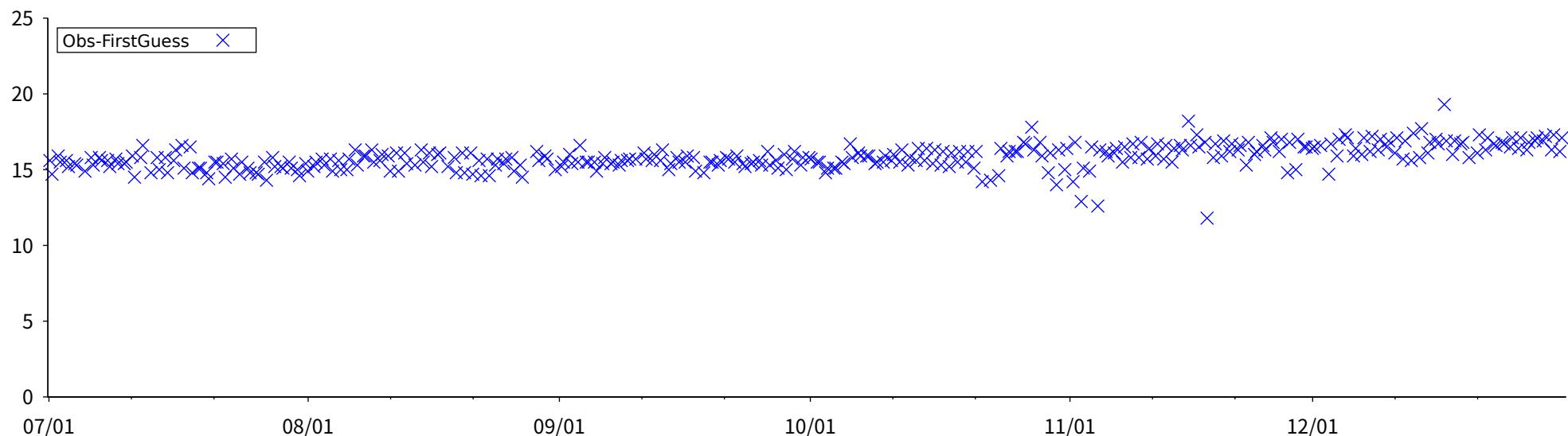
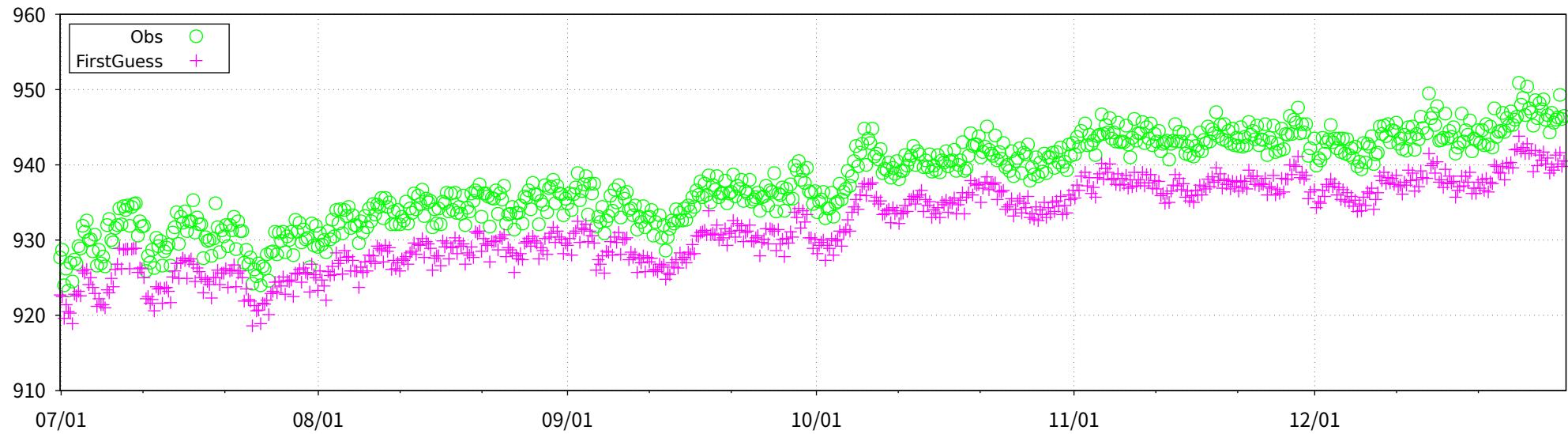


Figure 32 Time-series representation of SLP Obs minus FirstGuess for station 42083

ID: 42111 (lat: 30.3N, lon: 78.1E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

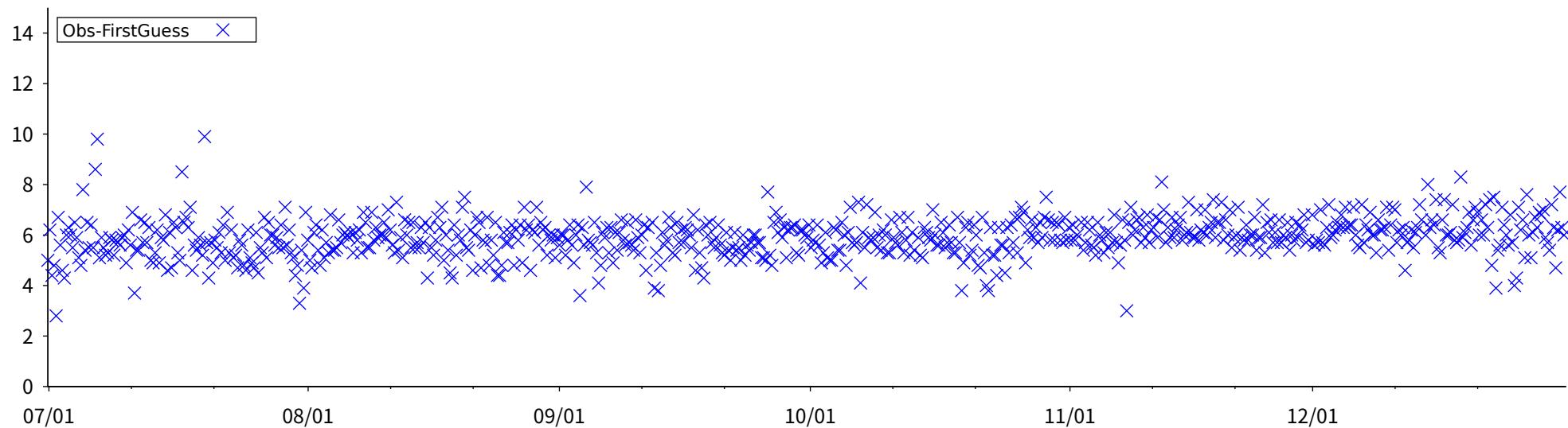


Figure 33 Time-series representation of SLP Obs minus FirstGuess for station 42111

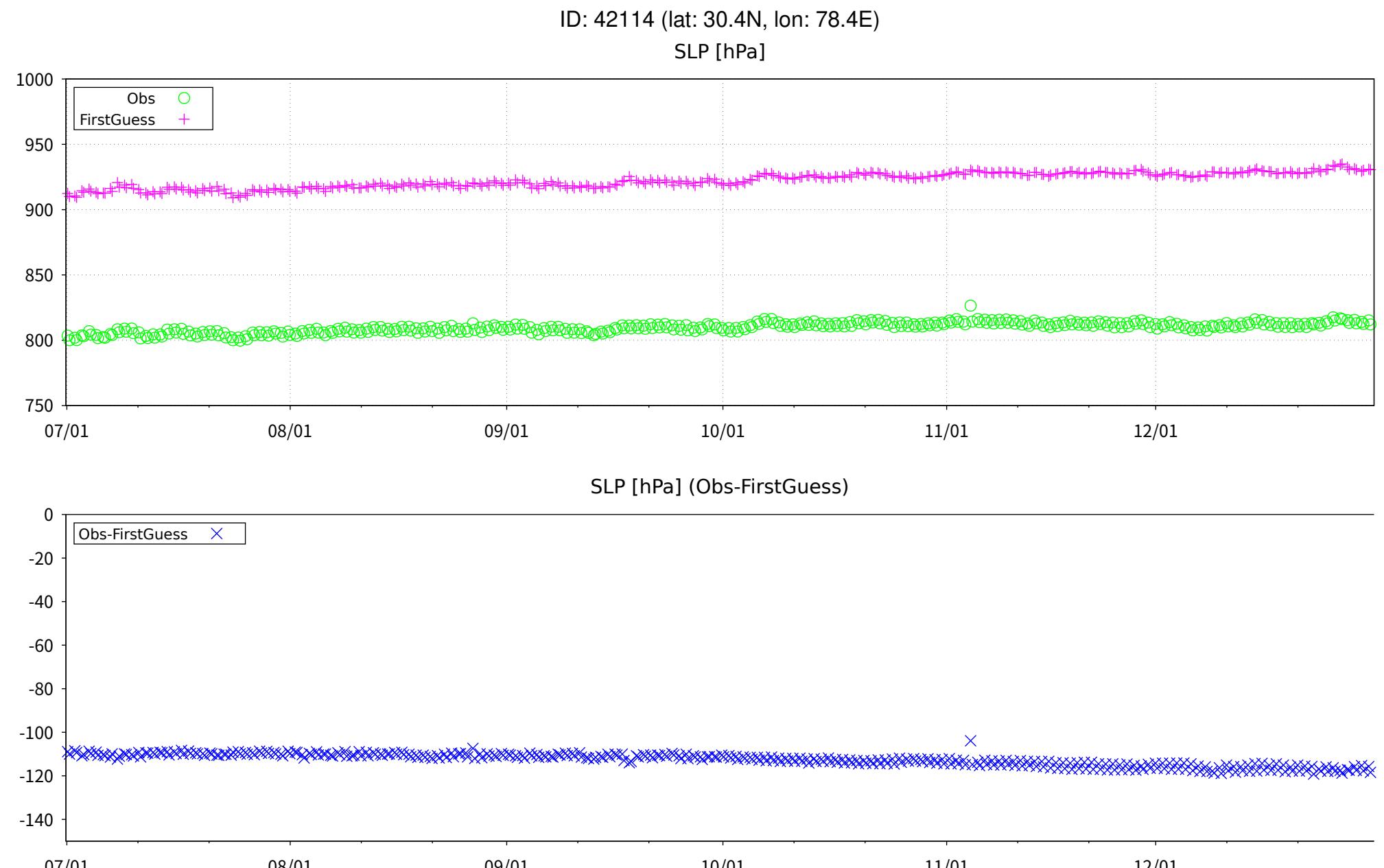
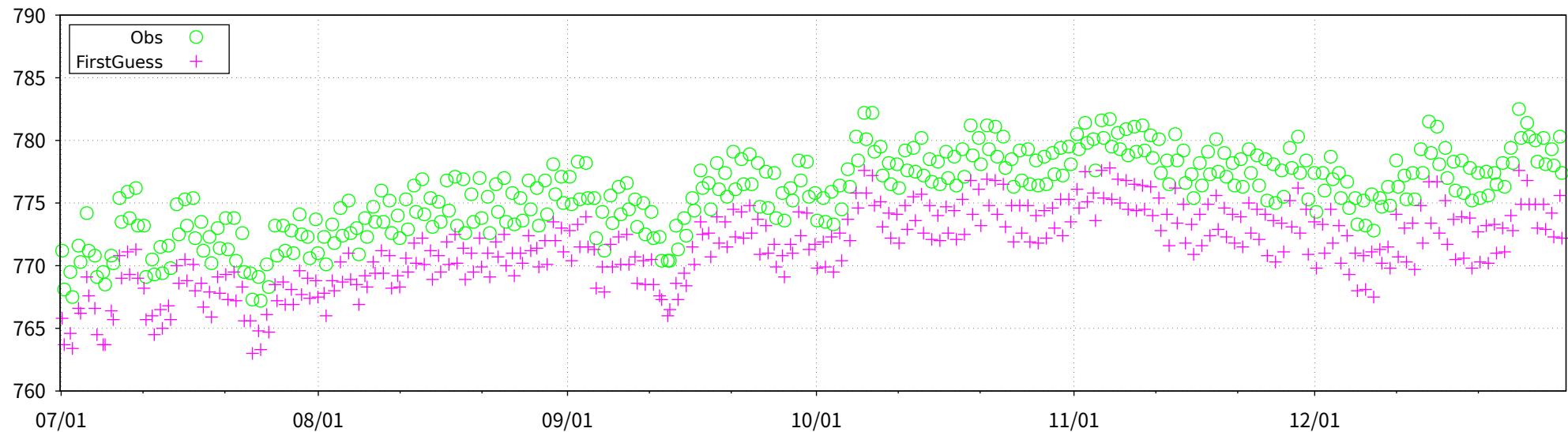


Figure 34 Time-series representation of SLP Obs minus FirstGuess for station 42114

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

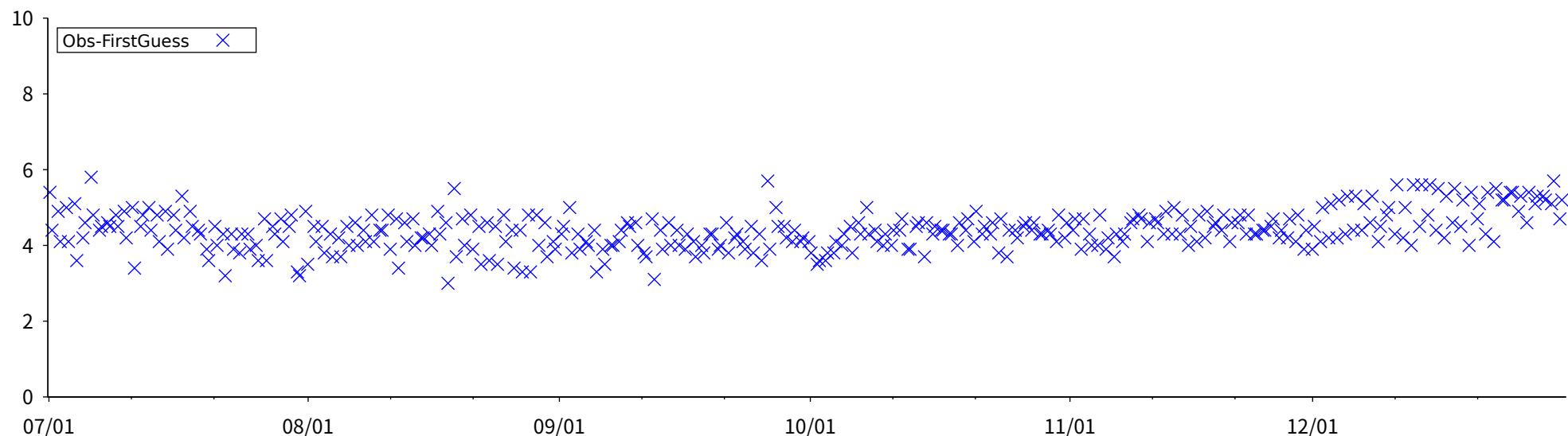
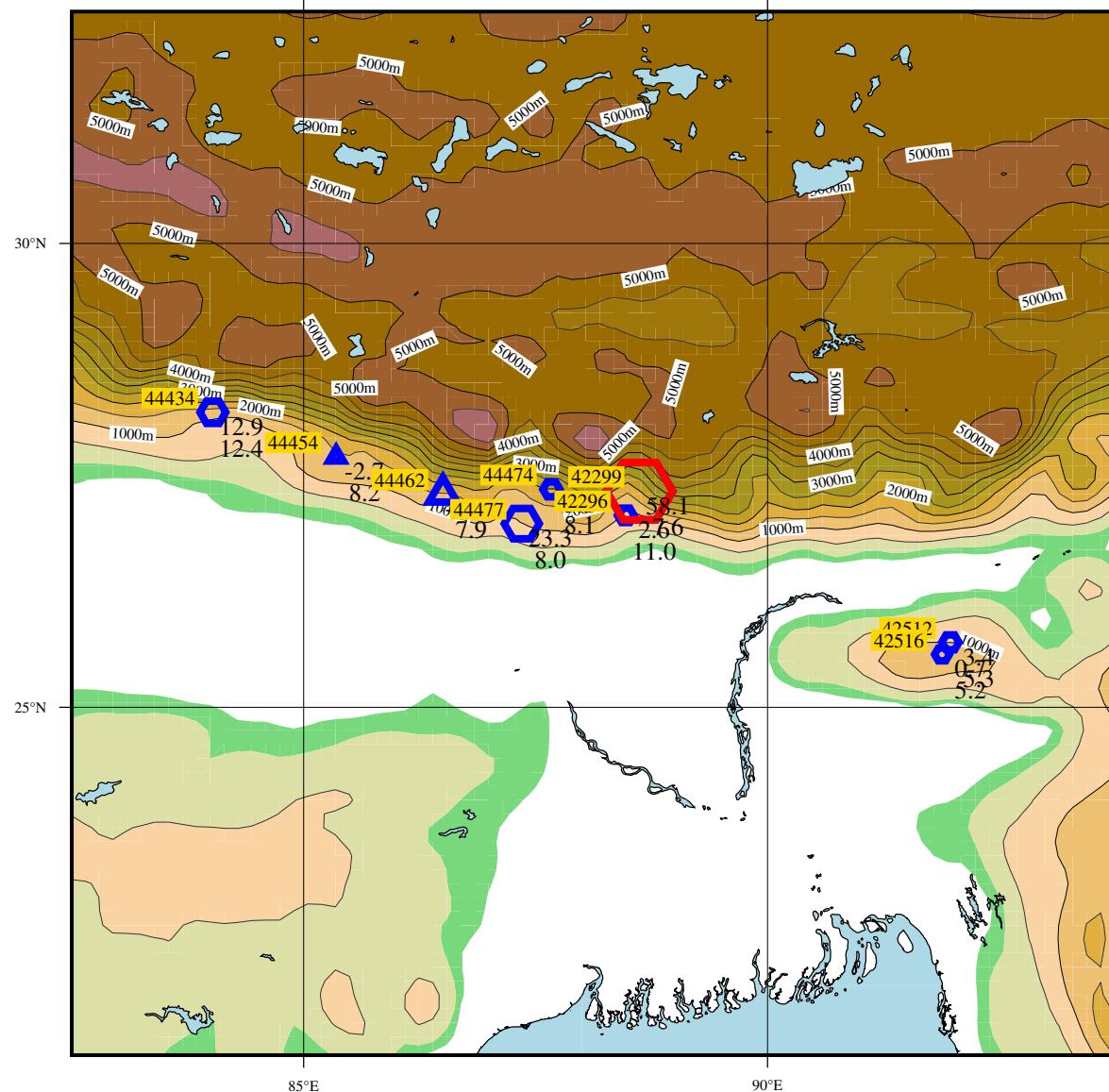


Figure 35 Time-series representation of SLP Obs minus FirstGuess for station 42147

LEVEL = SUR      ELEMENT = GZ  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

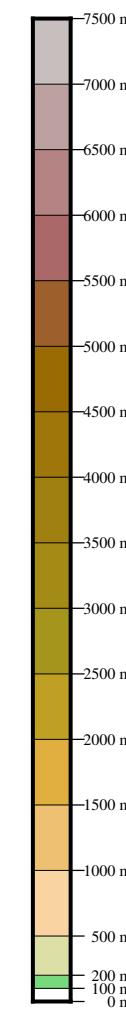


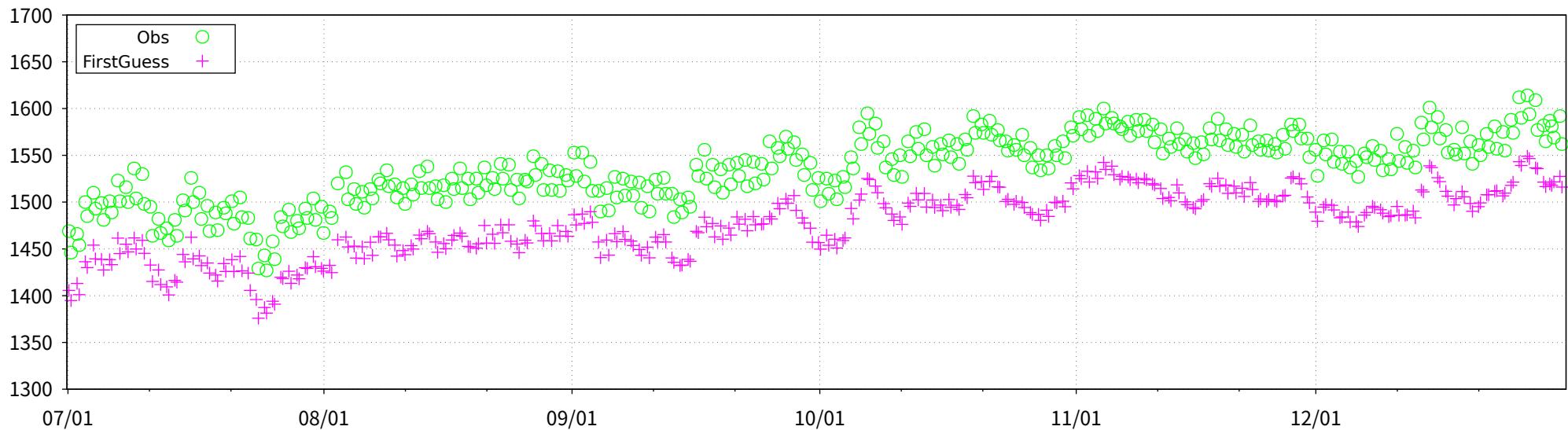
Figure 36 BIAS and SD of GZ for station 42299 (red) and surrounding stations (blue).

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)

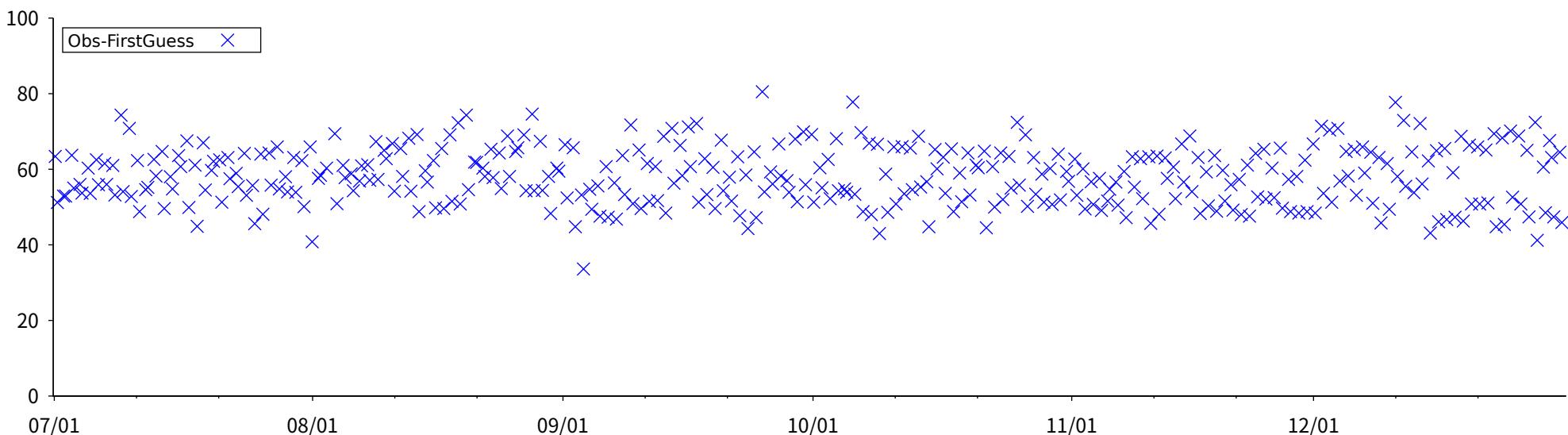
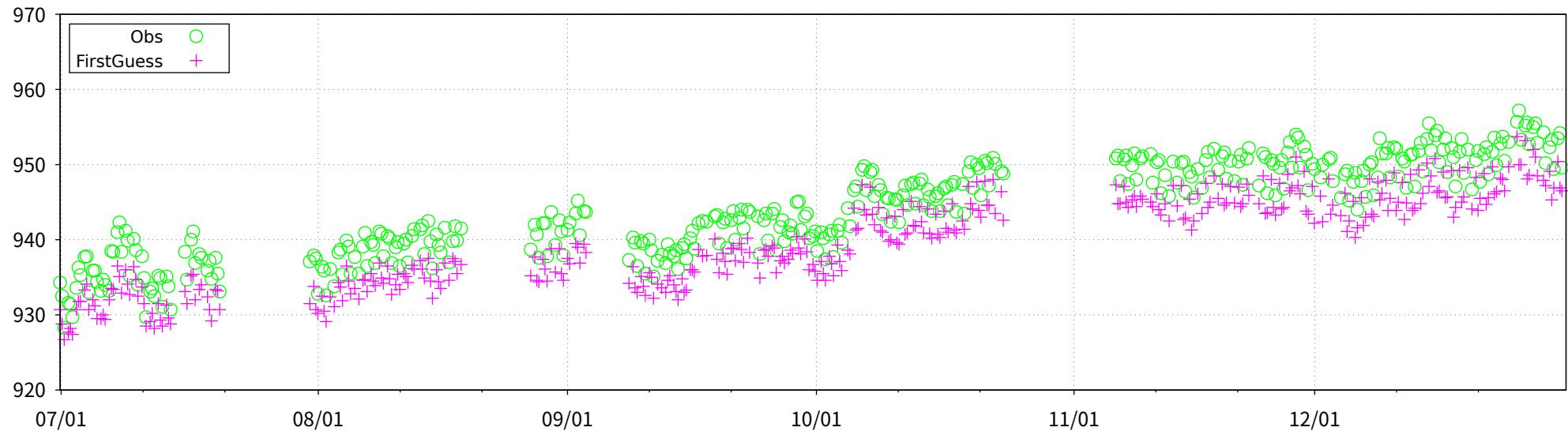


Figure 37 Time-series representation of GZ850 Obs minus FirstGuess for station 42299

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

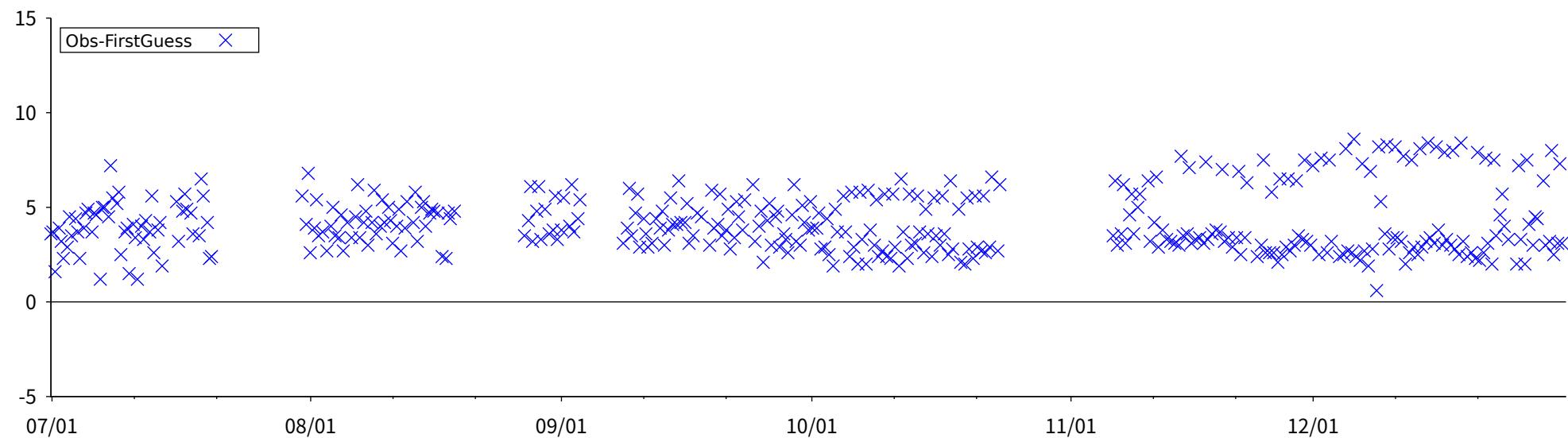
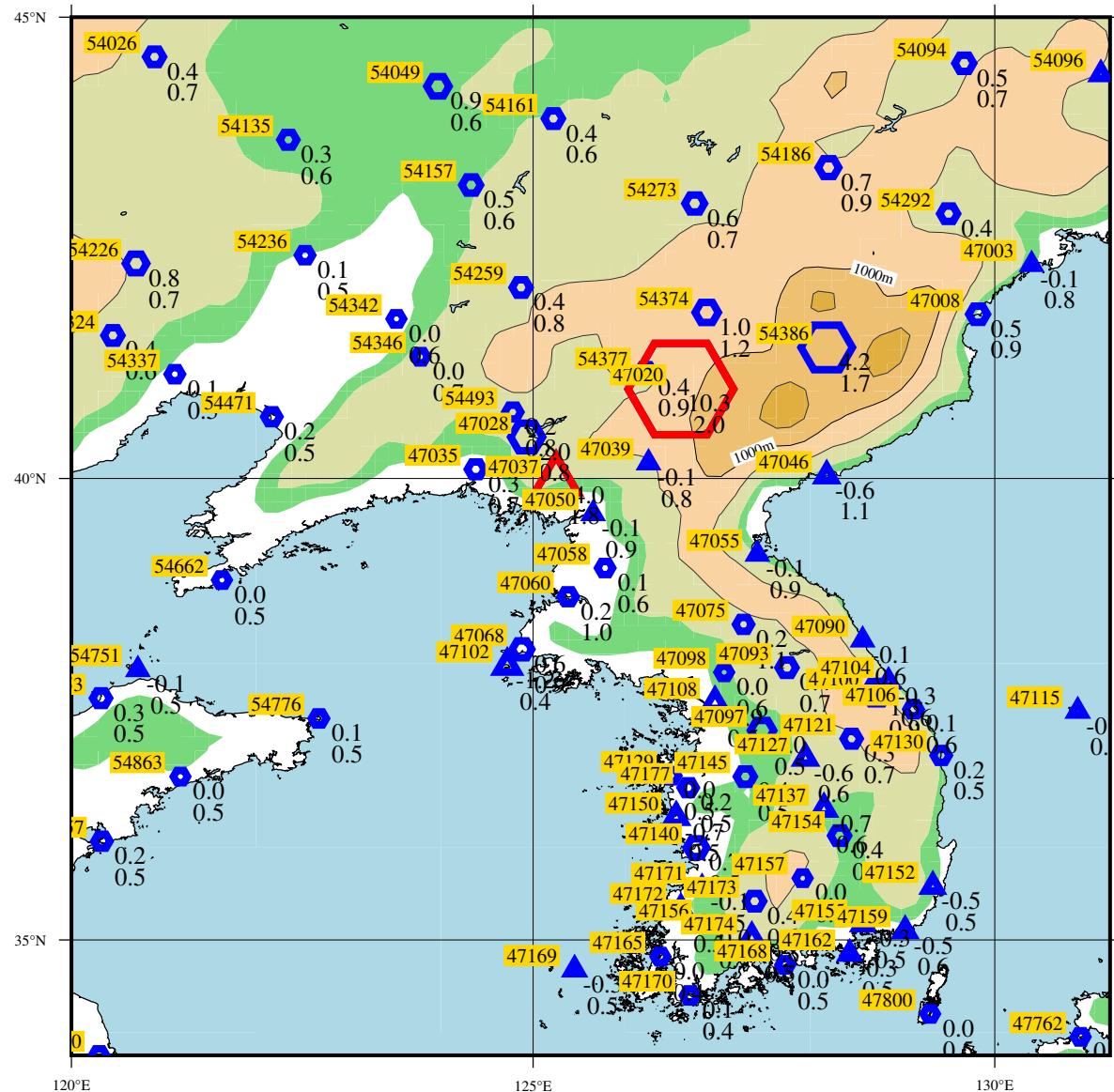


Figure 38 Time-series representation of SLP Obs minus FirstGuess for station 44406

LEVEL = SUR      ELEMENT = MSLP  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

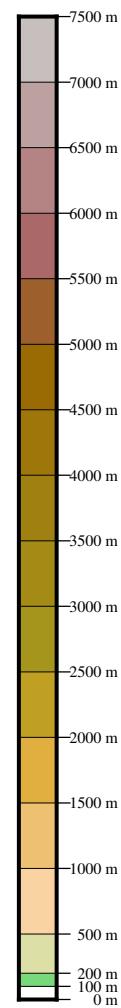


Figure 39 BIAS and SD of MSLP for station 47020, 47037 (red) and surrounding stations (blue).

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.

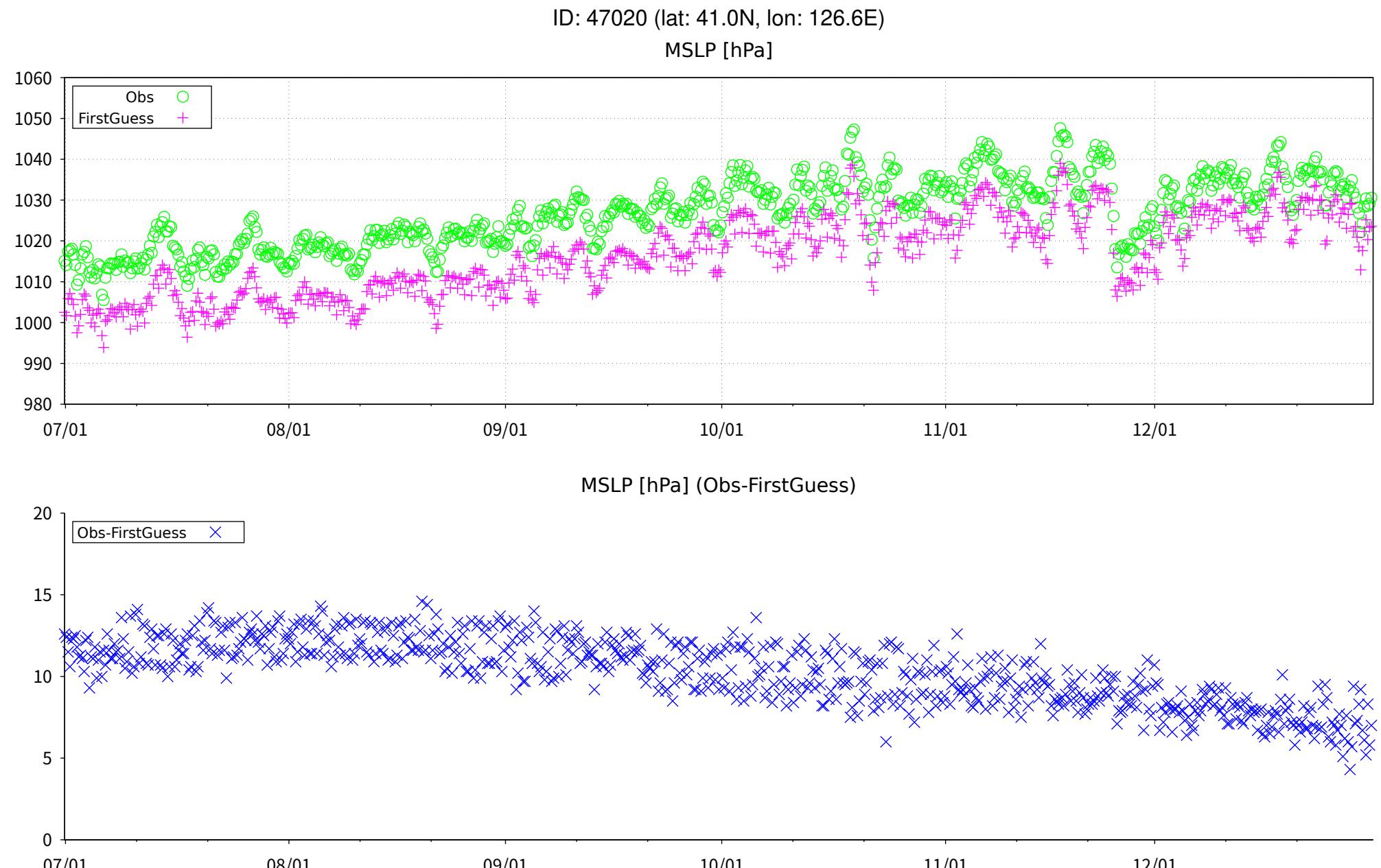


Figure 40 Time-series representation of MSLP Obs minus FirstGuess for station 47020

LEVEL = SUR      ELEMENT = SLP  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)

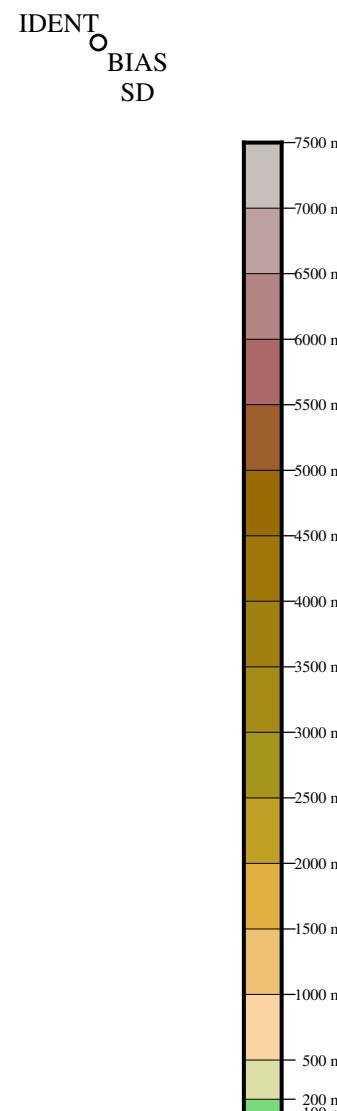
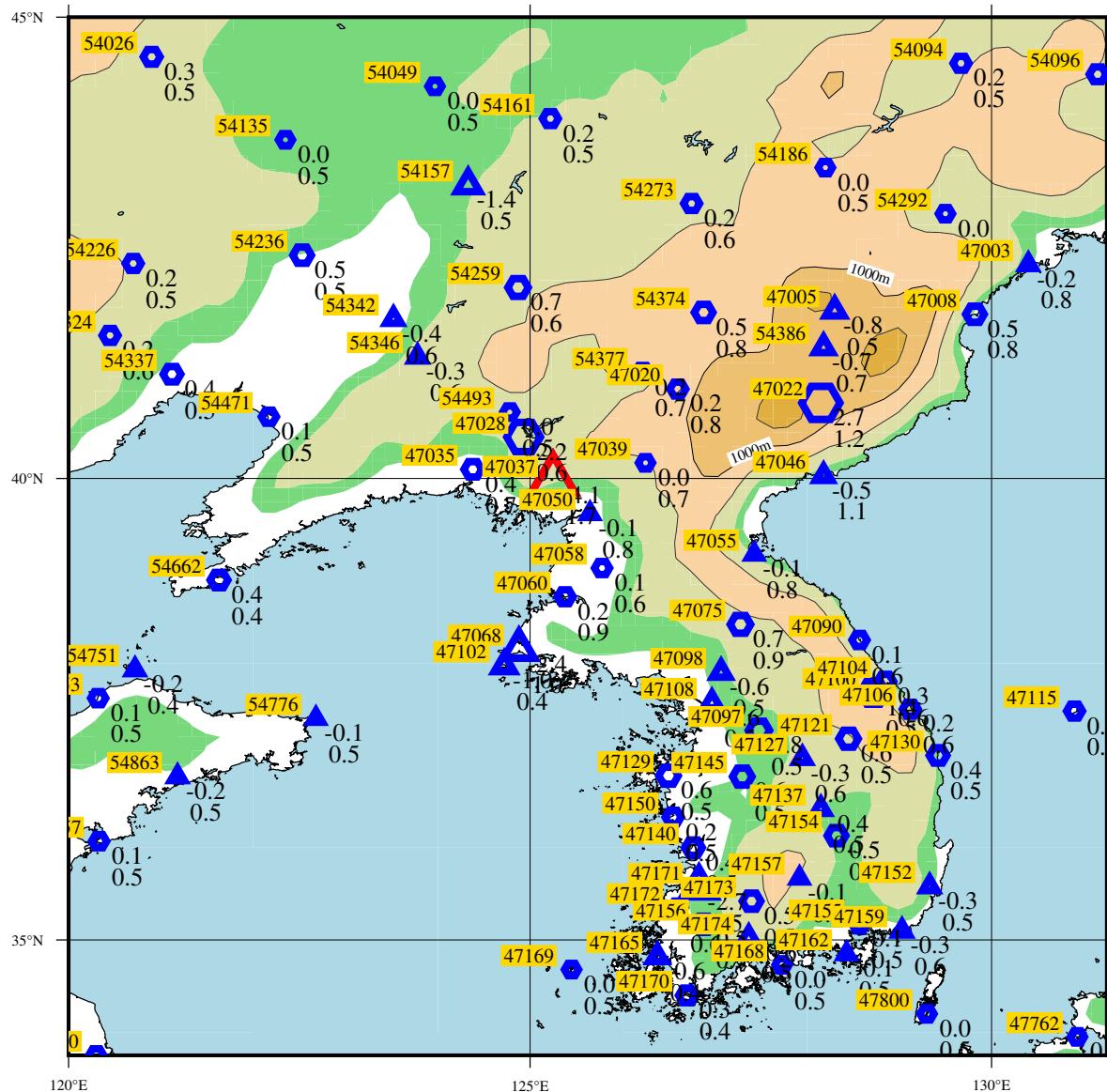


Figure 41 BIAS and SD of SLP for station 47037 (red) and surrounding stations (blue).

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.

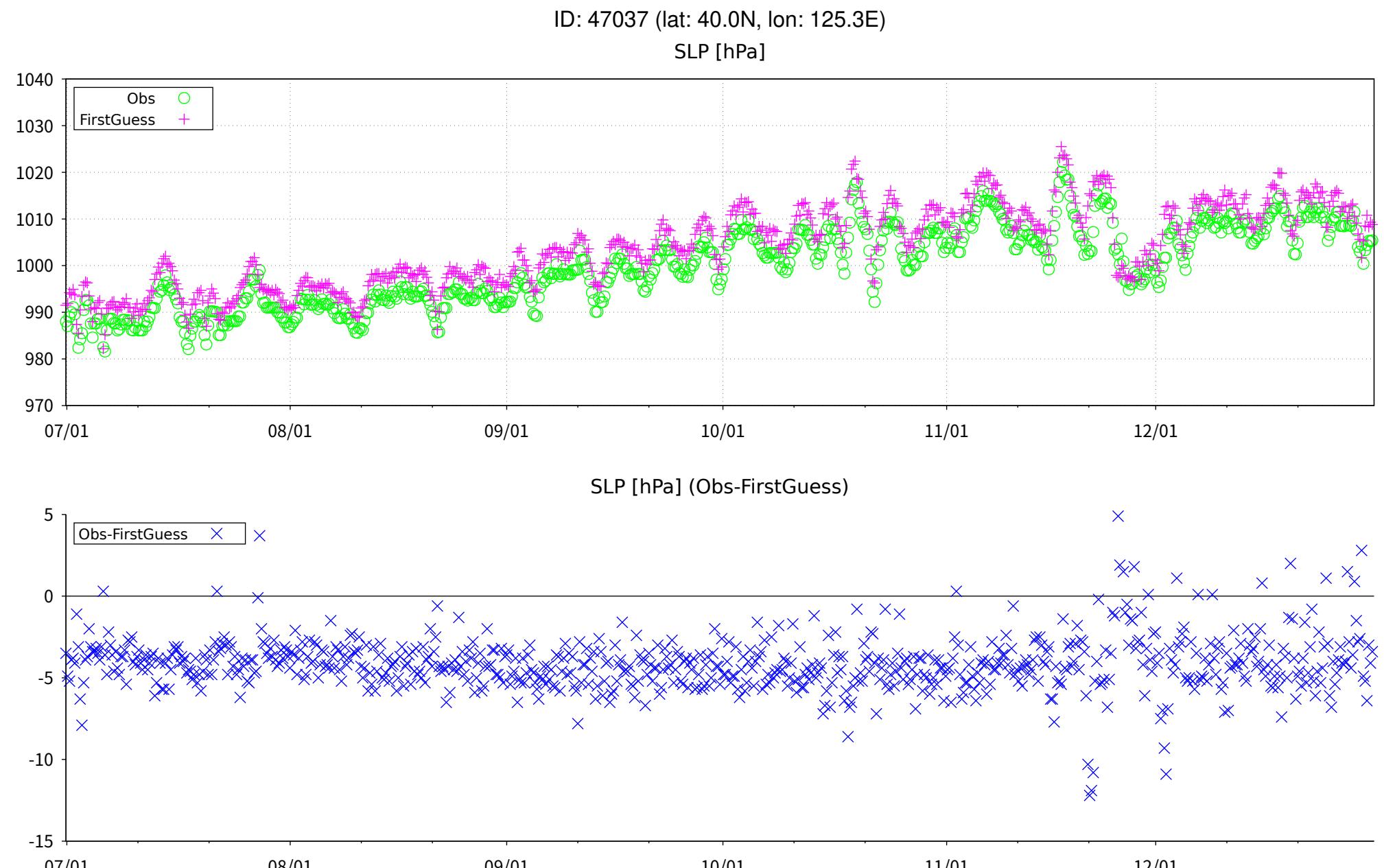


Figure 42(a) Time-series representation of SLP Obs minus FirstGuess for station 47037

ID: 47037 (lat: 40.0N, lon: 125.3E)  
MSLP [hPa]

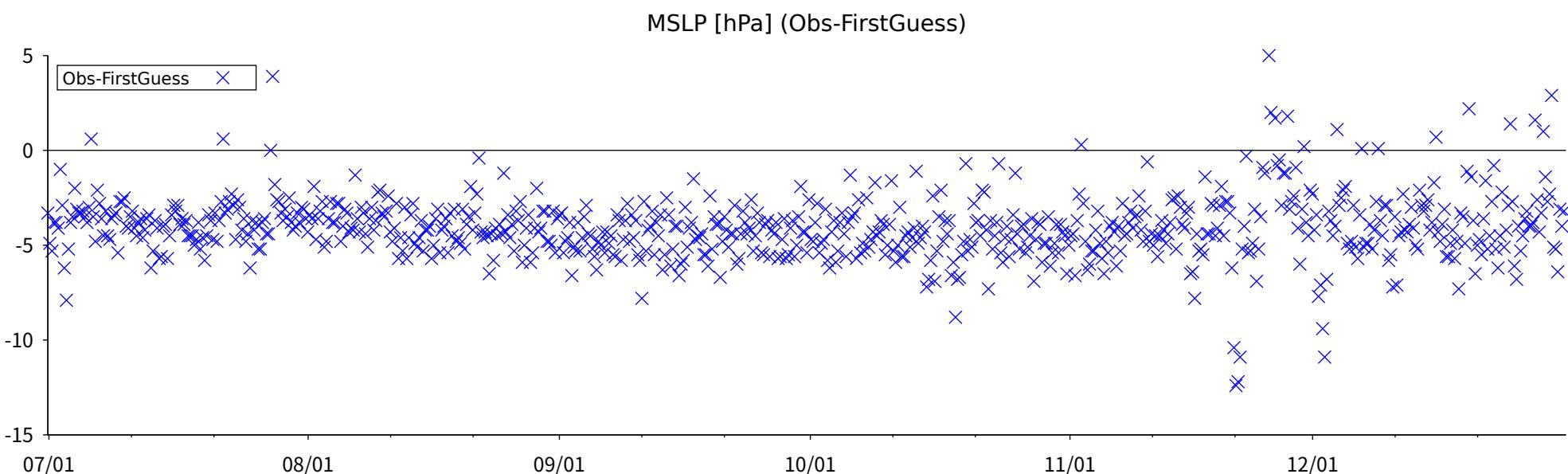
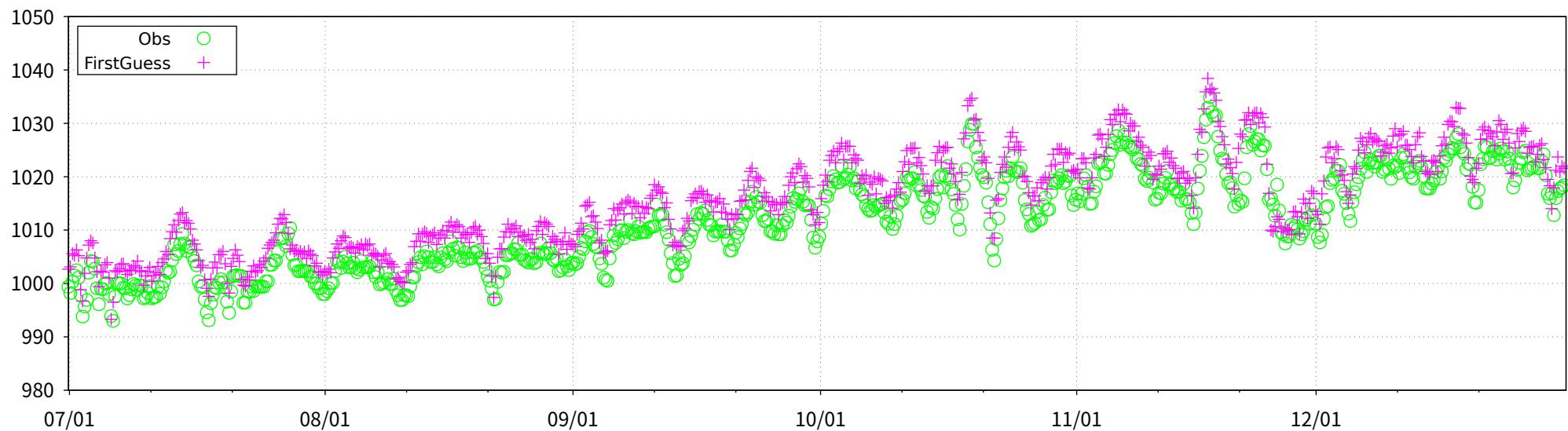
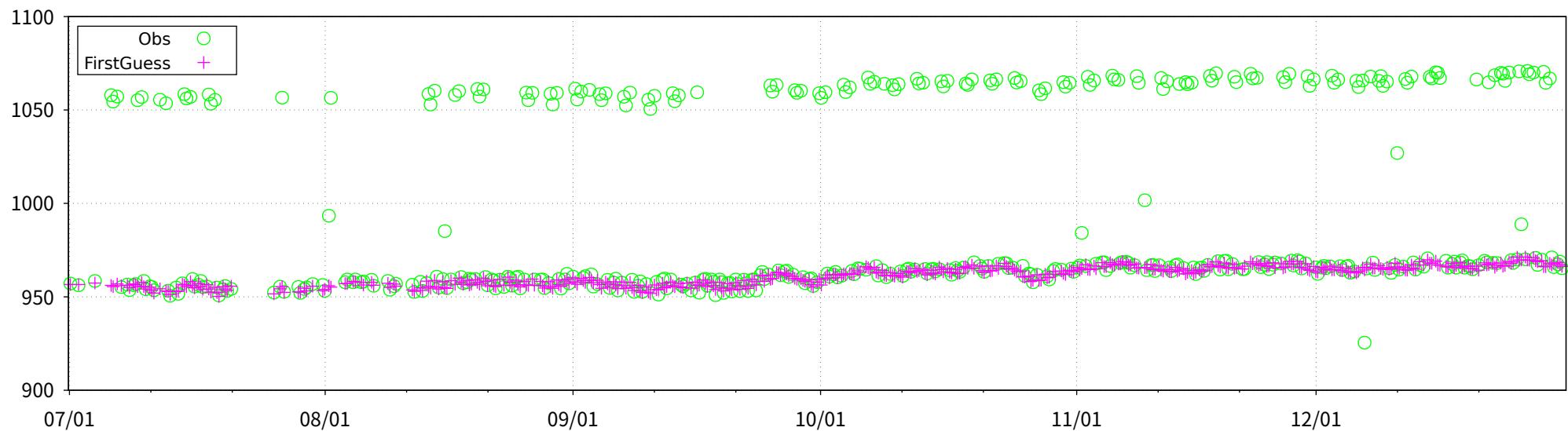


Figure 42(b) Time-series representation of MSLP Obs minus FirstGuess for station 47037

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

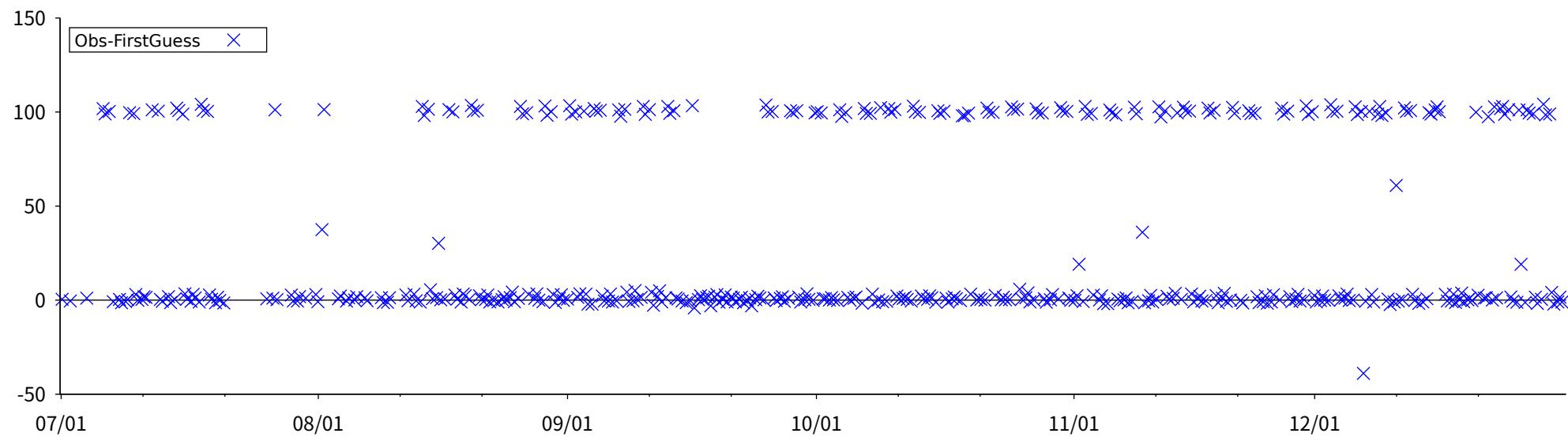


Figure 43 Time-series representation of SLP Obs minus FirstGuess for station 48001

LEVEL = SUR

ELEMENT = SLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)

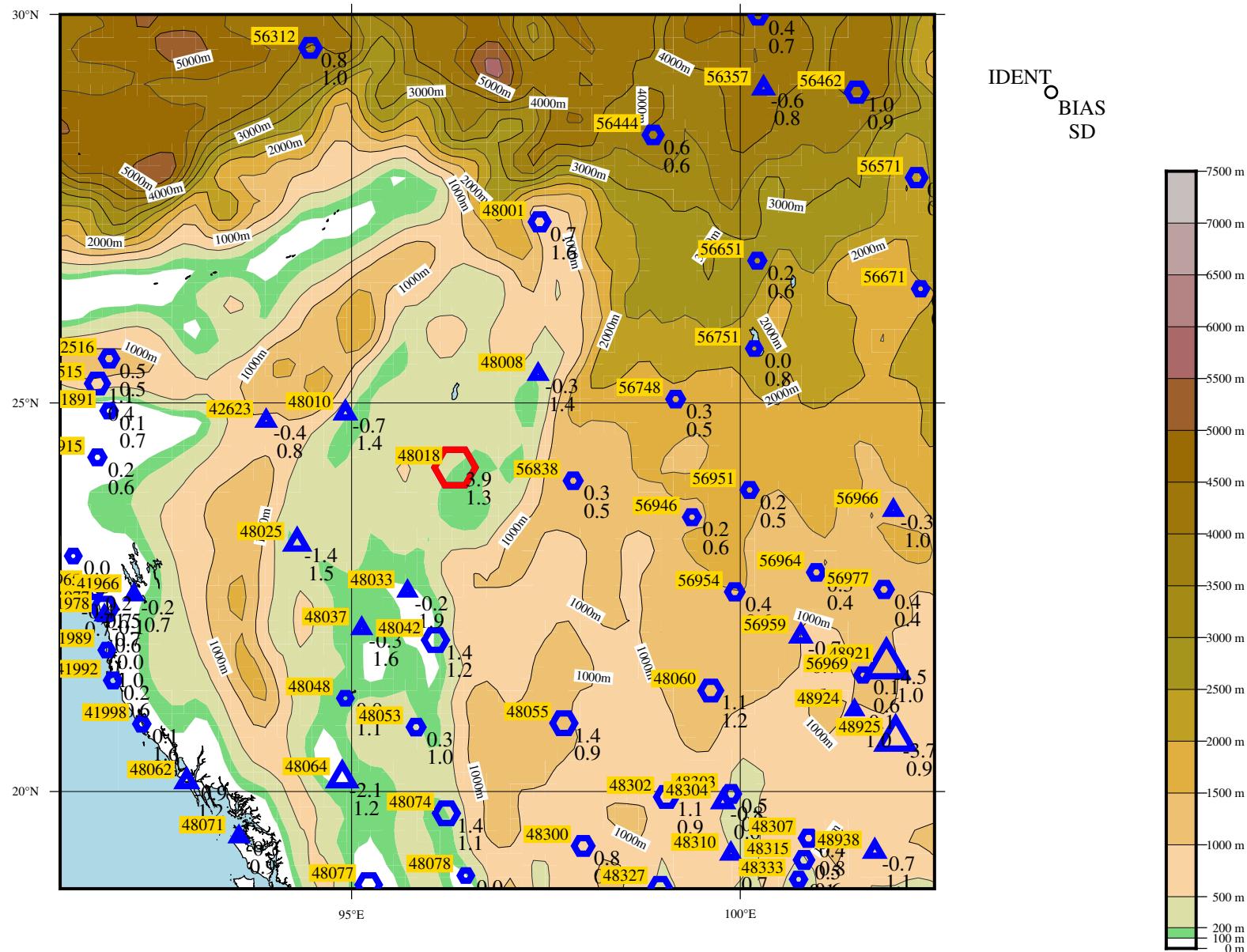


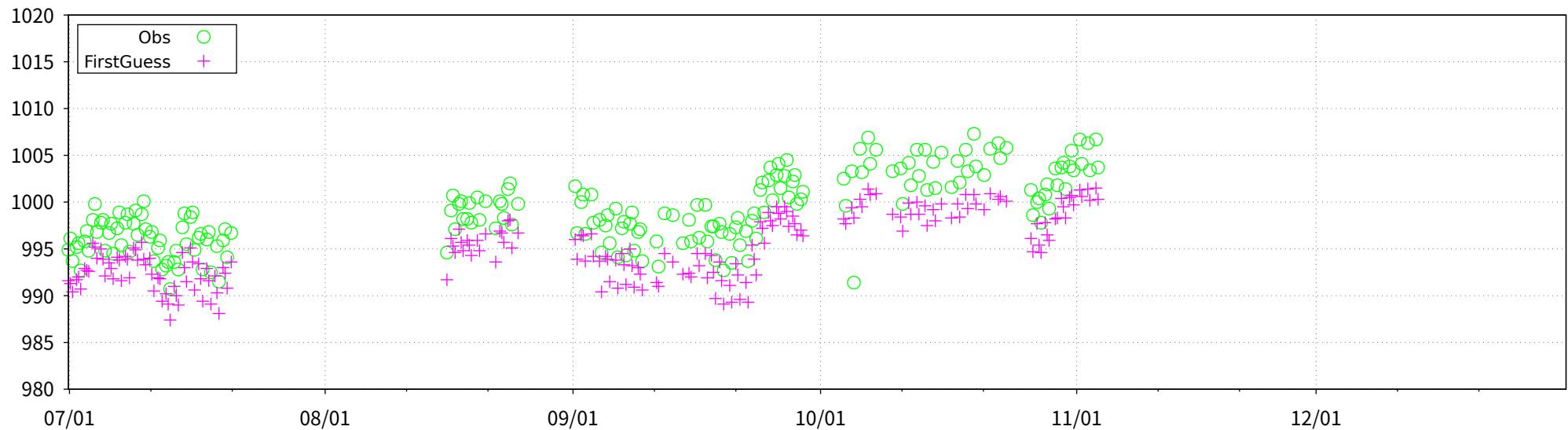
Figure 44 BIAS and SD of SLP for station 48018 (red) and surrounding stations (blue).

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)

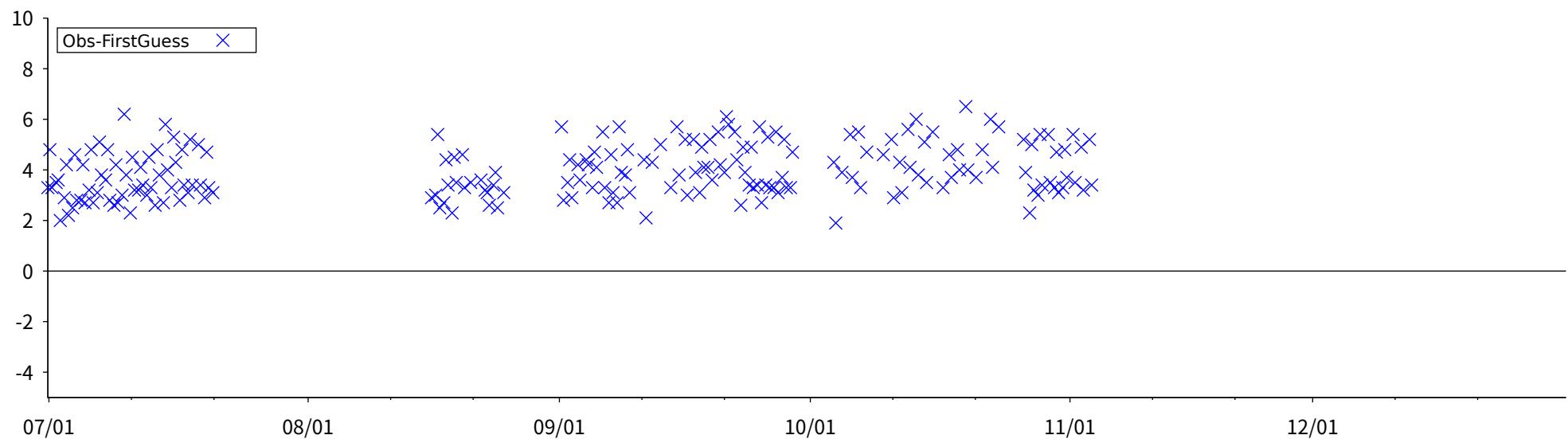
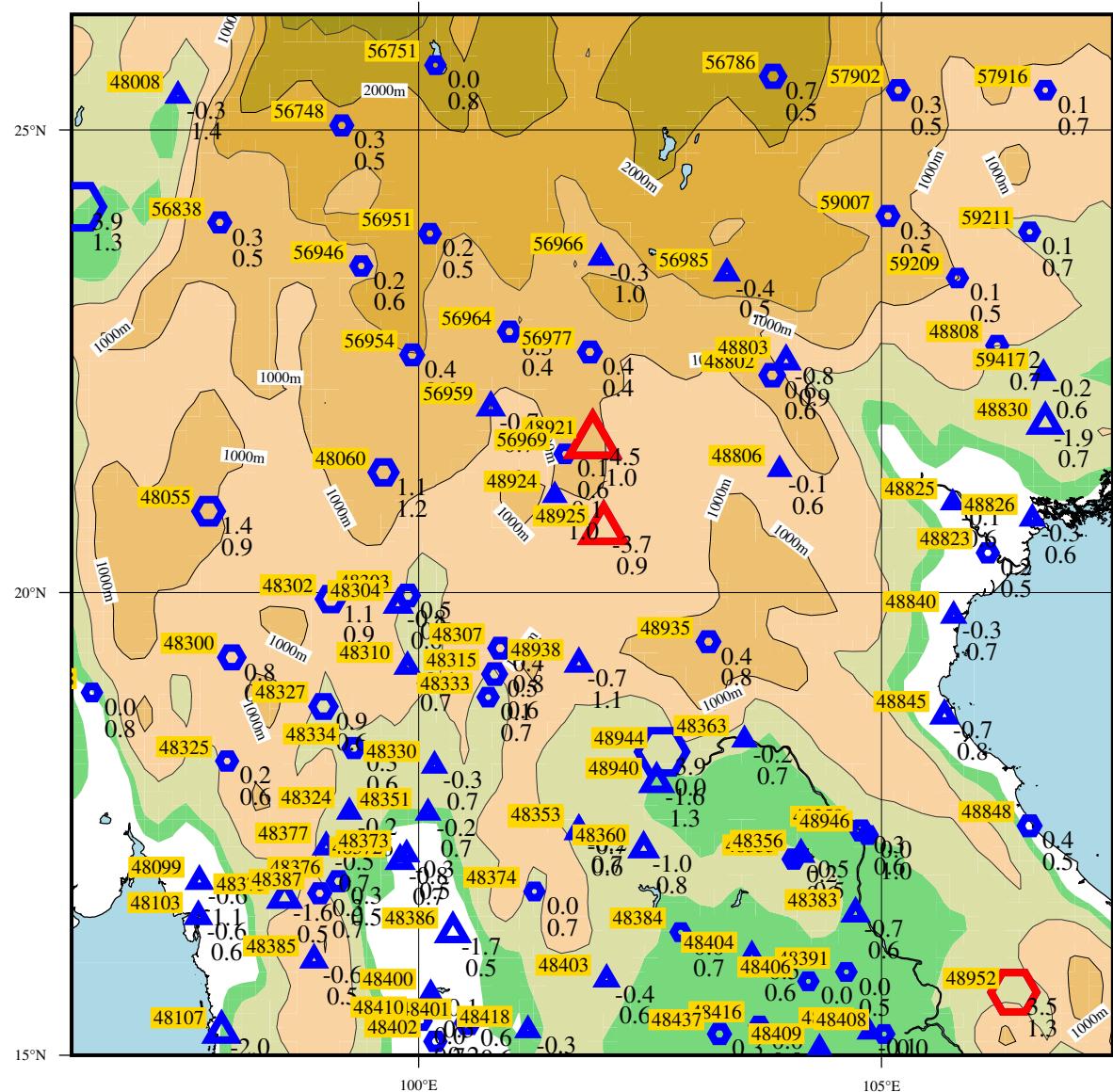


Figure 45 Time-series representation of SLP Obs minus FirstGuess for station 48018

LEVEL = SUR

ELEMENT = SLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

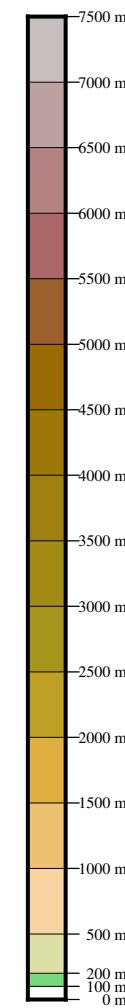


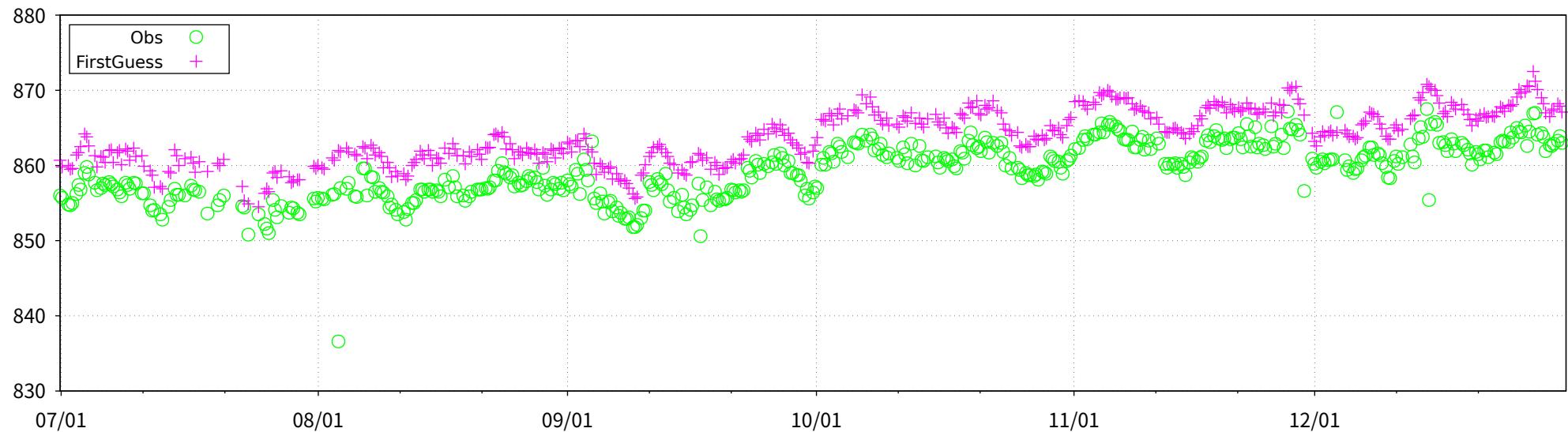
Figure 46 BIAS and SD of SLP for station 48921, 48925, 48952 (red) and surrounding stations (blue).

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)

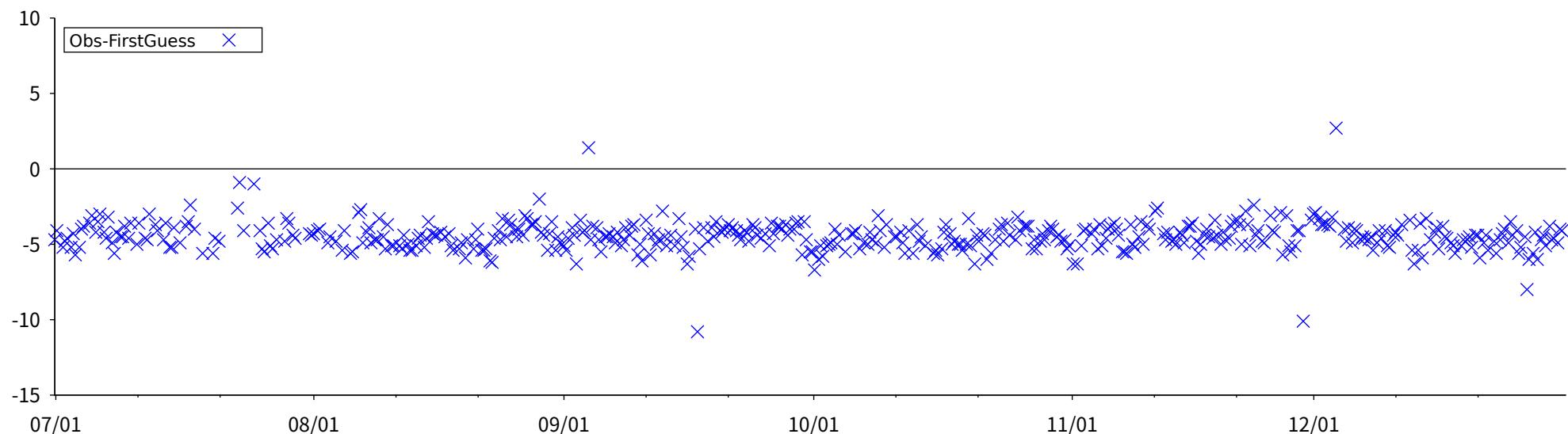
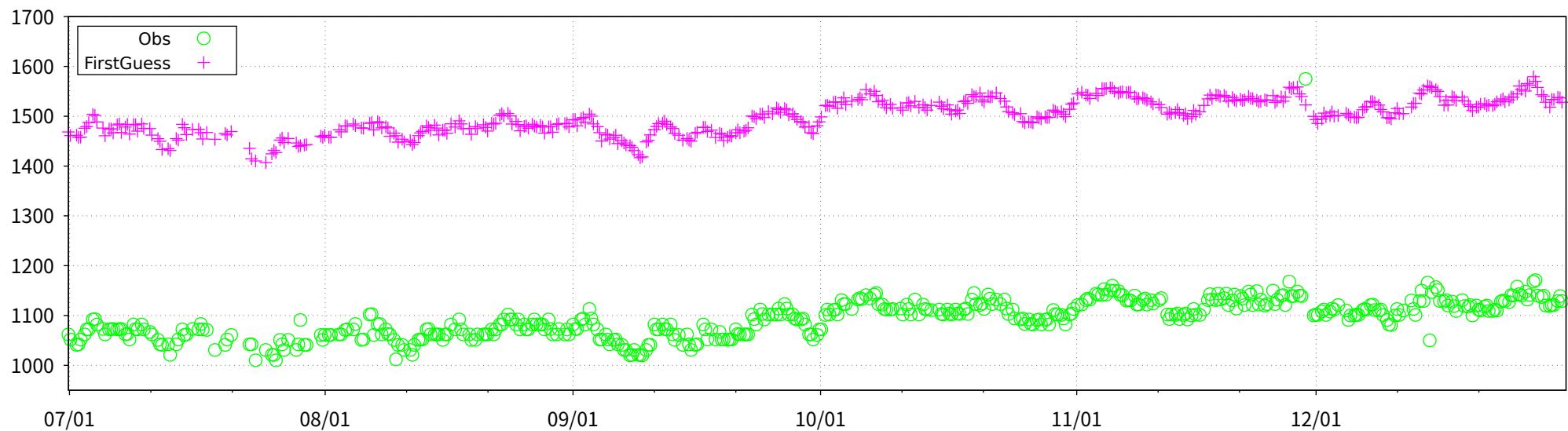


Figure 47(a) Time-series representation of SLP Obs minus FirstGuess for station 48921

ID: 48921 (lat: 21.6N, lon: 101.9E)  
GZ850 [m]



GZ850 [m] (Obs-FirstGuess)

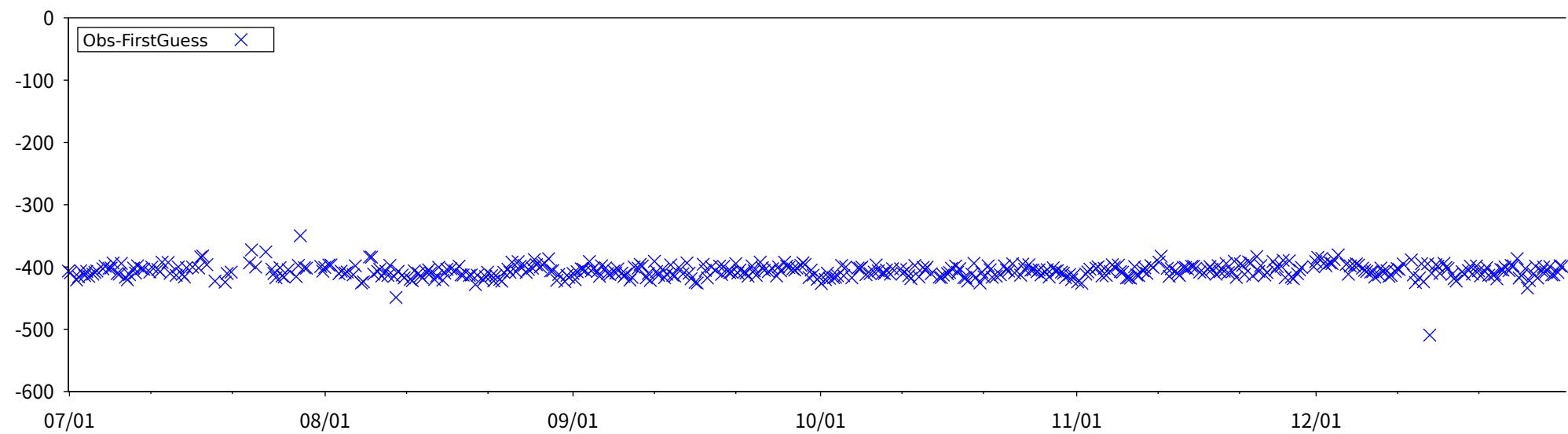
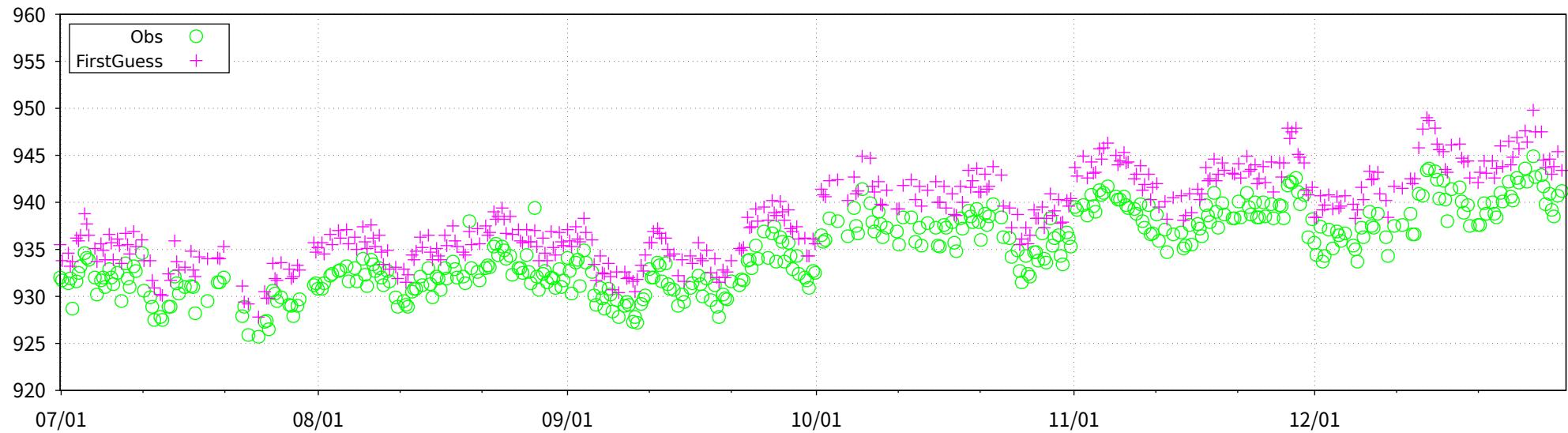


Figure 47(b) Time-series representation of GZ850 Obs minus FirstGuess for station 48921

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

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

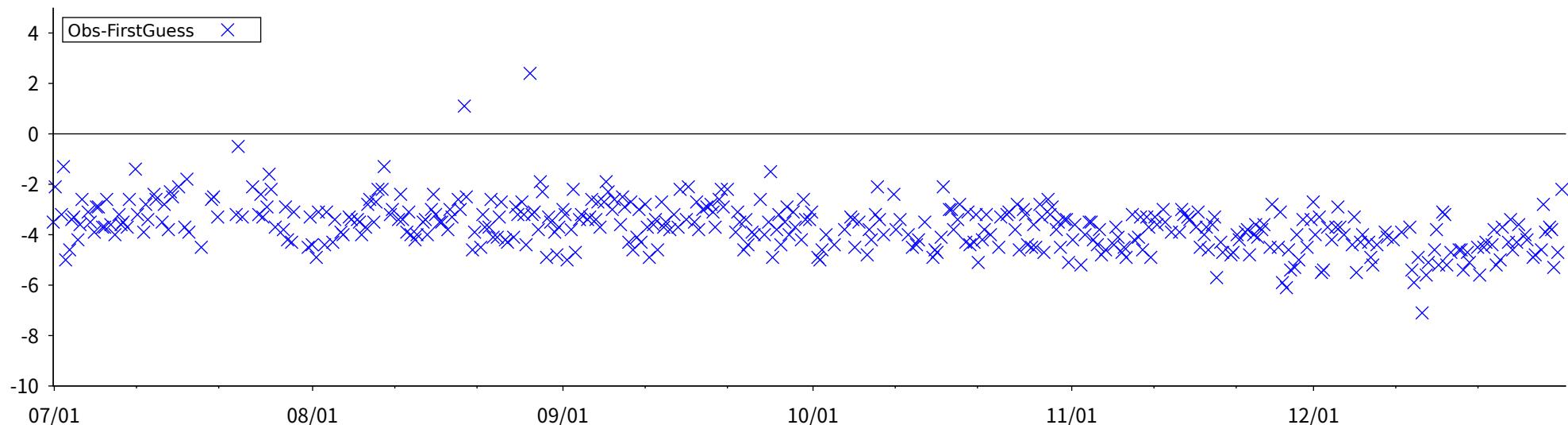
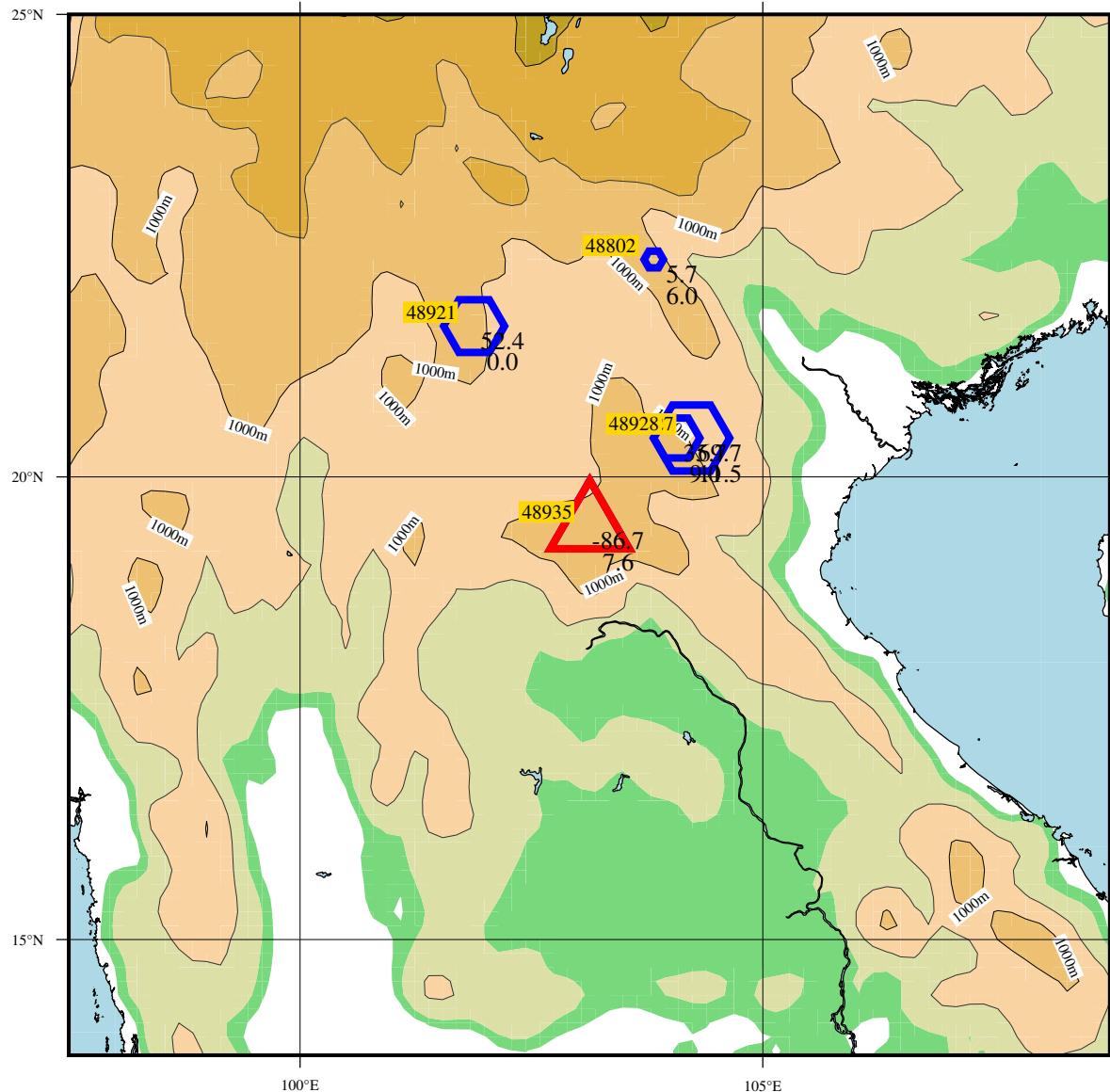


Figure 48 Time-series representation of SLP Obs minus FirstGuess for station 48925

LEVEL = SUR      ELEMENT = GZ  
2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
O BIAS  
SD

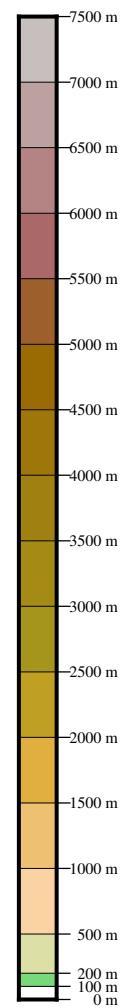
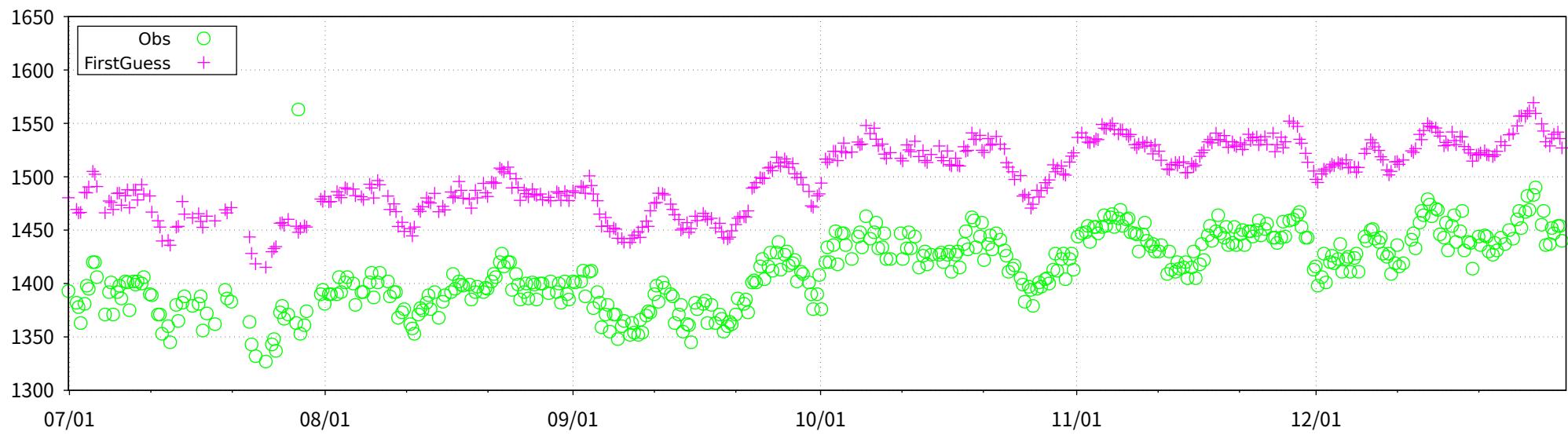


Figure 49 BIAS and SD of GZ for station 48935 (red) and surrounding stations (blue).

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: 48935 (lat: 19.5N, lon: 103.1E)  
GZ850 [m]



GZ850 [m] (Obs-FirstGuess)

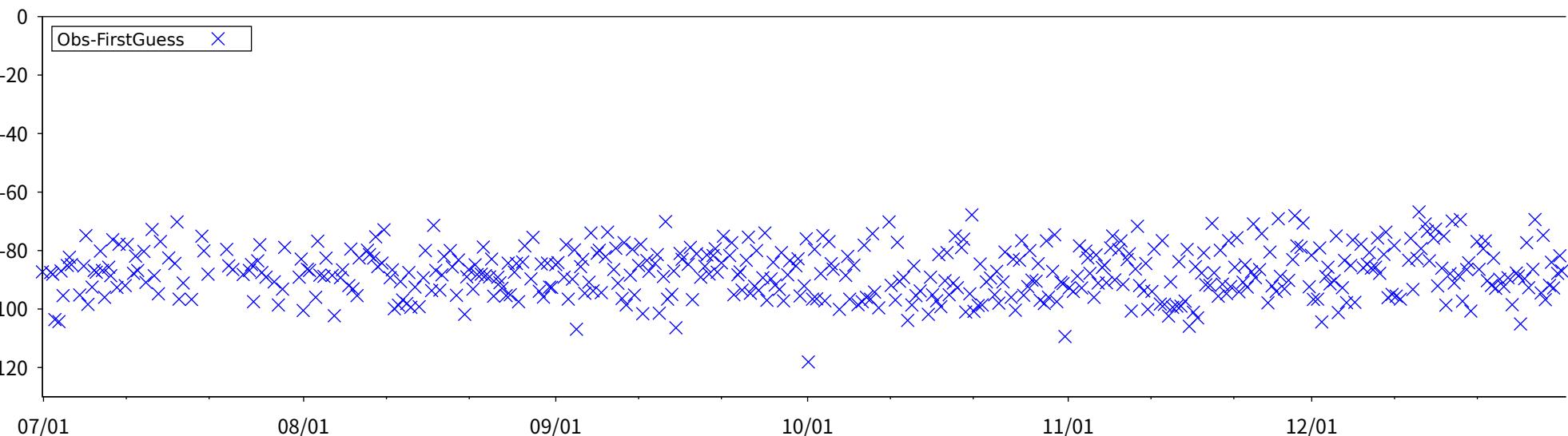
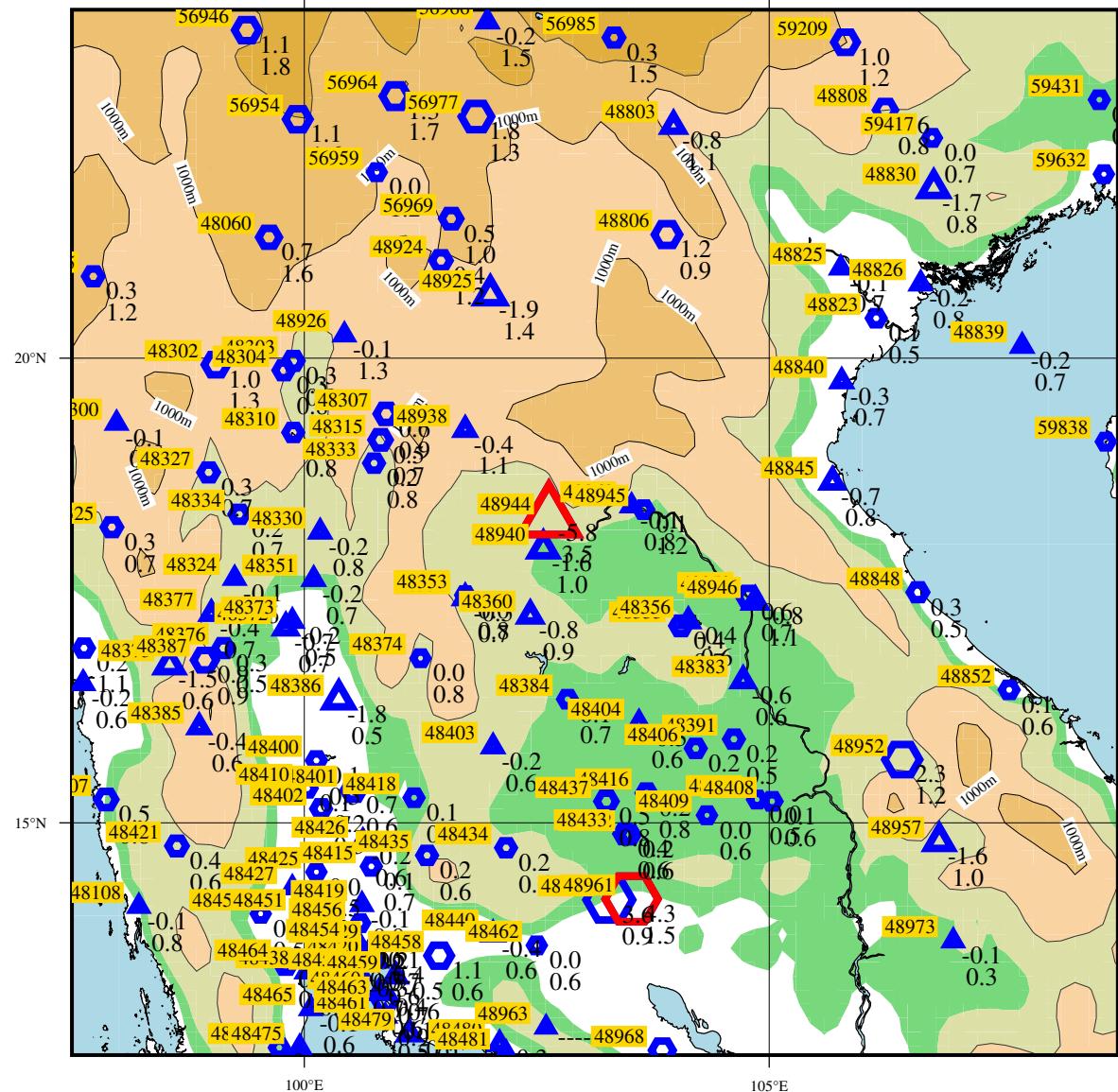


Figure 50 Time-series representation of GZ850 Obs minus FirstGuess for station 48935

LEVEL = SUR      ELEMENT = MSLP  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



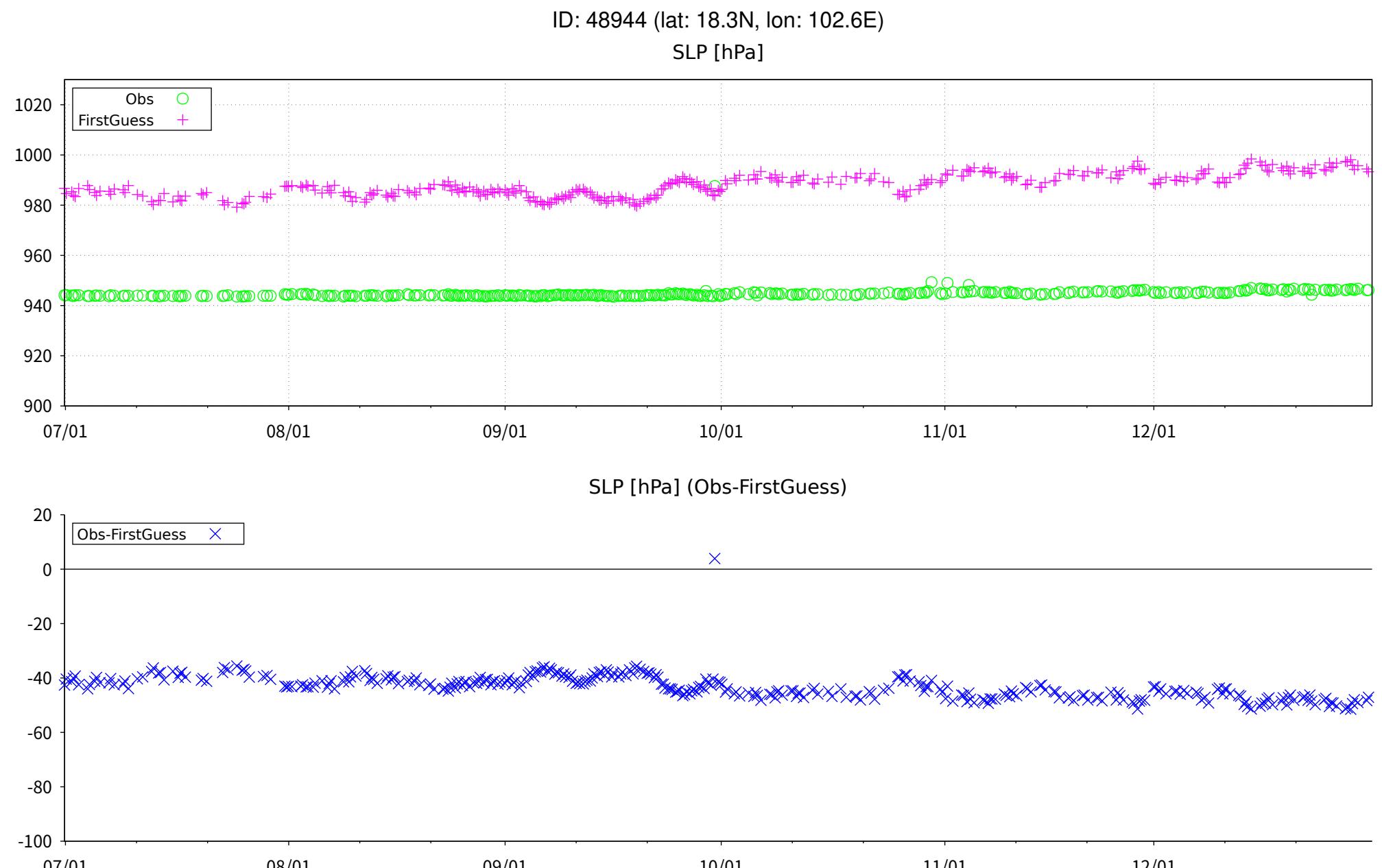
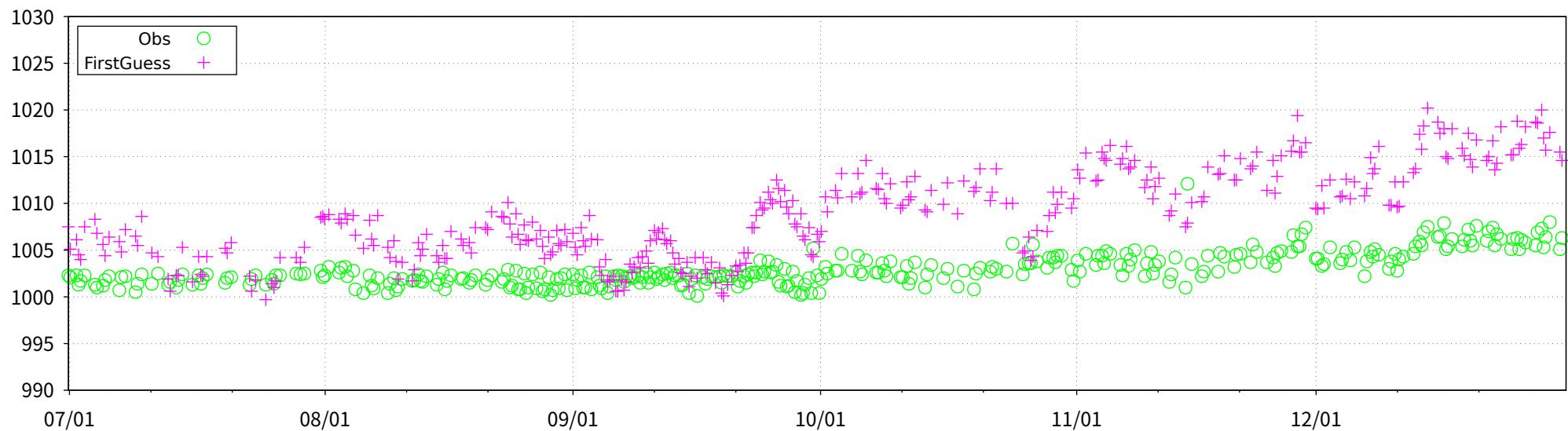


Figure 52(a) Time-series representation of SLP Obs minus FirstGuess for station 48944

ID: 48944 (lat: 18.3N, lon: 102.6E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

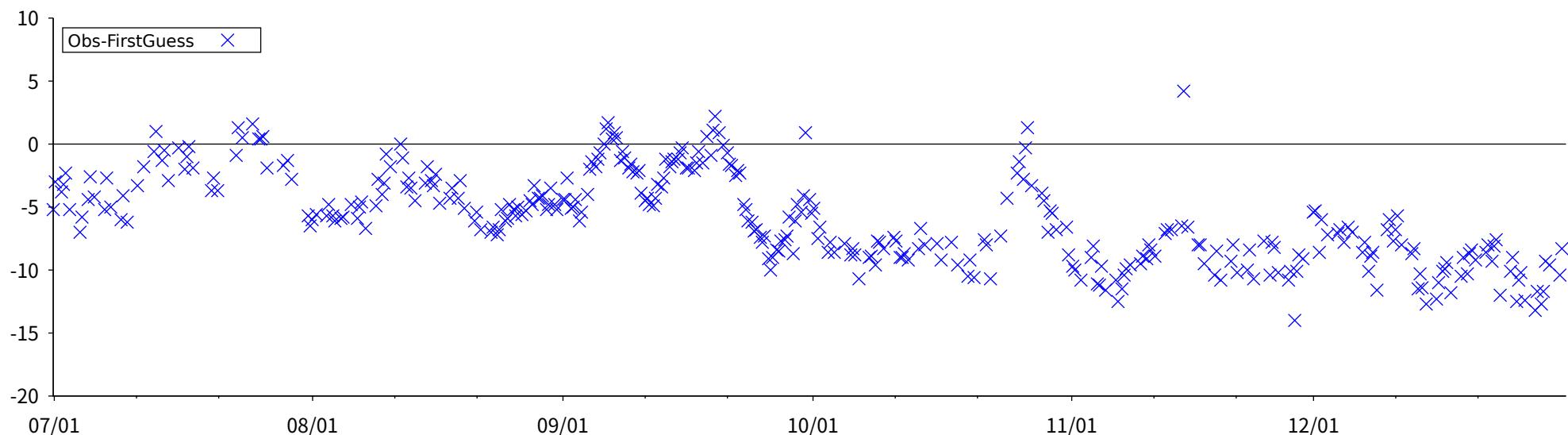


Figure 52(b) Time-series representation of MSLP Obs minus FirstGuess for station 48944

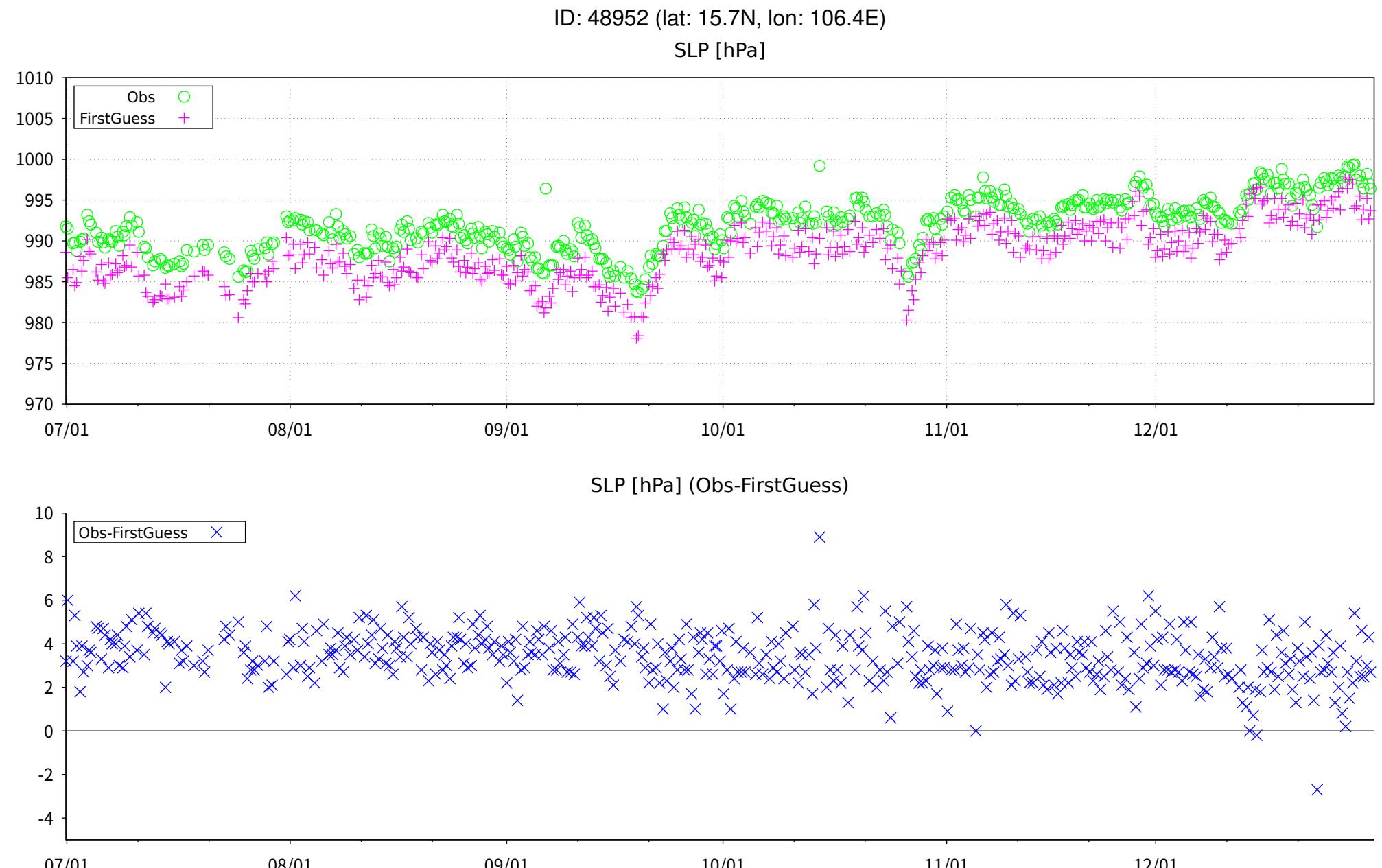
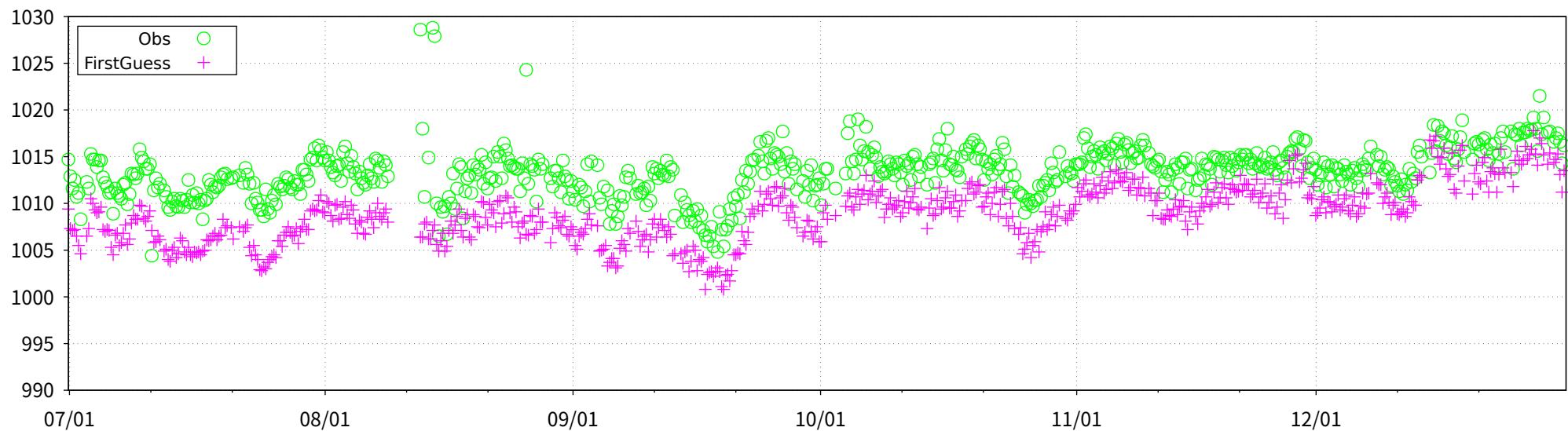


Figure 53 Time-series representation of SLP Obs minus FirstGuess for station 48952

ID: 48961 (lat: 14.2N, lon: 103.5E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

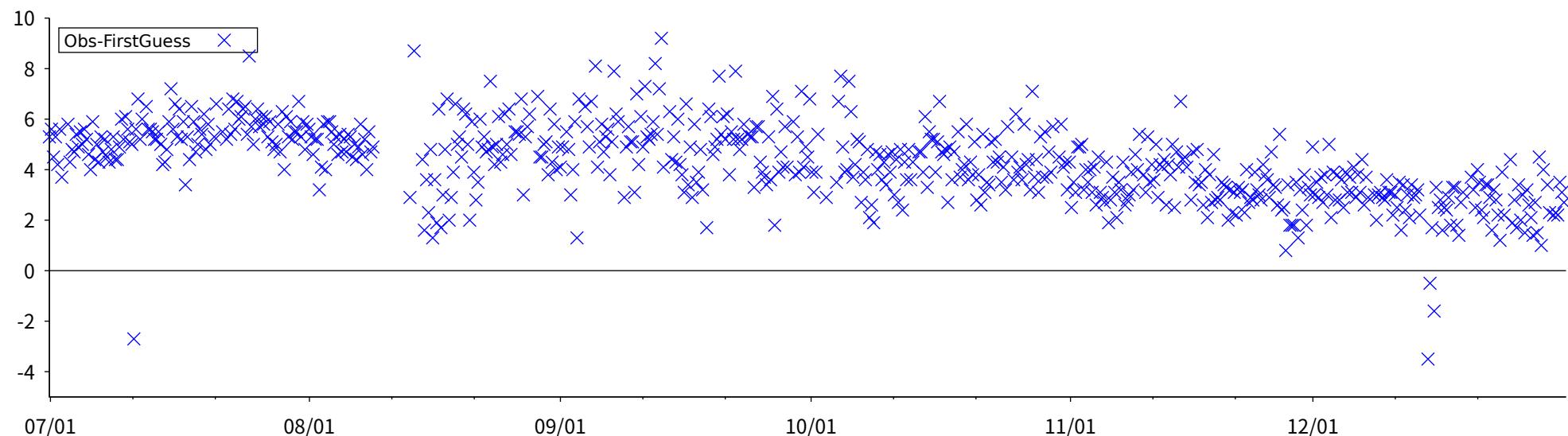
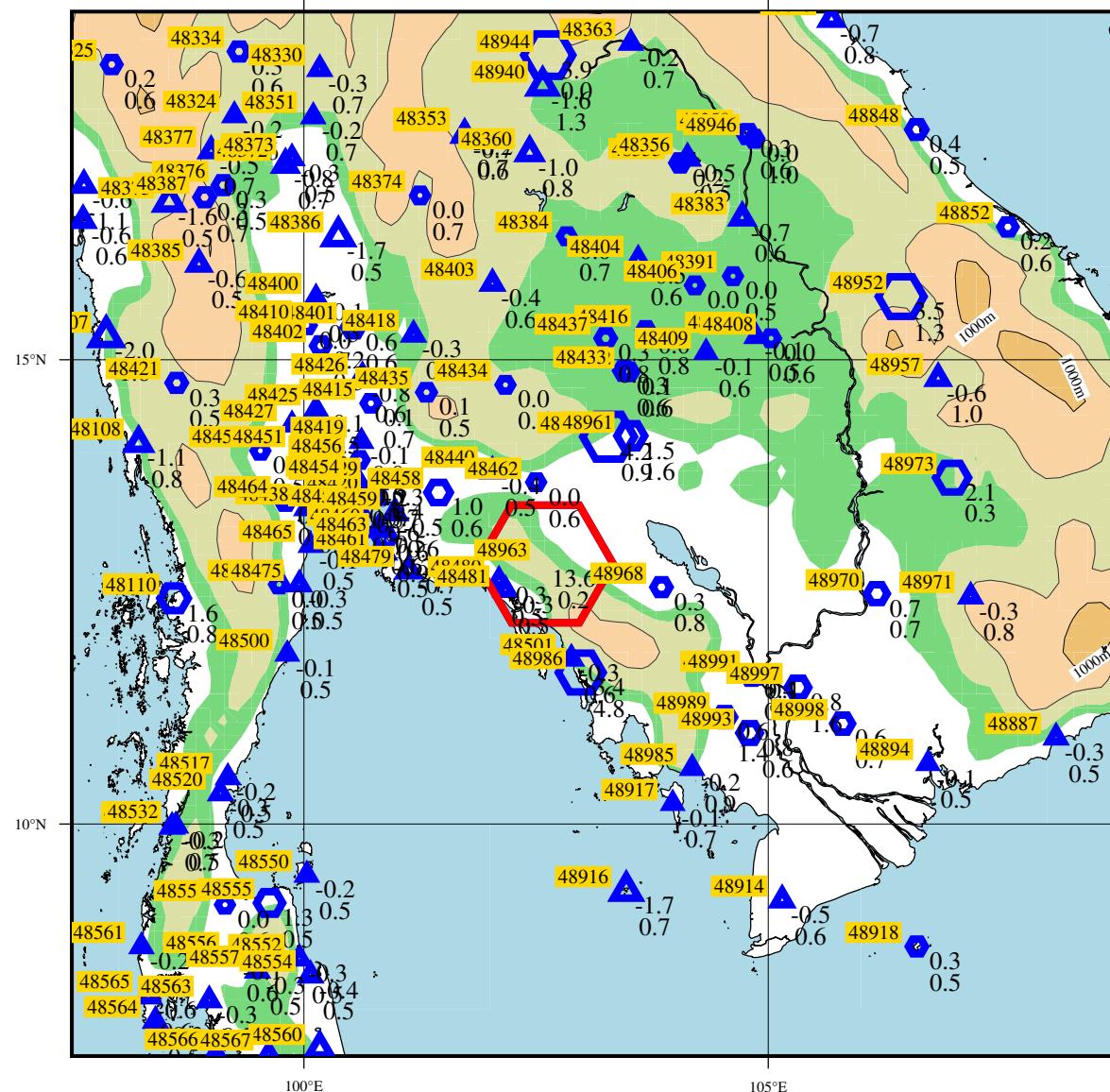


Figure 54 Time-series representation of MSLP Obs minus FirstGuess for station 48961

LEVEL = SUR

ELEMENT = SLP

2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

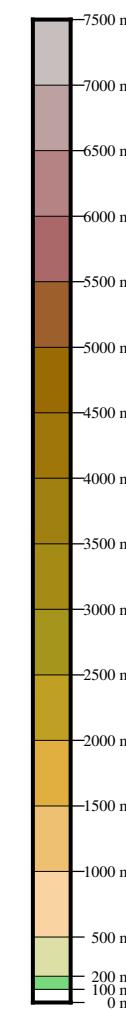


Figure 55 BIAS and SD of SLP for station 48963 (red) and surrounding stations (blue).

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.

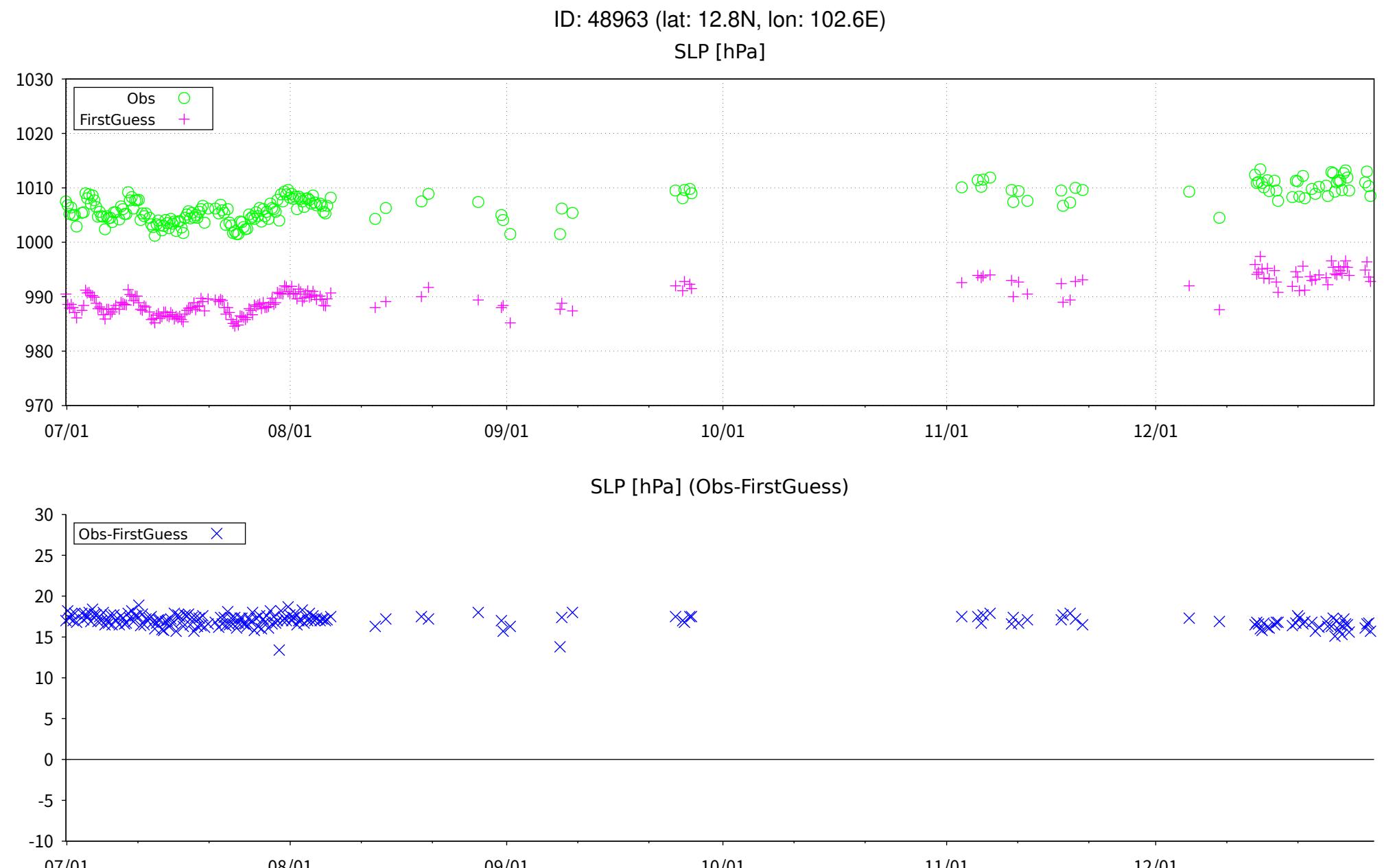
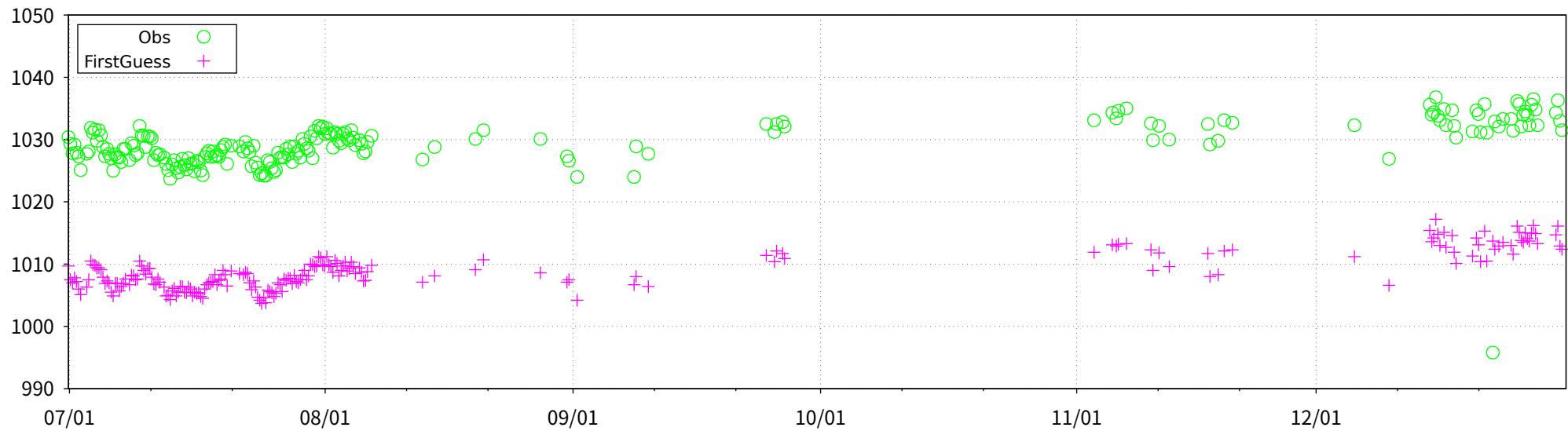


Figure 56(a) Time-series representation of SLP Obs minus FirstGuess for station 48963

ID: 48963 (lat: 12.8N, lon: 102.6E)

MSLP [hPa]



MSLP [hPa] (Obs-FirstGuess)

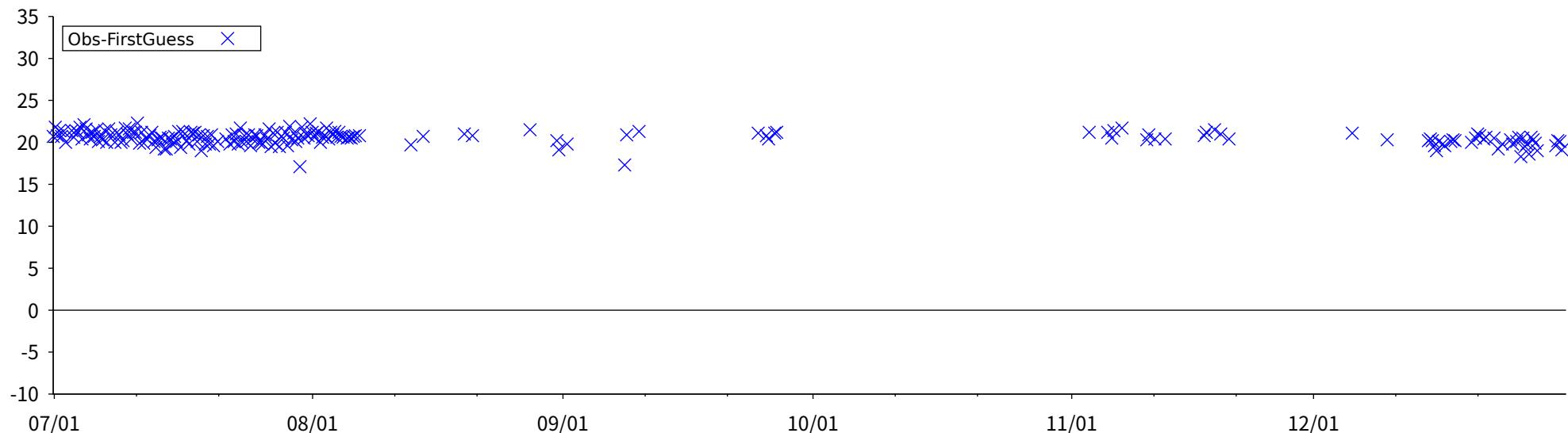


Figure 56(b) Time-series representation of MSLP Obs minus FirstGuess for station 48963

ID: 48986 (lat: 11.6N, lon: 103.0E)  
MSLP [hPa]

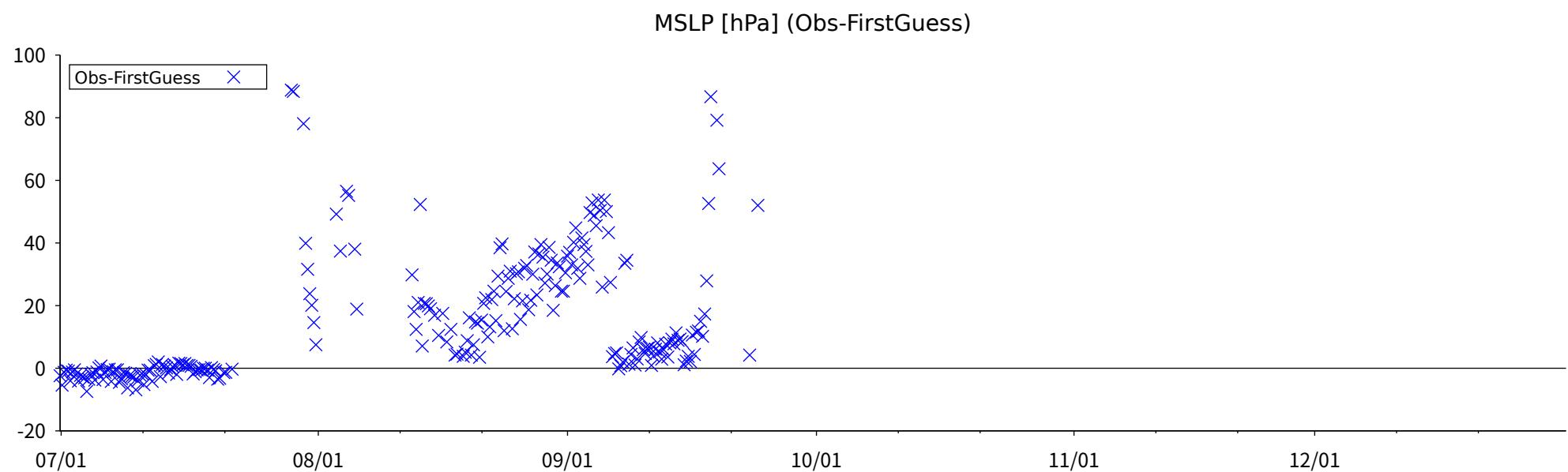
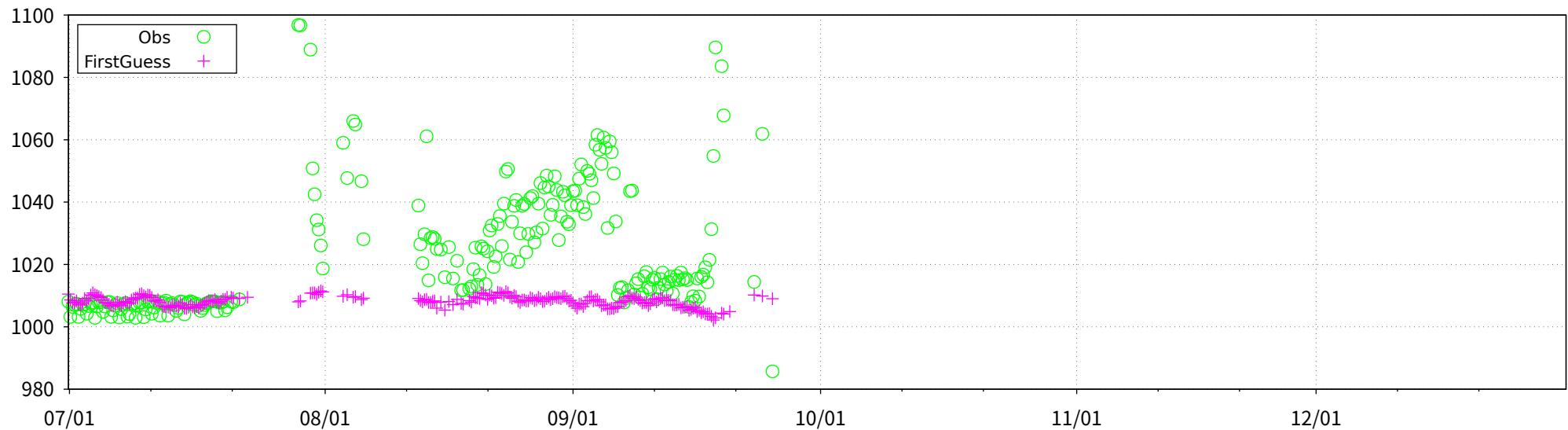
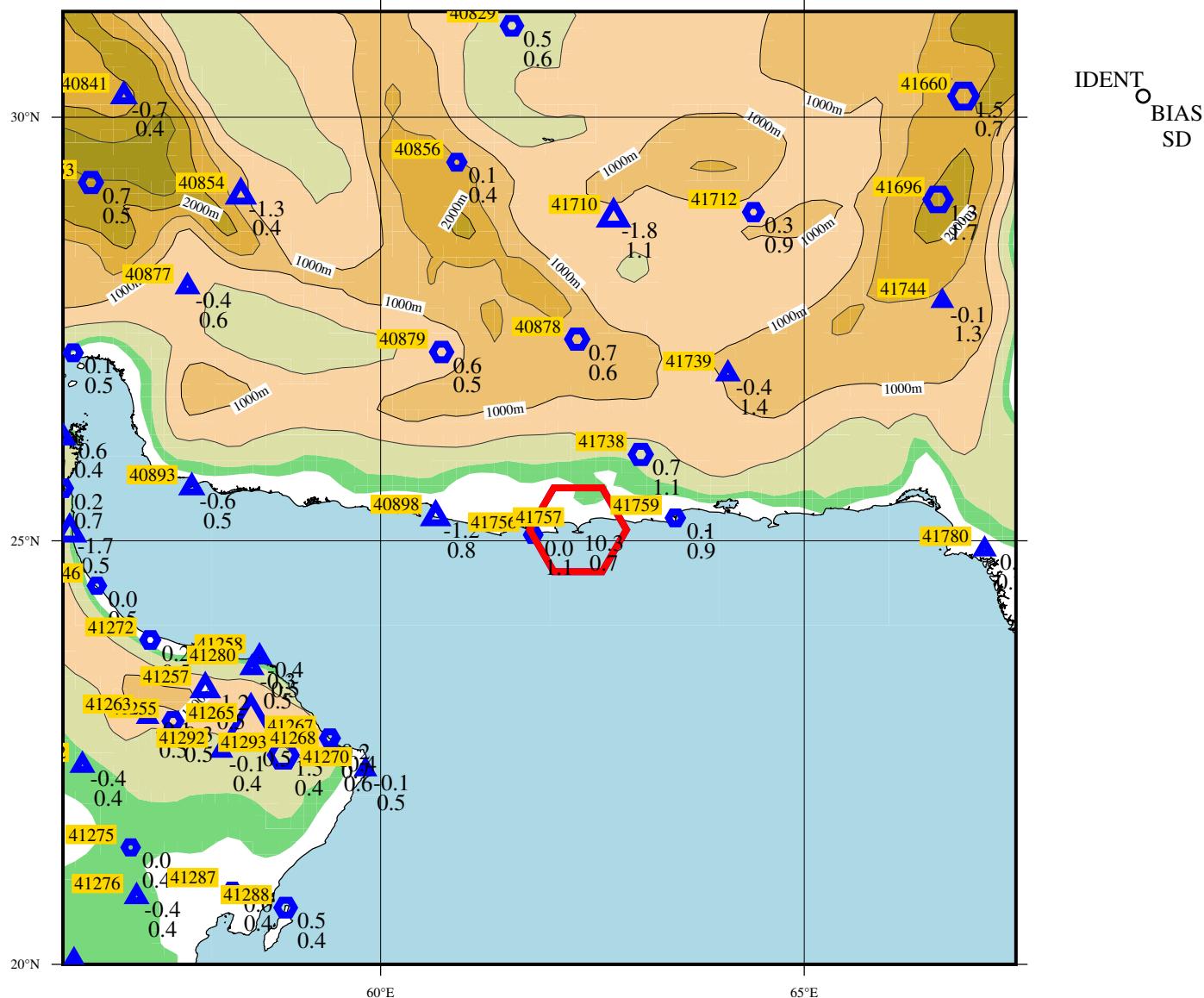


Figure 57 Time-series representation of MSLP Obs minus FirstGuess for station 48986

LEVEL = SUR      ELEMENT = SLP  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
BIAS  
SD

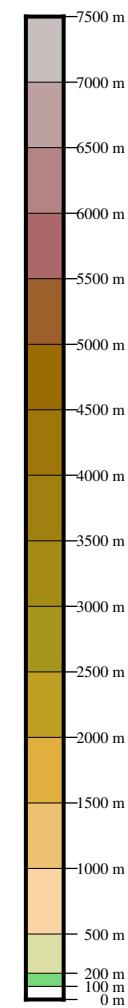


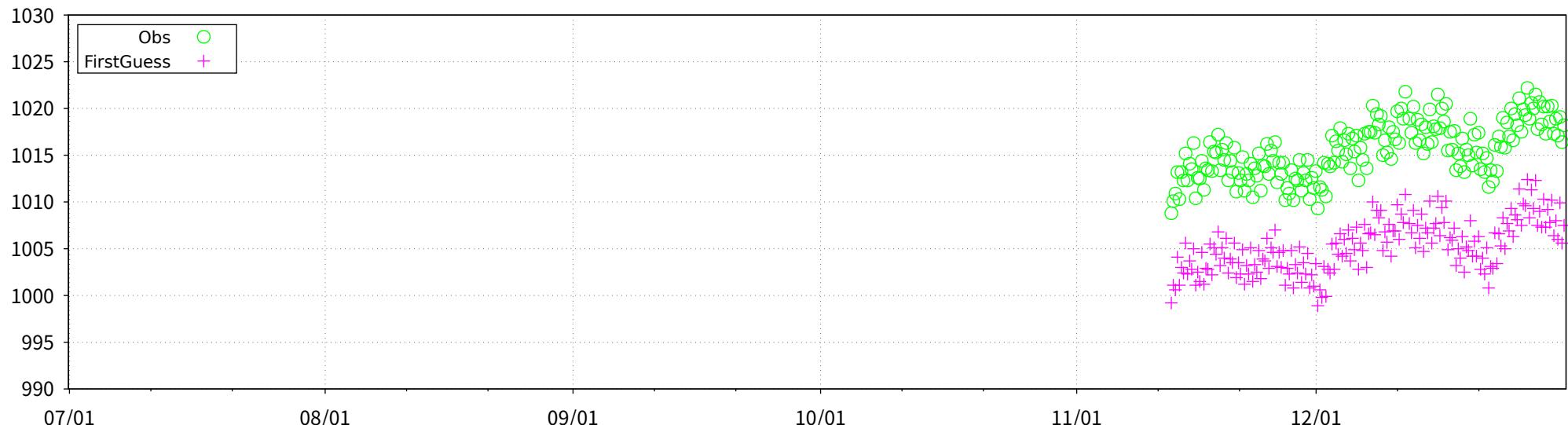
Figure 58 BIAS and SD of SLP for station 41757 (red) and surrounding stations (blue).

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: 41757 (lat: 25.1N, lon: 62.3E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

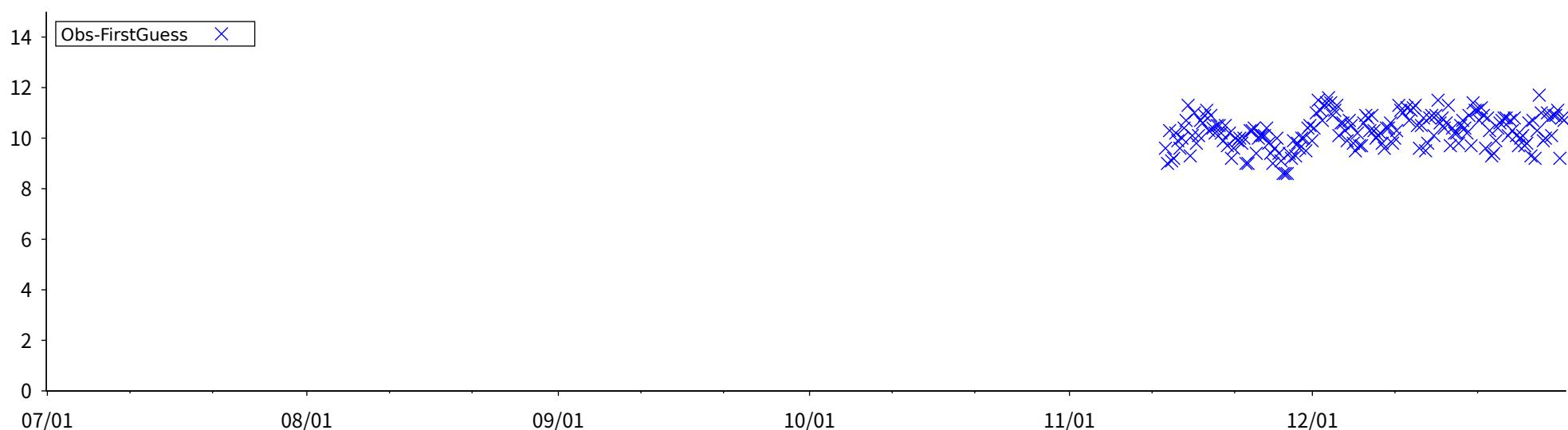
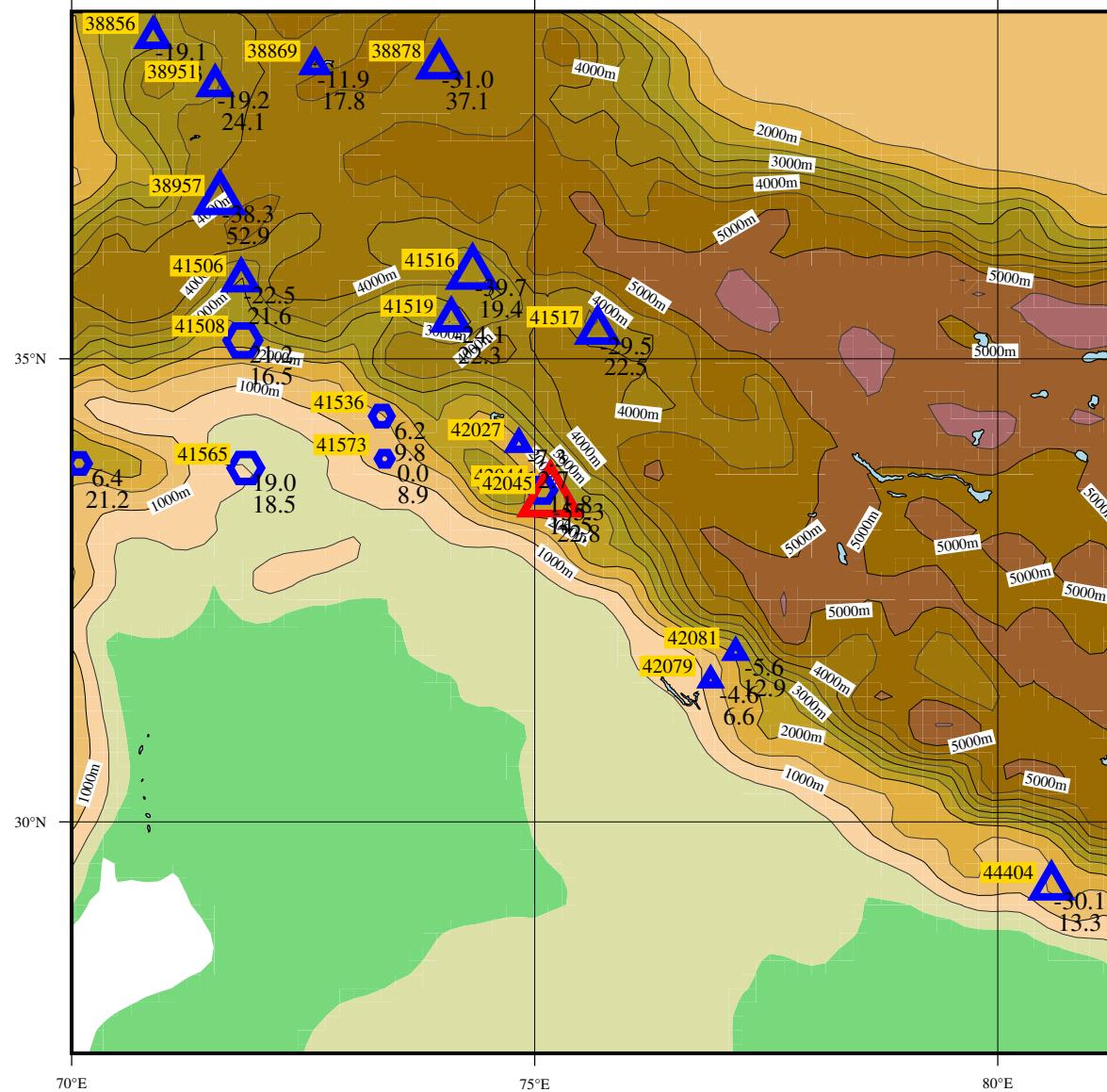


Figure 59 Time-series representation of SLP Obs minus FirstGuess for station 41757

LEVEL = SUR      ELEMENT = GZ  
 2024 07 01 00 UTC -> 2024 12 31 18 UTC ( 184 DAYS)



IDENT  
O BIAS  
SD

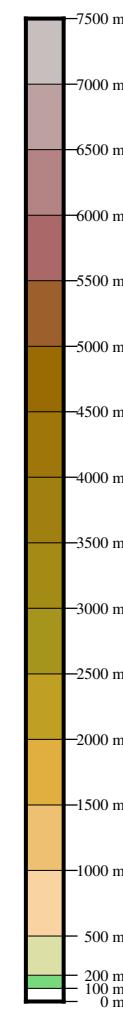


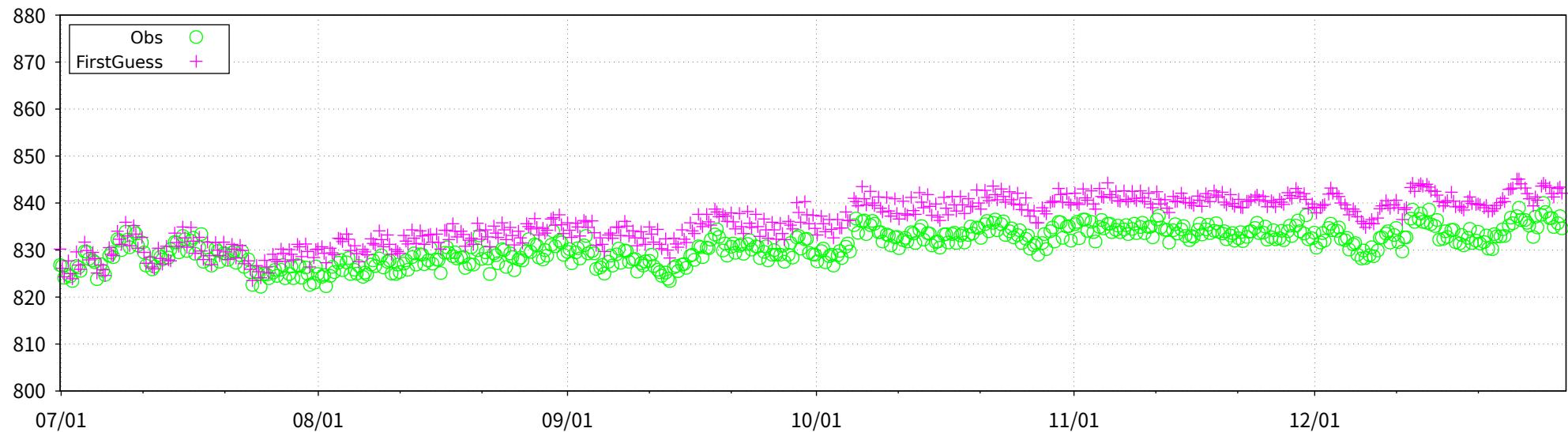
Figure 60 BIAS and SD of GZ for station 42045 (red) and surrounding stations (blue).

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: 42045 (lat: 33.5N, lon: 75.2E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

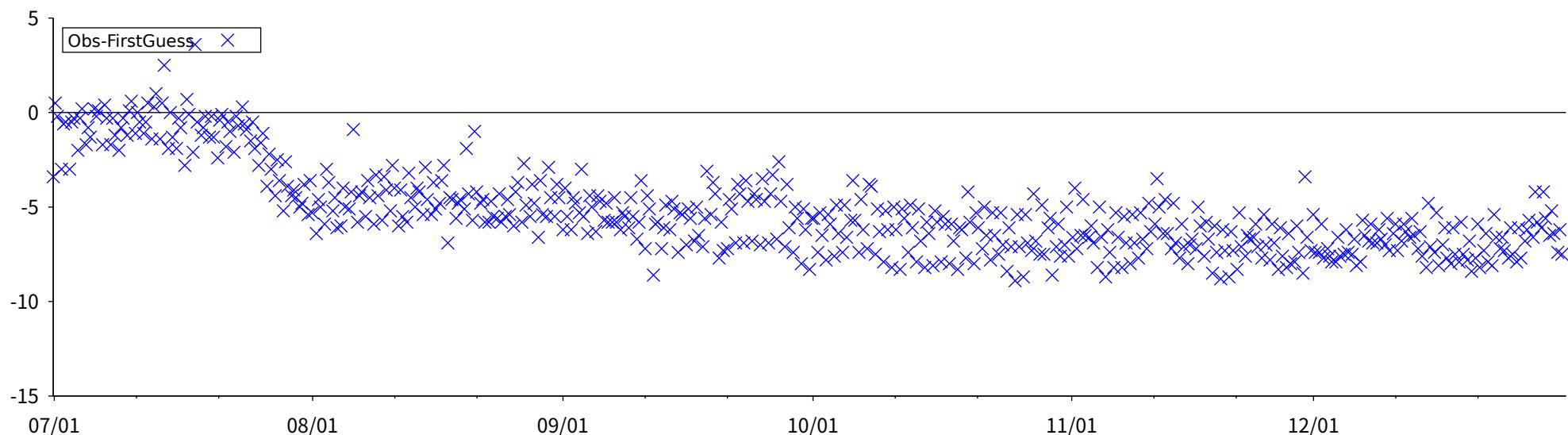
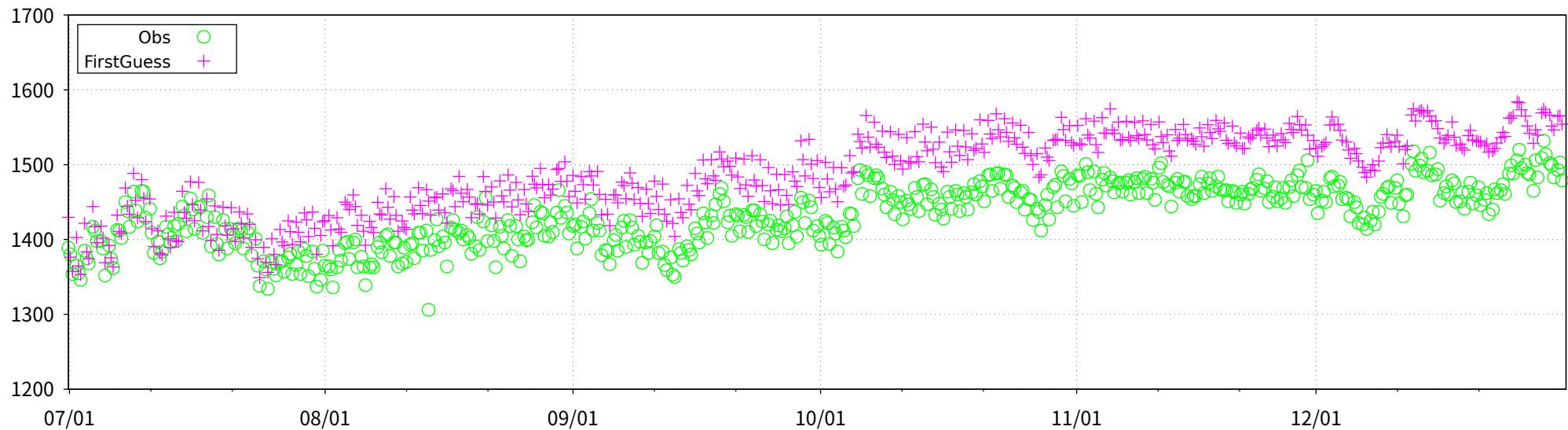


Figure 61(a) Time-series representation of SLP Obs minus FirstGuess for station 42045

ID: 42045 (lat: 33.5N, lon: 75.2E)  
GZ850 [m]



GZ850 [m] (Obs-FirstGuess)

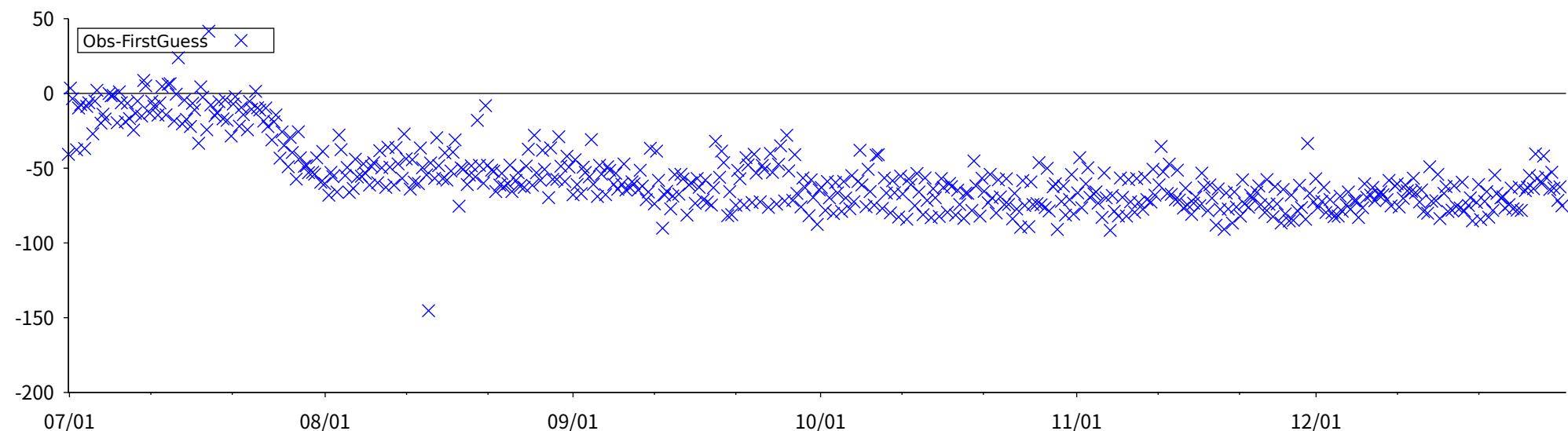


Figure 61(b) Time-series representation of GZ850 Obs minus FirstGuess for station 42045

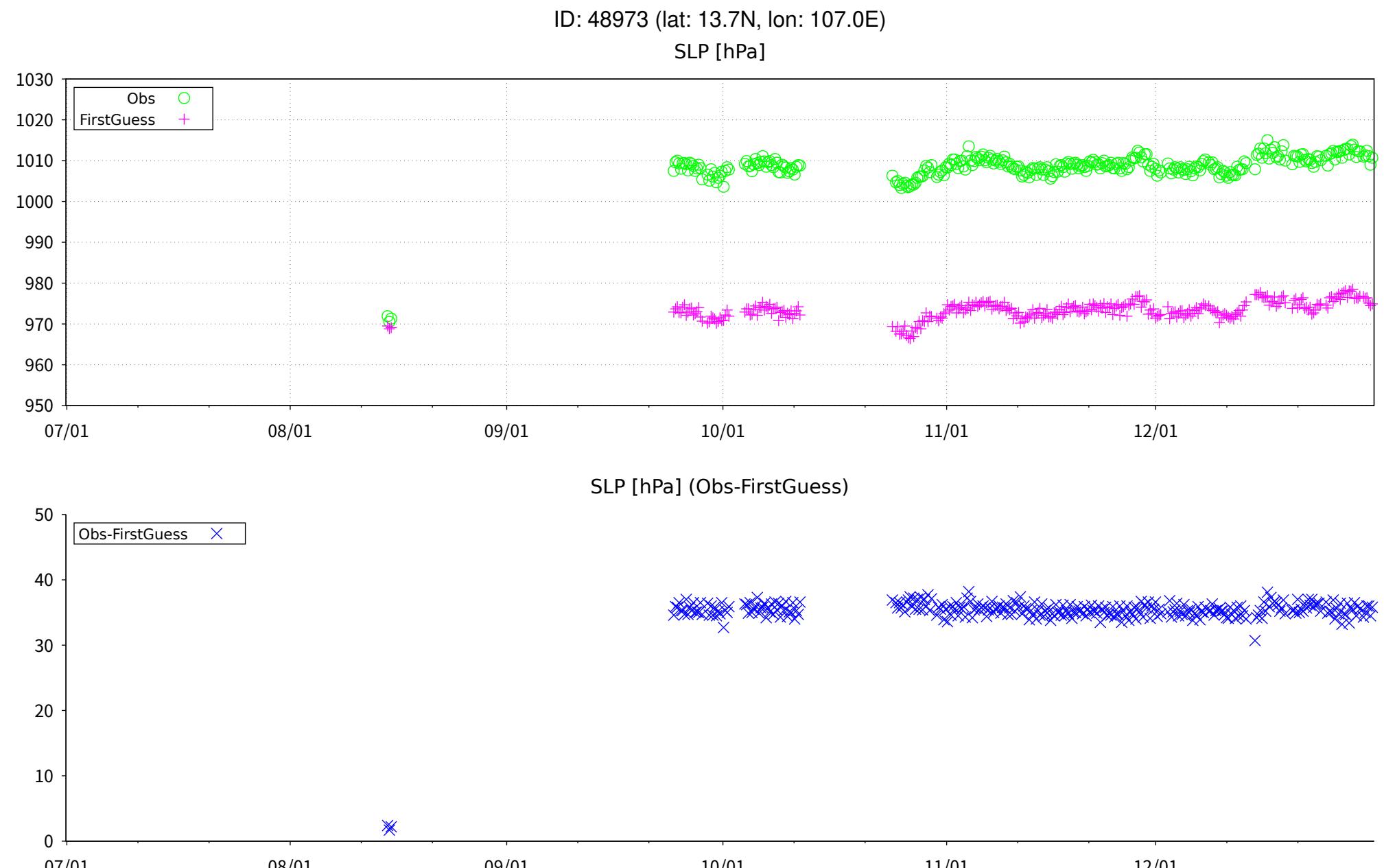


Figure 62(a) Time-series representation of SLP Obs minus FirstGuess for station 48973

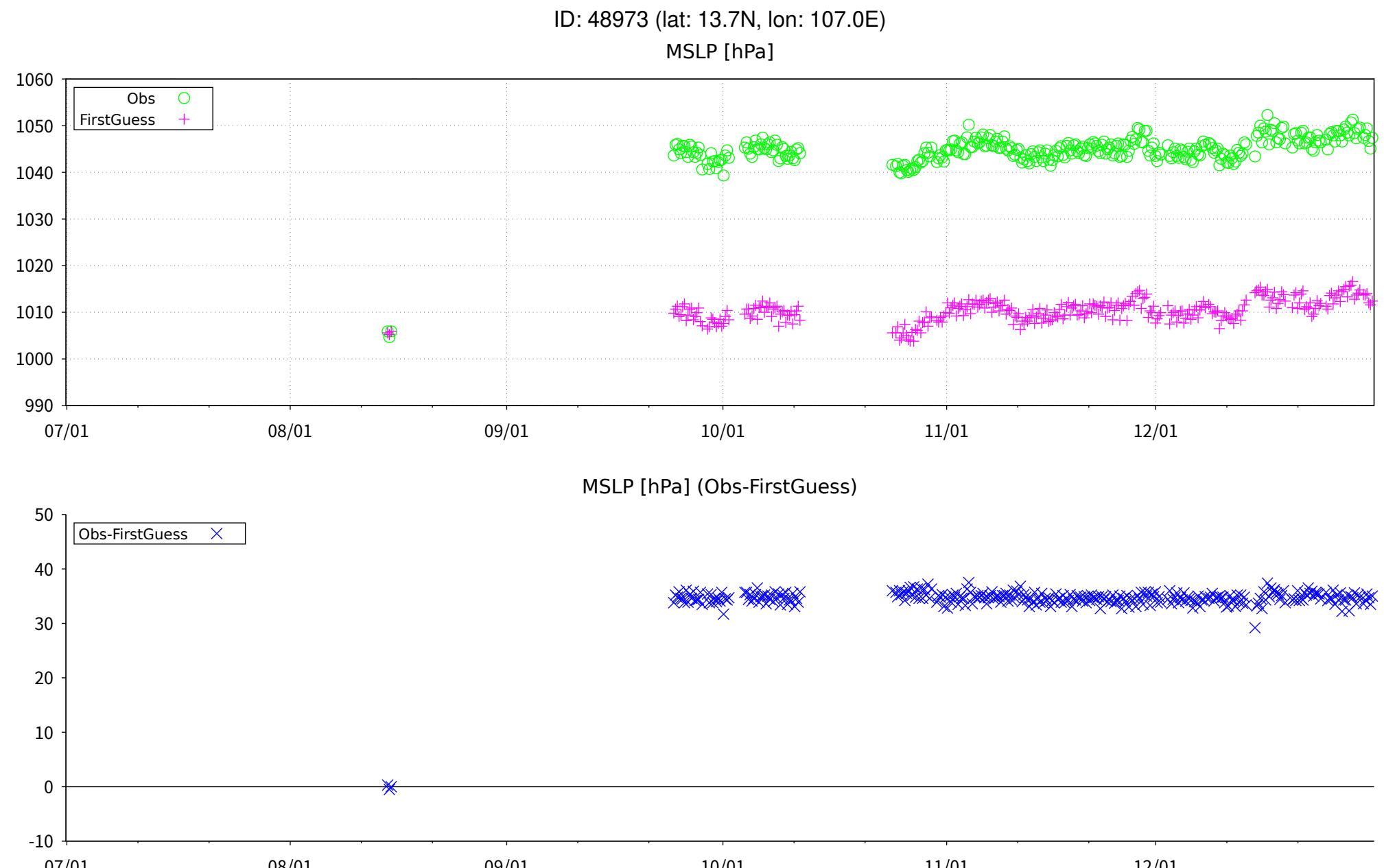
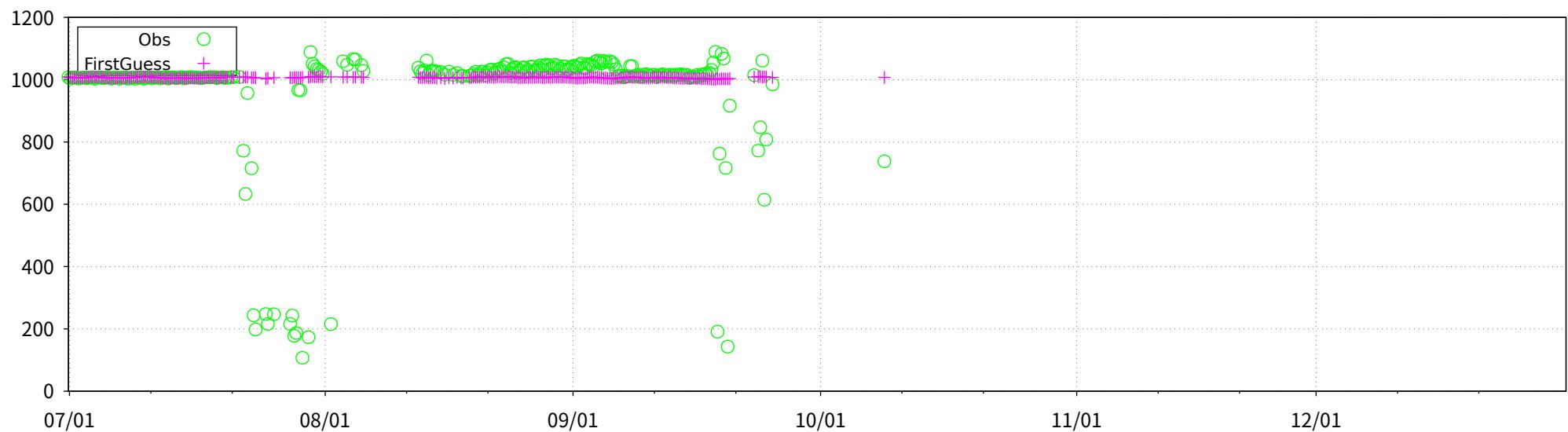


Figure 62(b) Time-series representation of MSLP Obs minus FirstGuess for station 48973

ID: 48986 (lat: 11.6N, lon: 103.0E)

SLP [hPa]



SLP [hPa] (Obs-FirstGuess)

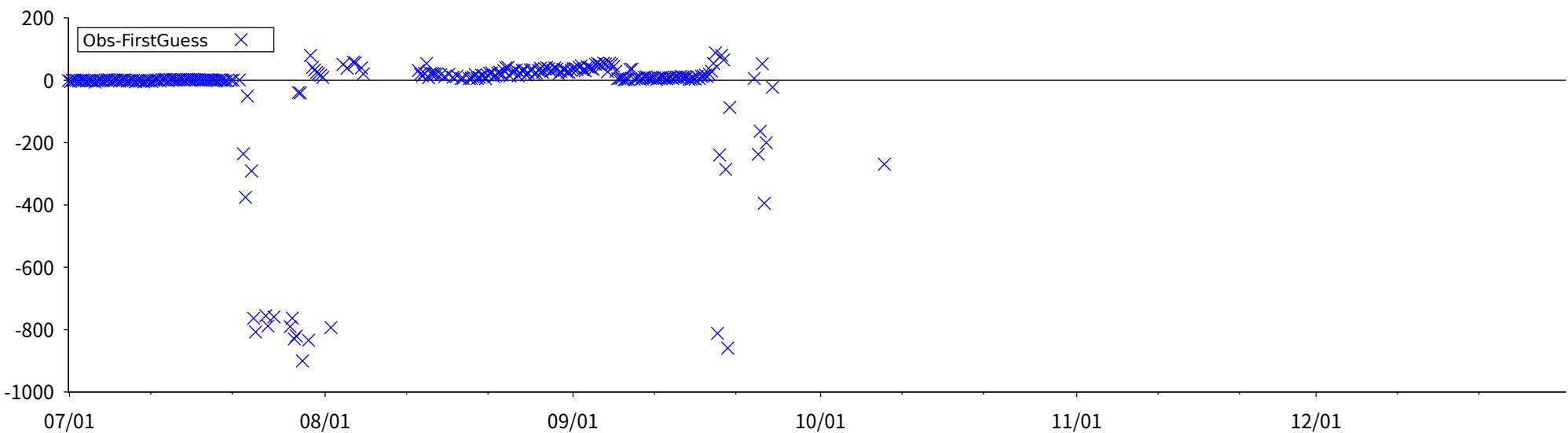


Figure 63 Time-series representation of SLP Obs minus FirstGuess for station 48986

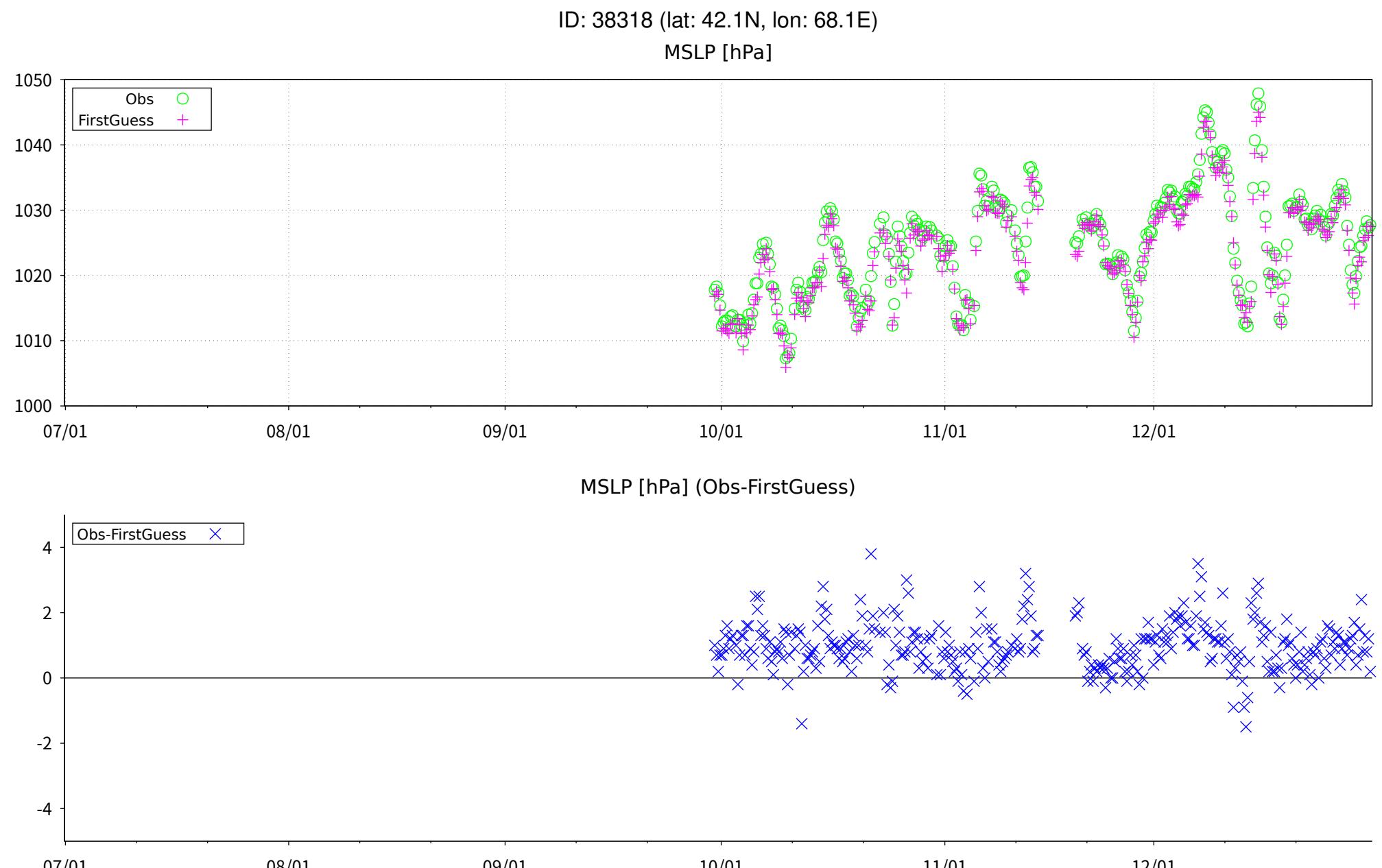


Figure 64 Time-series representation of MSLP Obs minus FirstGuess for station 38318

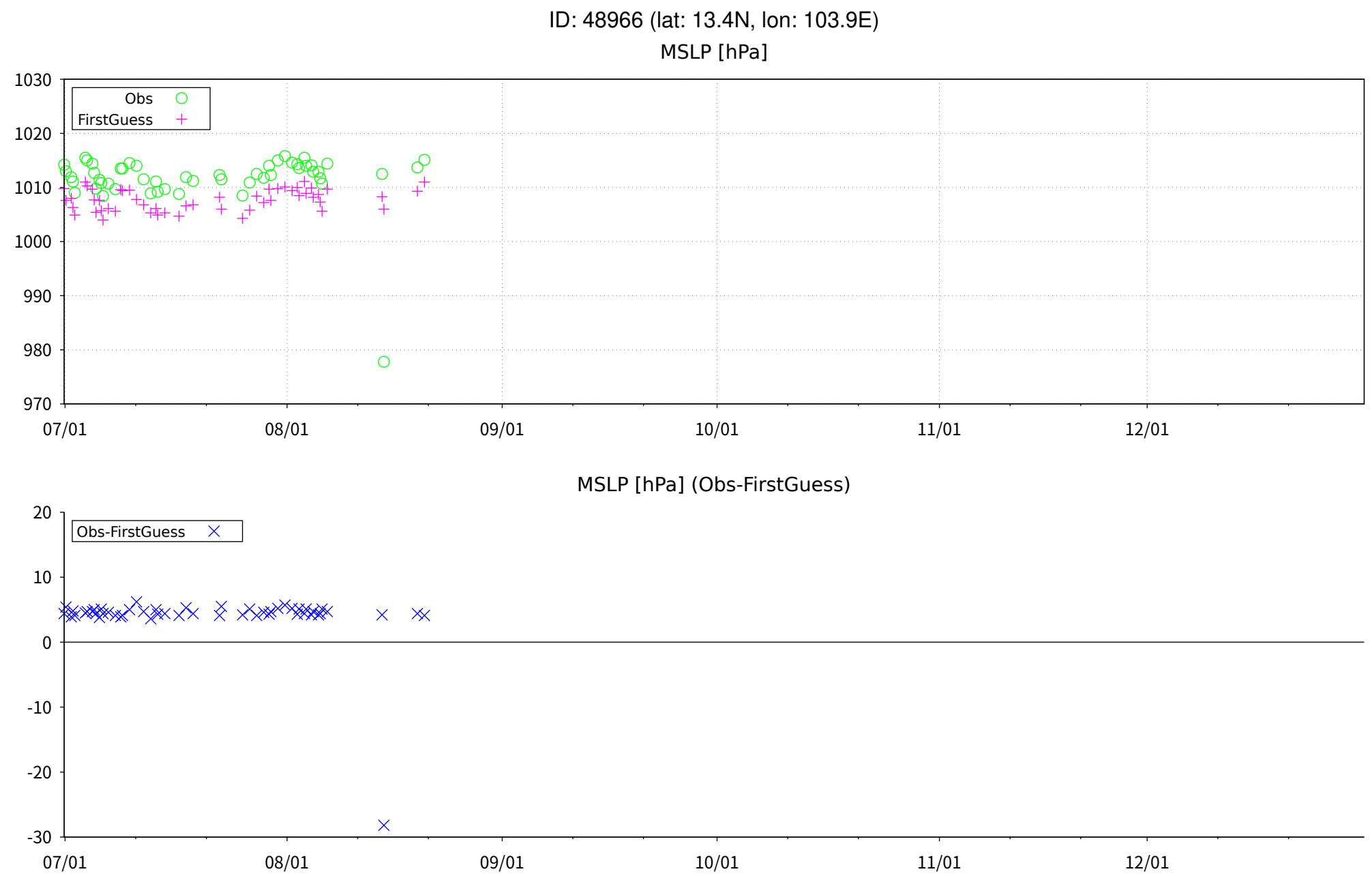


Figure 65 Time-series representation of MSLP Obs minus FirstGuess for station 48966