

Radiosonde-No.6-MOC-CMA(2024)

Report on the Quality of Radiosonde Observations in Region II (Asia)

June 2024

Regional WIGOS Centre, Beijing

China Meteorological Administration

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Report on the Quality of Radiosonde Observations in Region II (Asia)

June 2024

Introduction

In its role as a Regional WIGOS Centre (RWC) in Regional Association (RA) II, China Meteorological Administration (CMA) has issued the monthly report on the radiosonde observation quality monitoring of June 2024. The report includes a consolidated list of suspect stations that produced low-quality observation data.

CMA was designated as a Regional WIGOS Centre in RA II. The Centre is responsible for monitoring the quality of meteorological observations and maintaining consolidated lists of suspect stations of reporting low-quality observation data together with adequate evidence. The lists are to be passed on to the WMO secretariat and monitoring centres participating in the activity as well as to Members of RA II for their reference.

1. Data Acquisition

Radiosonde observation data are collected at GTS, including 2 times: 00 and 12(UTC). The observation elements are geopotential height(GPH), vector wind (WIN_S) and wind direction (WIN_D).

2. Monitoring Standard

2.1 Geopotential Height

*Standard of comparison: First guess field from CMA_GFS model

*Observation times : 00, 12 UTC

*Levels monitored : Standard levels from 1000 - 30 hPa

*Element monitored : Geopotential Height (m)

*Parameters monitored :

NUM OBS: Number of observations received excluding duplicates

NUM GRS: Number of observations with gross errors

% REJ: Percentage of observations rejected by quality control

SD: Standard deviation of differences of observations from first guess field

BIAS: Mean difference of observations from first guess field

RMS: Root mean square of differences of observations from first guess field

(SD, BIAS and RMS are estimated excluding observations with gross errors)

*GROSS ERROR LIMIT :

Level (hPa)	Geopotential Height (m)
1000	100
925	100
850	100
700	100
500	150
400	175
300	200
250	225
200	250
150	275
100	300
70	375
50	400
30	450

*SELECTION CRITERIA :

at least 3 levels with NUM OBS \geq 10 and 100 m weighted RMS
only the worst level is shown (with unweighted RMS)

2.2 Vector Wind

*Standard of comparison: First guess field from CMA_GFS model

*Observation times : 00, 12 UTC

*Levels monitored : Standard levels from 1000 - 100 hPa

*Element monitored : Vector Wind (m/s)

*Parameters monitored :

NUM OBS: Number of observations received excluding duplicates

NUM GRS: Number of observations with gross errors

% REJ: Percentage of observations rejected by quality control

U,V BIAS: Mean difference of observations from first guess field

RMS: Root mean square of differences of observations from first guess
field

(BIAS and RMS are estimated excluding observations with gross errors)

*GROSS ERROR LIMIT :

Level (hPa)	Vector Wind (m/s)
1000	35
925	35
850	35
700	40
500	45
400	50
300	60
250	60
200	50
150	50
100	45

SELECTION CRITERIA :

at least 1 level with NUM OBS \geq 10 and RMS \geq 15 m/s
standard level (1000 - 100 hPa) with highest RMS is shown

2.3 Wind Direction

*Standard of comparison: First guess field from CMA_GFS model

*Observation times : 00, 12 UTC

*Levels monitored : Standard levels from 500 - 150 hPa

*Element monitored : Wind Direction (degrees, clockwise)

*Parameters monitored :

NUM OBS: Minimum number of observations received excluding
duplicates at each level

(excluding gross errors and data with wind speed $<$ 5 m/s)

BIAS: Mean difference of observation from first guess field, averaged over
the monitoring levels

MAX SPREAD: Maximum absolute difference of SD at any level from SD
at all levels

SD: Standard deviation of differences of observations from first guess field
at all levels

(BIAS, MAX SPREAD and SD are estimated excluding observations with
gross errors and low wind speed)

GROSS ERROR LIMIT :

Level (hPa)	Wind Direction ($^{\circ}$)
500	45
400	50
300	60
250	60
200	50
150	50

SELECTION CRITERIA :

NUM OBS \geq 5 and

|BIAS| ≥ 10 degrees with
SD < 30 degrees and
MAX SPREAD < 10 degrees

3. Monitoring Results

3.1 Silent Stations

Table 1 List of silent stations from June

NUM	STATION_CODE	STATION_NAME	COUNTRY	LAT	LON
1	40938	HERAT	Afghanistan	34.22	62.22
2	40948	KABUL AIRPORT	Afghanistan	34.55	69.22
3	43285	MANGALORE/PANAMBUR	India	12.95	74.83
4	43192	GOA/PANJIM	India	15.48	73.82
5	42667	BHOPAL/BAIRAGHAR	India	23.28	77.35
6	40745	MASHHAD	Iran, Islamic Republic of	36.24	59.63
7	40811	AHWAZ	Iran, Islamic Republic of	31.34	48.74
8	47600	WAJIMA	Japan	37.39	136.90
9	47418	KUSHIRO	Japan	42.95	144.44
10	40582	KUWAIT INTERNATIONAL AIRPORT	Kuwait	29.24	47.97
11	43599	GAN	Maldives	-0.69	73.16
12	48097	YANGON	Myanmar	16.86	96.15
13	48042	MANDALAY	Myanmar	21.94	96.09
14	41316	SALALAH AIRPORT	Oman	17.03	54.07
15	41594	SARGODHA	Pakistan	32.05	72.67
16	41661	QUETTA (SHEIKH MANDA)	Pakistan	30.27	66.92
17	28722	UFA-DIOMA	Russia	54.71	55.82
18	24944	OLEKMINSK	Russia	60.37	120.42
19	31168	AYAN	Russia	56.45	138.15
20	30715	ANGARSK	Russia	52.48	103.85

21	38836	DUSHANBE	Tajikistan	38.58	68.73
22	38954	KHOROG	Tajikistan	37.50	71.50
23	38507	TURKMENBASHI	Turkmenistan	40.03	52.98

The list is the stations that did not receive data from June, please check the status of the stations according to the list, if it is closed or silent, please go to the OSCAR/Surface to modify the declared status.

3.2 Geopotential Height (GPH)

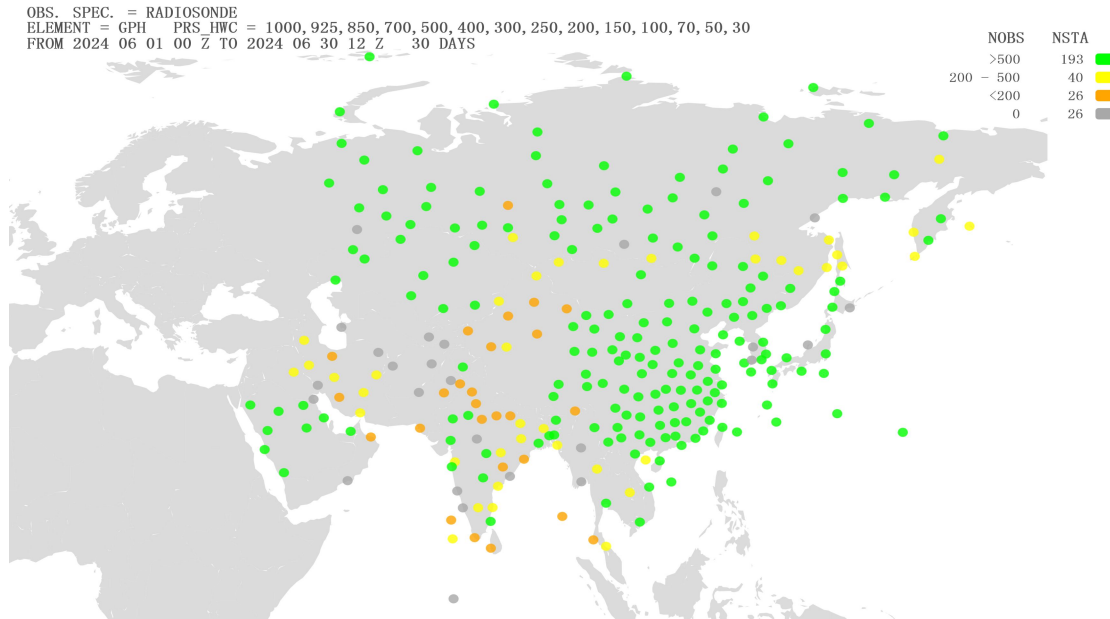
3.2.1 List of Suspect Stations

Table 2 List of GPH suspected in June 2024

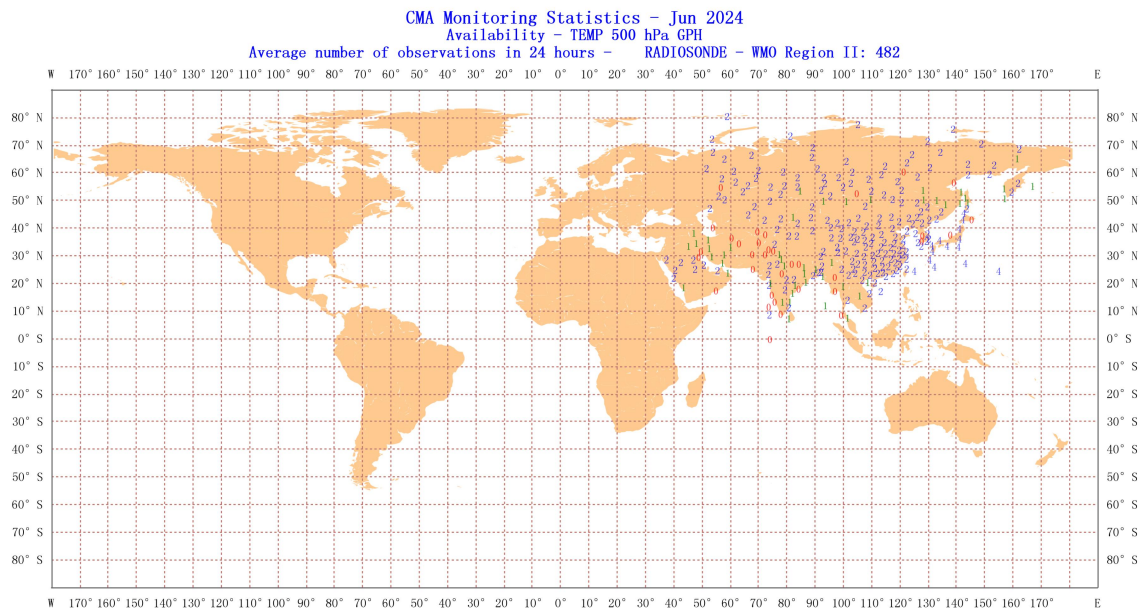
LINE NUM	WMO IDENT	COUNTRY	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ (%)	BIAS	SD	RMS
1	36003	Kazakhstan	00	200	29	1	3.3	42.9	73.8	85.4
2	38341	Kazakhstan	00	100	19	5	8.3	-51.7	150.8	159.4
3	38341	Kazakhstan	12	50	13	5	0	22.4	208	209.2
4	42339	India	00	700	23	1	0	34.1	23	41.1
5	42339	India	12	50	22	0	0	124.8	25.9	127.4
6	42348	India	00	400	29	0	0	73.7	30.5	79.8
7	42348	India	12	100	23	1	4.2	144.5	56.1	155
8	42724	India	12	50	10	1	0	136.7	32	140.4
9	42867	India	12	30	23	0	0	165.6	59.2	175.9
10	42874	India	12	200	18	1	0	69.4	24.5	73.6
11	43041	India	12	700	18	0	0	31.8	13.5	34.6
12	43295	India	00	500	24	3	0	34	45.5	56.8
13	43346	India	00	850	28	1	0	30.6	24.8	39.4
14	43346	India	12	50	14	0	0	122.1	38.8	128.1
15	43369	India	00	70	10	0	0	155	61.7	166.8
16	52533	China	00	30	27	0	0	181.7	173.3	251.2
17	52533	China	12	30	26	0	0	127.2	126.9	179.7
18	57083	China	00	50	24	6	23.3	192.3	124.6	229.2

19	58027	China	00	30	21	2	8.7	177.9	162.3	240.8
20	58424	China	00	30	22	1	4.3	125	154	198.3

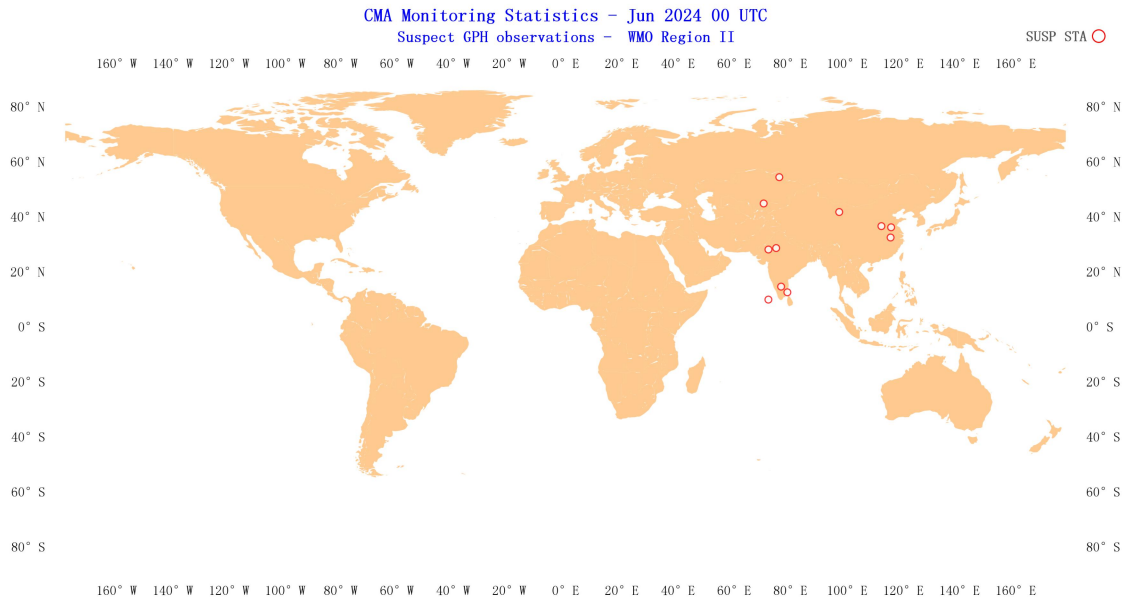
3.2.2 Suspect Station Analysis



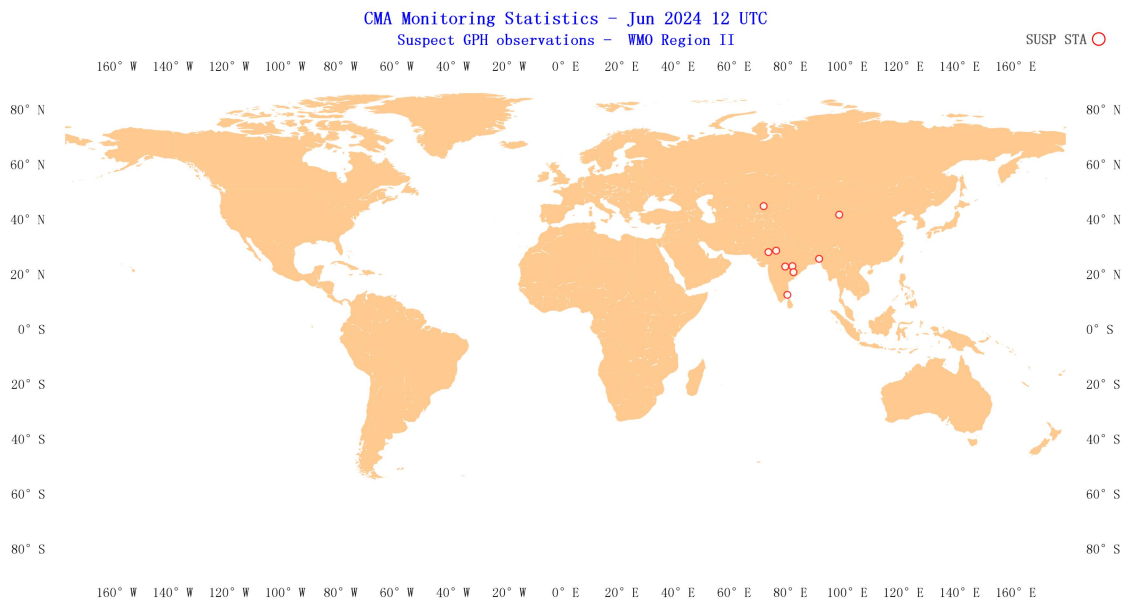
Location of all radiosonde stations reporting geopotential height observations in Region II over the month of June 2024. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers to NOBS is higher than 500, color yellow refers to NOBS is between 200 and 500(including 500), color orange refers to NOBS is between 0 and 200(including 200), and color gray refers to NOBS is 0.



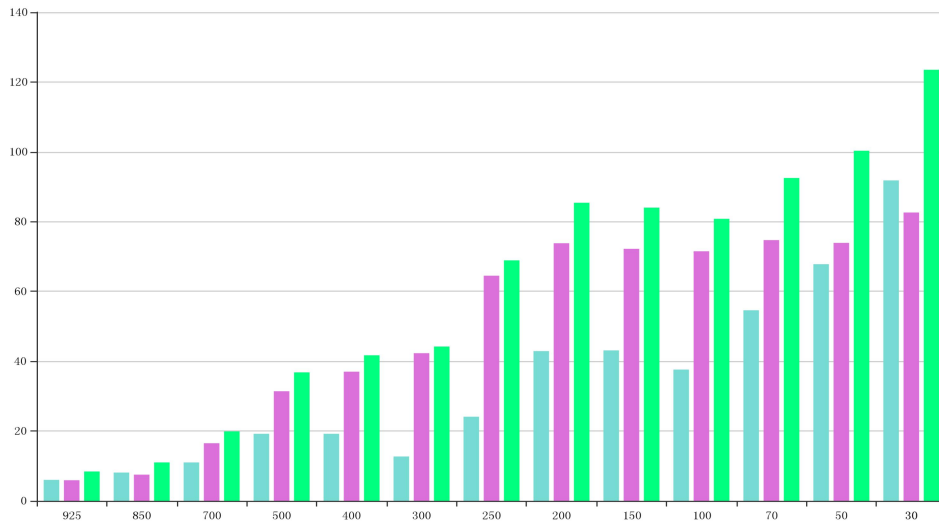
Location of all radiosonde stations reporting geopotential height average number of observations in 24 hours in Region II over the month of June 2024.



Distribution of suspect stations - Geopotential Height 00 UTC

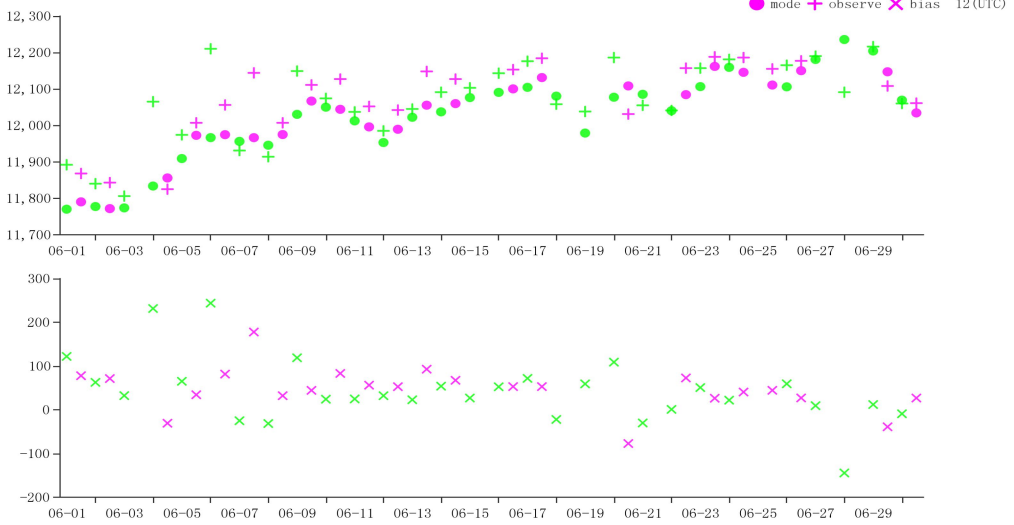


Distribution of suspect stations - Geopotential Height 12 UTC

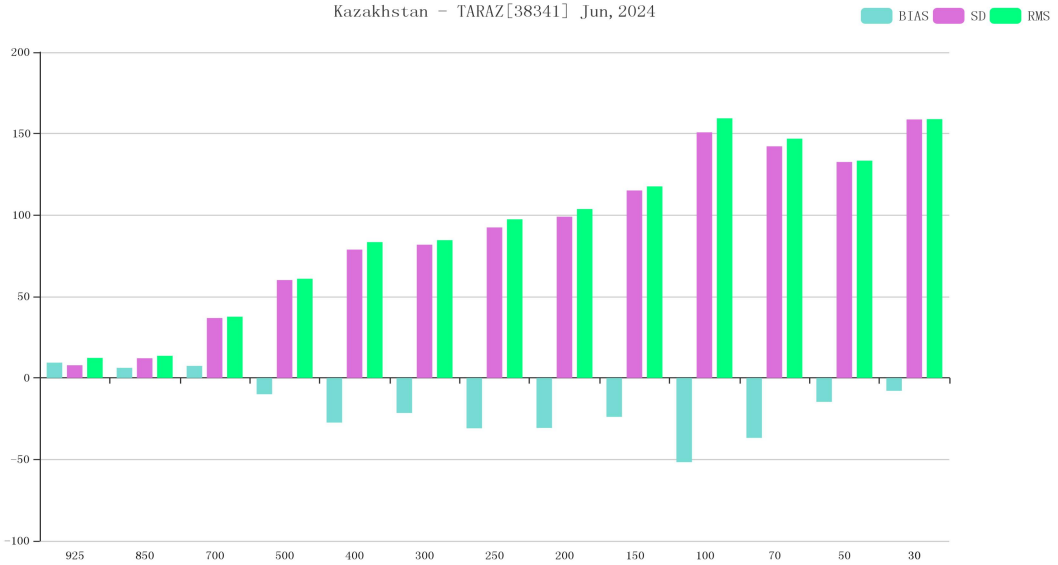


BIAS、SD and RMS of GPH for station 36003(OBS-TIME:00)

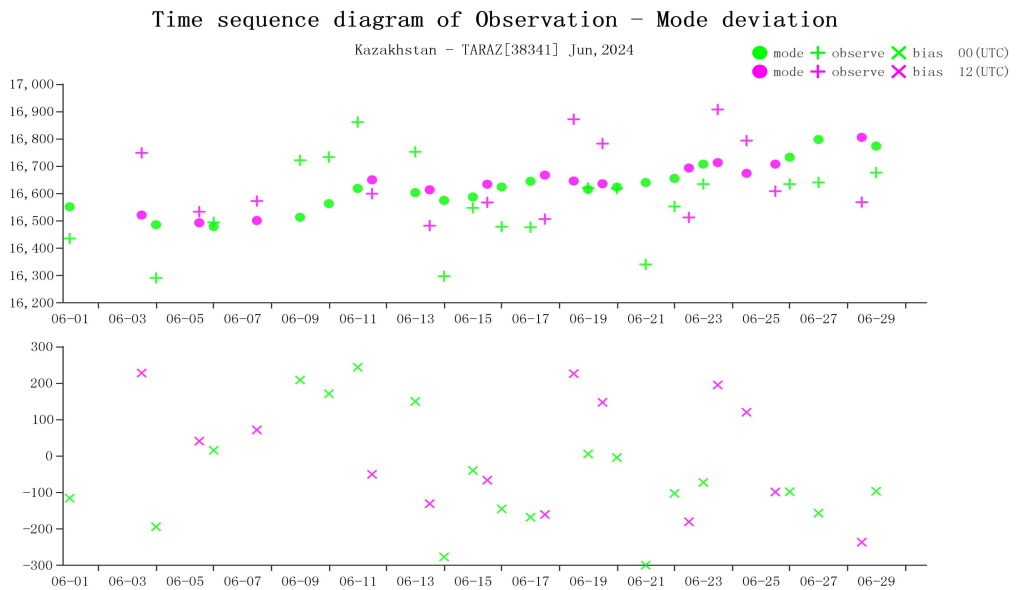
Time sequence diagram of Observation - Mode deviation



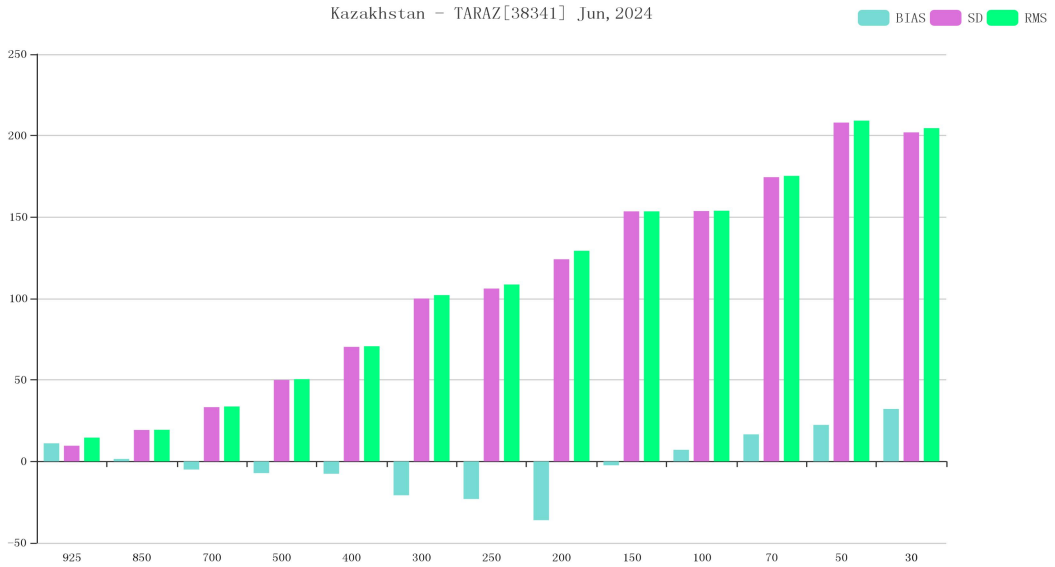
Time-series representation of GPH Obs minus first guess for station 36003(Level:200)



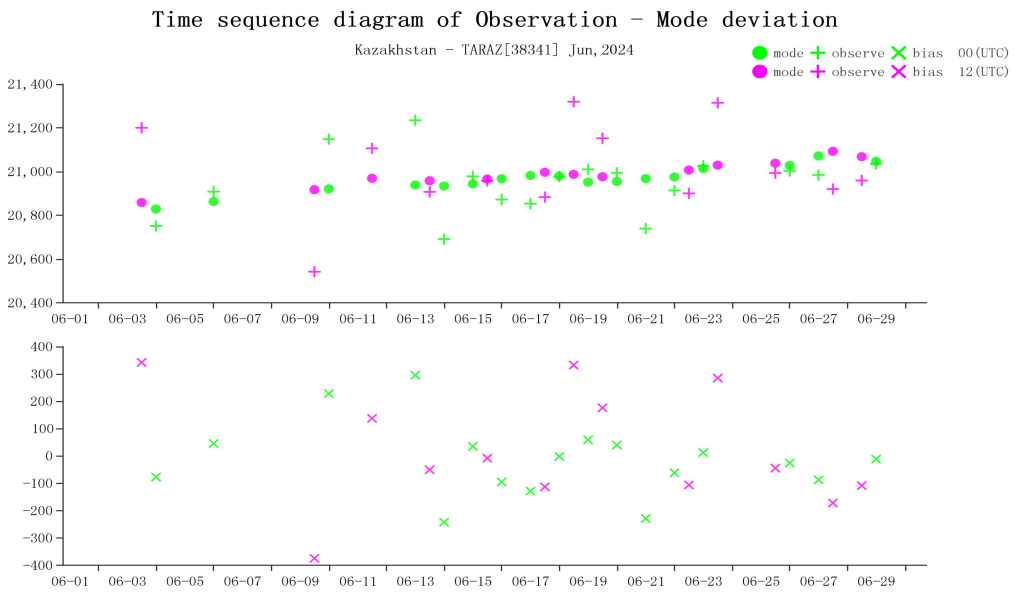
BIAS、SD and RMS of GPH for station 38341(OBS-TIME:00)



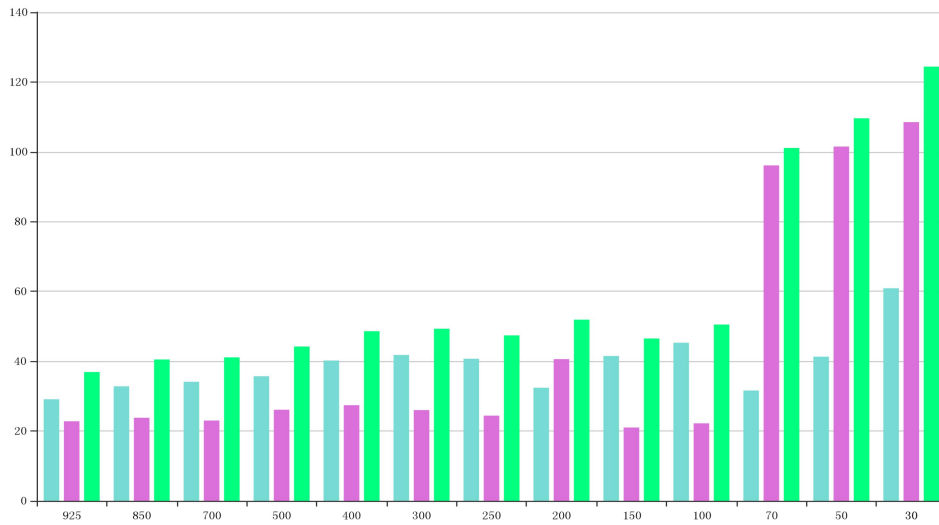
Time-series representation of GPH Obs minus first guess for station 38341(Level:100)



BIAS、SD and RMS of GPH for station 38341(OBS-TIME:12)

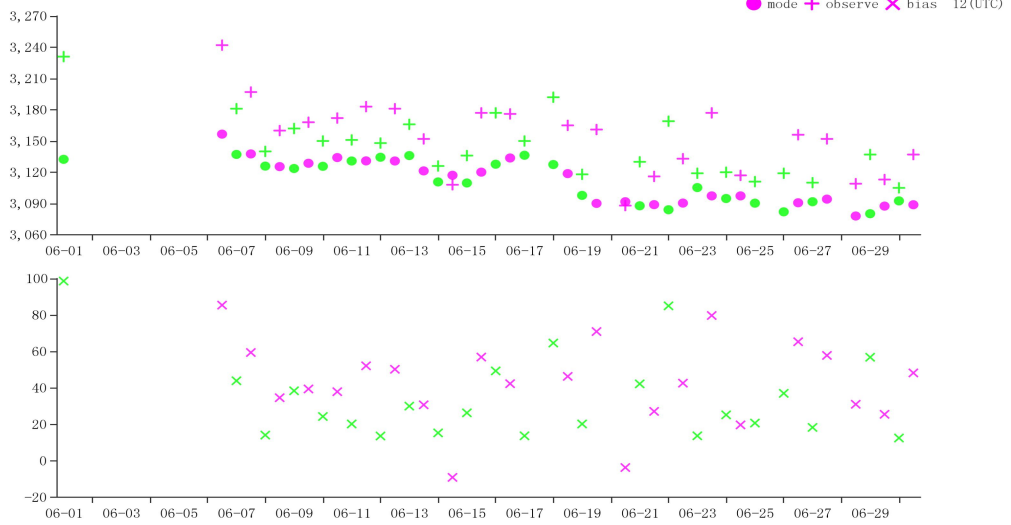


Time-series representation of GPH Obs minus first guess for station 38341(Level:50)



BIAS、SD and RMS of GPH for station 42339(OBS-TIME:00)

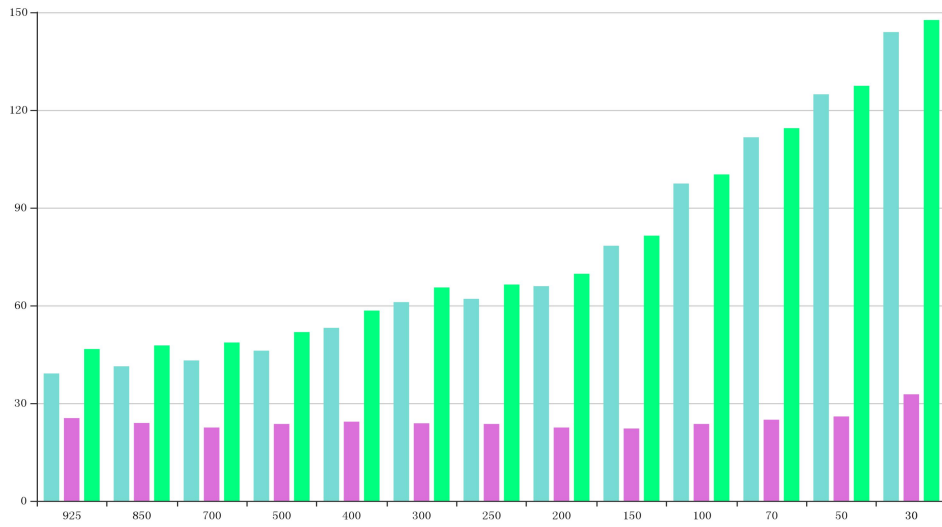
Time sequence diagram of Observation - Mode deviation



Time-series representation of GPH Obs minus first guess for station 42339(Level:700)

India - JODHPUR[42339] Jun, 2024

BIAS SD RMS

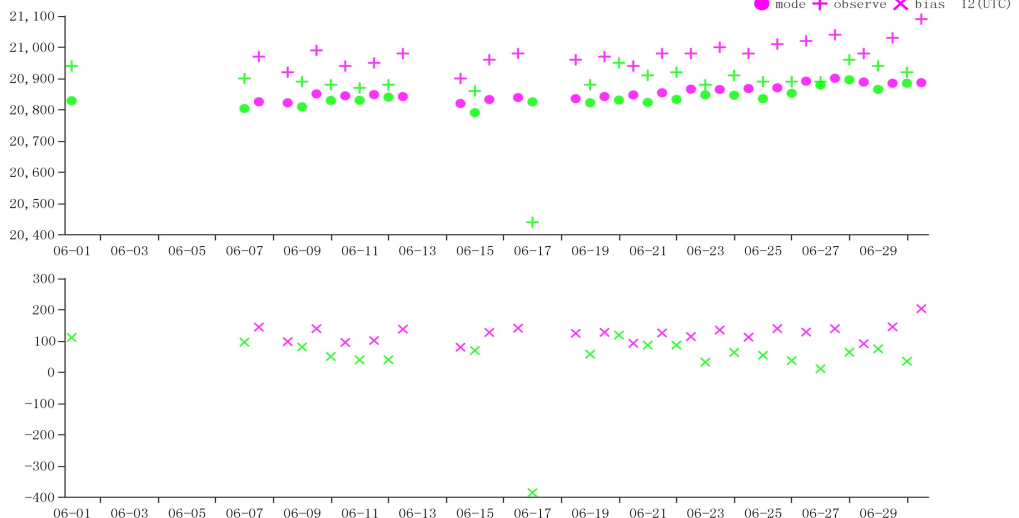


BIAS、SD and RMS of GPH for station 42339(OBS-TIME:12)

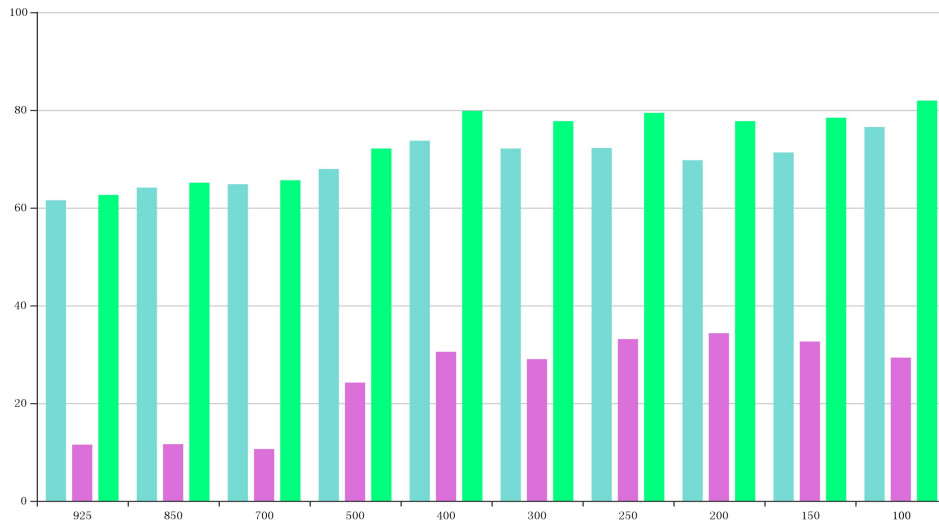
Time sequence diagram of Observation - Mode deviation

India - JODHPUR[42339] Jun, 2024

mode + observe X bias 00 (UTC)
mode + observe X bias 12 (UTC)

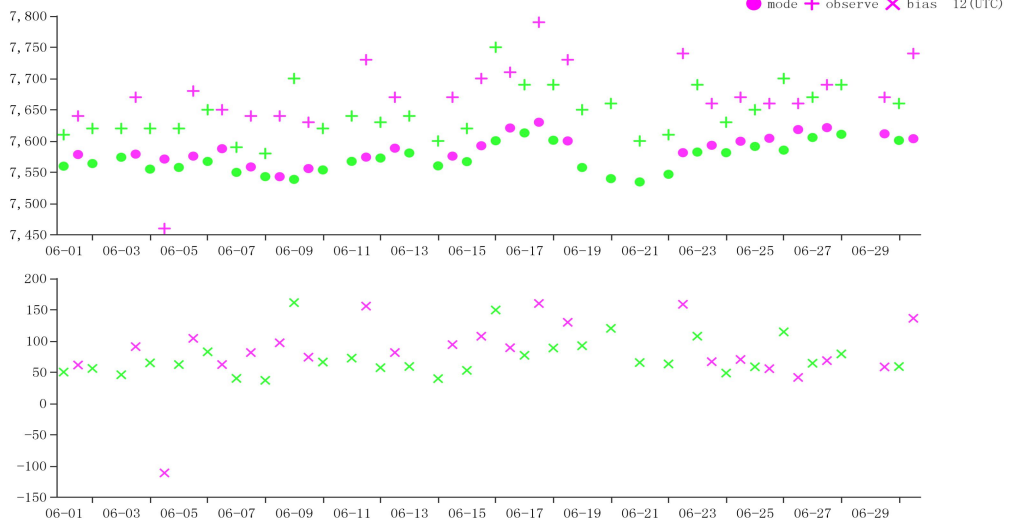


Time-series representation of GPH Obs minus first guess for station 42339(Level:50)

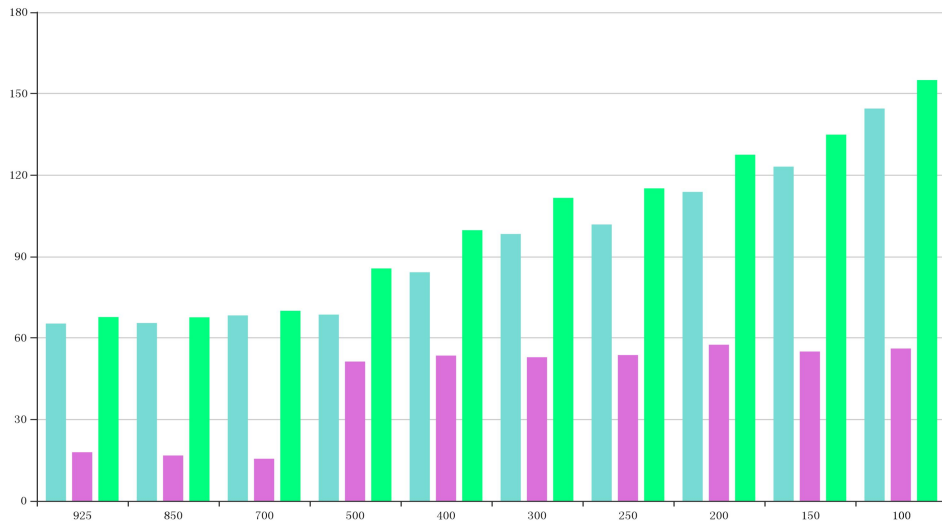


BIAS、SD and RMS of GPH for station 42348(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

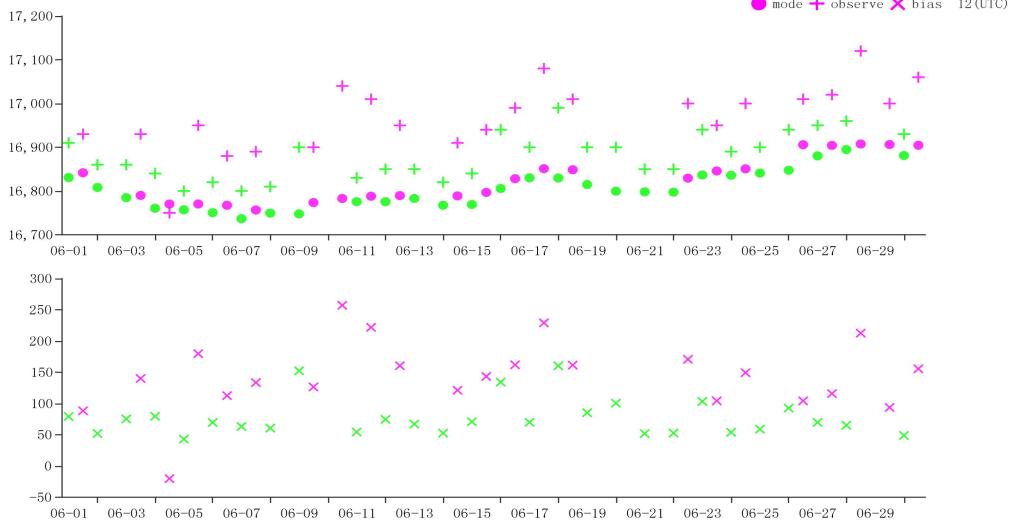


Time-series representation of GPH Obs minus first guess for station 42348(Level:400)

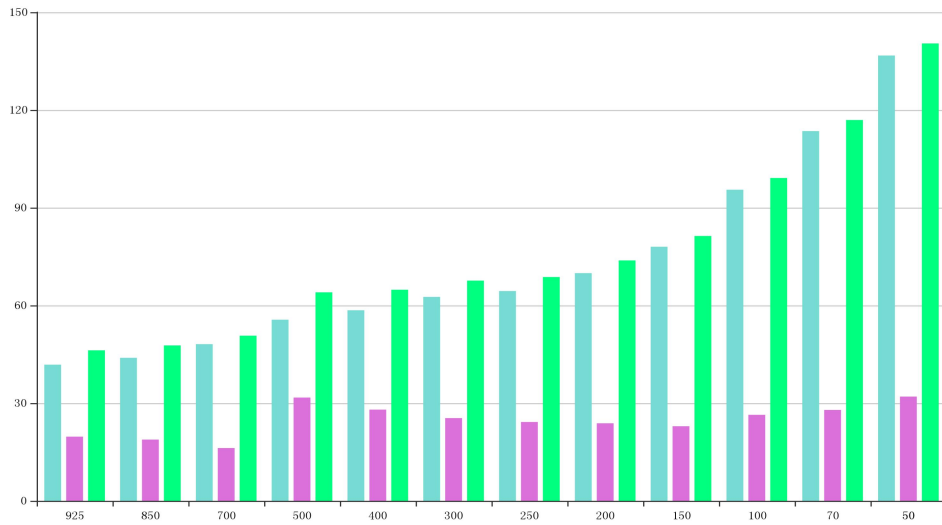


BIAS、SD and RMS of GPH for station 42348(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

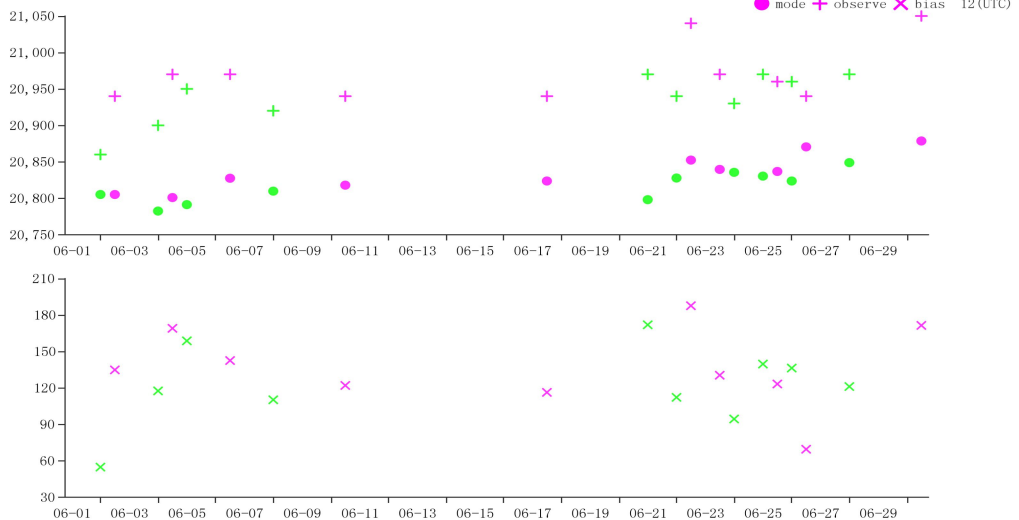


Time-series representation of GPH Obs minus first guess for station 42348(Level:100)

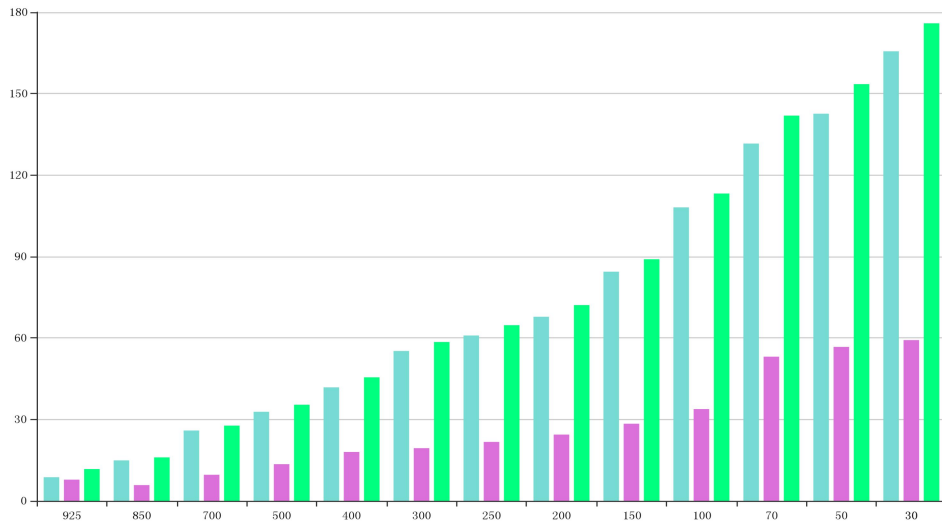


BIAS、SD and RMS of GPH for station 42724(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

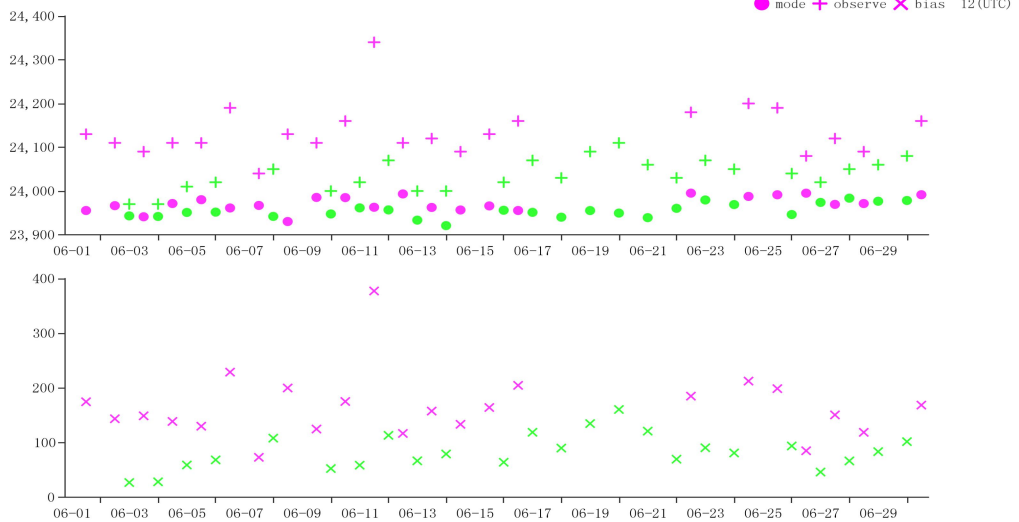


Time-series representation of GPH Obs minus first guess for station 42724(Level:50)

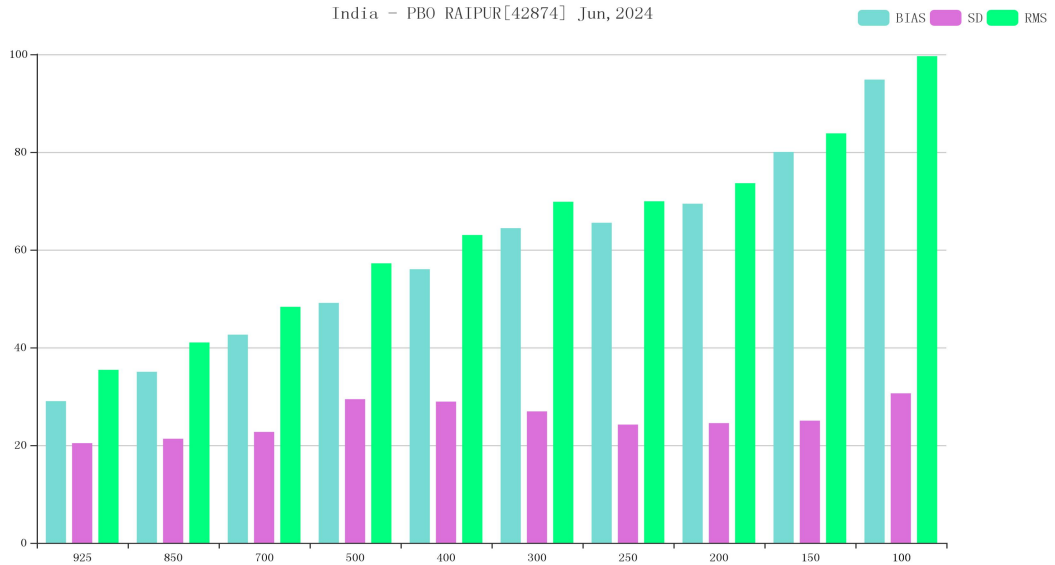


BIAS、SD and RMS of GPH for station 42867(OBS-TIME:12)

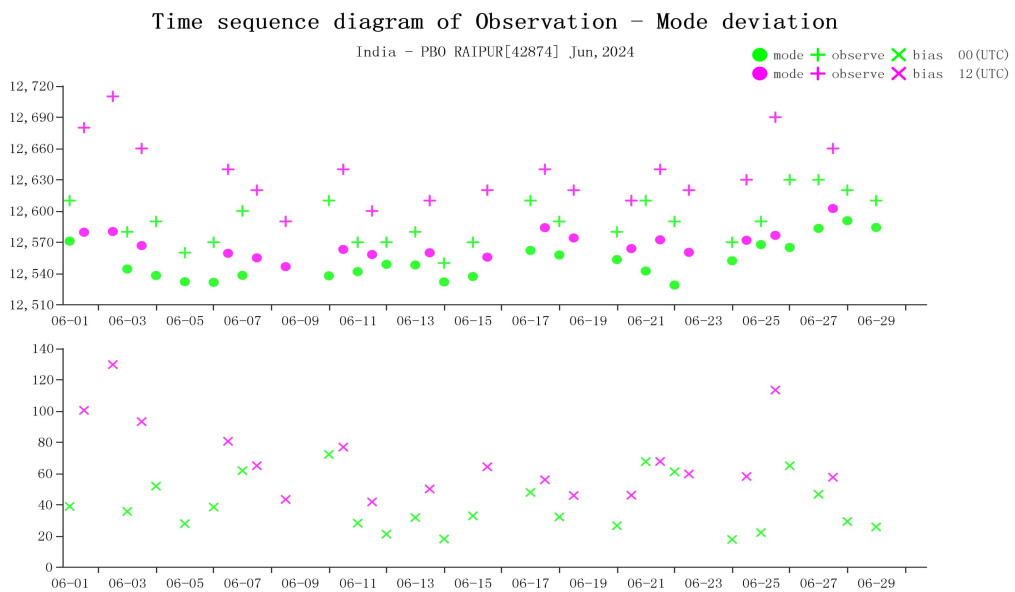
Time sequence diagram of Observation - Mode deviation



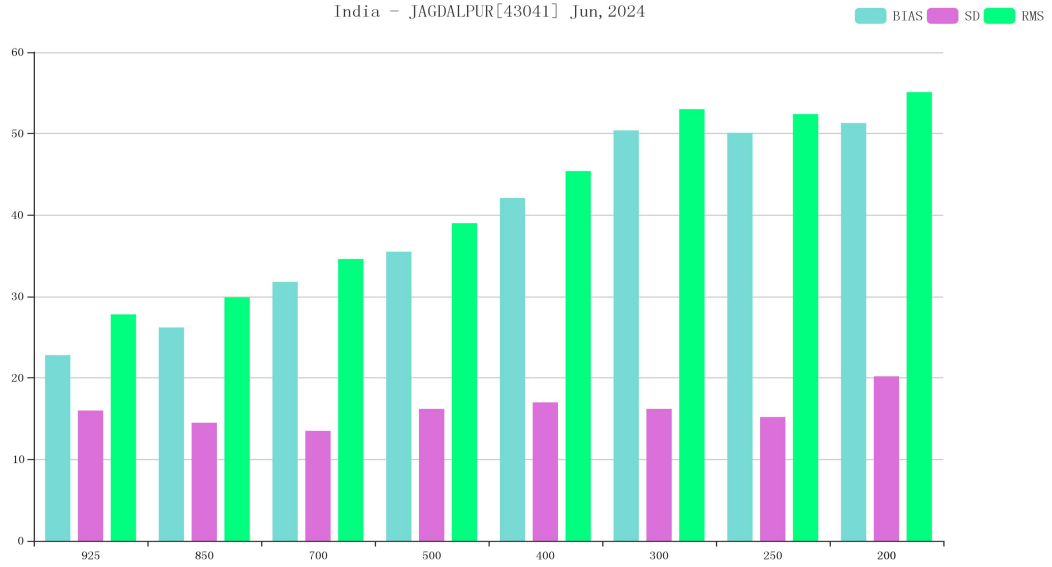
Time-series representation of GPH Obs minus first guess for station 42867(Level:30)



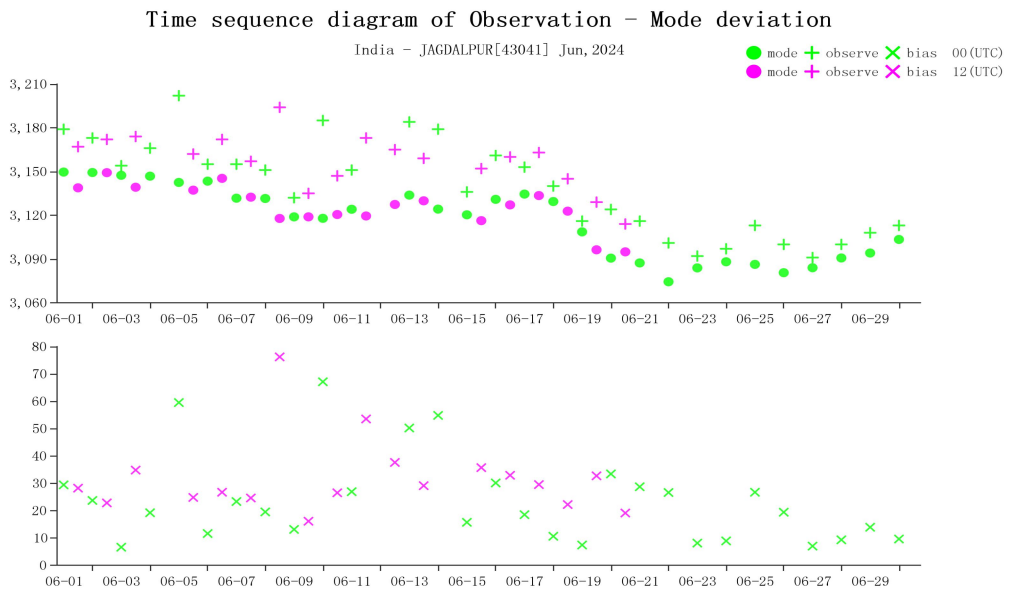
BIAS、SD and RMS of GPH for station 42874(OBS-TIME:12)



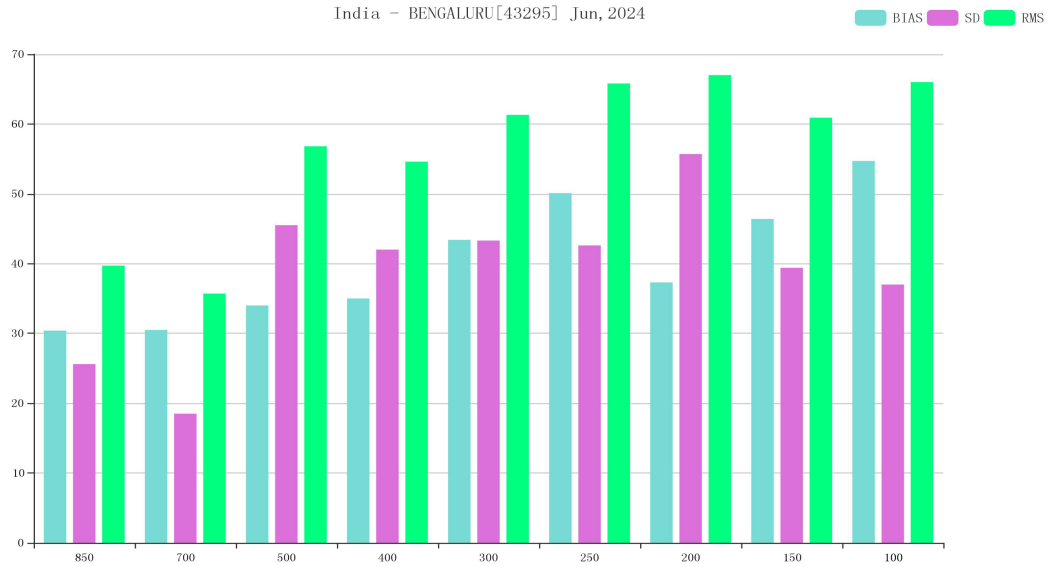
Time-series representation of GPH Obs minus first guess for station 42874(Level:200)



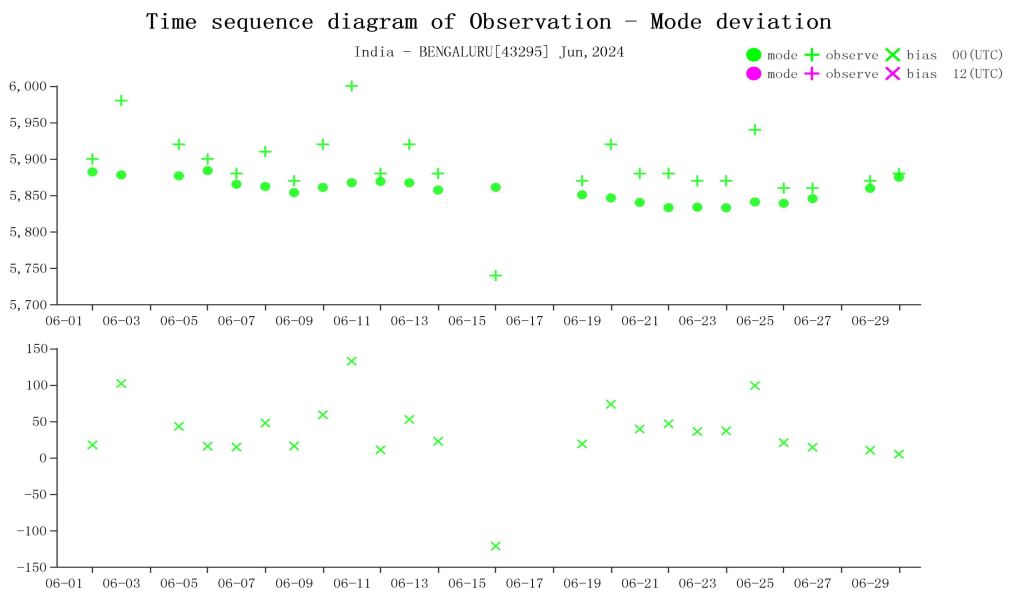
BIAS、SD and RMS of GPH for station 43041(OBS-TIME:12)



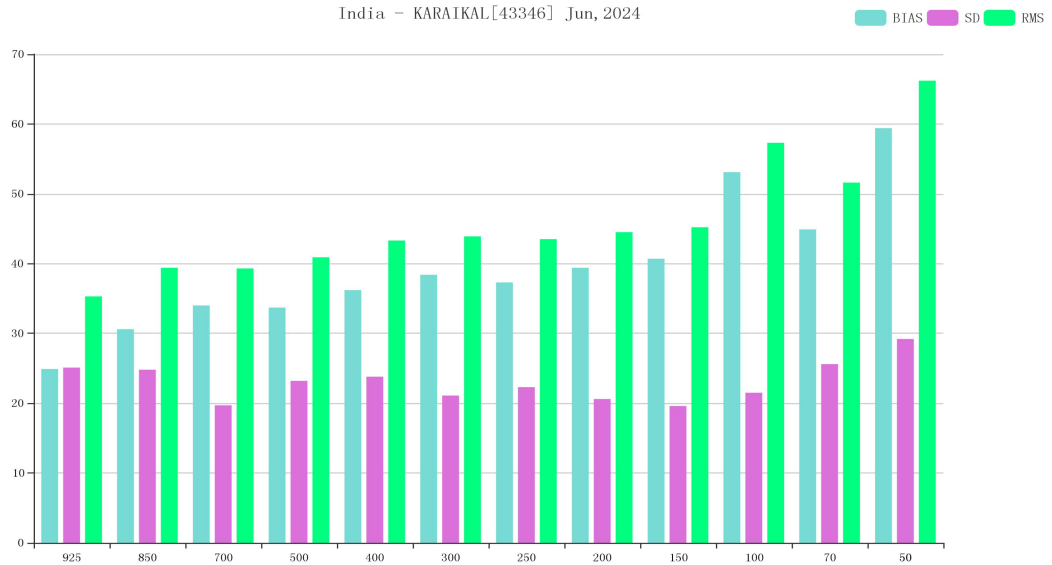
Time-series representation of GPH Obs minus first guess for station 43041(Level:700)



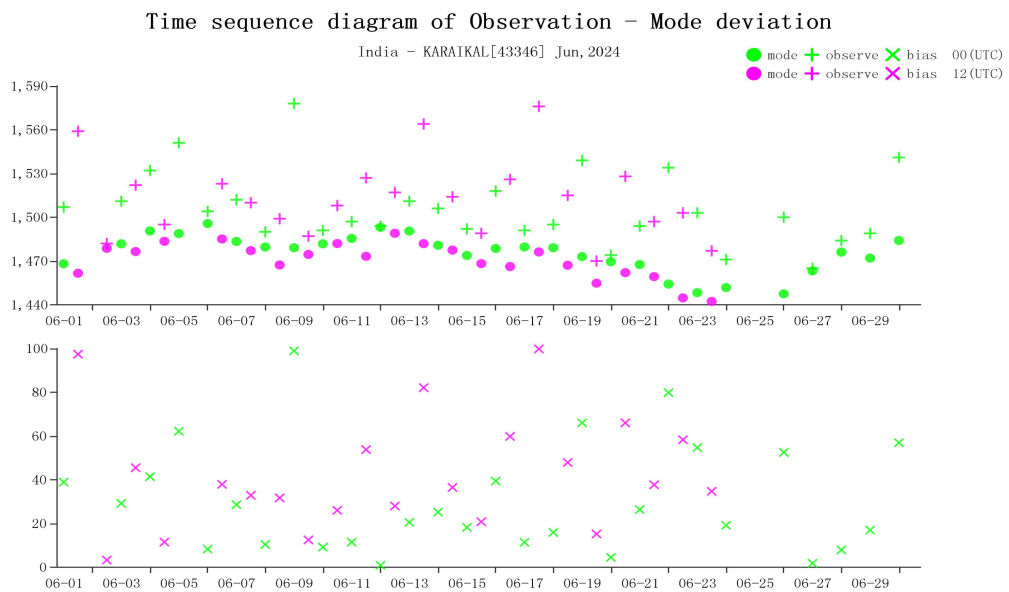
BIAS、SD and RMS of GPH for station 43295(OBS-TIME:00)



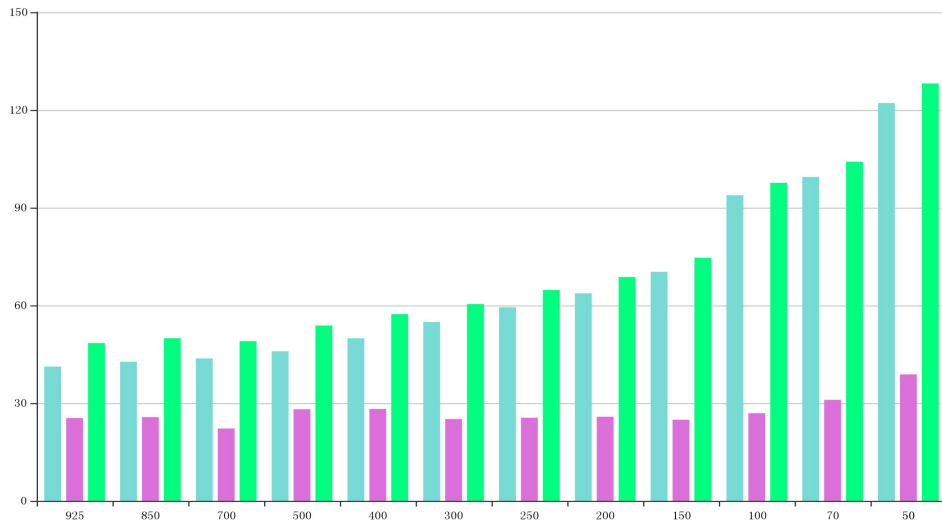
Time-series representation of GPH Obs minus first guess for station 43295(Level:500)



BIAS、SD and RMS of GPH for station 43346(OBS-TIME:00)

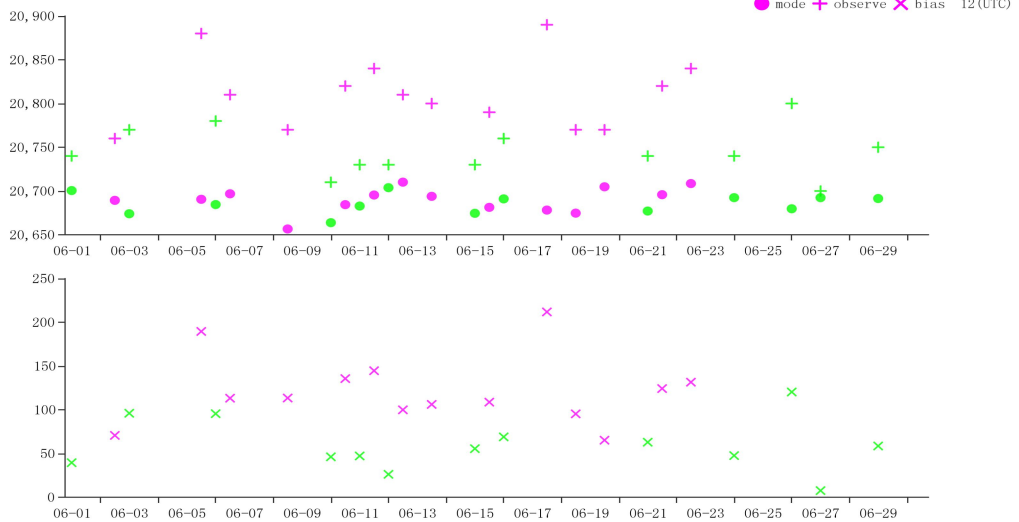


Time-series representation of GPH Obs minus first guess for station 43346(Level:850)

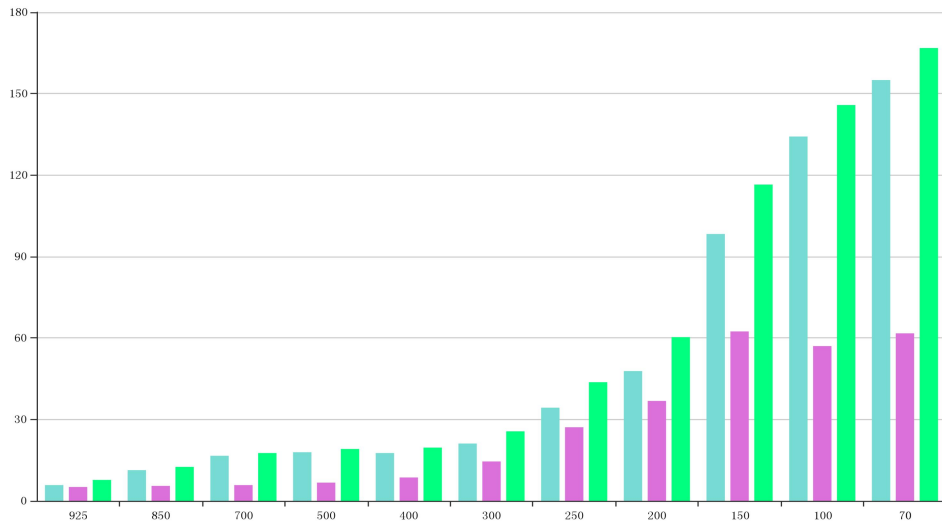


BIAS、SD and RMS of GPH for station 43346(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

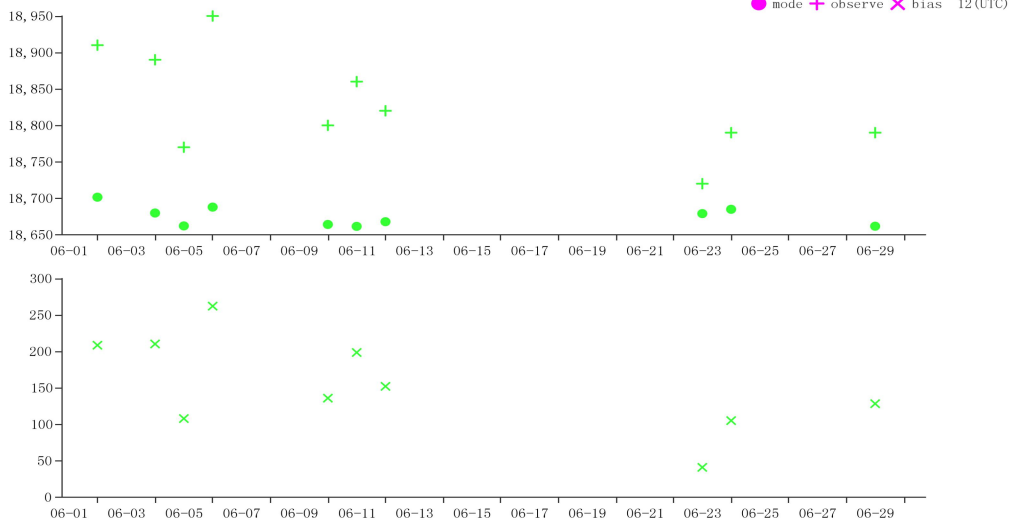


Time-series representation of GPH Obs minus first guess for station 43346(Level:50)

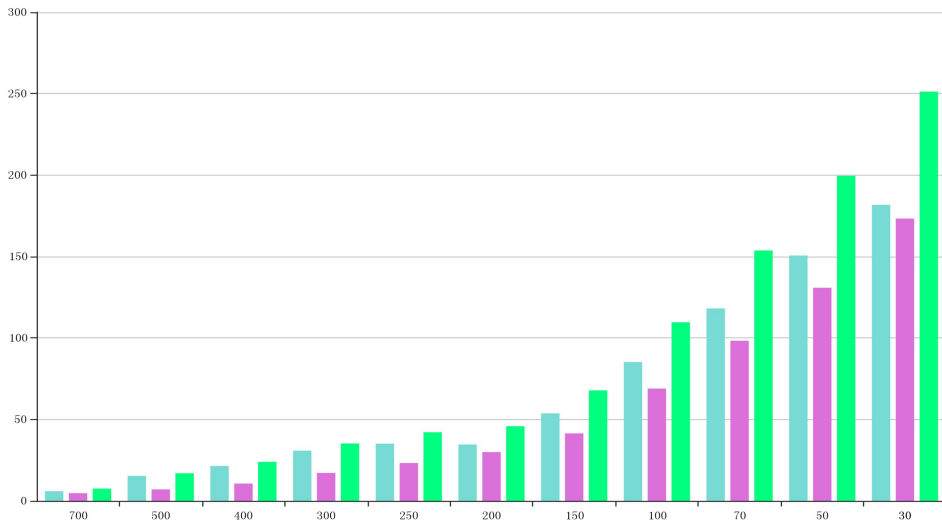


BIAS、SD and RMS of GPH for station 43369(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

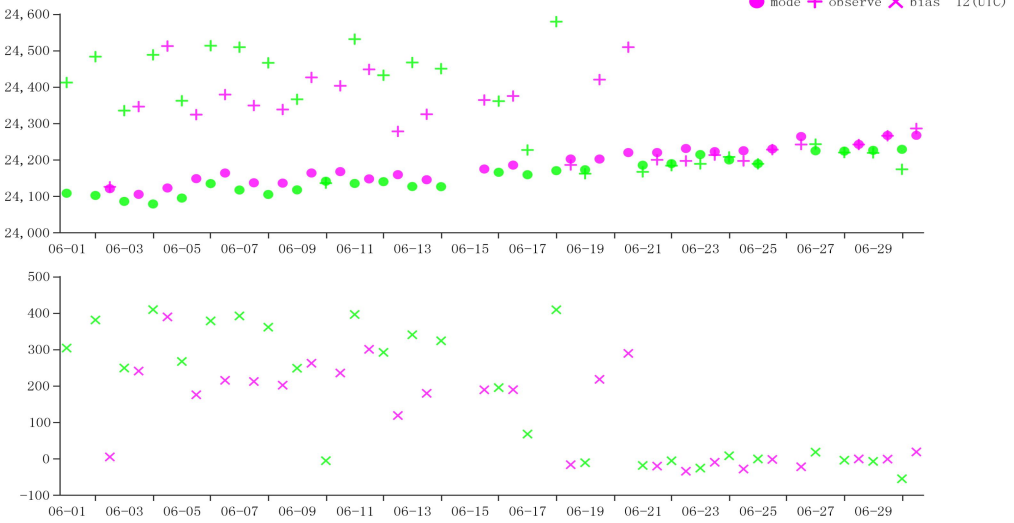


Time-series representation of GPH Obs minus first guess for station 43369(Level:70)



BIAS、SD and RMS of GPH for station 52533(OBS-TIME:00)

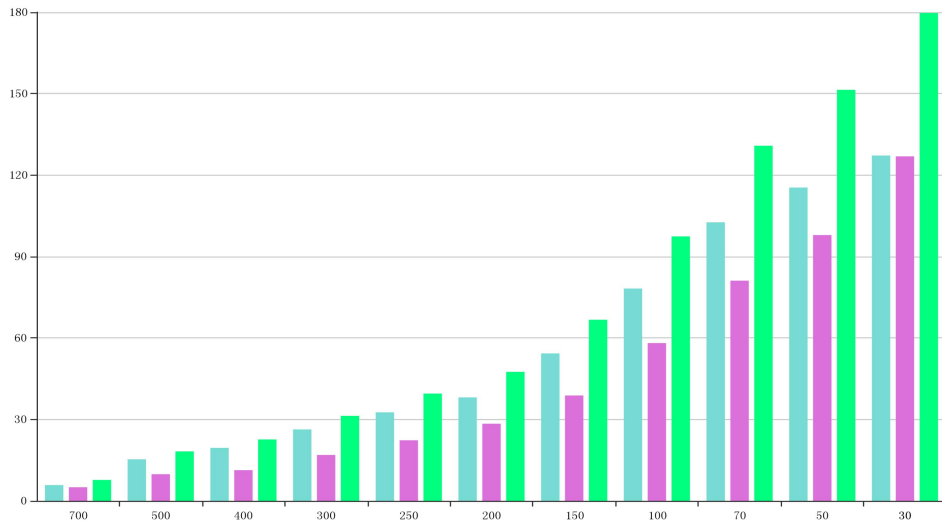
Time sequence diagram of Observation - Mode deviation



Time-series representation of GPH Obs minus first guess for station 52533(Level:30)

China - JIUQUAN[52533] Jun, 2024

BIAS SD RMS

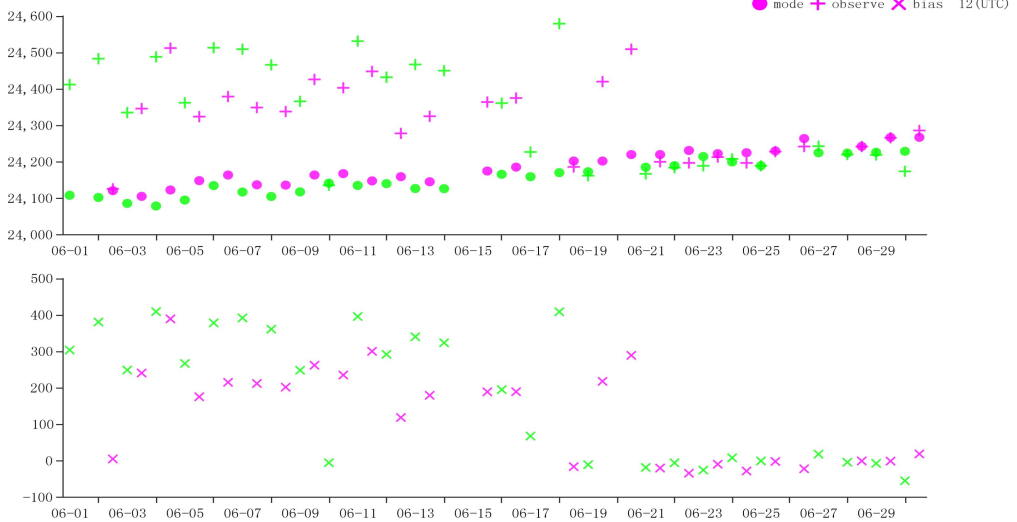


BIAS、SD and RMS of GPH for station 52533(OBS-TIME:12)

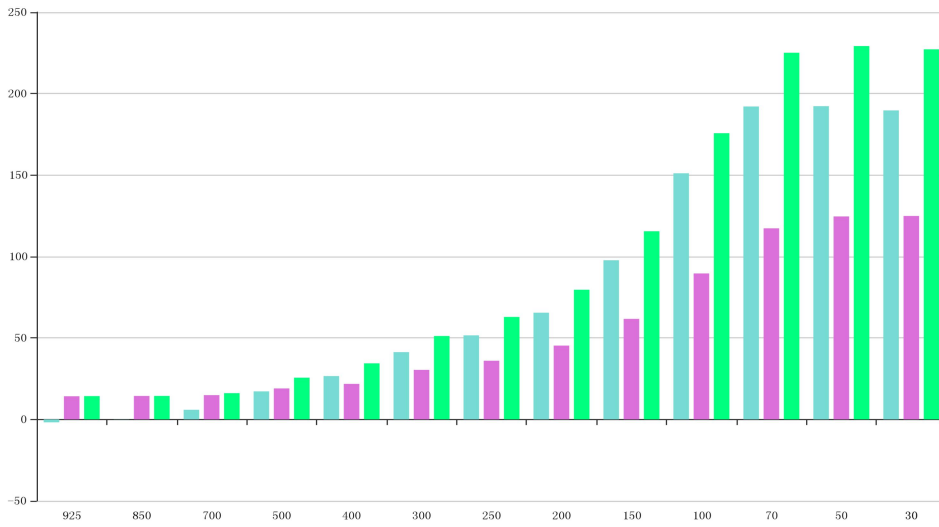
Time sequence diagram of Observation - Mode deviation

China - JIUQUAN[52533] Jun, 2024

mode + observe X bias 00 (UTC)
mode + observe X bias 12 (UTC)

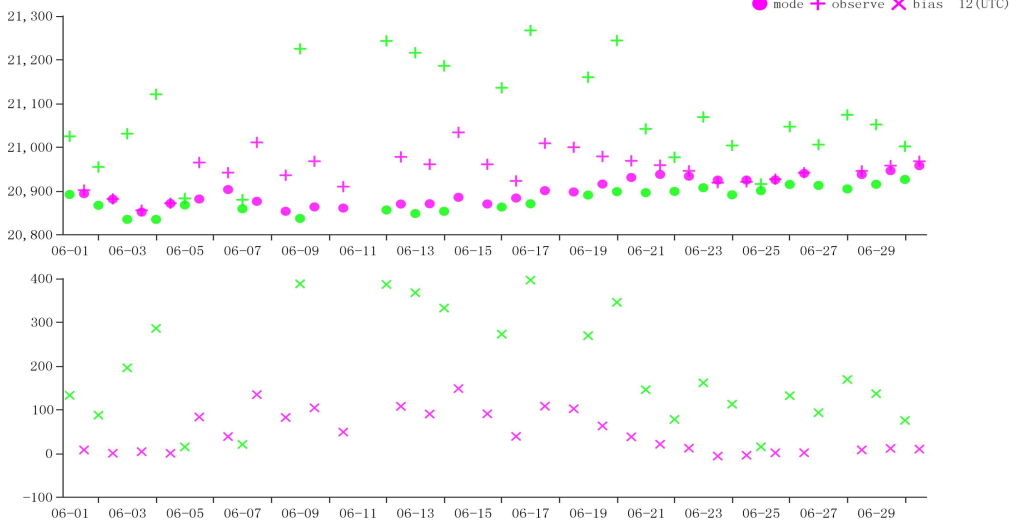


Time-series representation of GPH Obs minus first guess for station 52533(Level:30)



BIAS、SD and RMS of GPH for station 57083(OBS-TIME:00)

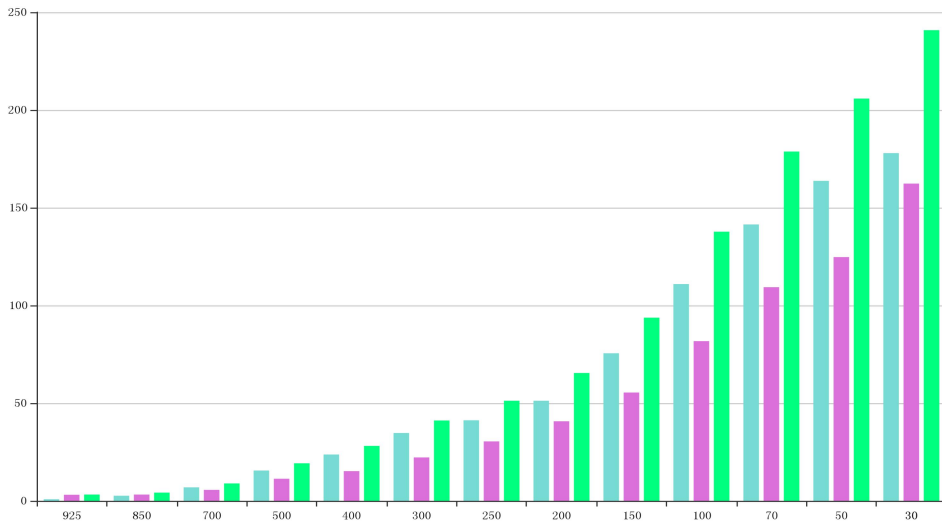
Time sequence diagram of Observation - Mode deviation



Time-series representation of GPH Obs minus first guess for station 57083(Level:50)

China - XUZHOU[58027] Jun, 2024

BIAS SD RMS

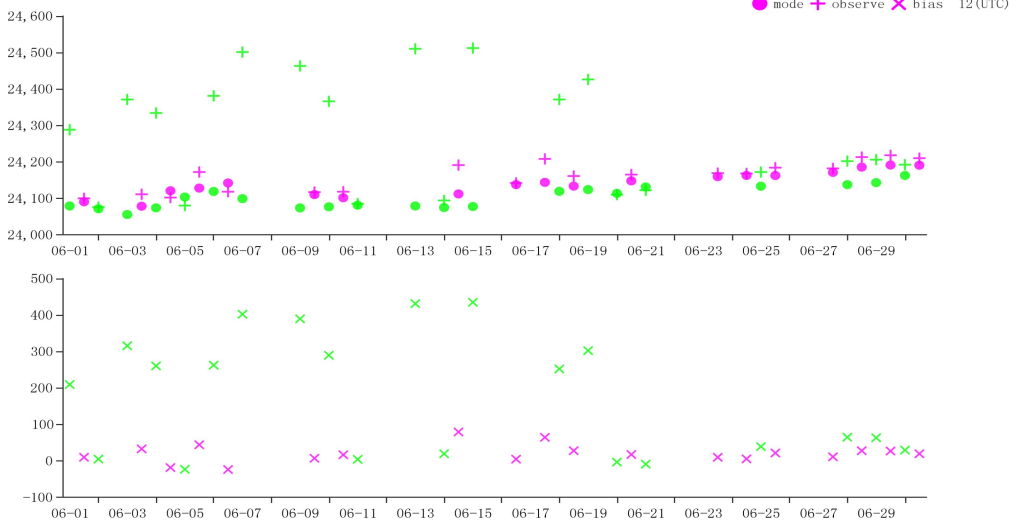


BIAS、SD and RMS of GPH for station 58027(OBS-TIME:00)

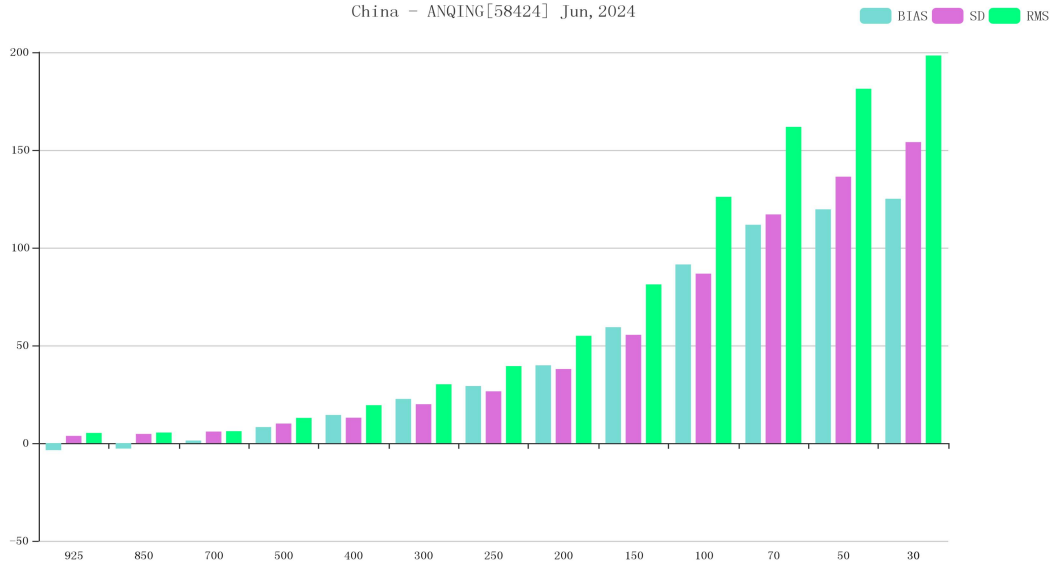
Time sequence diagram of Observation - Mode deviation

China - XUZHOU[58027] Jun, 2024

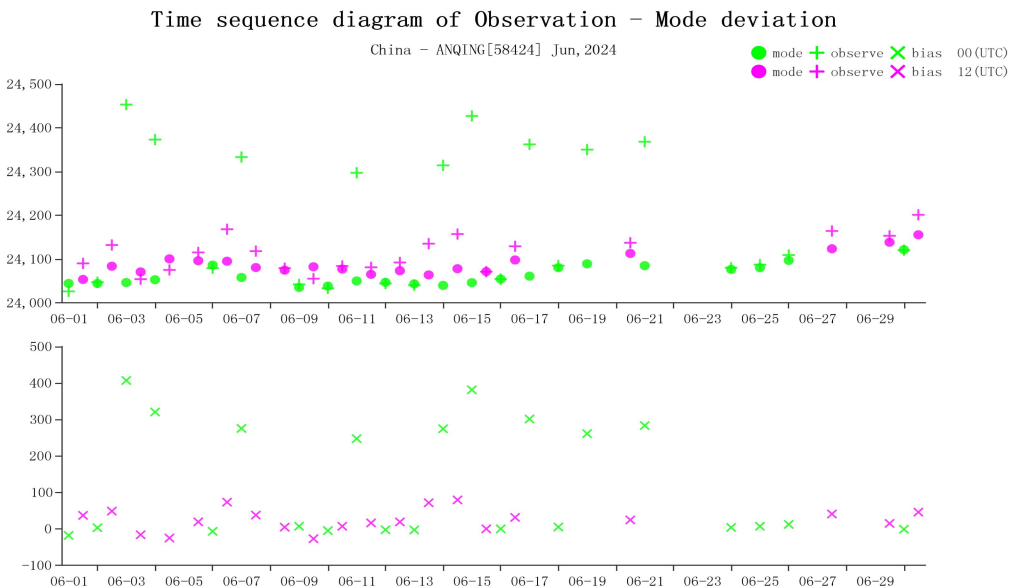
mode + observe x bias 00 (UTC)
mode + observe x bias 12 (UTC)



Time-series representation of GPH Obs minus first guess for station 58027(Level:30)



BIAS、SD and RMS of GPH for station 58424(OBS-TIME:00)



Time-series representation of GPH Obs minus first guess for station 58424(Level:30)

3.3 Vector Wind (WIN_S)

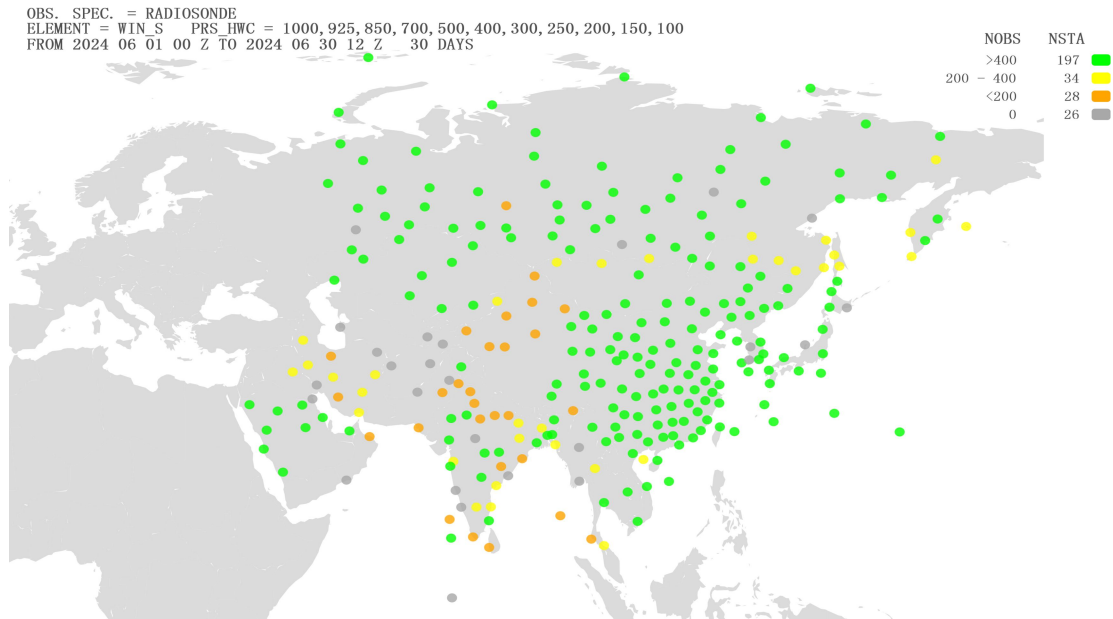
3.3.1 List of Suspect Stations

Table 3 List of WIN_S suspected in June 2024

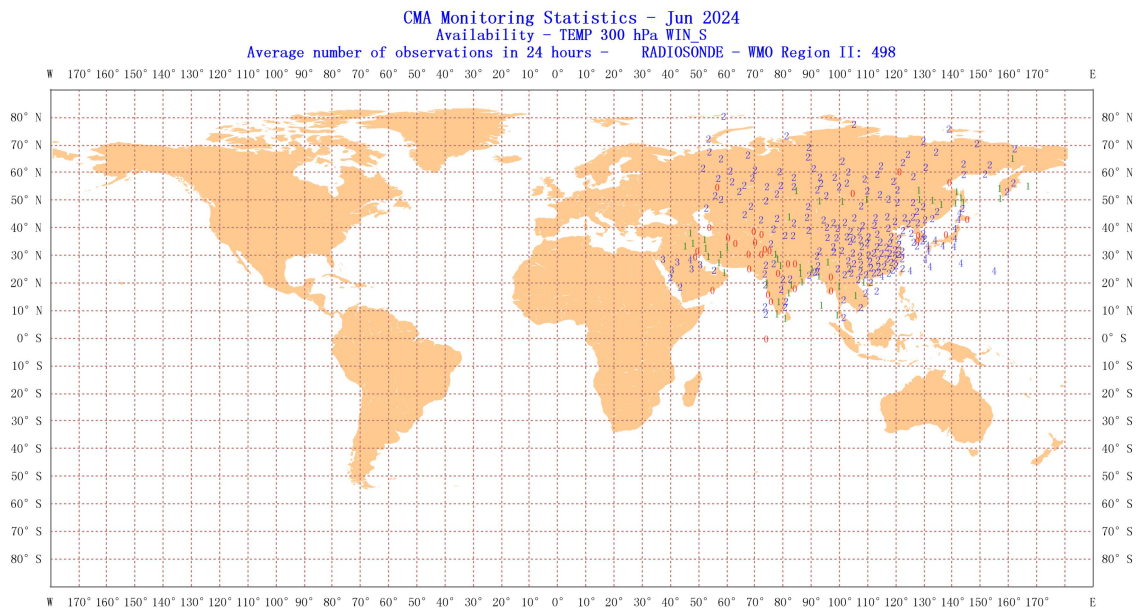
LINE	WMO	COUNTRY	OBS	LEVEL	NUM	NUM	REJ	BIAS	SD	RMS
NUM	IDENT		TIME		OBS	GRS	(%)			

1	38341	Kazakhstan	12	400	16	1	0	8.4	15.4	17.5
2	44373	Mongolia	12	400	27	0	0	5.6	14.1	15.1

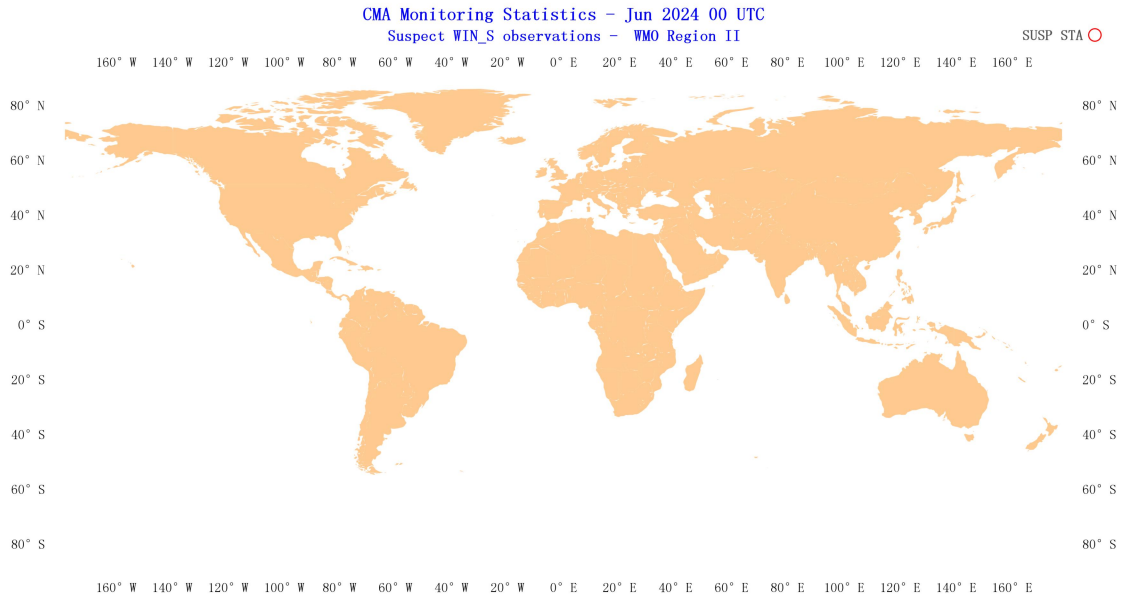
3.3.2 Suspect Station Analysis



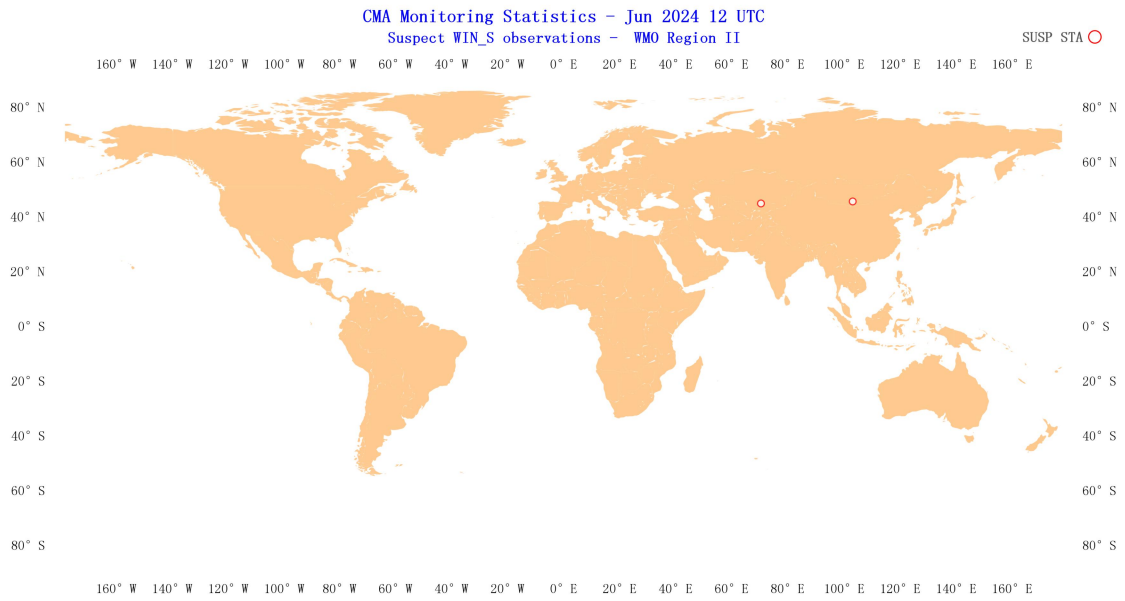
Location of all radiosonde stations reporting vector wind observations in Region II over the month of June 2024. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers to NOBS is higher than 400, color yellow refers to NOBS is between 200 and 400(including 400), color orange refers to NOBS is between 0 and 200(including 200), and color gray refers to NOBS is 0.



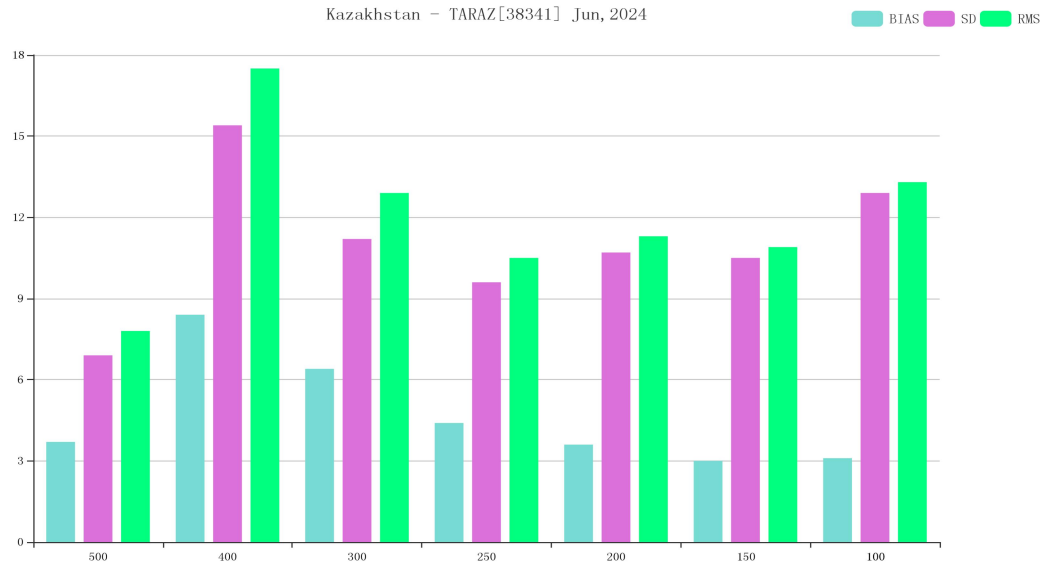
Location of all radiosonde stations reporting vector wind average number of observations in 24 hours in Region II over the month of June 2024.



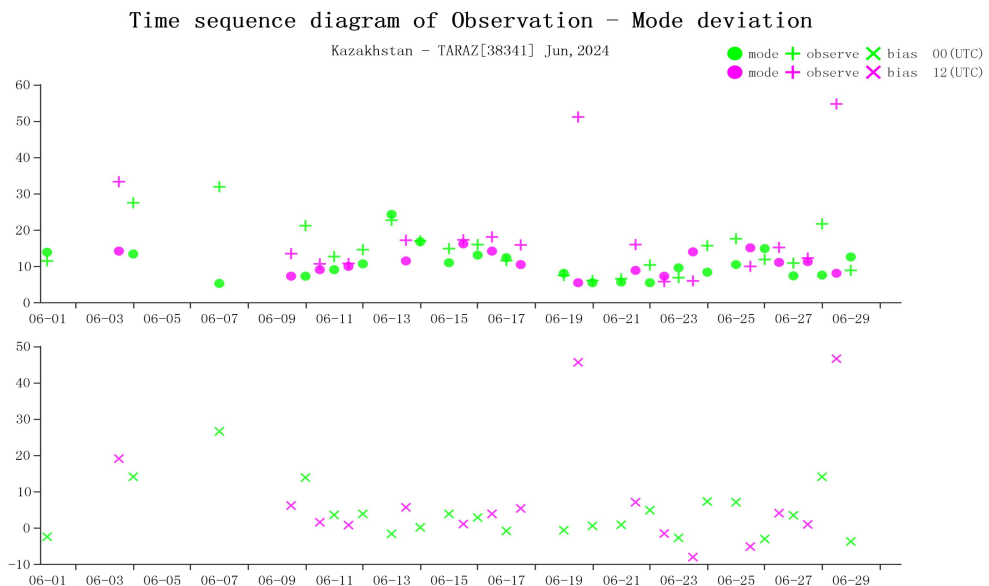
Distribution of suspect stations - Vector Wind 00 UTC



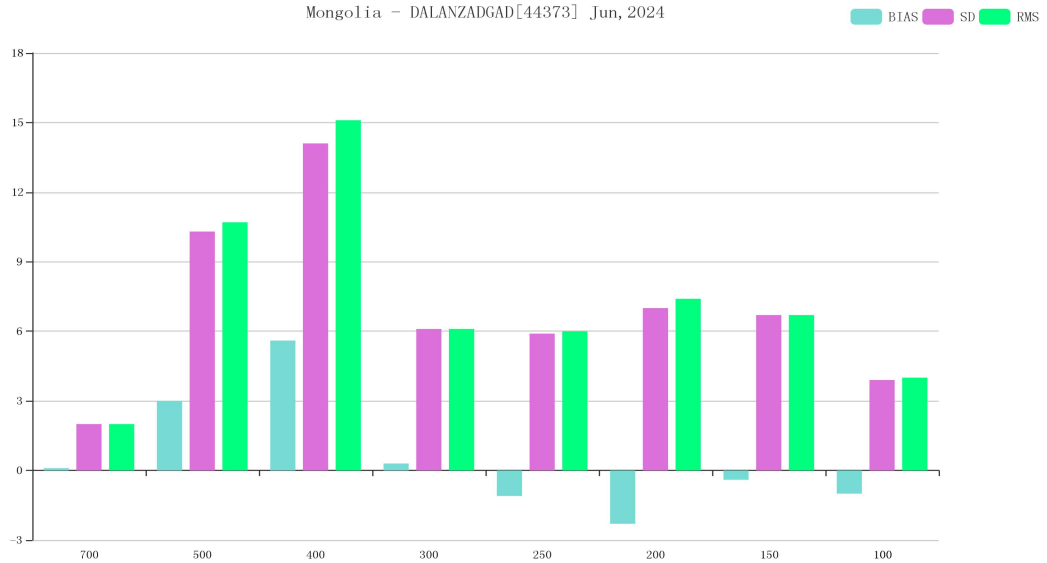
Distribution of suspect stations - Vector Wind 12 UTC



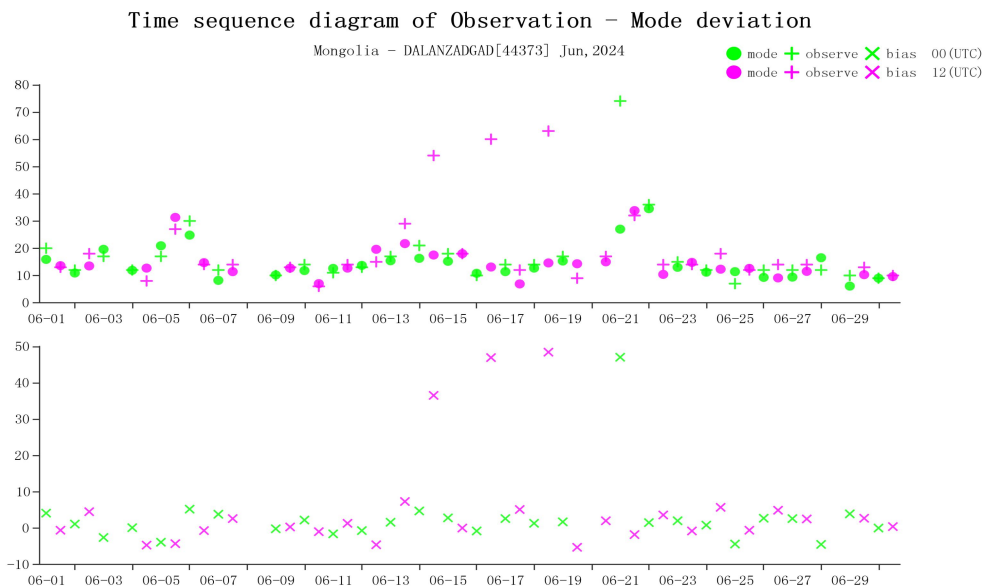
BIAS、SD and RMS of WIN_S for station 38341(OBS-TIME:12)



Time-series representation of WIN_S Obs minus first guess for station 38341(Level:400)



BIAS、SD and RMS of WIN_S for station 44373(OBS-TIME:12)



Time-series representation of WIN_S Obs minus first guess for station 44373(Level:400)

3.4 Wind Direction (WIN_D)

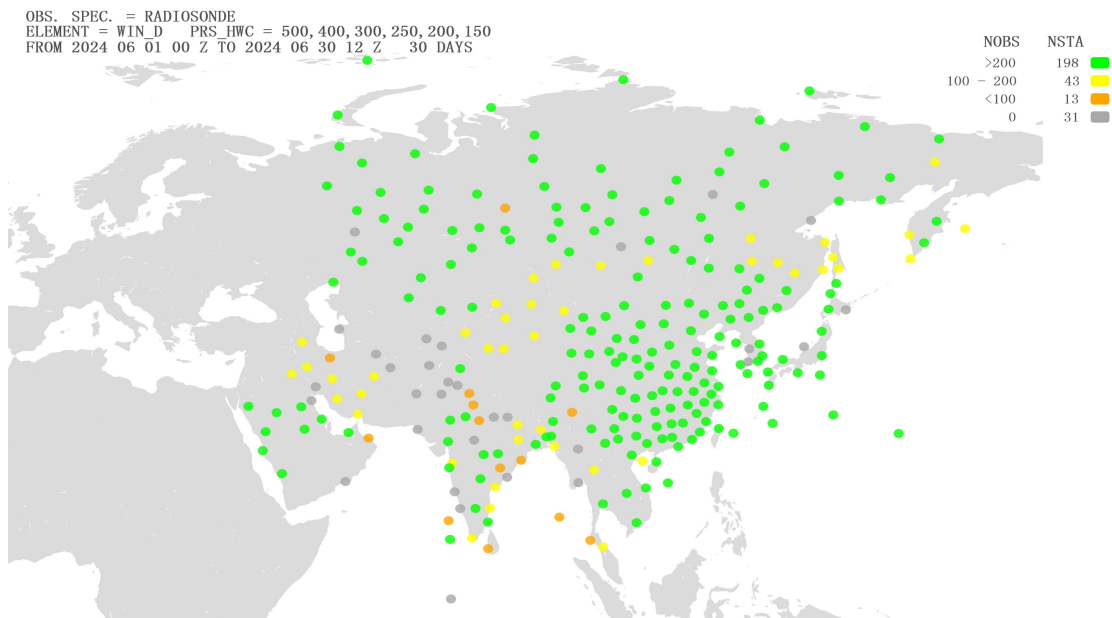
3.4.1 List of Suspect Stations

Table 4 List of WIN_D suspected in June 2024

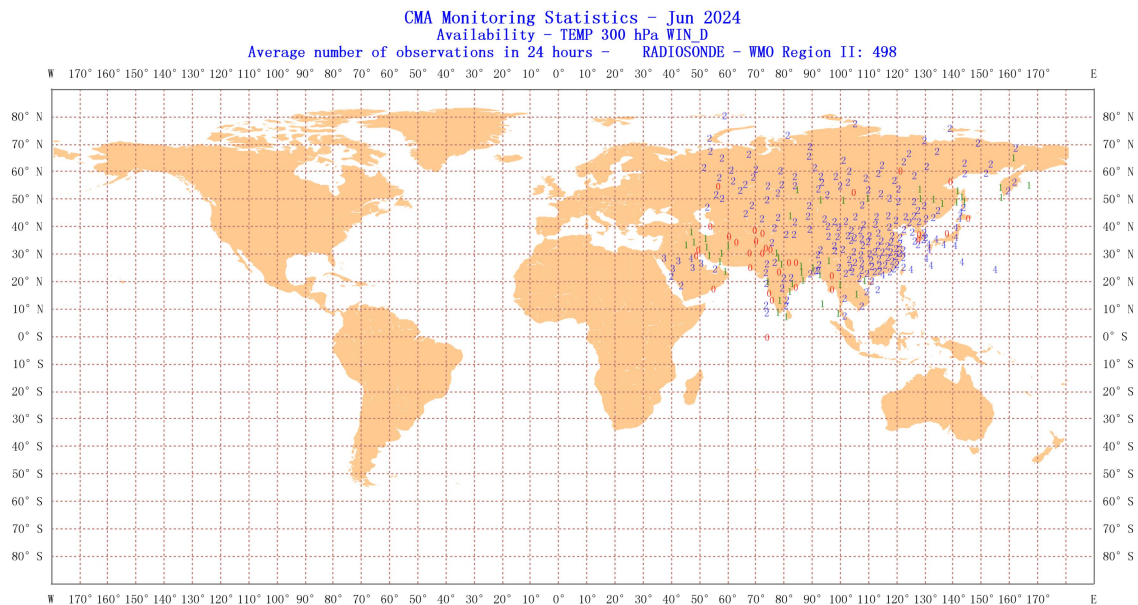
LINE NUM	WMO IDENT	COUNTRY	OBS TIME	NUM OBS	BIAS	SD	MAX SPREAD

1	38341	Kazakhstan	00	19	11.8	18.3	6.5
2	38341	Kazakhstan	12	16	15.1	17.3	4.7
3	42314	India	00	13	11.7	15.7	4.4
4	54340	China	00	30	13.2	9.5	2.9
5	54340	China	12	29	14.5	10.1	6
6	57816	China	00	21	11.4	15.5	5.5

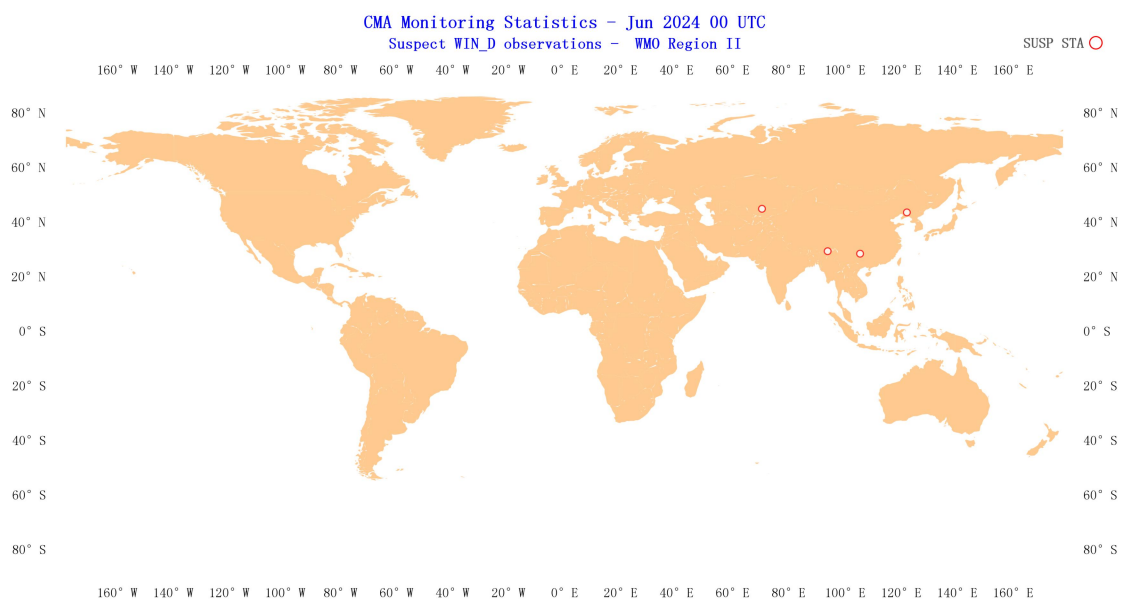
3.4.2 Suspect Station Analysis



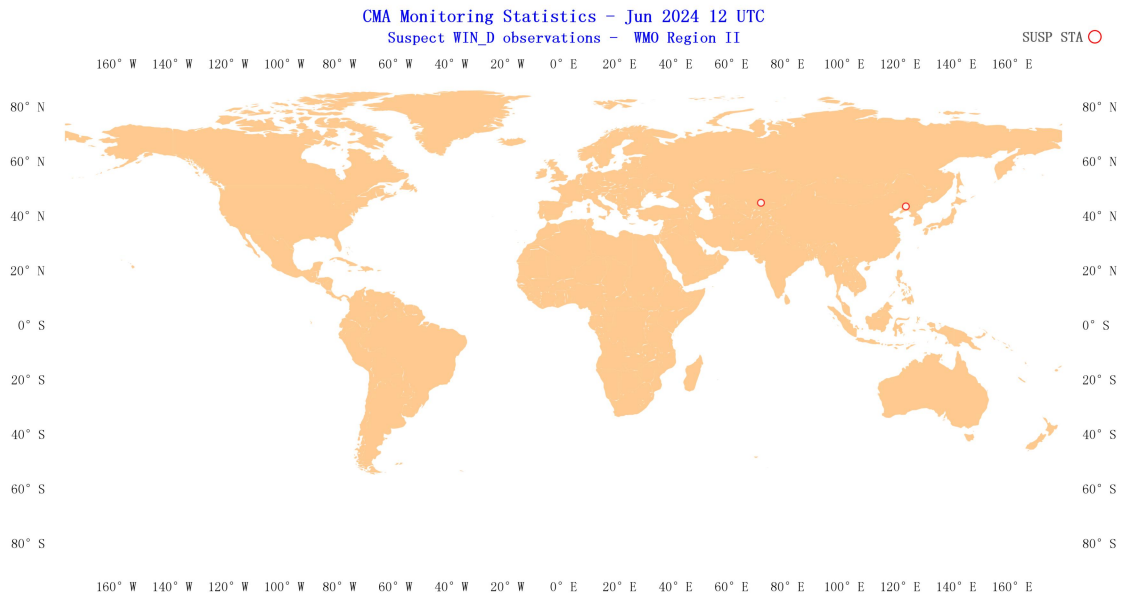
Location of all radiosonde stations reporting wind direction observations in Region II over the month of June 2024. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers to NOBS is higher than 200, color yellow refers to NOBS is between 100 and 200(including 200), color orange refers to NOBS is between 0 and 100(including 100), and color gray refers to NOBS is 0.



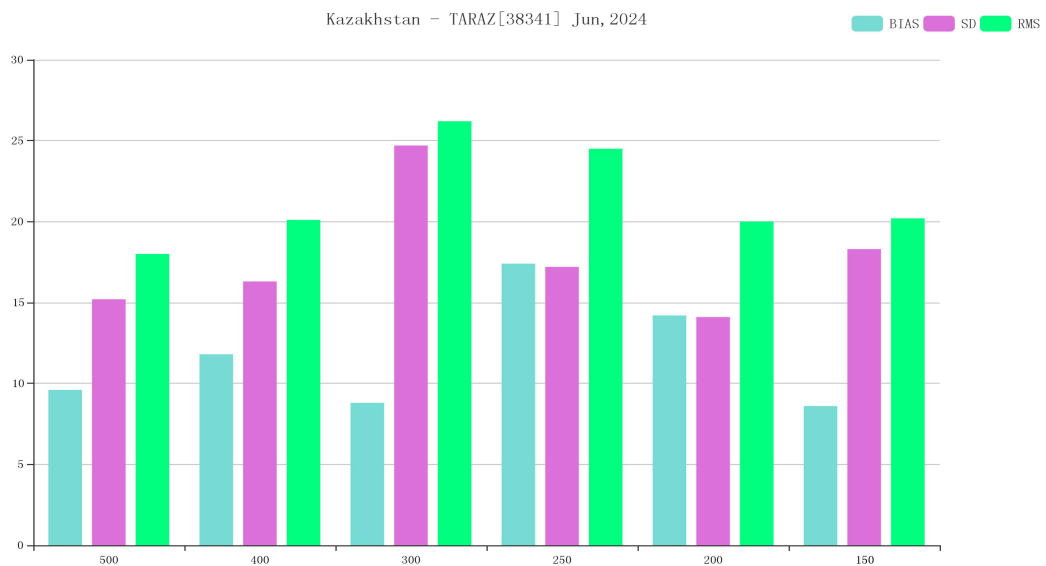
Location of all radiosonde stations reporting wind direction average number of observations in 24 hours in Region II over the month of June 2024.



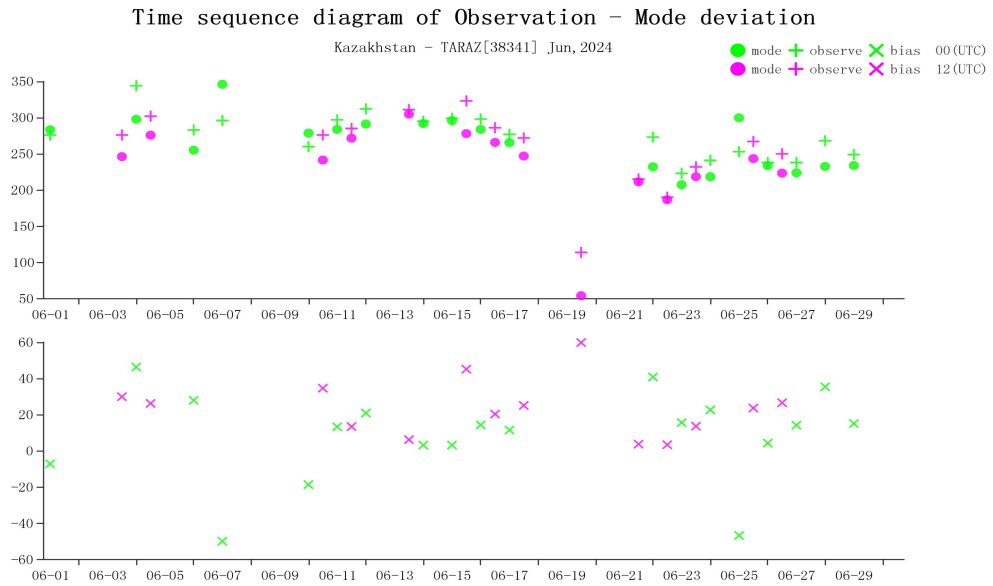
Distribution of suspect stations - Wind Direction 00 UTC



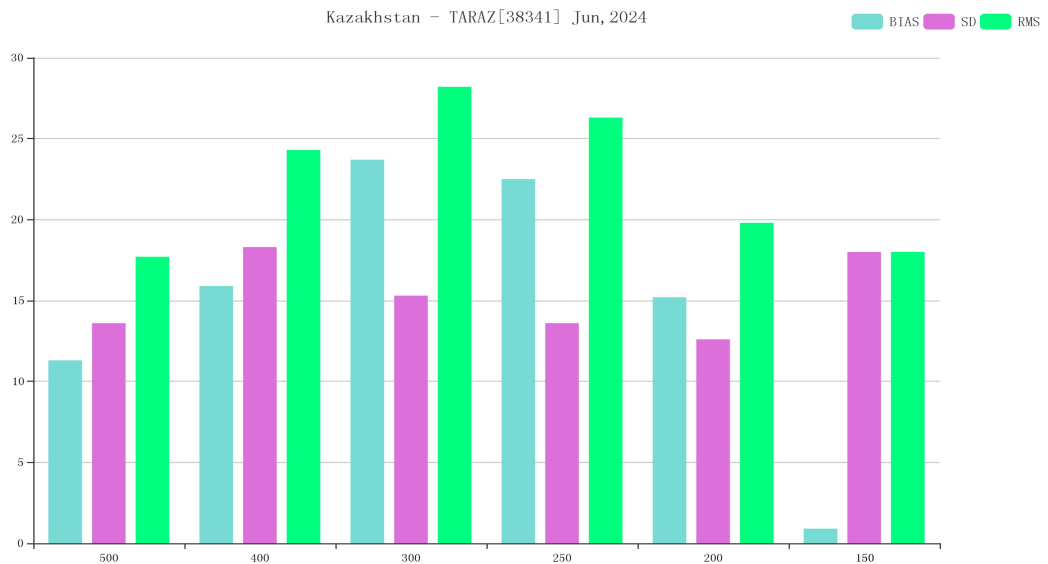
Distribution of suspect stations - Wind Direction 12 UTC



BIAS、SD and RMS of WIN_D for station 38341(OBS-TIME:00)

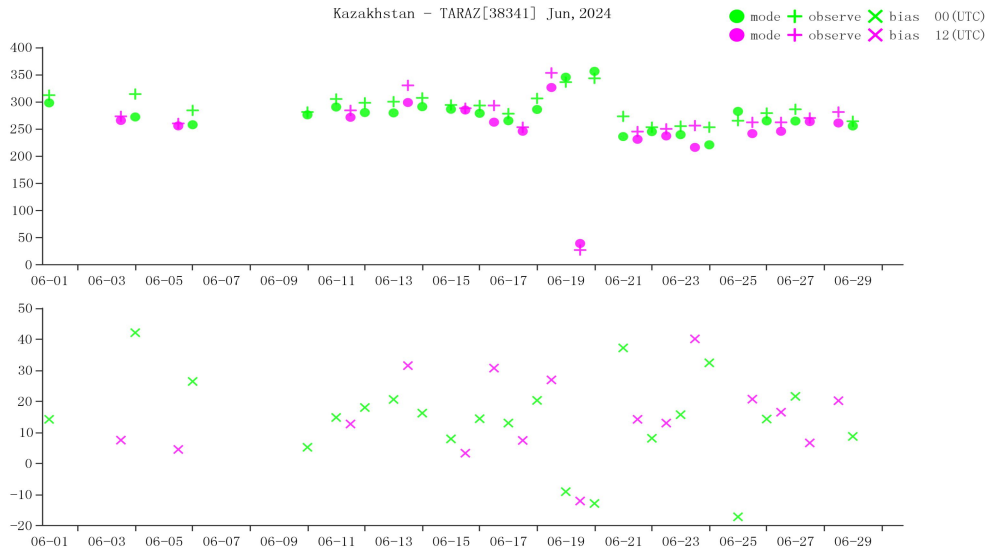


Time-series representation of WIN_D Obs minus first guess for station 38341(Level:300)

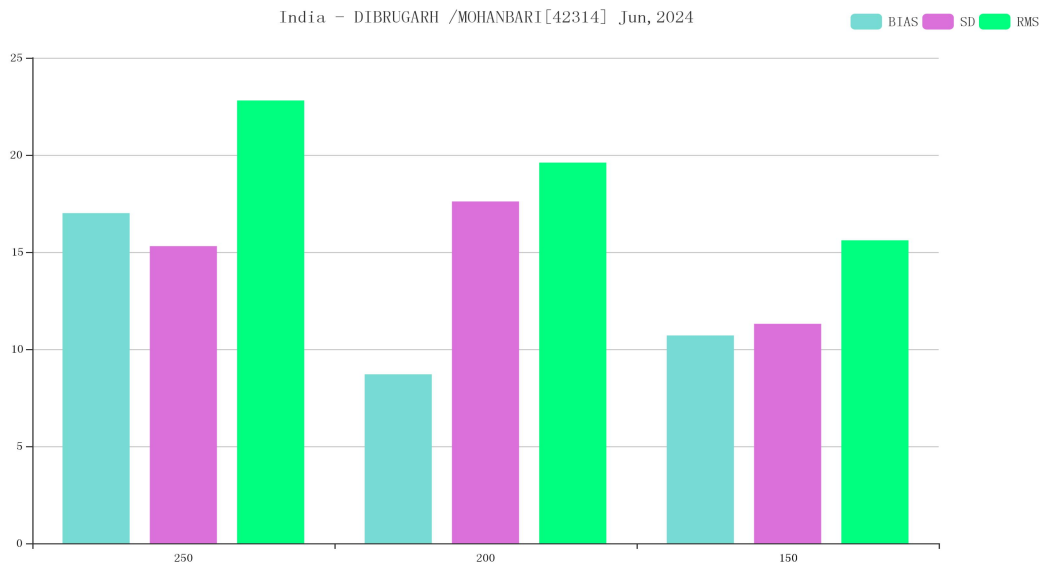


BIAS、SD and RMS of WIN_D for station 38341(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

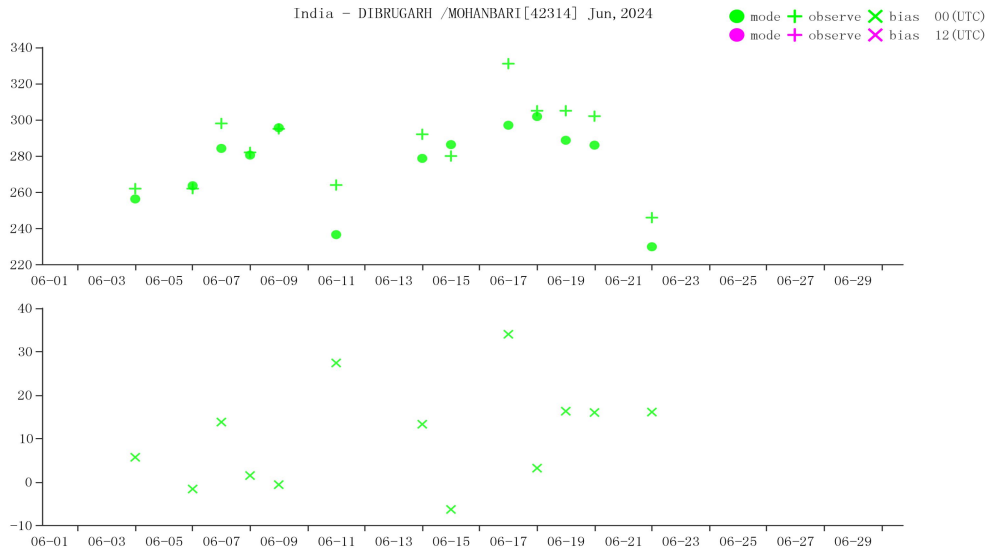


Time-series representation of WIN_D Obs minus first guess for station 38341(Level:200)

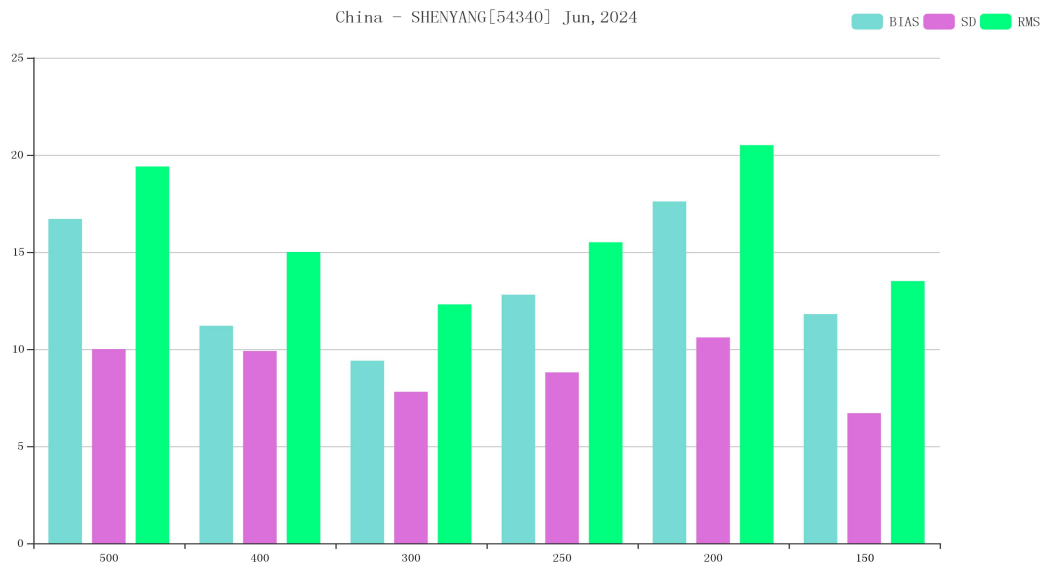


BIAS、SD and RMS of WIN_D for station 42314(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

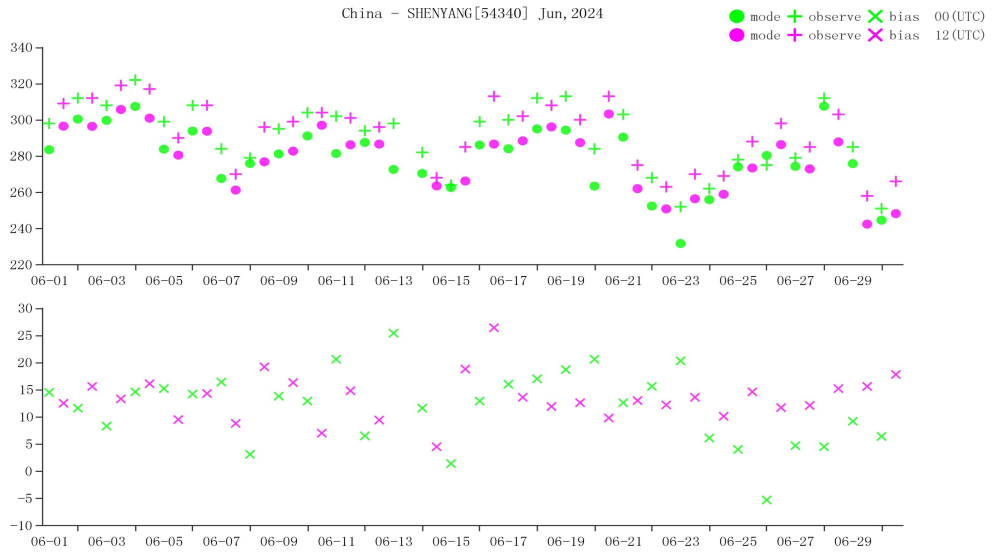


Time-series representation of WIN_D Obs minus first guess for station 42314(Level:150)

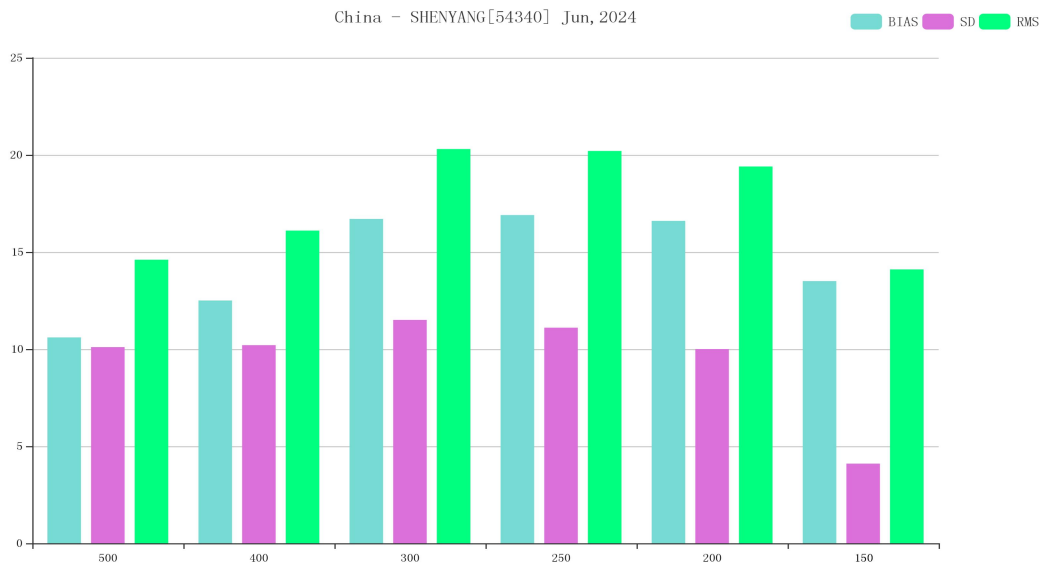


BIAS、SD and RMS of WIN_D for station 54340(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

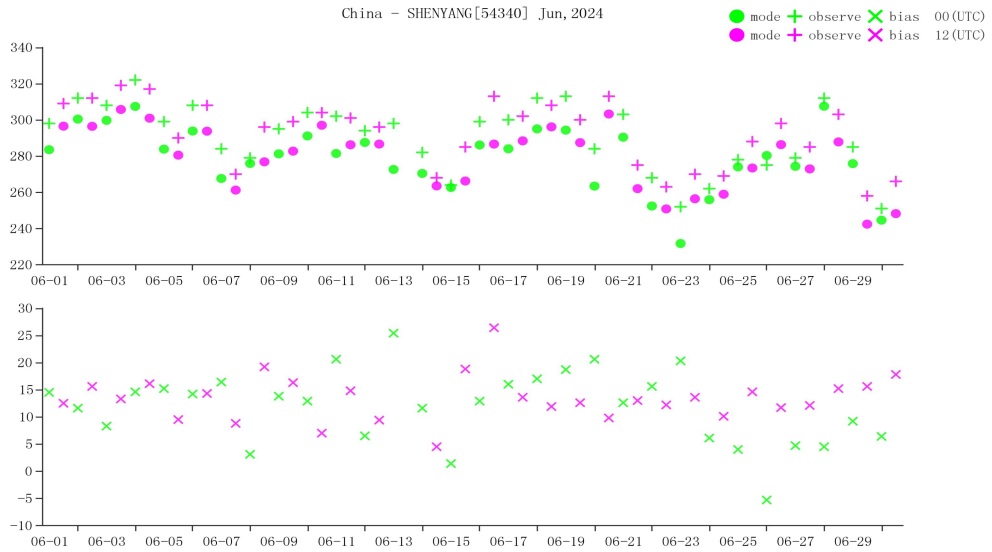


Time-series representation of WIN_D Obs minus first guess for station 54340(Level:150)

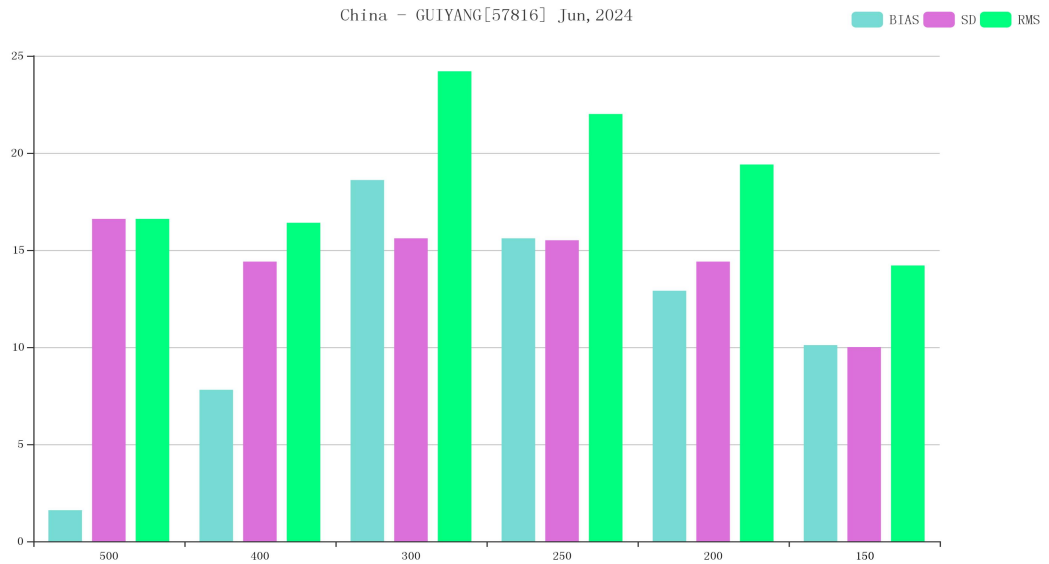


BIAS、SD and RMS of WIN_D for station 54340(OBS-TIME:12)

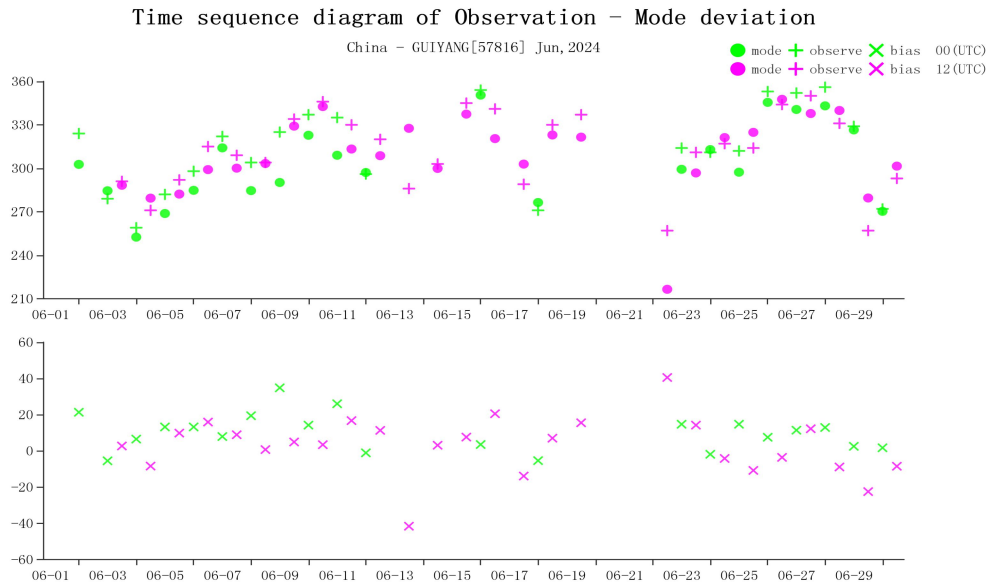
Time sequence diagram of Observation - Mode deviation



Time-series representation of WIN_D Obs minus first guess for station 54340(Level:150)



BIAS、SD and RMS of WIN_D for station 57816(OBS-TIME:00)



Time-series representation of WIN_D Obs minus first guess for station 57816(Level:150)

4. Comparison with Other Results

Element	CMA				JMA				EC			
	Country	Station	Level	Time	Country	Station	Level	Time	Country	Station	Level	Time
Geopotential Height	Kazakhstan	36003	200	00	Kazakhstan	38341	250	00	Kazakhstan	38341	150	12
	Kazakhstan	38341	100	00	Kazakhstan	38341	150	12	Kazakhstan	38341	400	00
	Kazakhstan	38341	50	12	India	42339	850	00	India	42724	50	12
	India	42339	700	00	India	42339	925	12	India	42867	100	12
	India	42339	50	12	India	42724	850	12	India	42874	700	12
	India	42348	400	00	India	42867	50	12	China	52533	30	00
	India	42348	100	12	India	42874	700	12	China	52533	50	12
	India	42724	50	12	India	43346	925	00	China	57083	70	00
	India	42867	30	12	India	43346	925	12	China	58027	30	00
	India	42874	200	12	India	43369	70	00	China	58424	50	00
	India	43041	700	12	China	52533	30	00				
	India	43295	500	00	China	52533	50	12				
	India	43346	850	00	China	57083	100	00				
	India	43346	50	12	China	58027	50	00				
	India	43369	70	00	China	58424	70	00				
	China	52533	30	00								
	China	52533	30	12								
	China	57083	50	00								
	China	58027	30	00								
	China	58424	30	00								
Vector Wind	Kazakhstan	38341	400	12					Kazakhstan	38341	300	00
	Mongolia	44373	400	12					Kazakhstan	38341	150	12
Wind Direction	Kazakhstan	38341		00	China	54340		00	China	54340		00
	Kazakhstan	38341		12	China	54340		12	China	54340		12
	India	42314		00								
	China	54340		00								
	China	54340		12								
	China	57816		00								

5. Possible Causes of Remarkable Biases

The following are possible causes of remarkable and sustained biases:

- (1) The radiosonde has significant error.

- (2) 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.
- (3) Biases are specific to the NWP model used in quality monitoring.

Technical Support

Any comments on the contents and the format of the report are welcome and should be contacted to:

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