Radiosonde-No.6-MOC-CMA(2025)

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

June 2025

Regional WIGOS Centre, Beijing

China Meteorological Administration

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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 2025. 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 ≥ 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 ≥ 10 and RMS ≥ 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 (°)
500	45
400	50
300	60
250	60
200	50
150	50

SELECTION CRITERIA:

NUM OBS ≥ 5 and

|BIAS| ≥ 10 degrees with

SD < 30 degrees and

MAX SPREAD < 10 degrees

3. Monitoring Results

3.1 Non-Reporting Stations with Operational Status

Table 1 List of non-reporting stations with operational status from June

INDEX	STATION_CODE	STATION_NAME	MEMBER	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	42701	M.O. RANCHI	India	23.32	85.32
5	42667	BHOPAL/BAIRAGHAR	India	23.28	77.35
6	43369	MINICOY	India	8.28	73.06
7	43333	PORT BLAIR	India	11.67	92.72
8	47418*	KUSHIRO (47418-1)	Japan	42.95	144.44
9	47600*	WAJIMA	Japan	37.39	136.90
10	48097*	YANGON	Myanmar	16.86	96.15
11	48042*	MANDALAY	Myanmar	21.94	96.09
12	41780	KARACHI AIRPORT	Pakistan	24.90	67.13
13	41661	QUETTA (SHEIKH MANDA)	Pakistan	30.27	66.92
14	41594	SARGODHA (41594-0)	Pakistan	32.05	72.67
15	24944	OLEKMINSK (24944-1)	Russian Federation	60.37	120.42
16	31168	AYAN	Russian Federation	56.45	138.15
17	30715*	ANGARSK	Russian Federation	52.48	103.85
18	38954	KHOROG	Tajikistan	37.50	71.50

19	38836	DUSHANBE	Tajikistan	38.58	68.73
20	38507	TURKMENBASHI (38507-1)	Turkmenistan	40.03	52.98

This list includes the non-reporting stations with operational status during June, please check the status of the stations. If it is closed or silent, please update the declared status in OSCAR/Surface. In addition, "*" represents GBON station.

3.2 Geopotential Height (GPH)

3.2.1 List of Suspect Stations

Table 2 List of GPH suspected in June 2025

INDEX	STATION_CODE	MEMBER	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ（%）	BIAS	SD	RMS
1	21432*	Russian Federation	00	250	27	2	0	64.6	71.4	96.3
2	29839*	Russian Federation	00	100	10	0	0	125.9	14.3	126.7
3	29839*	Russian Federation	12	50	10	0	0	173	13.9	173.6
4	32389*	Russian Federation	00	30	25	3	0	32.1	167	170.1
5	32389*	Russian Federation	12	30	19	2	0	56.1	172.9	181.8
6	35121*	Russian Federation	00	30	26	0	0	204.8	88.2	223
7	35121*	Russian Federation	12	30	26	0	0	219.1	84.3	234.7
8	36003*	Kazakhstan	00	70	26	1	0	96.9	73.5	121.6
9	38341*	Kazakhstan	00	50	11	3	0	-4	226.5	226.6
10	42314	India	12	250	17	1	0	-34.8	62.5	71.6
11	42348	India	00	925	24	0	0	51.8	5.1	52.1
12	52323	China	00	30	25	1	0	156.7	126	201.1
13	56080	China	00	30	29	0	0	123.2	135.4	183

3.2.2 Suspect Station Analysis

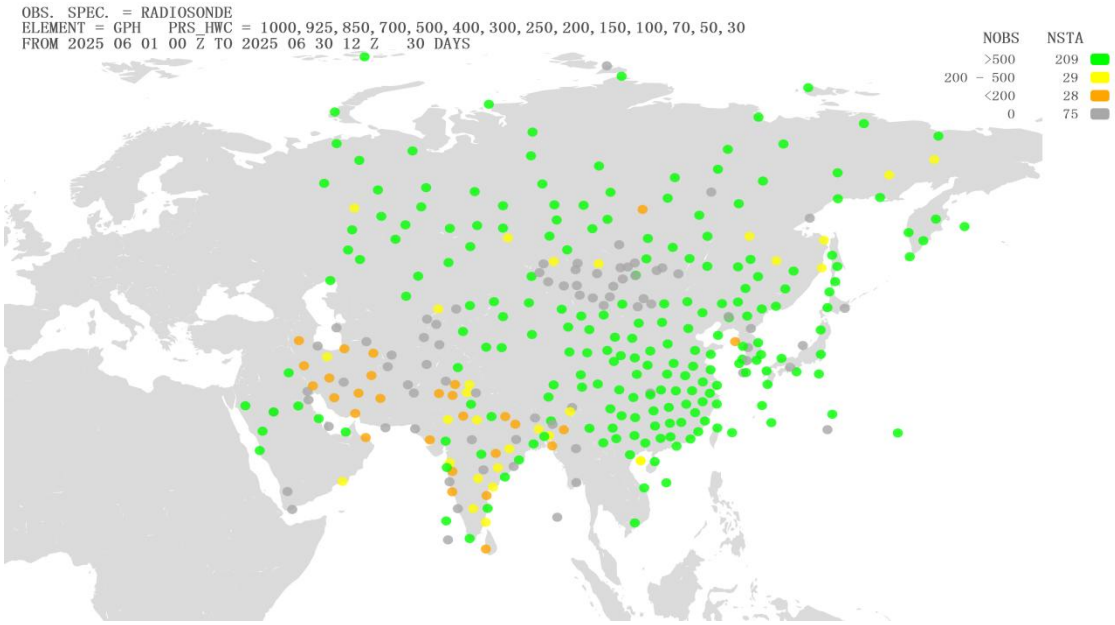

Figure 1 Location of all radiosonde stations reporting geopotential height observations in Region II over the month of June 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color 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

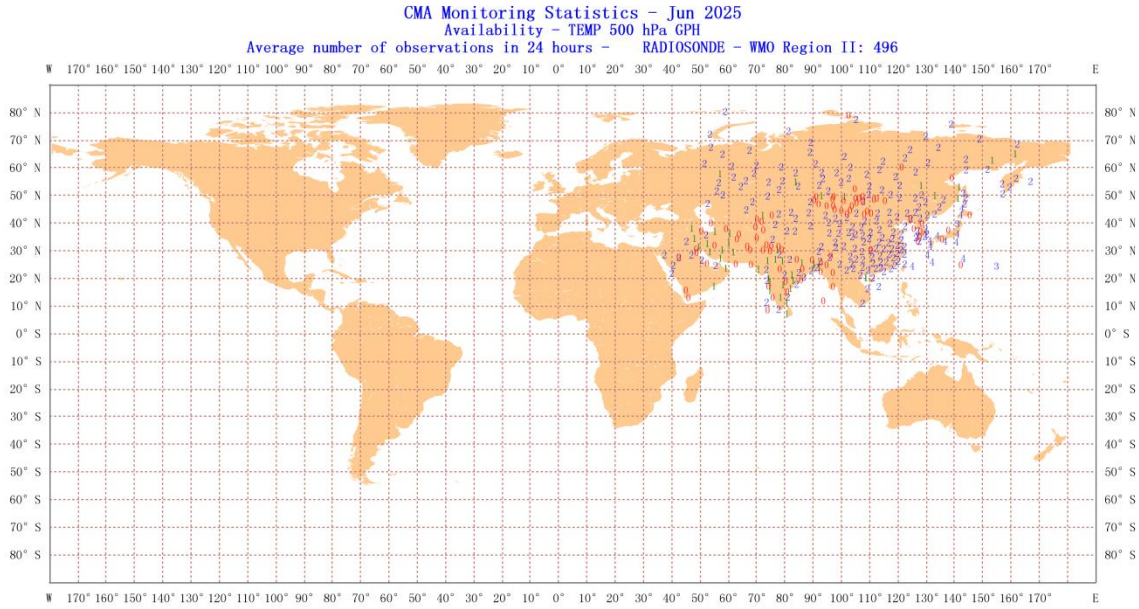

Figure 2 Location of all radiosonde stations reporting geopotential height average number of observations in 24 hours in Region II over the month of June 2025

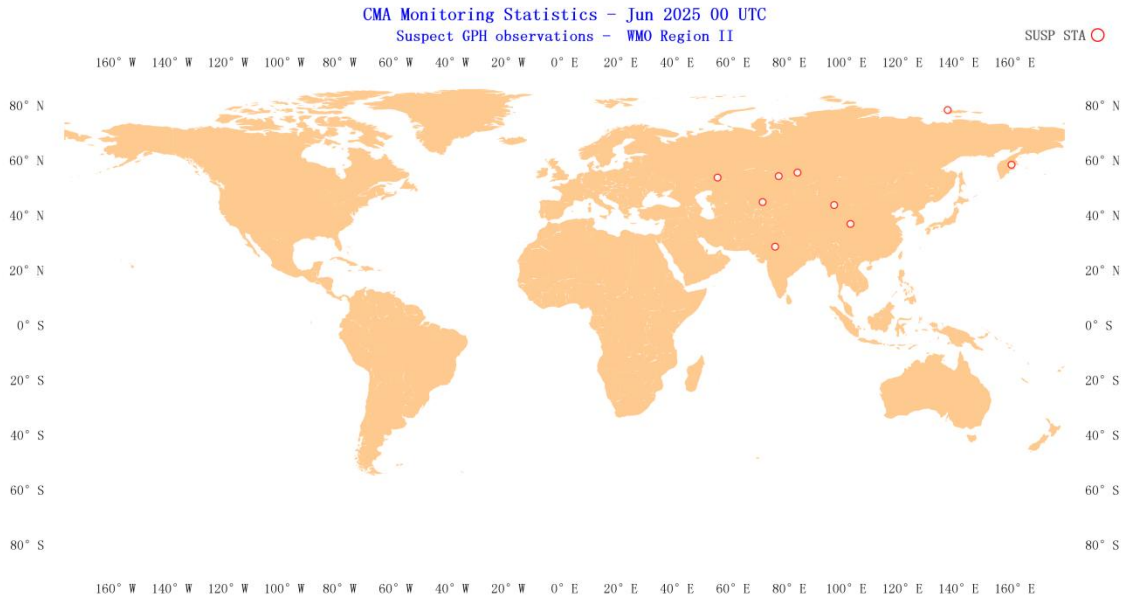

Figure 3 Distribution of suspect stations - Geopotential Height 00 UTC

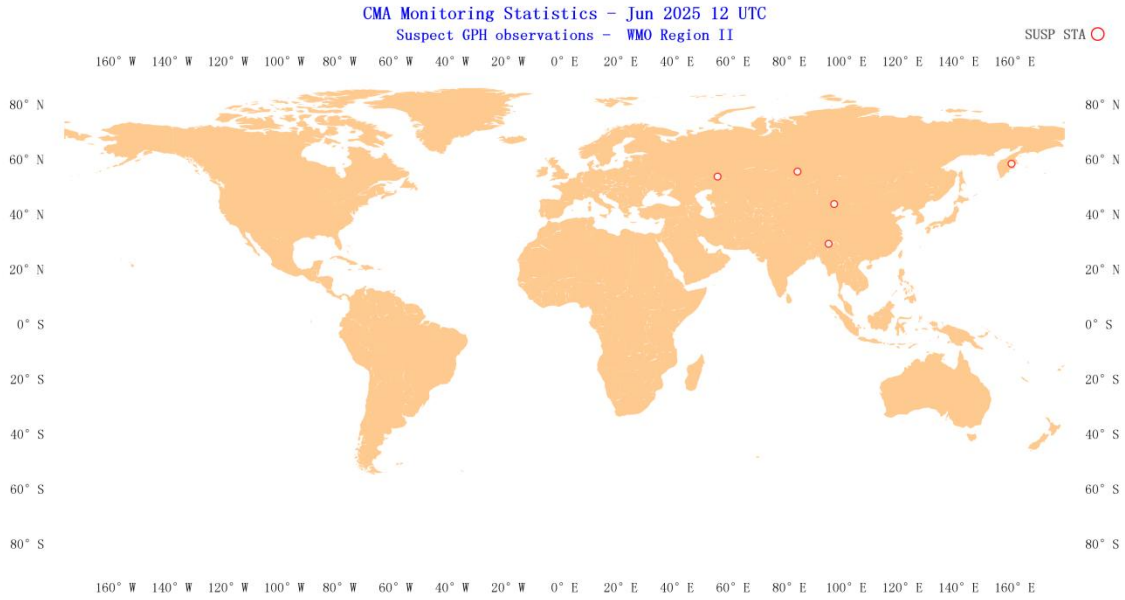

Figure 4 Distribution of suspect stations - Geopotential Height 12 UTC

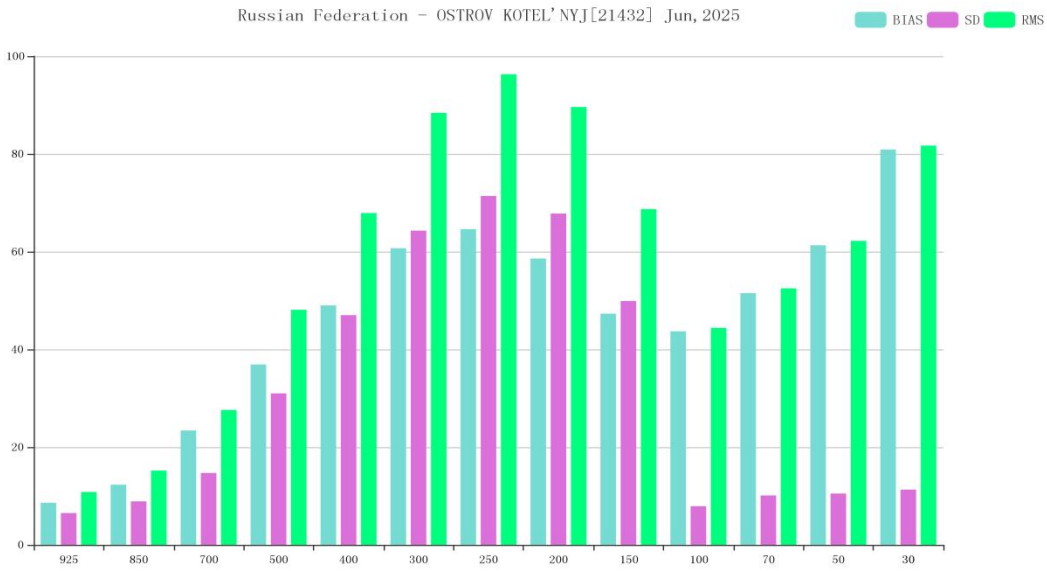

Figure 5 BIAS、SD and RMS of GPH for station 21432*(OBS-TIME:00)

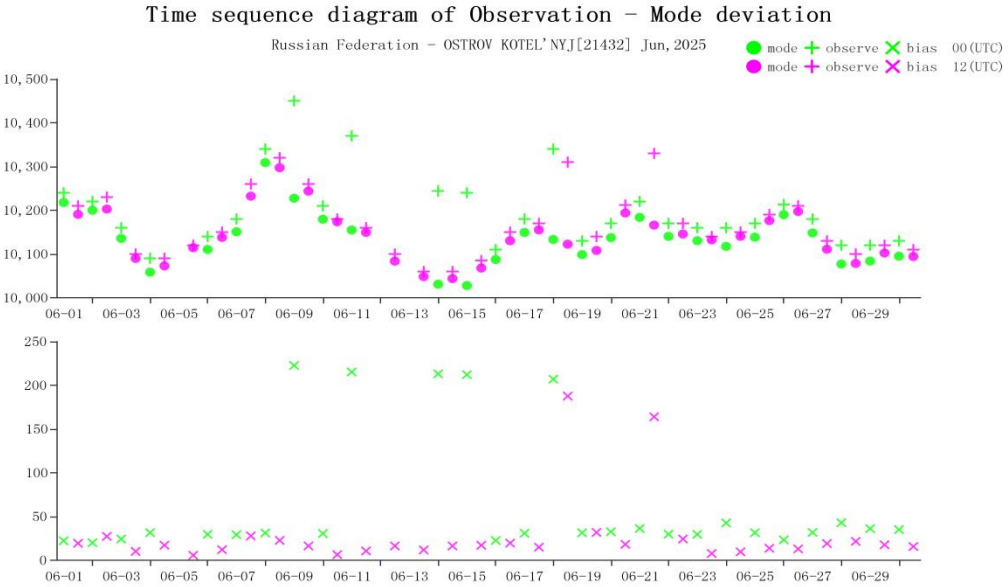

Figure 6 Time-series representation of GPH Obs minus first guess for station 21432*(Level:250)

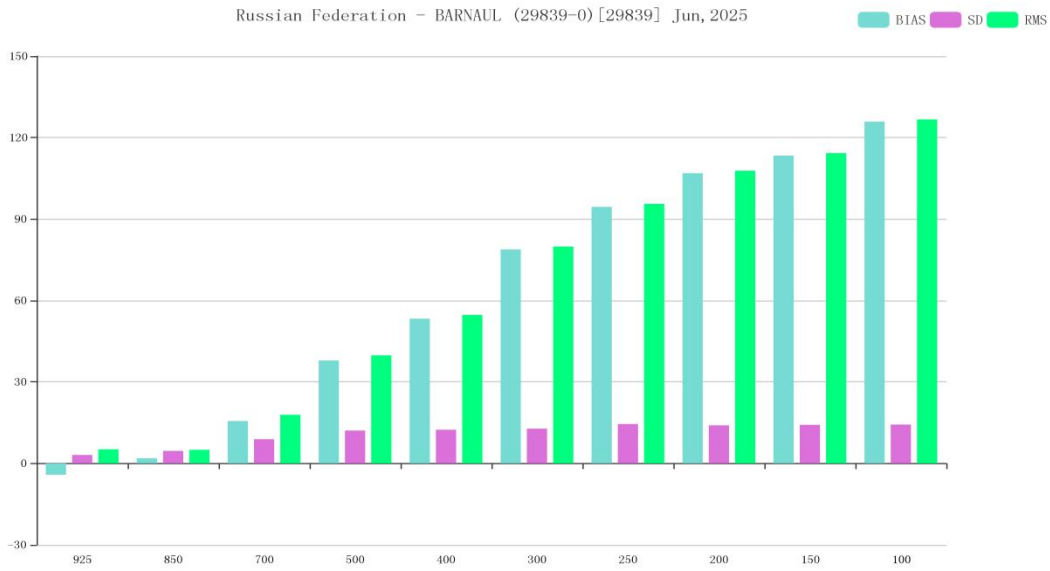

Figure 7 BIAS、SD and RMS of GPH for station 29839*(OBS-TIME:00)

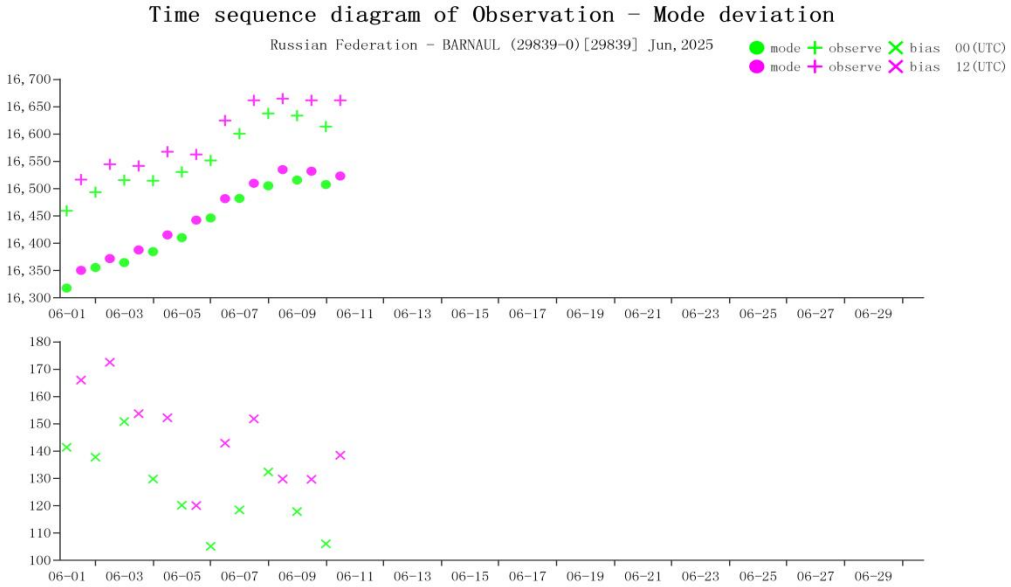

Figure 8 Time-series representation of GPH Obs minus first guess for station 29839*(Level:100)

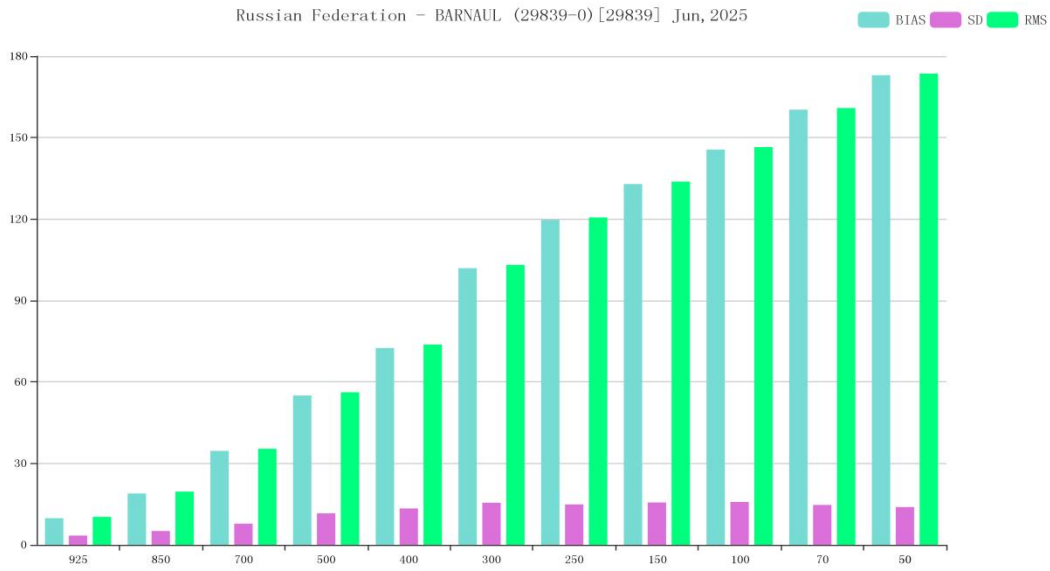

Figure 9 BIAS、SD and RMS of GPH for station 29839*(OBS-TIME:12)

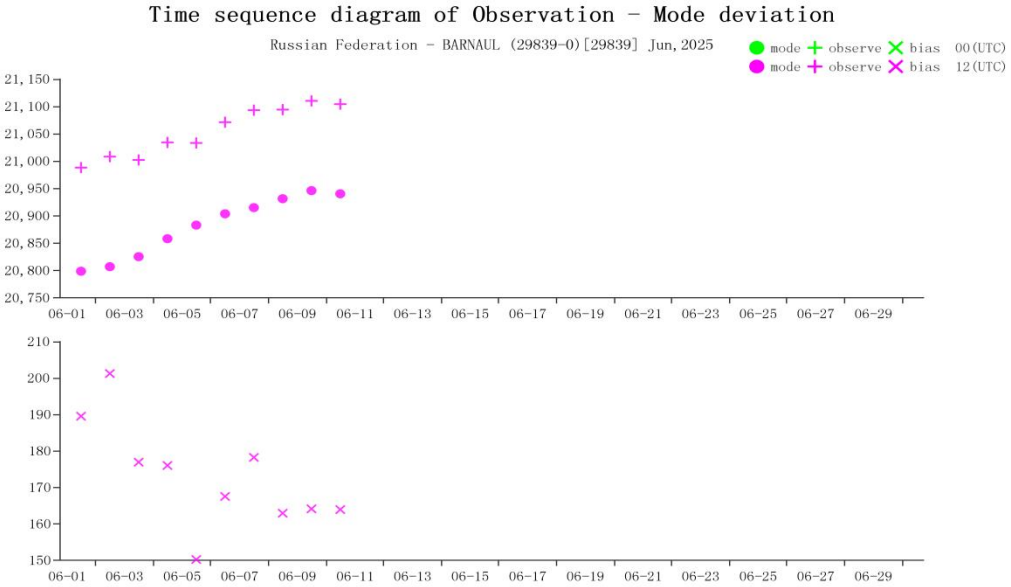

Figure 10 Time-series representation of GPH Obs minus first guess for station 29839*(Level:50)

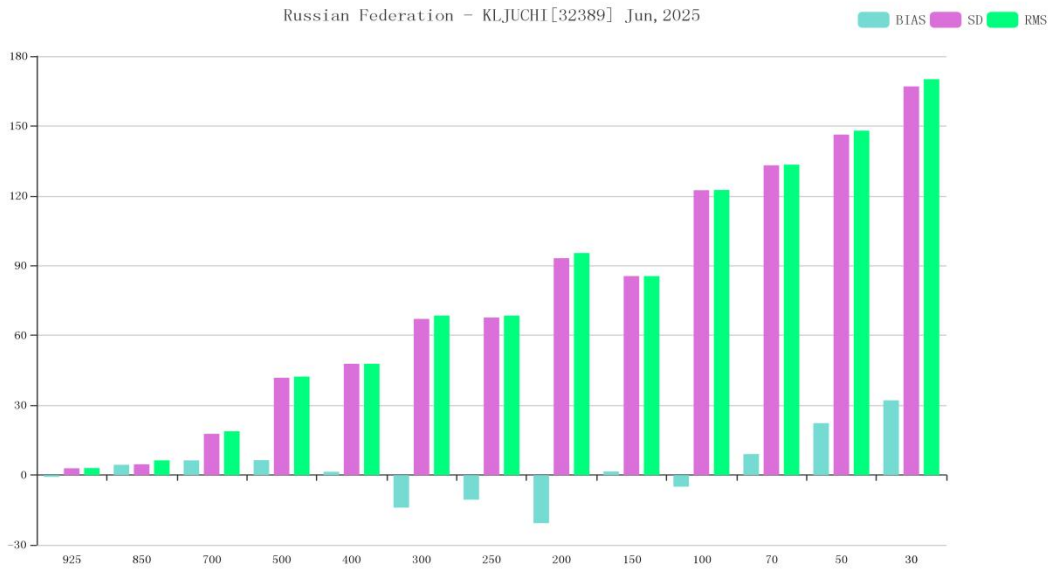

Figure 11 BIAS、SD and RMS of GPH for station 32389*(OBS-TIME:00)

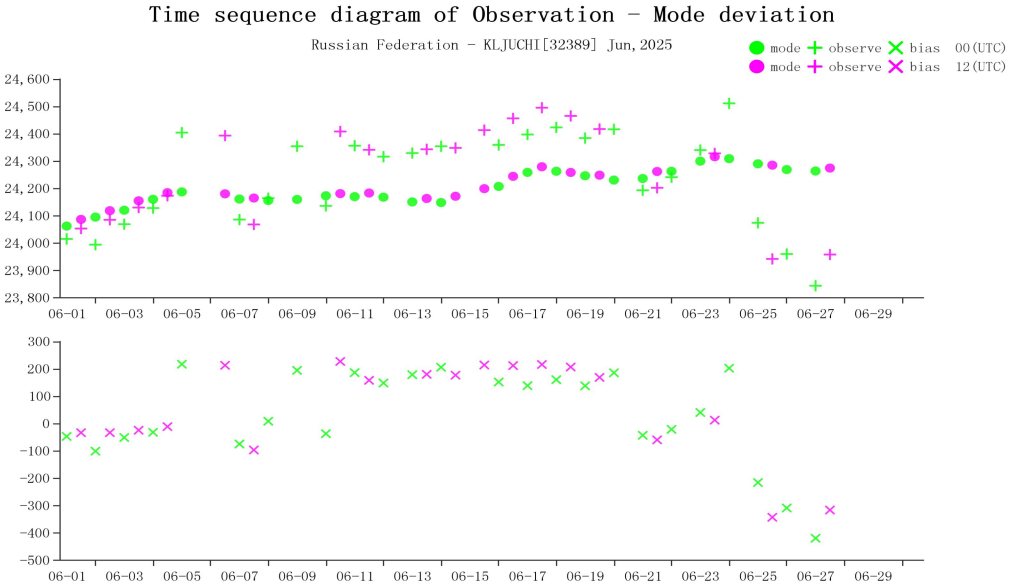

Figure 12 Time-series representation of GPH Obs minus first guess for station 32389*(Level:30)

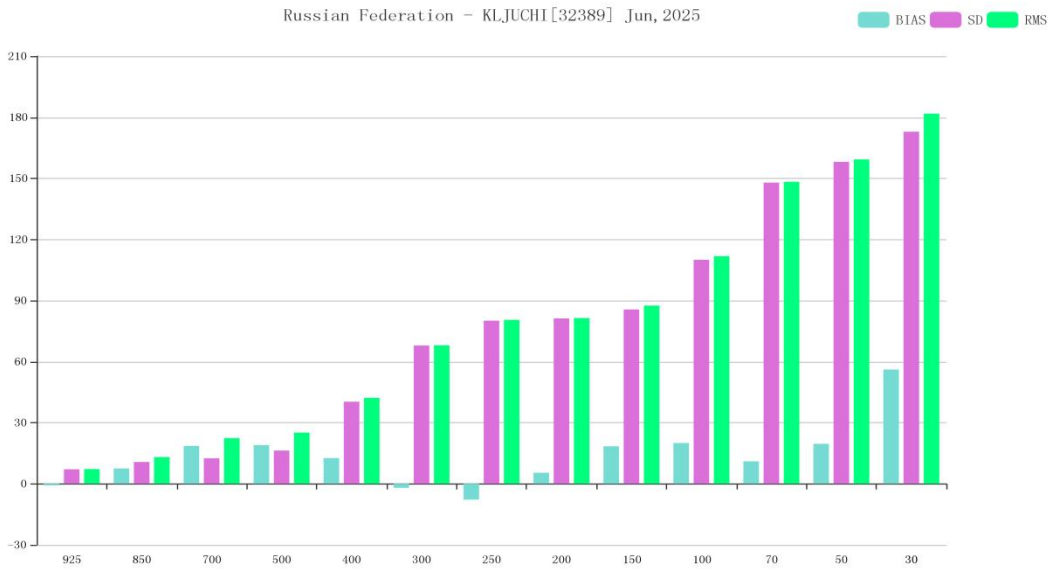

Figure 13 BIAS、SD and RMS of GPH for station 32389*(OBS-TIME:12)

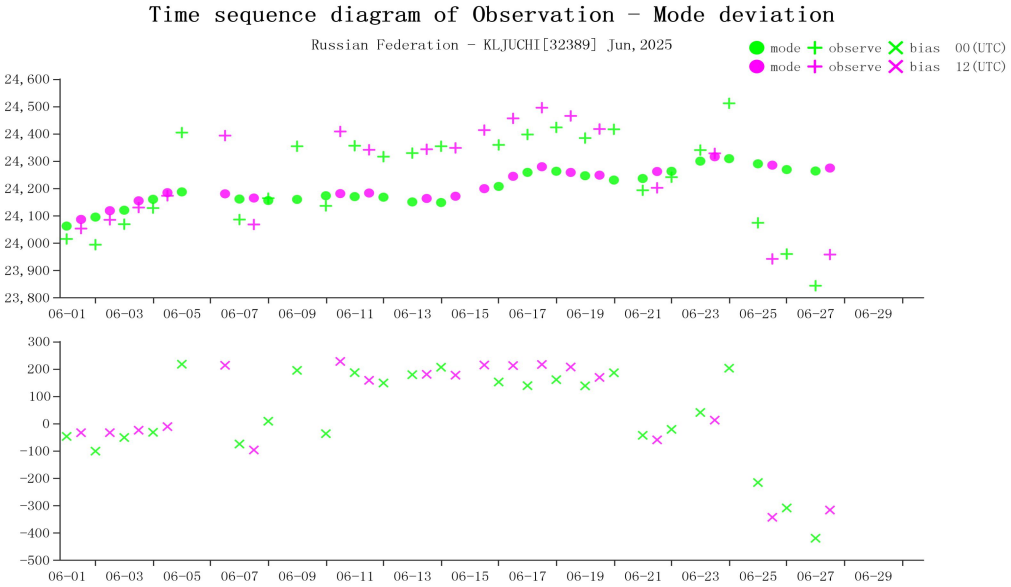

Figure 14 Time-series representation of GPH Obs minus first guess for station 32389*(Level:30)

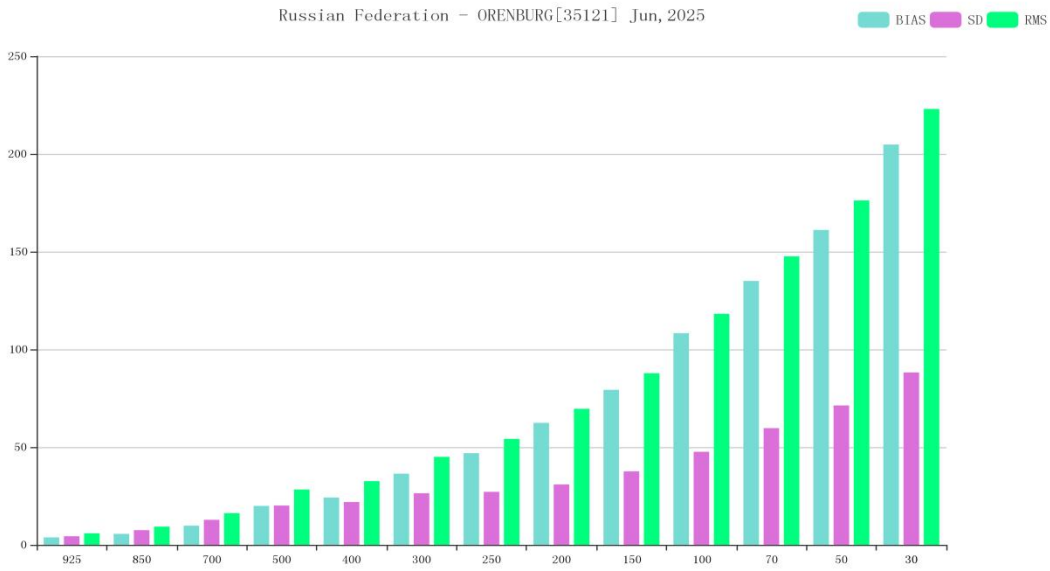

Figure 15 BIAS、SD and RMS of GPH for station 35121*(OBS-TIME:00)

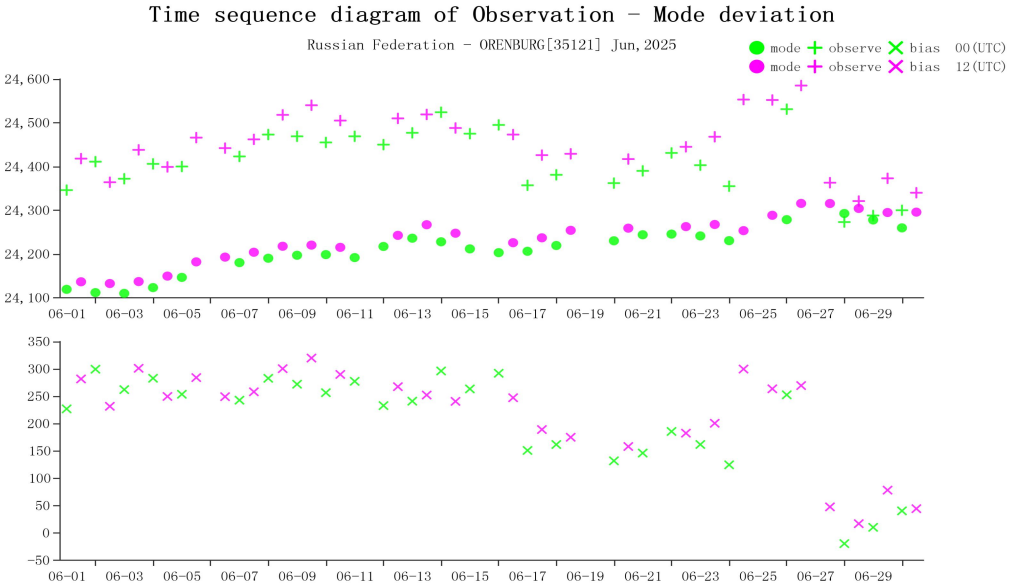

Figure 16 Time-series representation of GPH Obs minus first guess for station 35121*(Level:30)

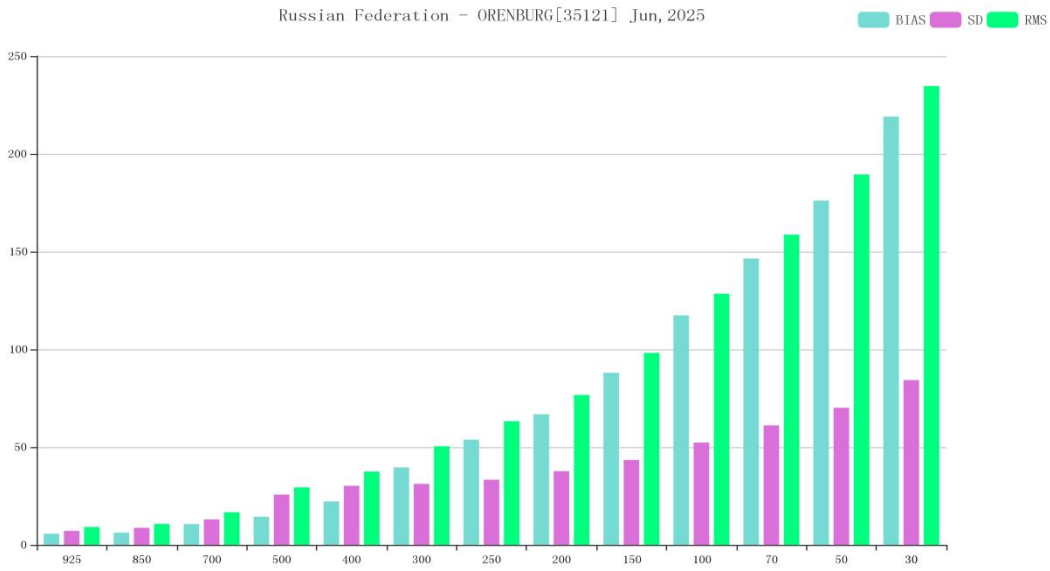

Figure 17 BIAS、SD and RMS of GPH for station 35121*(OBS-TIME:12)

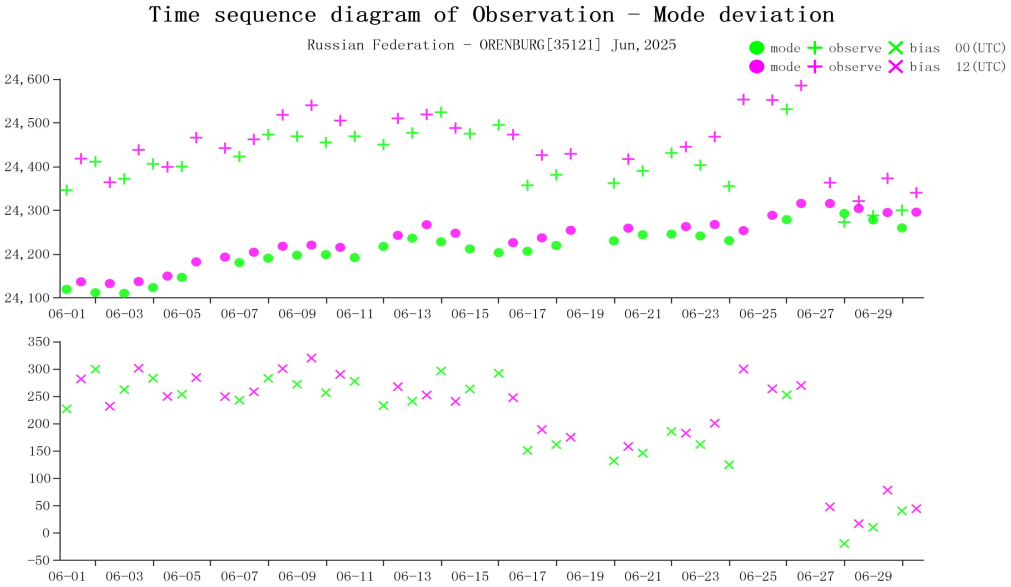

Figure 18 Time-series representation of GPH Obs minus first guess for station 35121*(Level:30)

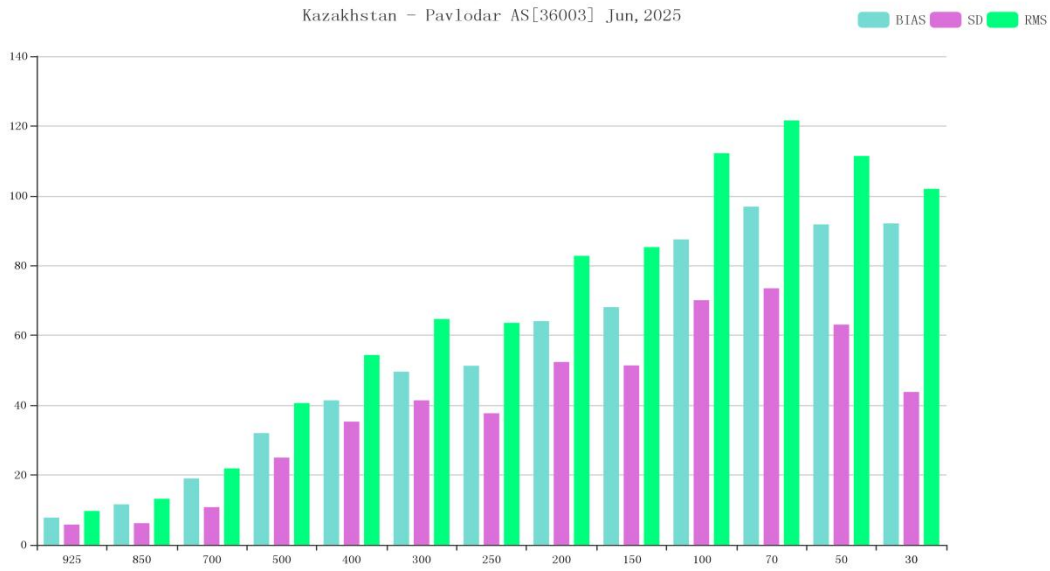

Figure 19 BIAS、SD and RMS of GPH for station 36003*(OBS-TIME:00)

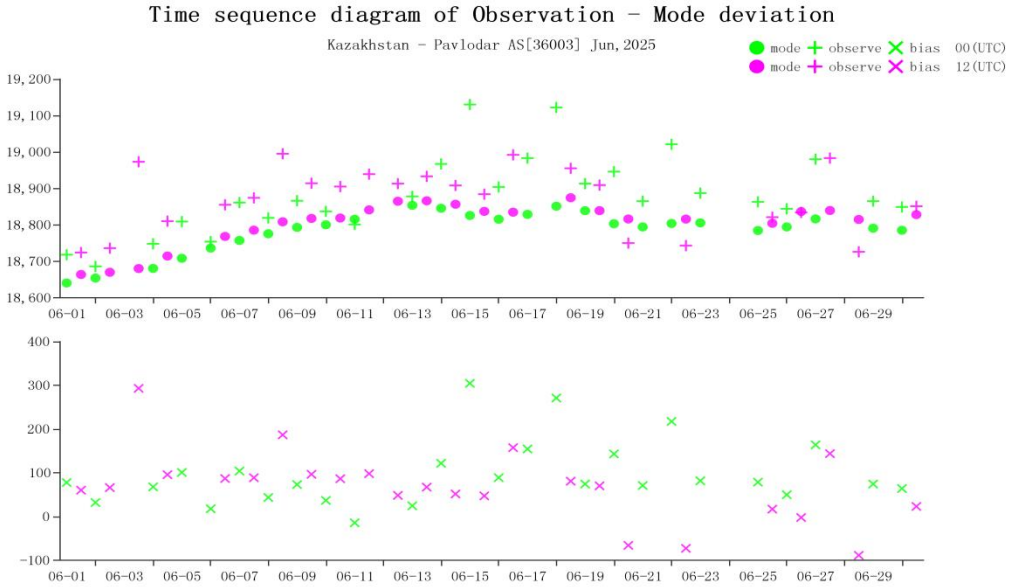

Figure 20 Time-series representation of GPH Obs minus first guess for station 36003*(Level:70)

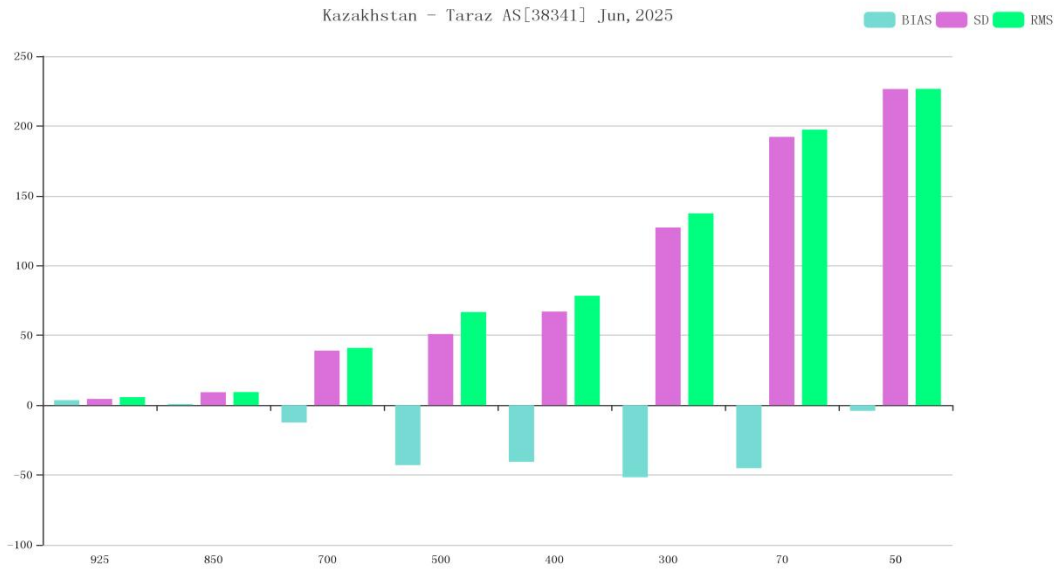

Figure 21 BIAS、SD and RMS of GPH for station 38341*(OBS-TIME:00)

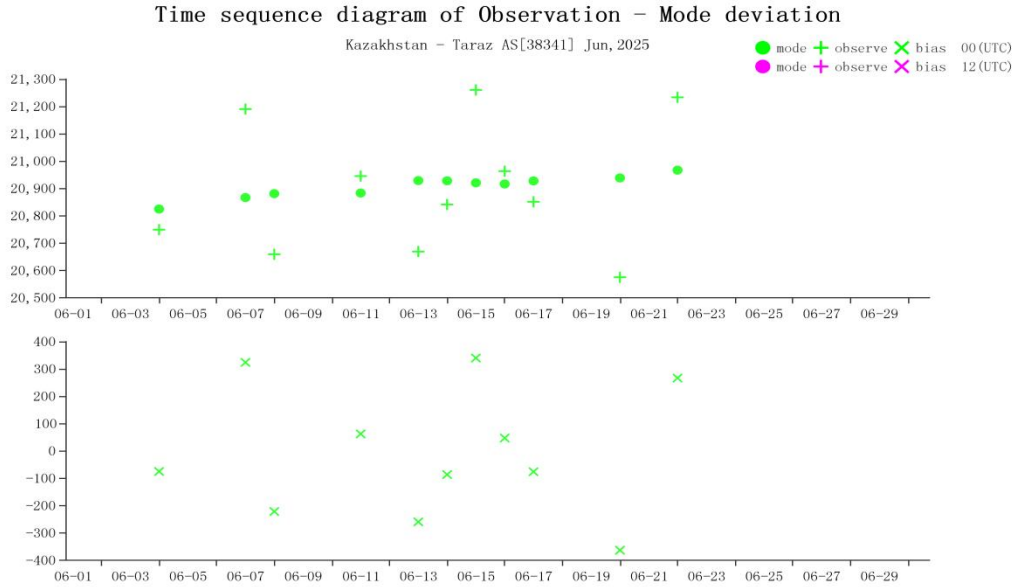

Figure 22 Time-series representation of GPH Obs minus first guess for station 38341*(Level:50)

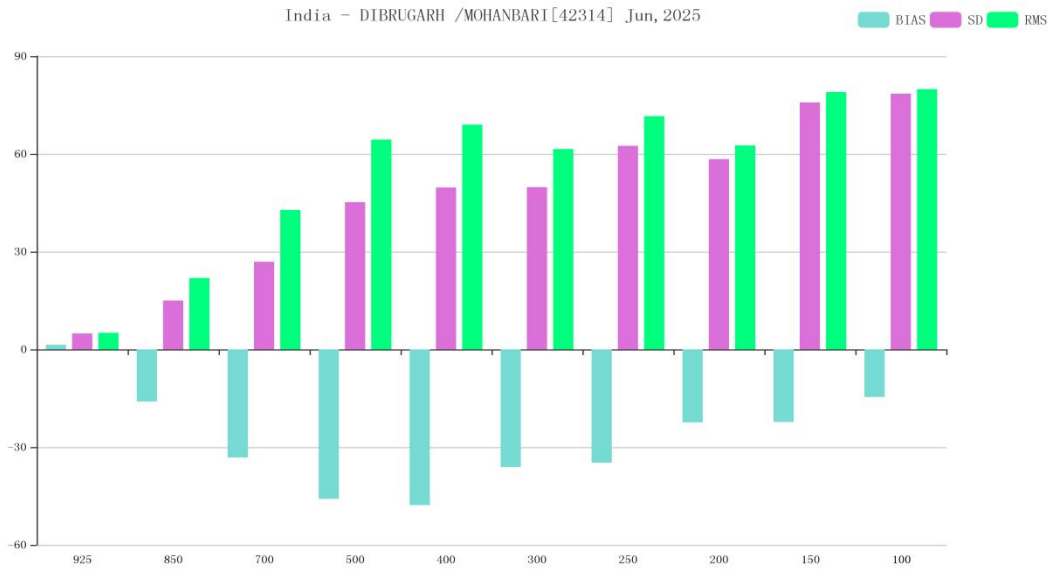

Figure 23 BIAS、SD and RMS of GPH for station 42314(OBS-TIME:12)

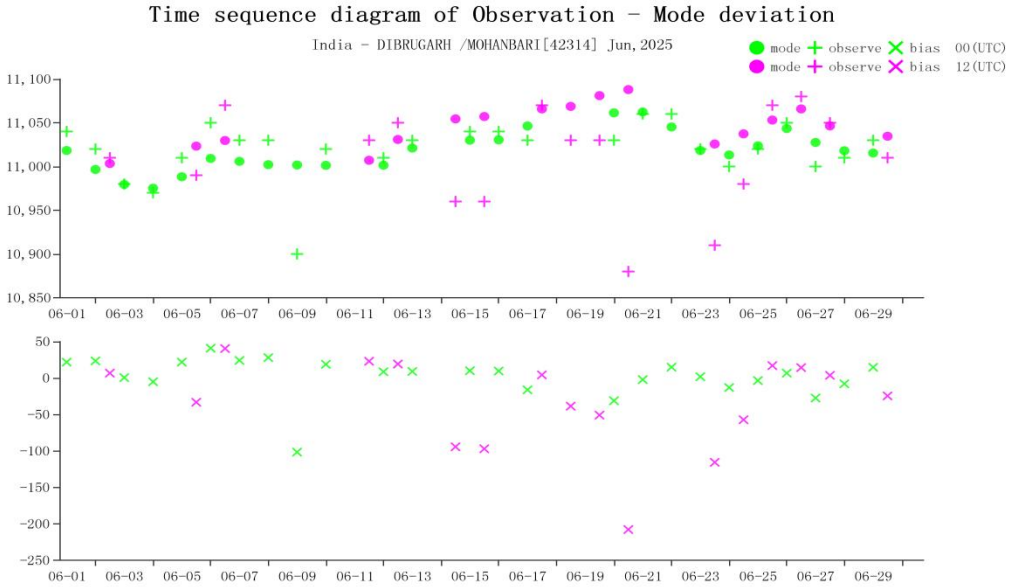

Figure 24 Time-series representation of GPH Obs minus first guess for station 42314(Level:250)

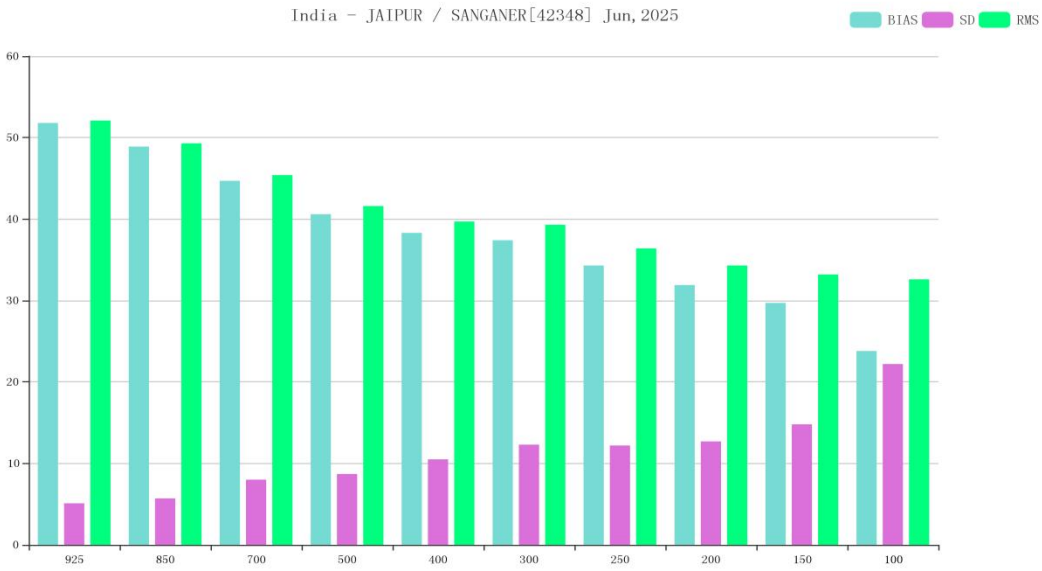

Figure 25 BIAS、SD and RMS of GPH for station 42348(OBS-TIME:00)

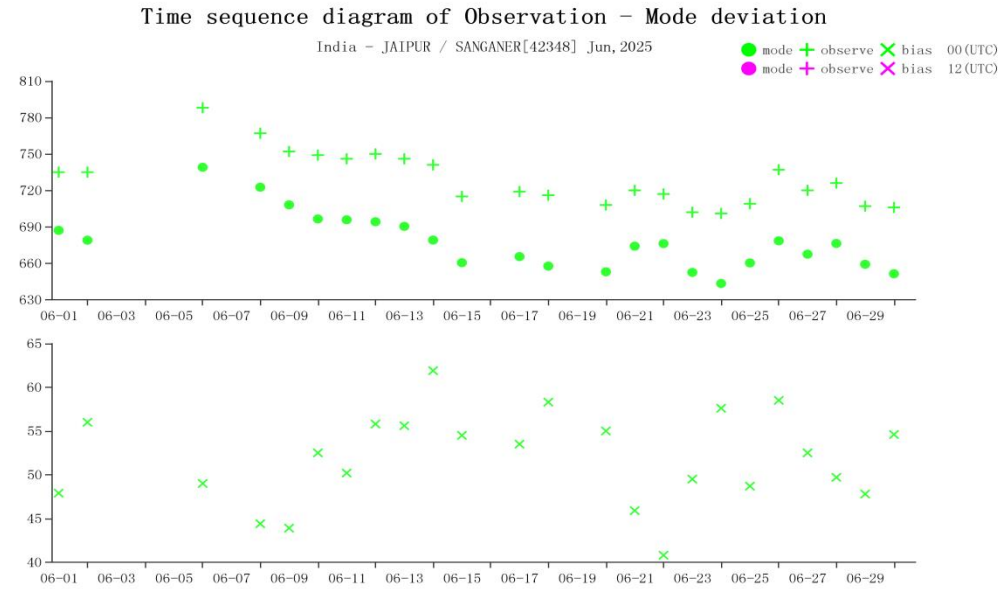

Figure 26 Time-series representation of GPH Obs minus first guess for station 42348(Level:925)

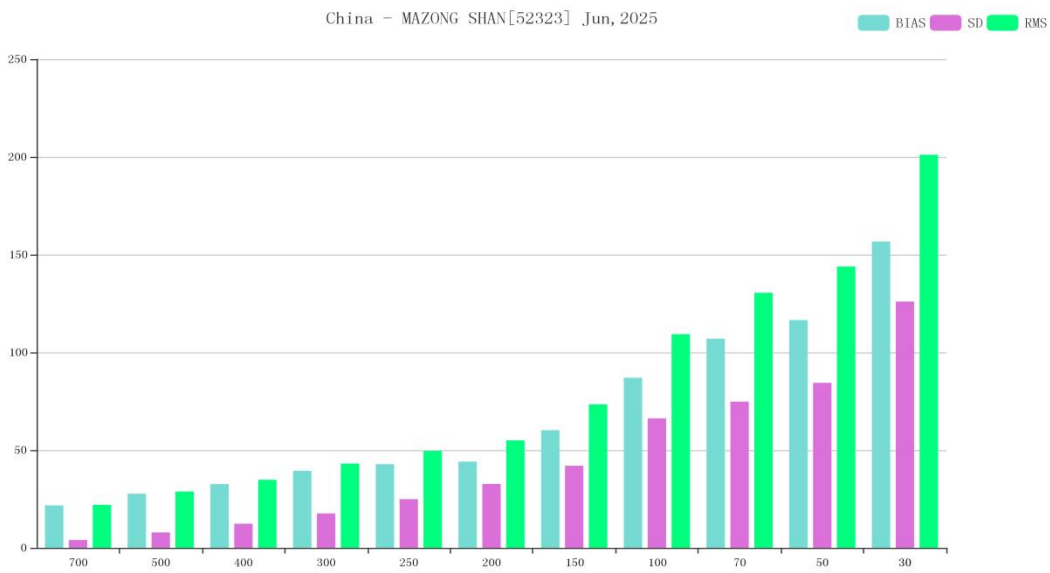

Figure 27 BIAS、SD and RMS of GPH for station 52323(OBS-TIME:00)

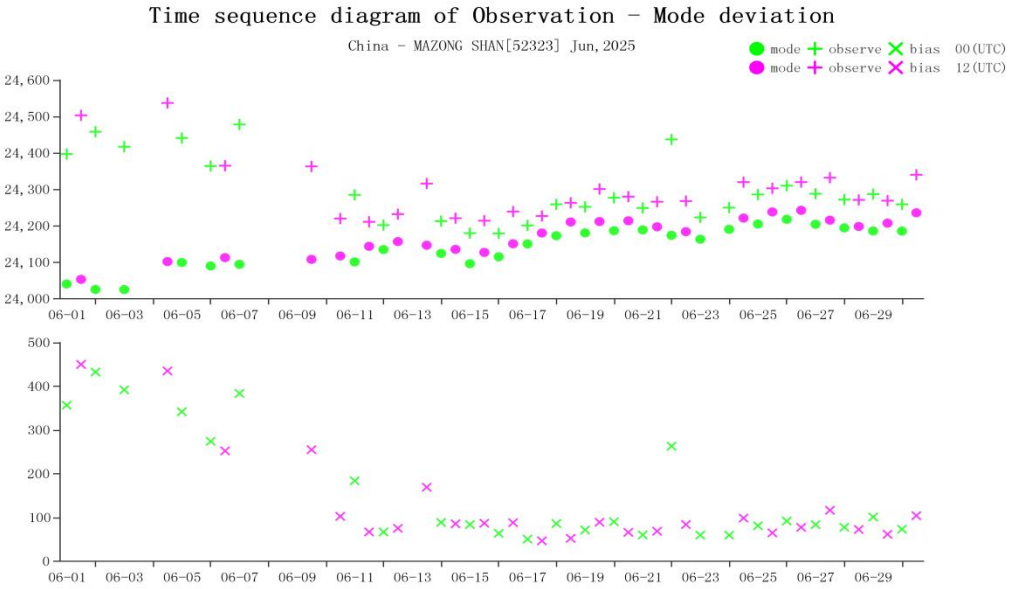

Figure 28 Time-series representation of GPH Obs minus first guess for station 52323(Level:30)

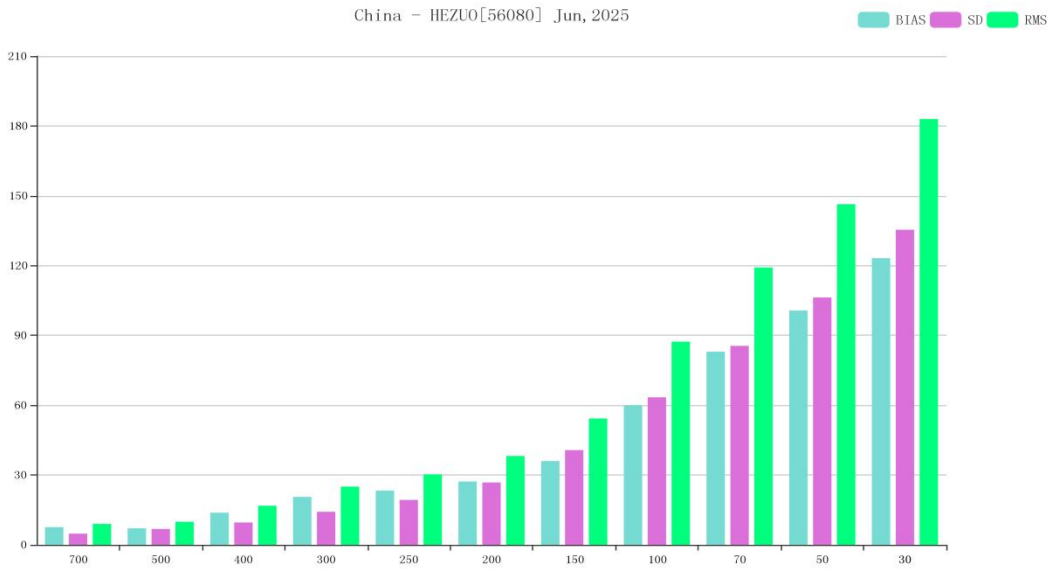

Figure 29 BIAS、SD and RMS of GPH for station 56080(OBS-TIME:00)

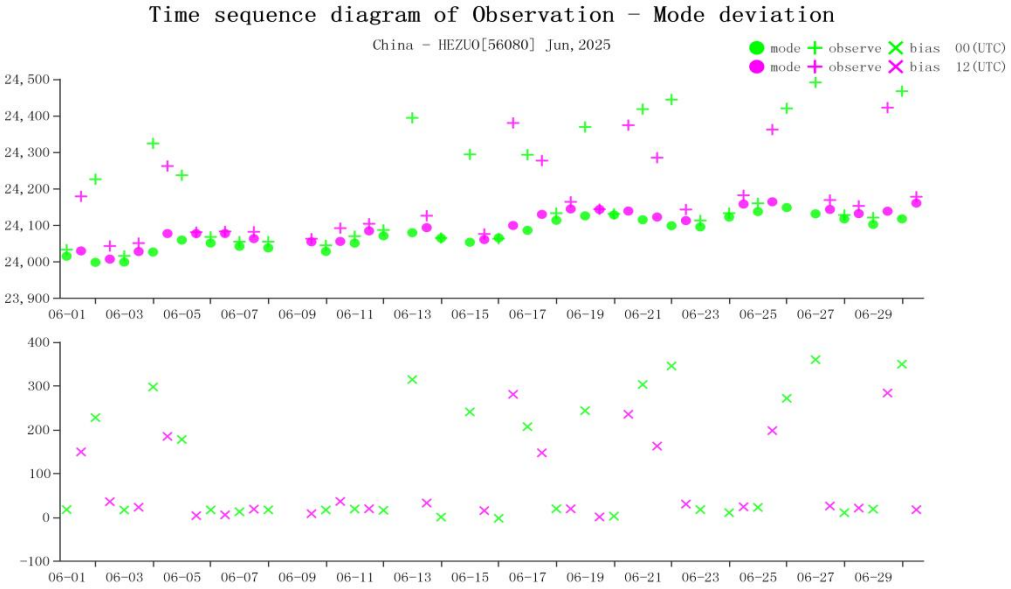

Figure 30 Time-series representation of GPH Obs minus first guess for station 56080(Level:30)

3.3 Vector Wind (WIN_S)

3.3.1 List of Suspect Stations

Table 3 List of WIN_S suspected in June 2025

INDEX	STATION_CODE	MEMBER	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ（%）	BIAS	SD	RMS
1	38341*	Kazakhstan	12	250	10	0	0	13.7	14.6	20

3.3.2 Suspect Station Analysis

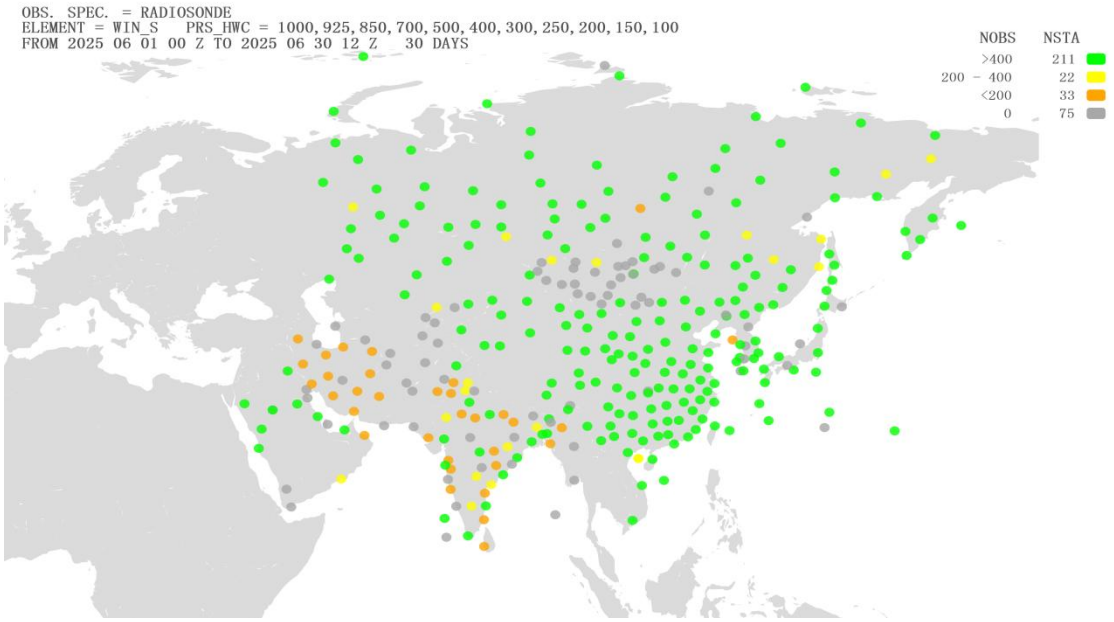

Figure 31 Location of all radiosonde stations reporting vector wind observations in Region II over the month of June 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green 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

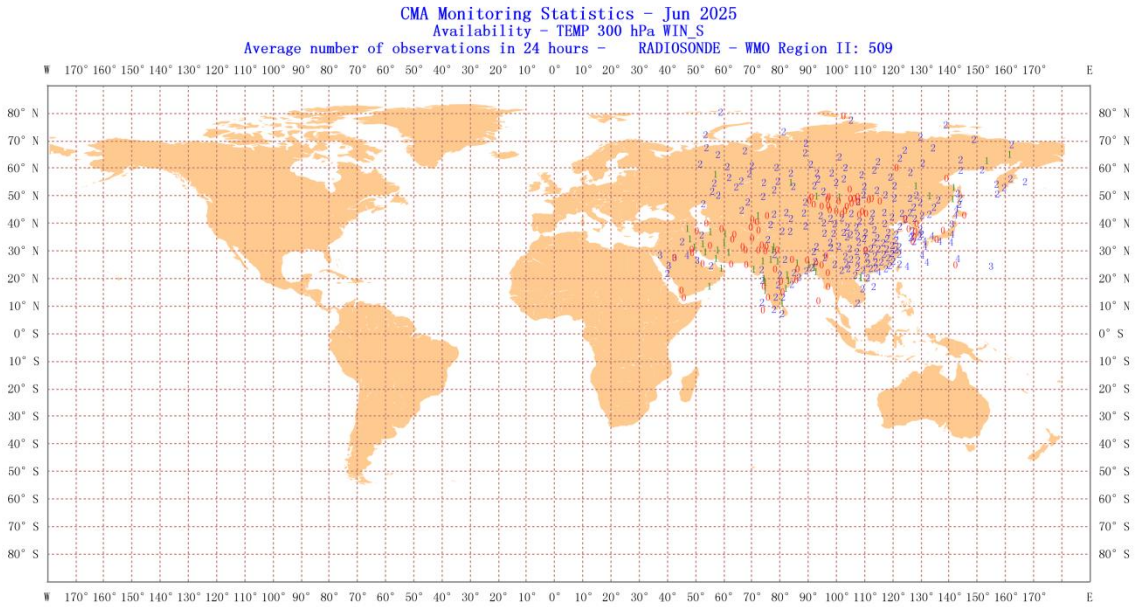

Figure 32 Location of all radiosonde stations reporting vector wind average number of observations in 24 hours in Region II over the month of June 2025

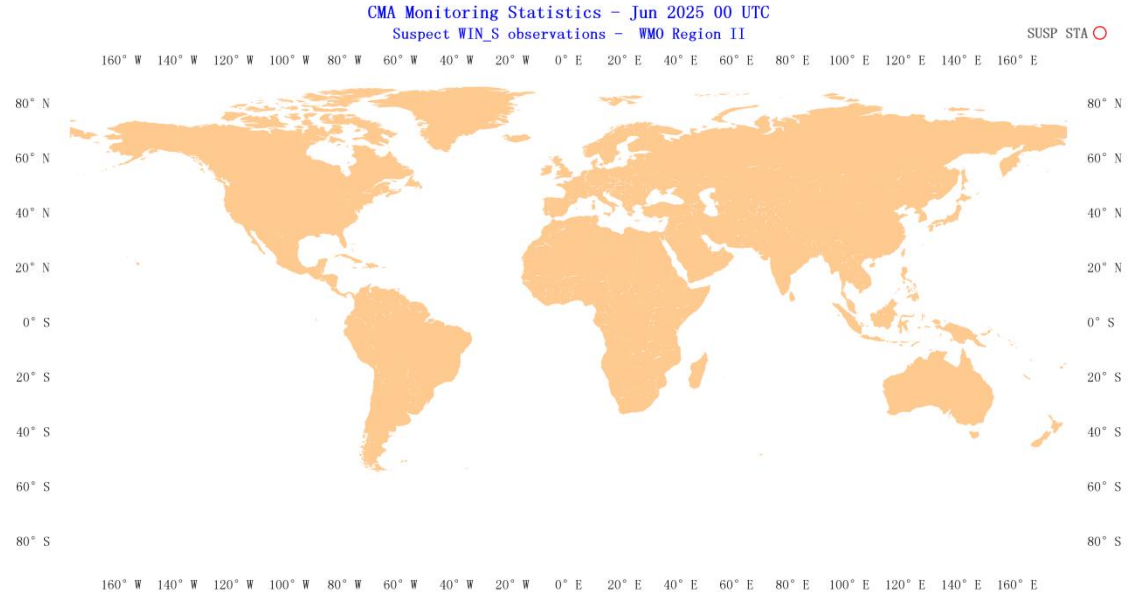

Figure 33 Distribution of suspect stations - Vector Wind 00 UTC

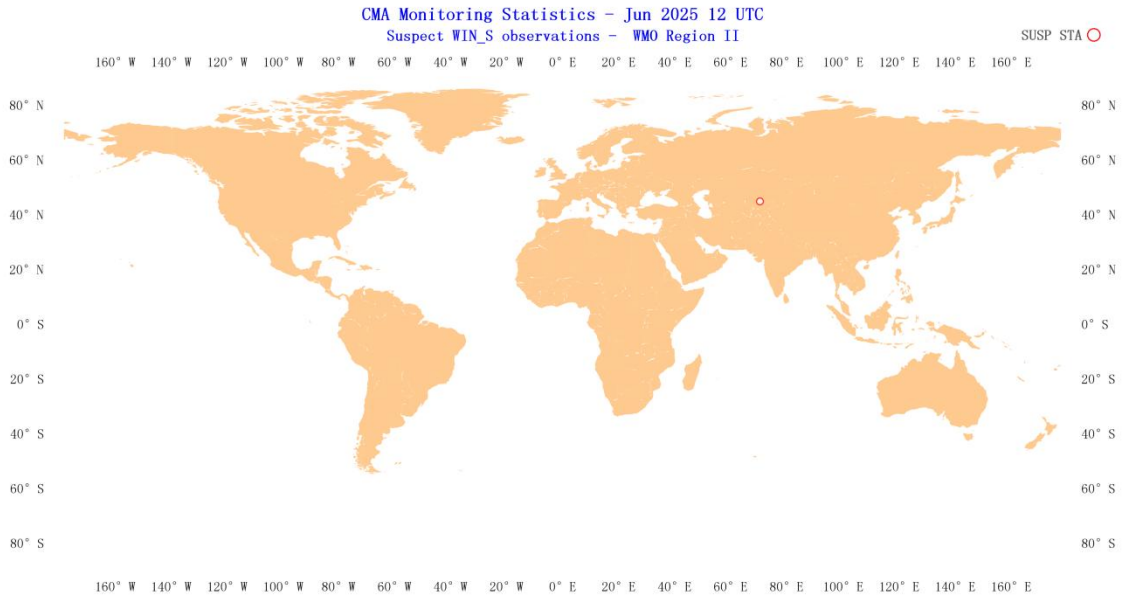

Figure 34 Distribution of suspect stations - Vector Wind 12 UTC

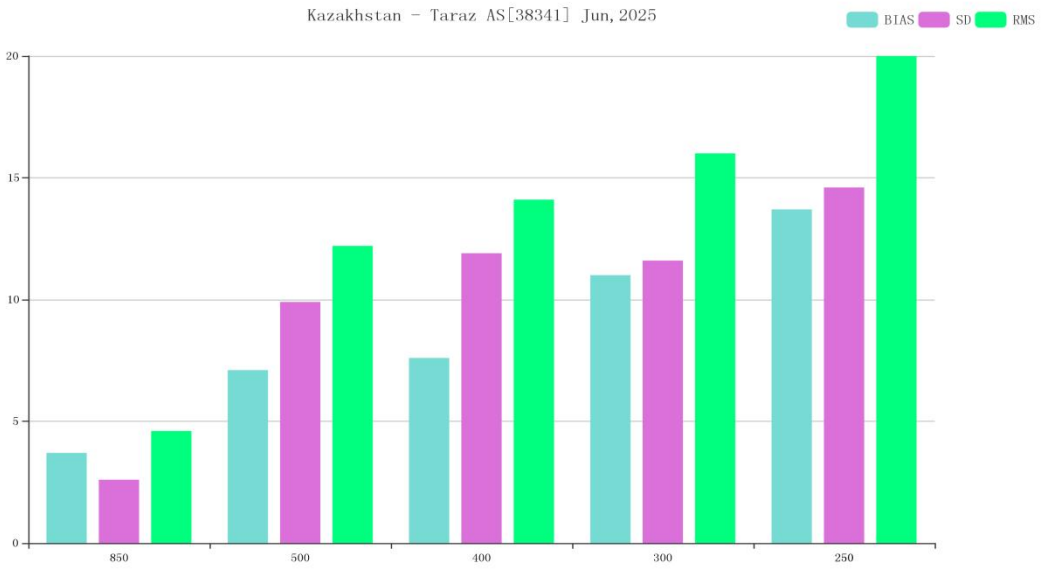

Figure 35 BIAS、SD and RMS of WIN_S for station 38341*(OBS-TIME:12)

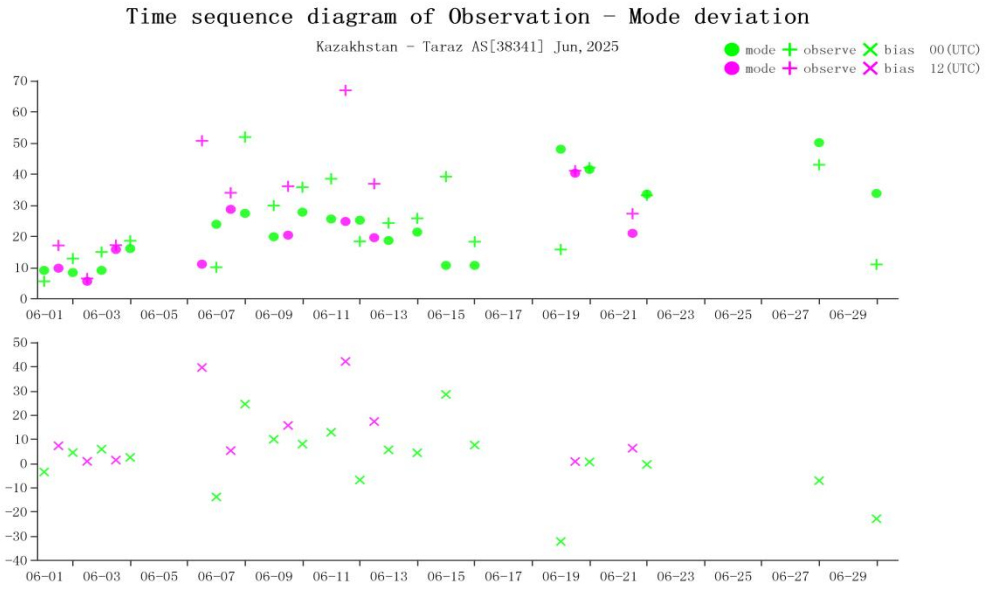

Figure 36 Time-series representation of WIN_S Obs minus first guess for station 38341*(Level:250)

3.4 Wind Direction (WIN_D)

3.4.1 List of Suspect Stations

Table 4 List of WIN_D suspected in June 2025

INDEX	STATION_CODE	MEMBER	OBS TIME	NUM OBS	BIAS	SD	MAX SPREAD
1	38341*	Kazakhstan	00	17	12.3	19.3	5.1
2	38341*	Kazakhstan	12	10	15.3	15.1	1.4
3	41883	Bangladesh	00	10	-13.2	17.2	0.9

3.4.2 Suspect Station Analysis

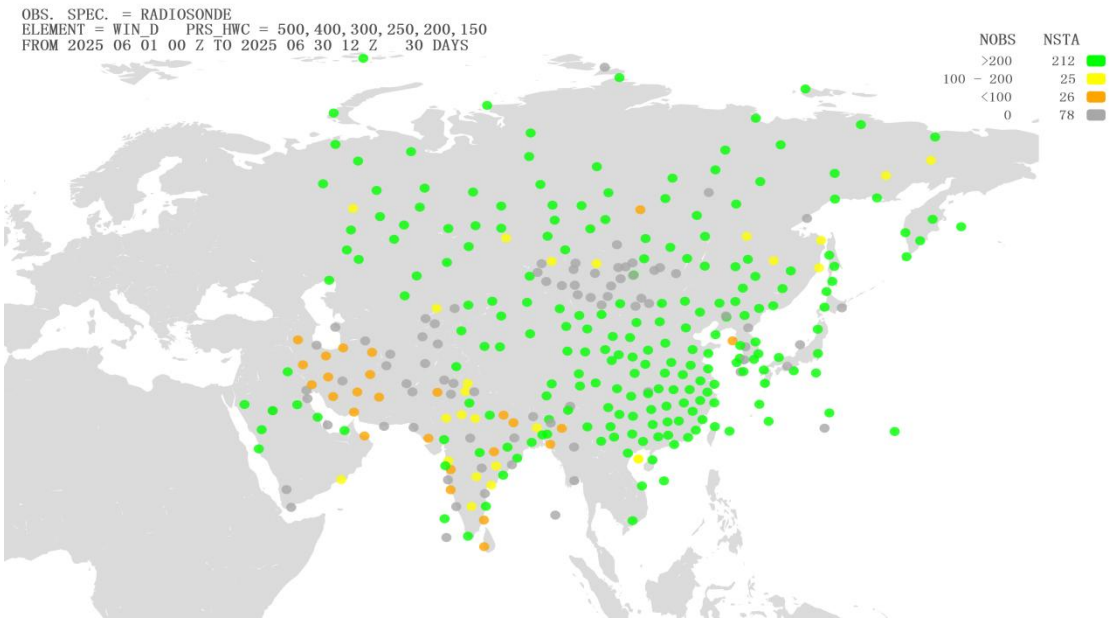

Figure 37 Location of all radiosonde stations reporting wind direction observations in Region II over the month of June 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green 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

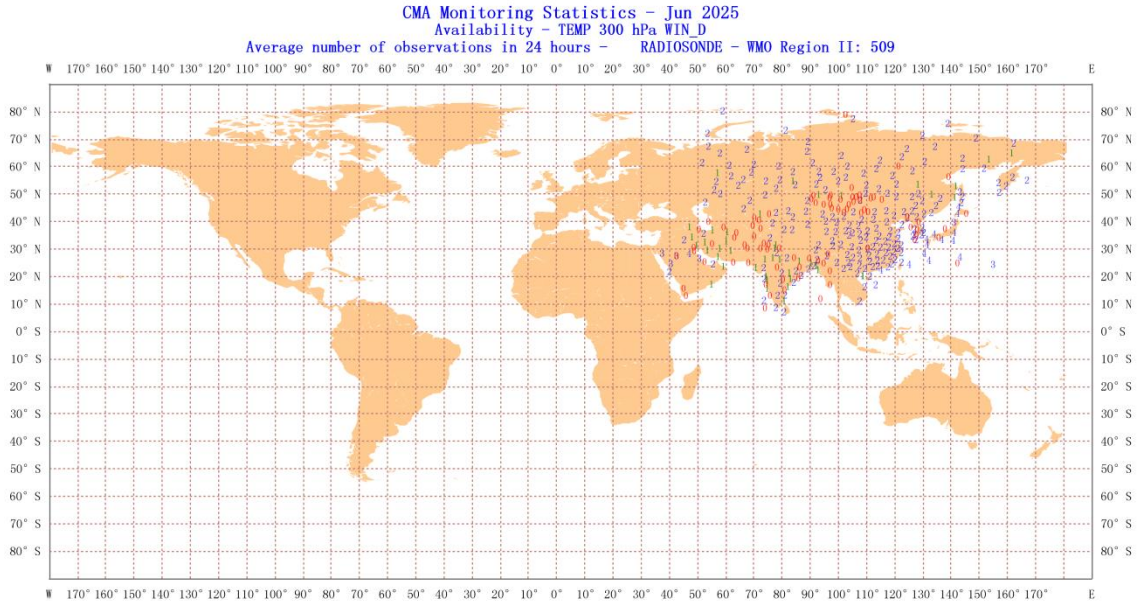

Figure 38 Location of all radiosonde stations reporting wind direction average number of observations in 24 hours in Region II over the month of June 2025

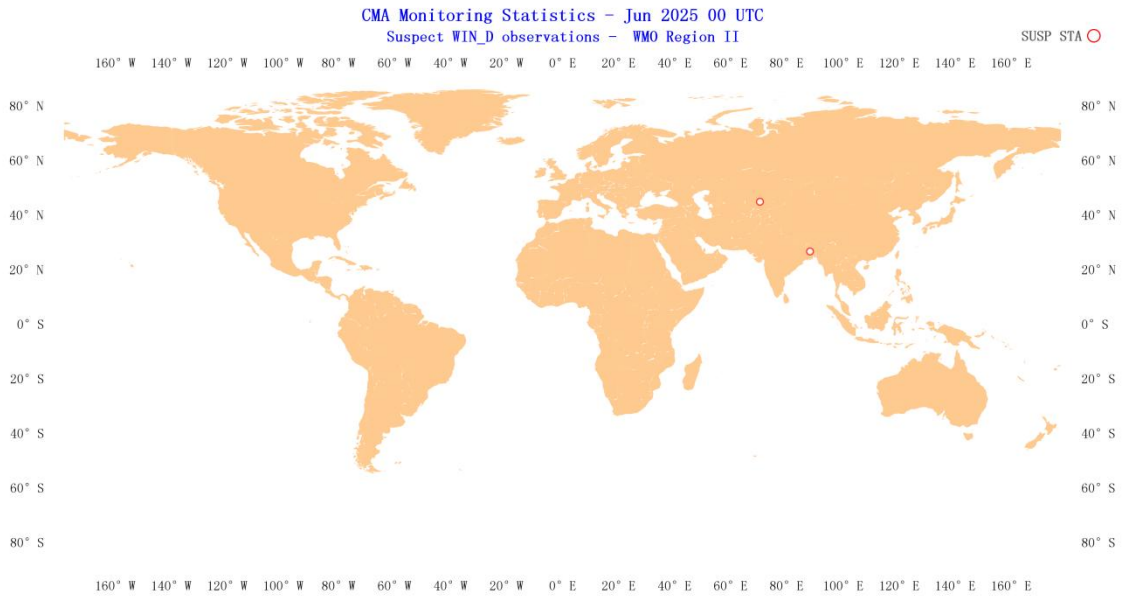

Figure 39 Distribution of suspect stations - Wind Direction 00 UTC

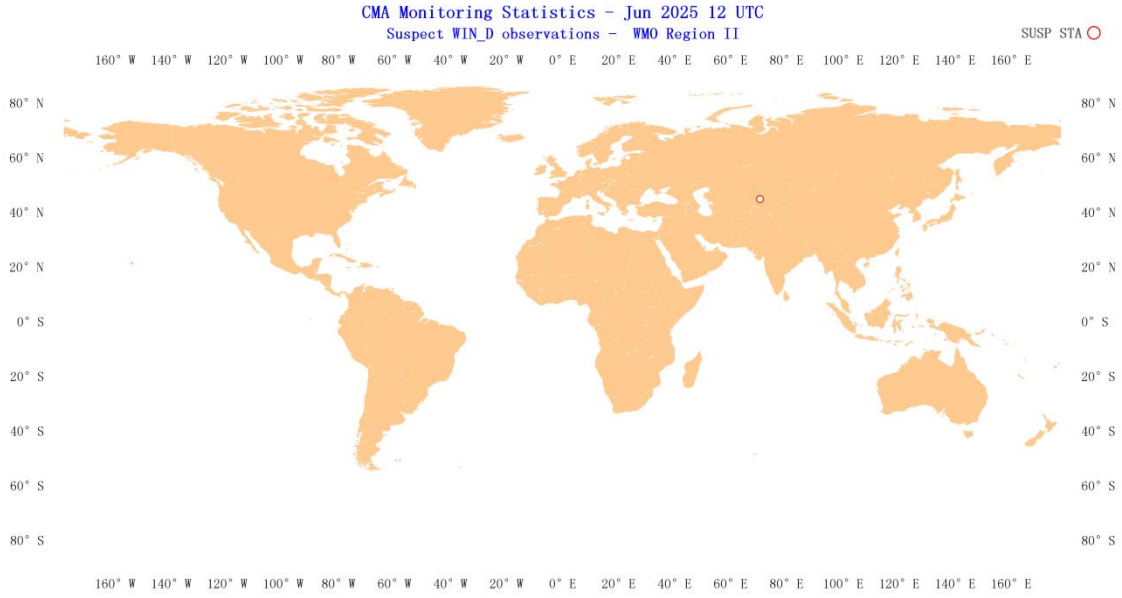

Figure 40 Distribution of suspect stations - Wind Direction 12 UTC

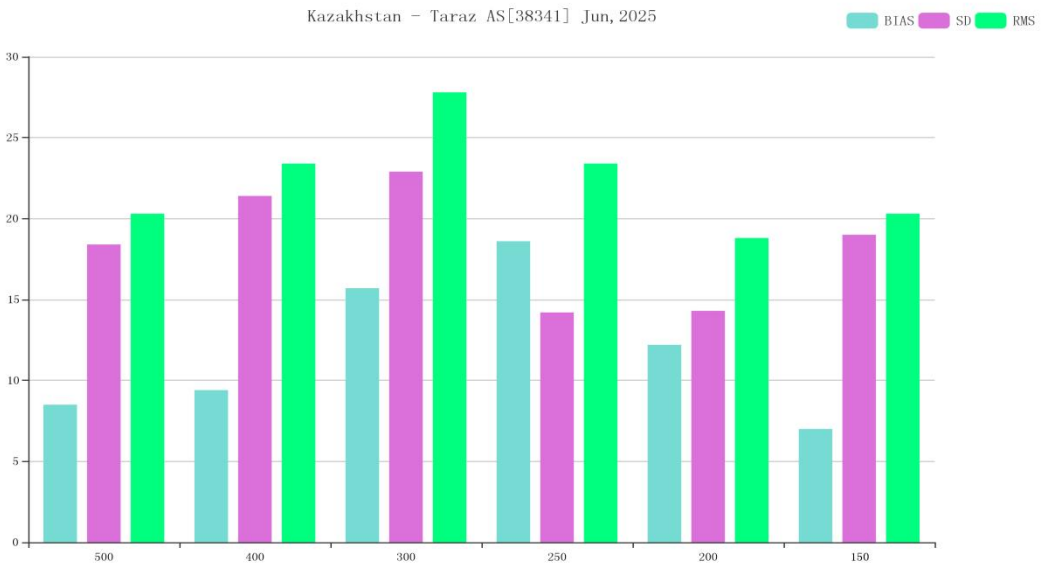

Figure 41 BIAS、SD and RMS of WIN_D for station 38341*(OBS-TIME:00)

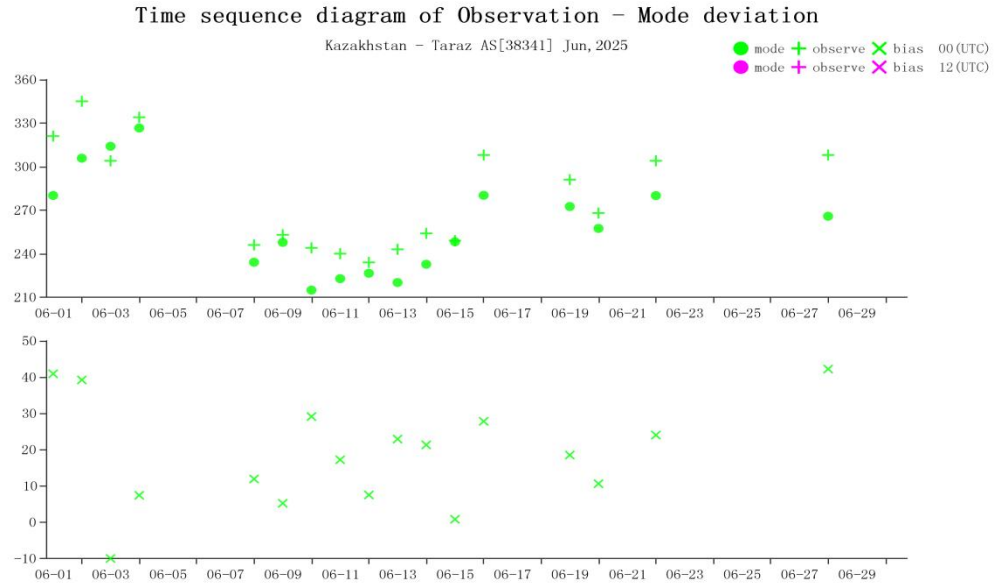

Figure 42 Time-series representation of WIN_D Obs minus first guess for station 38341*(Level:250)

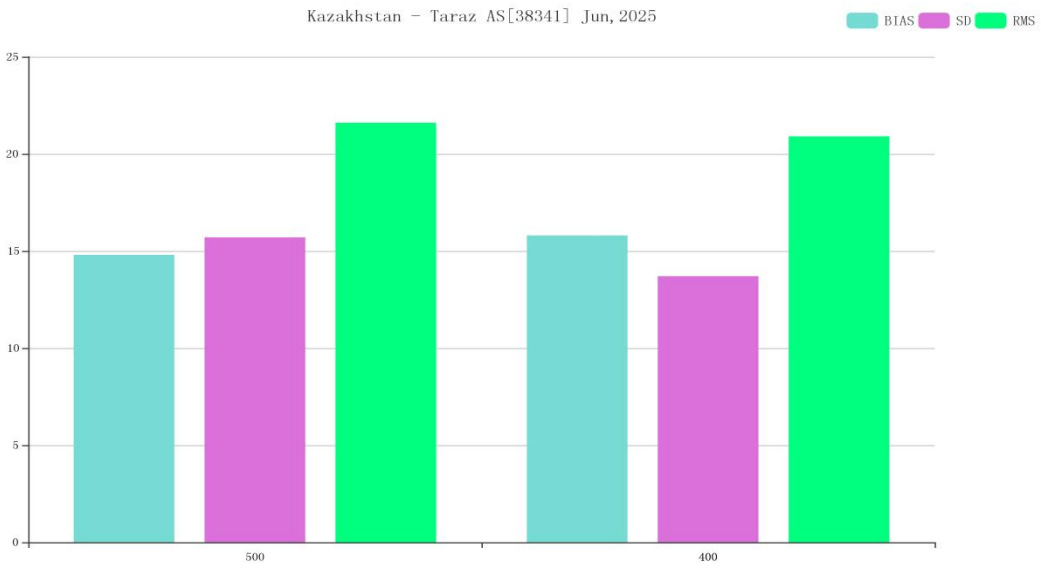

Figure 43 BIAS、SD and RMS of WIN_D for station 38341*(OBS-TIME:12)

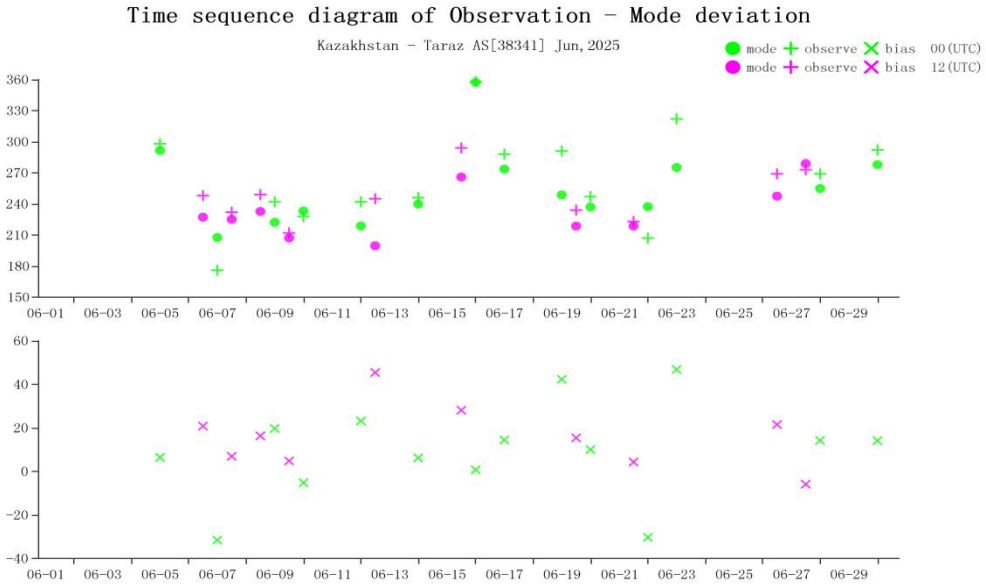

Figure 44 Time-series representation of WIN_D Obs minus first guess for station 38341*(Level:400)

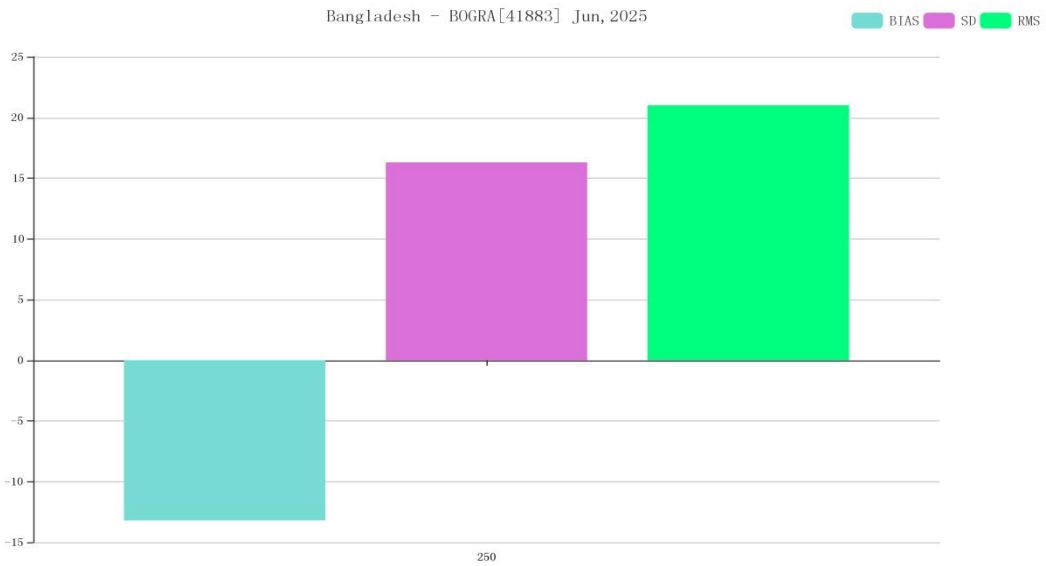

Figure 45 BIAS、SD and RMS of WIN_D for station 41883(OBS-TIME:00)

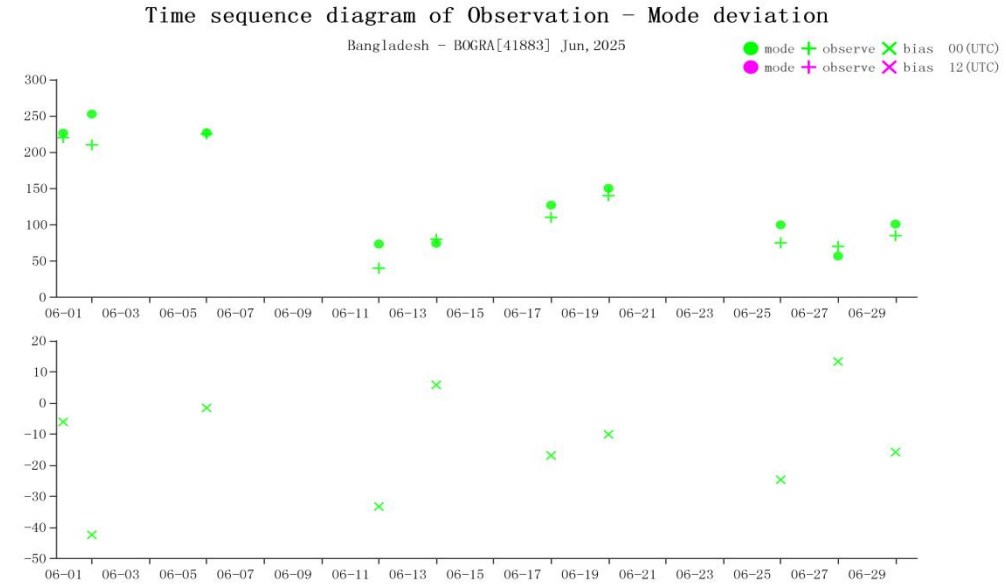

Figure 46 Time-series representation of WIN_D Obs minus first guess for station 41883(Level:250)

4. Comparison with Other Results

Element	CMA				EC				JMA			
	Member	Station	Time	Level	Member	Station	Time	Level	Member	Station	Time	Level
Geopotential Height	Russian Federation	21432	00	250	Russian Federation	21432	00	250	Russian Federation	21432	00	250
					Russian Federation	23933	12	250	Russian Federation	23933	00	300
					Russian Federation	23933	00	300	Russian Federation	23933	12	250
	Russian Federation	29839	00	100	Russian Federation	29839	00	200	Russian Federation	29839	00	200
	Russian Federation	29839	12	50	Russian Federation	29839	12	250	Russian Federation	29839	12	250
	Russian Federation	32389	00	30	Russian Federation	32389	12	70	Russian Federation	32389	00	200
	Russian Federation	32389	12	30	Russian Federation	32389	00	50	Russian Federation	32389	12	70
	Russian Federation	35121	00	30	Russian Federation	35121	12	50	Russian Federation	35121	00	30
	Russian Federation	35121	12	30	Russian Federation	35121	00	30	Russian Federation	35121	12	50
	Kazakhstan	36003	00	70	Kazakhstan	36003	00	150	Kazakhstan	36003	00	300
	Kazakhstan	38341	00	50	Kazakhstan	38341	00	250	Kazakhstan	38341	00	250
					Kazakhstan	38341	12	250	Kazakhstan	38341	12	400
	India	42314	12	250					India	42314	12	400
	India	42348	00	925								
	China	52323	00	30	China	52323	00	30	China	52323	00	70
	China	56080	00	30	China	56080	00	30				
Vector Wind	Kazakhstan	38341	12	250	Kazakhstan	38341	12	250				
					Kazakhstan	38341	00	100				
Wind Direction	Kazakhstan	38341	0						China	59431	12	
	Kazakhstan	38341	12									
	Bangladesh	41883	0									

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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