Radiosonde-No.8-MOC-CMA(2025)

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

August 2025

Regional WIGOS Centre, Beijing

China Meteorological Administration

No. 46 Zhongguancun Nandajie

Beijing, CHINA

Contents

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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 August 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 August

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	43311	AMINIDIVI	India	11.12	72.73
4	43369	MINICOY	India	8.28	73.06
5	43333	PORT BLAIR	India	11.67	92.72
6	40875	BANDARABBASS	Iran, Islamic Republic of	27.21	56.37
7	40800	ESFAHAN	Iran, Islamic Republic of	32.52	51.71
8	40754*	TEHRAN-MEHRABAD	Iran, Islamic Republic of	35.69	51.31
9	40848	SHIRAZ	Iran, Islamic Republic of	29.56	52.60
10	40745*	MASHHAD	Iran, Islamic Republic of	36.24	59.63
11	40650	BAGHDAD INT. AIRPORT	Iraq	33.30	44.40
12	47600*	WAJIMA	Japan	37.39	136.90
13	48097*	YANGON	Myanmar	16.86	96.15
14	48042*	MANDALAY	Myanmar	21.94	96.09
15	41594	SARGODHA (41594-0)	Pakistan	32.05	72.67
16	41661	QUETTA (SHEIKH MANDA)	Pakistan	30.27	66.92
17	41780	KARACHI AIRPORT	Pakistan	24.90	67.13

18	24944	OLEKMINSK (24944-1)	Russian Federation	60.37	120.42
19	30230*	KIRENSK	Russian Federation	57.77	108.07
20	32150*	JUZHNO-SAHALINSK	Russian Federation	46.95	142.72
21	31168	AYAN	Russian Federation	56.45	138.15
22	29839*	BARNAUL (29839-0)	Russian Federation	53.50	83.83
23	23921*	IVDEL'	Russian Federation	60.68	60.45
24	38954	KHOROG	Tajikistan	37.50	71.50
25	38836	DUSHANBE	Tajikistan	38.58	68.73
26	38507	TURKMENBASHI (38507-1)	Turkmenistan	40.03	52.98

This list includes the non-reporting stations with operational status during August, 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 August 2025

INDEX	STATION_CODE	MEMBER	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ (%)	BIAS	SD	RMS
1	23933*	Russian Federation	12	250	29	0	0	-77.7	29	83
2	25913*	Russian Federation	00	30	15	0	0	142	90.7	168.5
3	31770*	Russian Federation	00	70	25	0	0	82.8	88.2	121
4	31977*	Russian Federation	00	70	30	0	0	104.3	57.6	119.1
5	38341*	Kazakhstan	00	200	10	4	14.3	-54.8	97.6	112
6	40811*	Iran, Islamic Republic of	12	30	10	2	0	146.3	98.4	176.3
7	55591	China	00	30	21	0	4.8	190.4	95	212.7

8	55591	China	12	30	20	0	0	189.1	106.7	217.2

3.2.2 Suspect Station Analysis

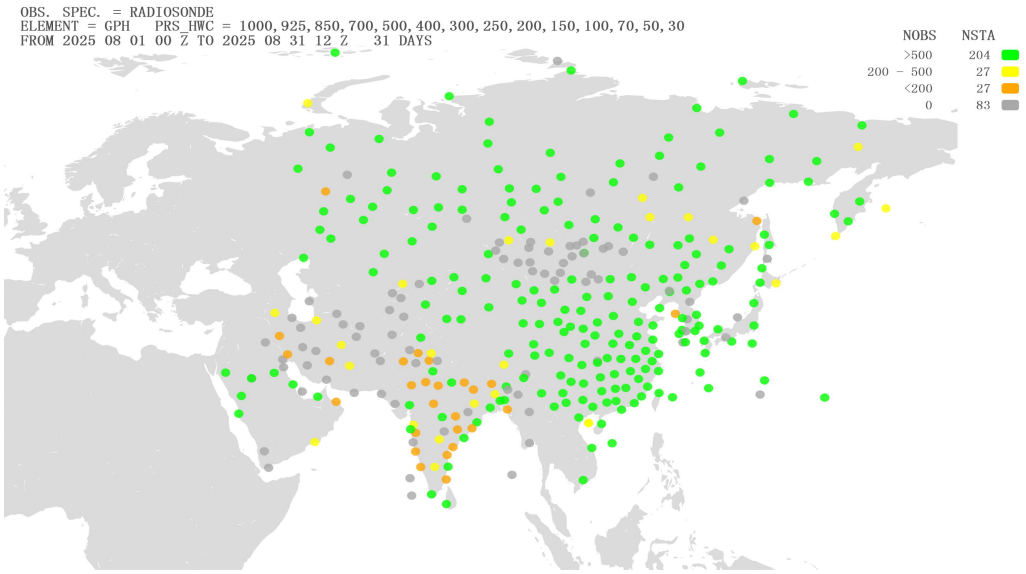

Figure 1 Location of all radiosonde stations reporting geopotential height observations in Region II over the month of August 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color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

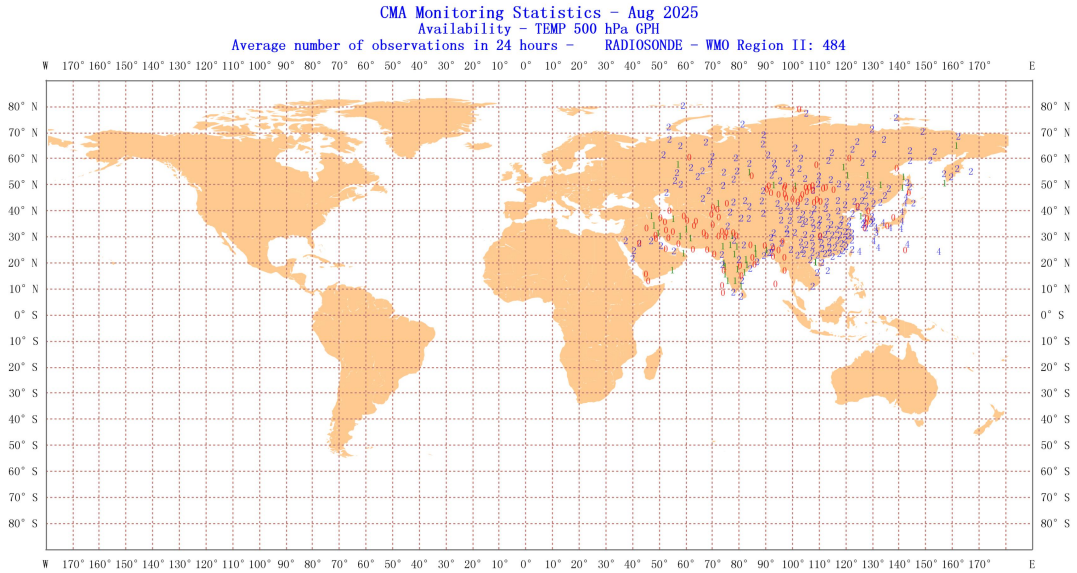

Figure 2 Location of all radiosonde stations reporting geopotential height average number of observations in 24 hours in Region II over the month of August 2025

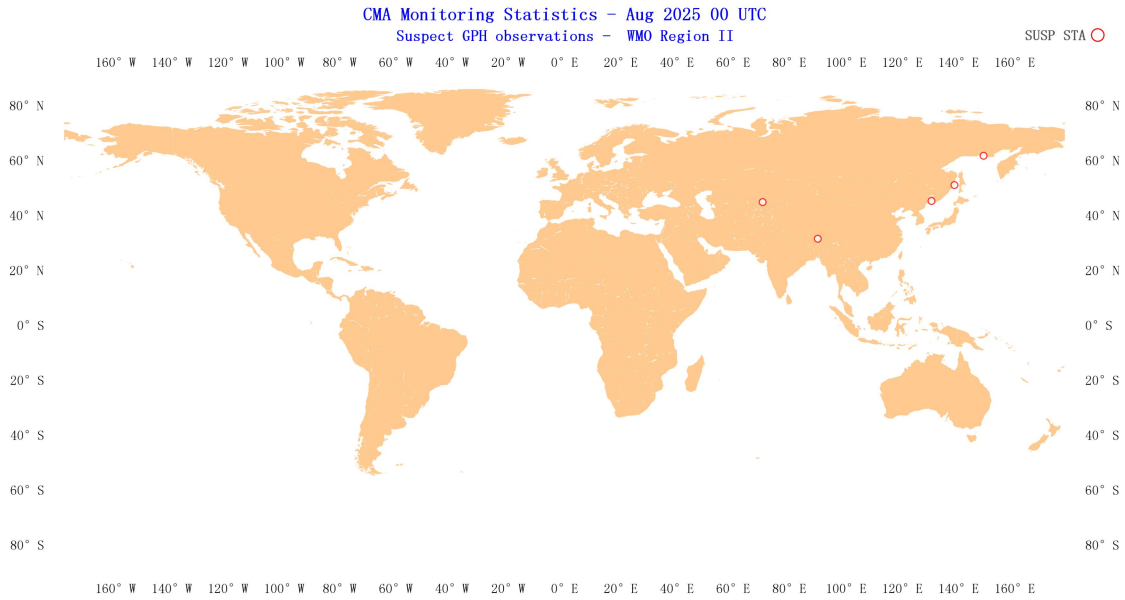

Figure 3 Distribution of suspect stations - Geopotential Height 00 UTC

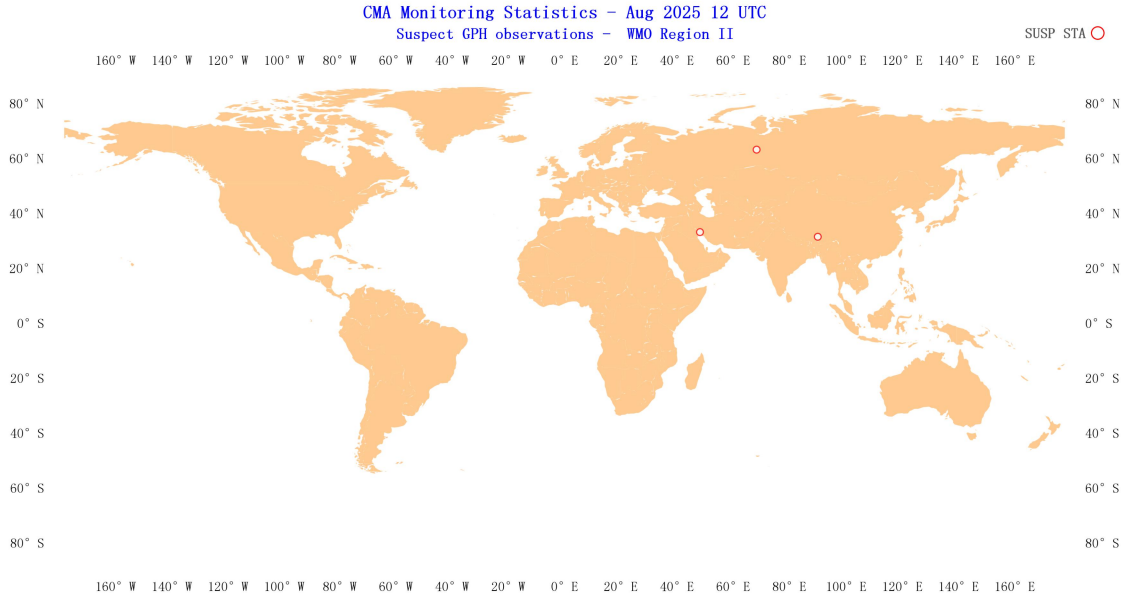

Figure 4 Distribution of suspect stations - Geopotential Height 12 UTC

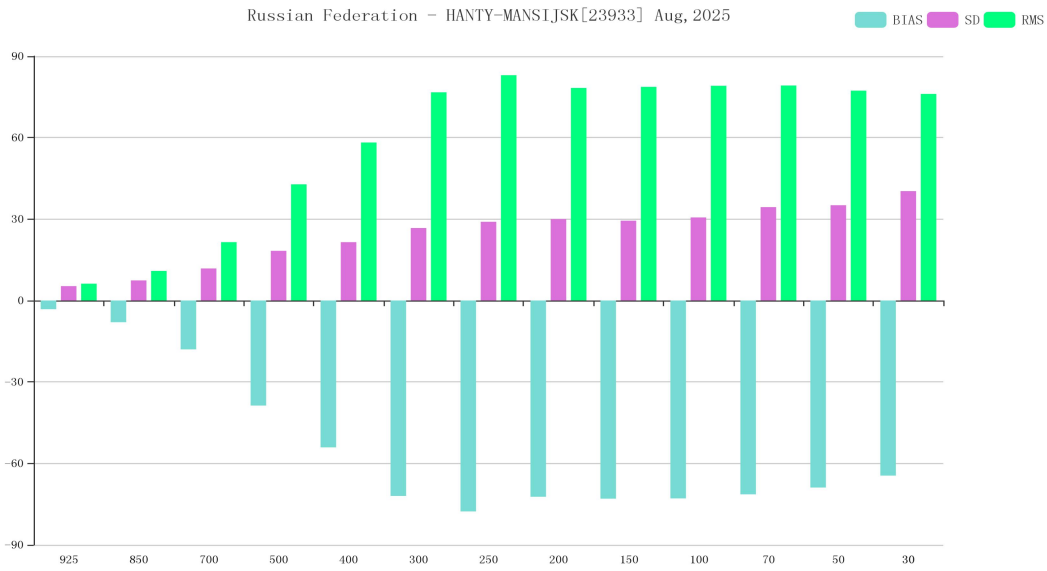

Figure 5 BIAS、SD and RMS of GPH for station 23933*(OBS-TIME:12)

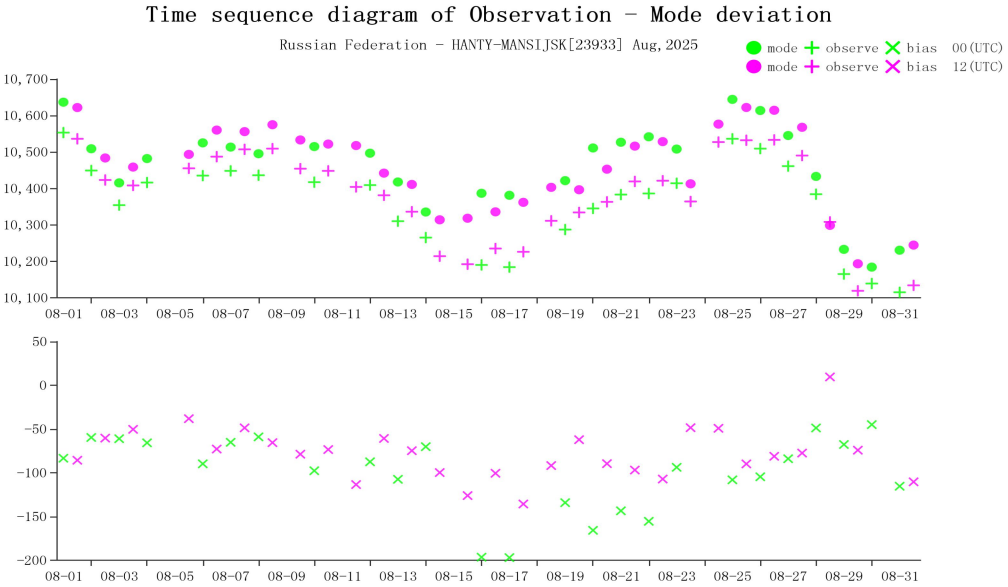

Figure 6 Time-series representation of GPH Obs minus first guess for station 23933*(Level:250)

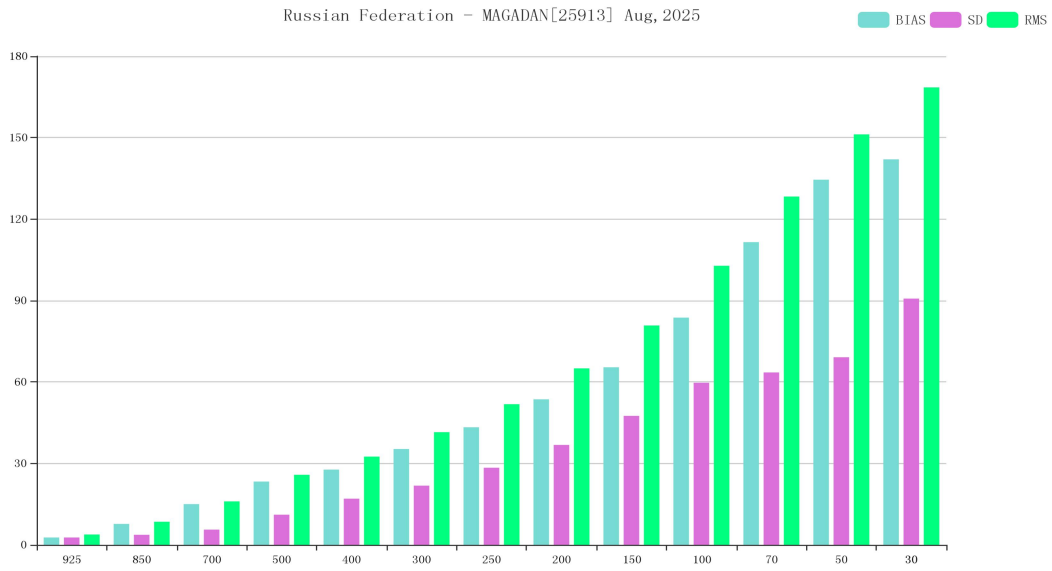

Figure 7 BIAS、SD and RMS of GPH for station 25913*(OBS-TIME:00)

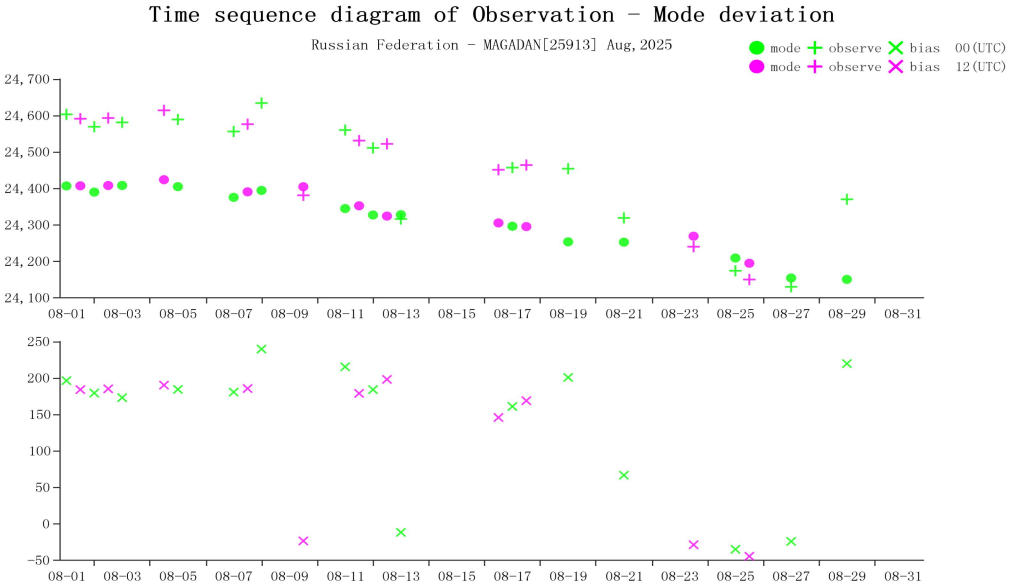

Figure 8 Time-series representation of GPH Obs minus first guess for station 25913*(Level:30)

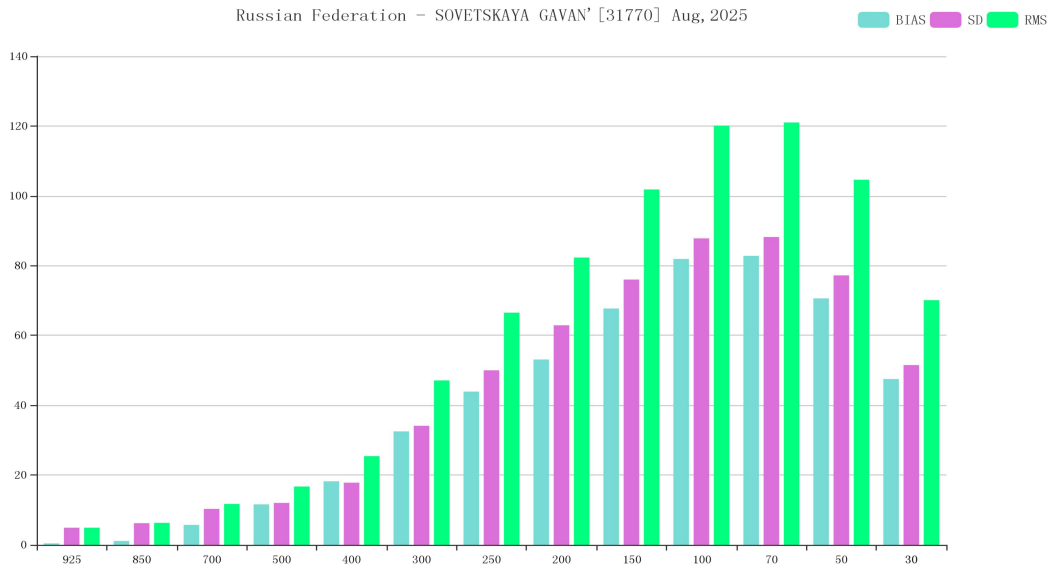

Figure 9 BIAS、SD and RMS of GPH for station 31770*(OBS-TIME:00)

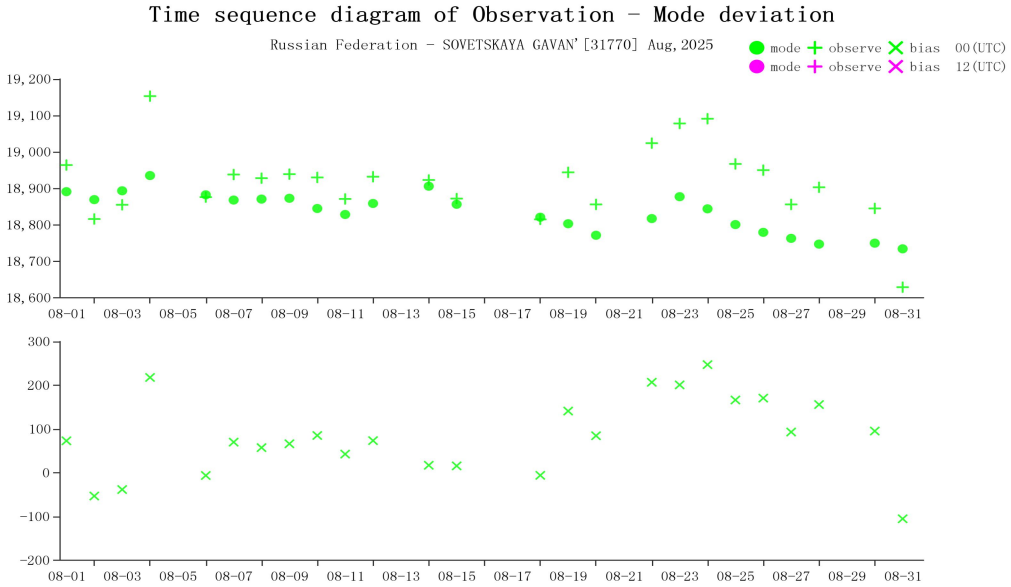

Figure 10 Time-series representation of GPH Obs minus first guess for station 31770*(Level:70)

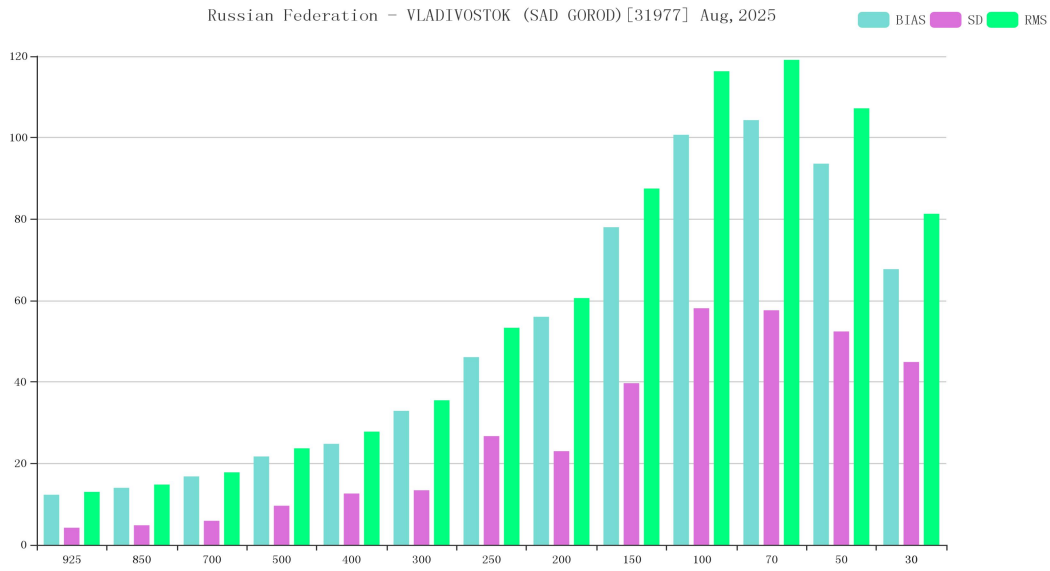

Figure 11 BIAS、SD and RMS of GPH for station 31977*(OBS-TIME:00)

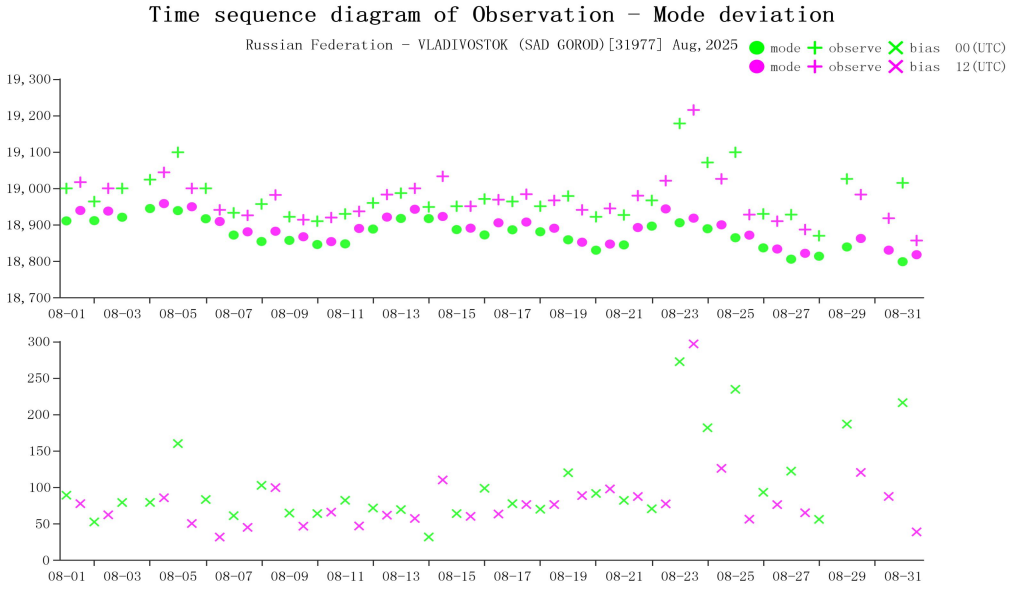

Figure 12 Time-series representation of GPH Obs minus first guess for station 31977*(Level:70)

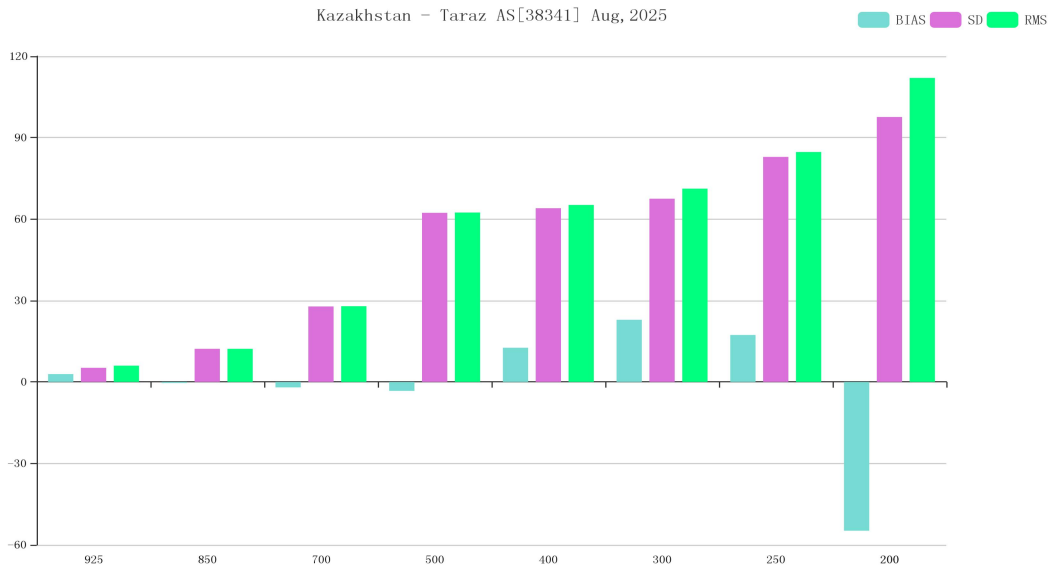

Figure 13 BIAS、SD and RMS of GPH for station 38341*(OBS-TIME:00)

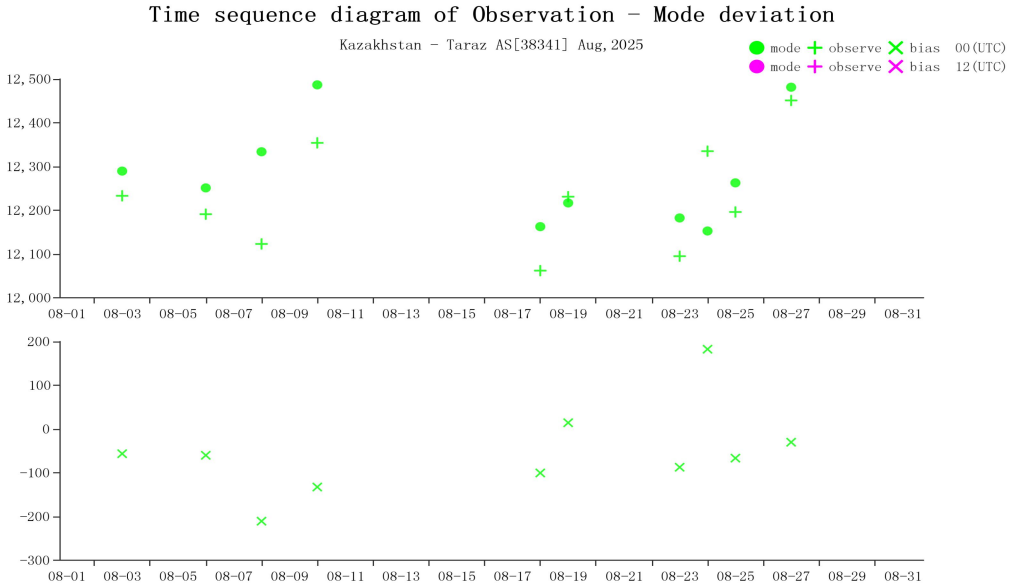

Figure 14 Time-series representation of GPH Obs minus first guess for station 38341*(Level:200)

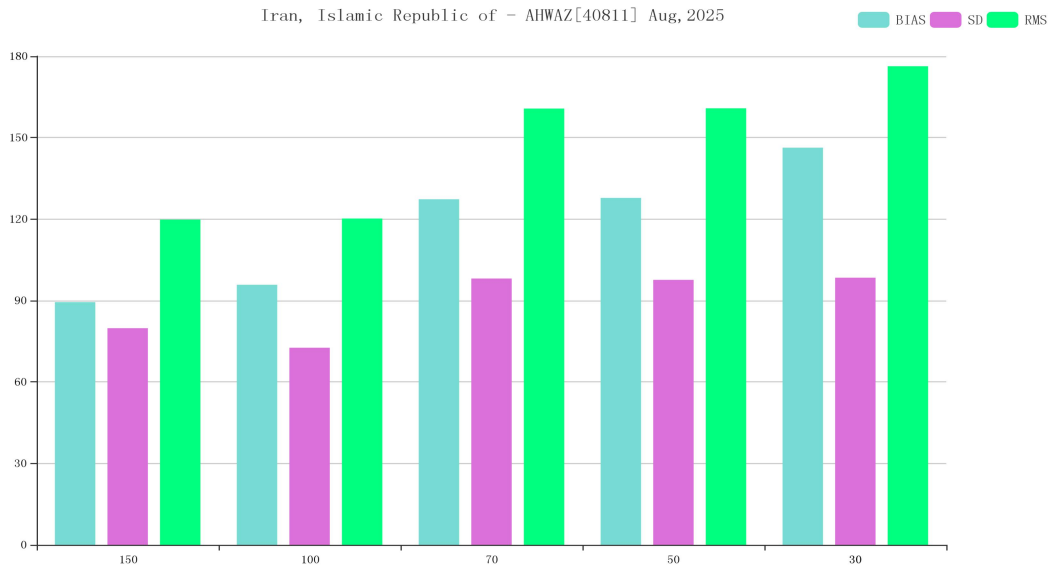

Figure 15 BIAS、SD and RMS of GPH for station 40811*(OBS-TIME:12)

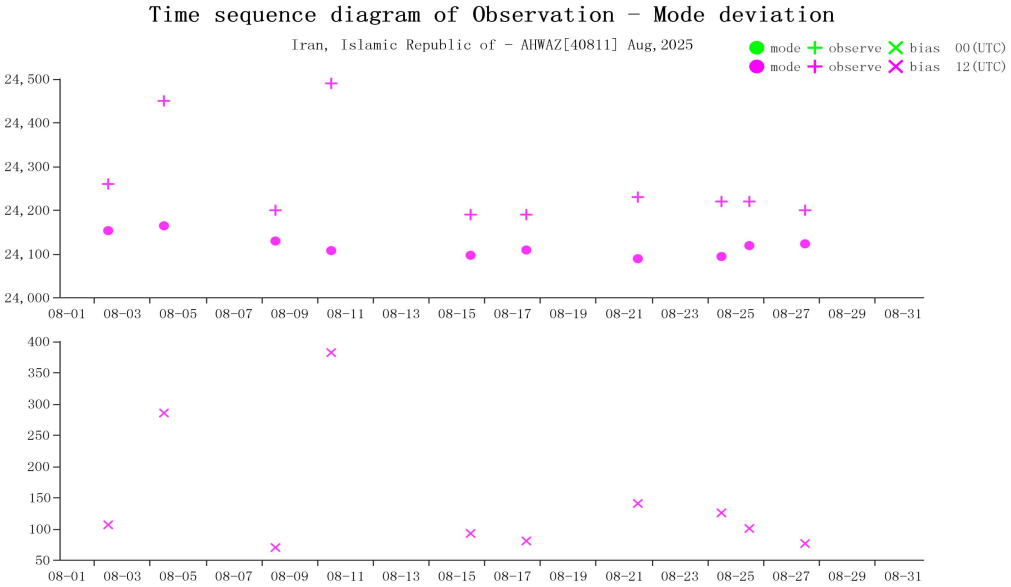

Figure 16 Time-series representation of GPH Obs minus first guess for station 40811*(Level:30)

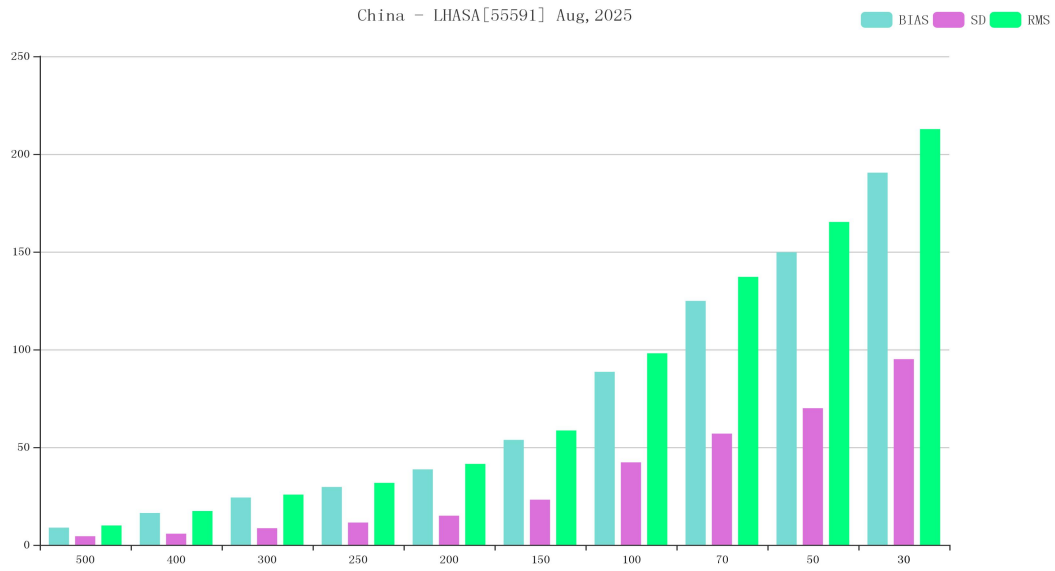

Figure 17 BIAS、SD and RMS of GPH for station 55591(OBS-TIME:00)

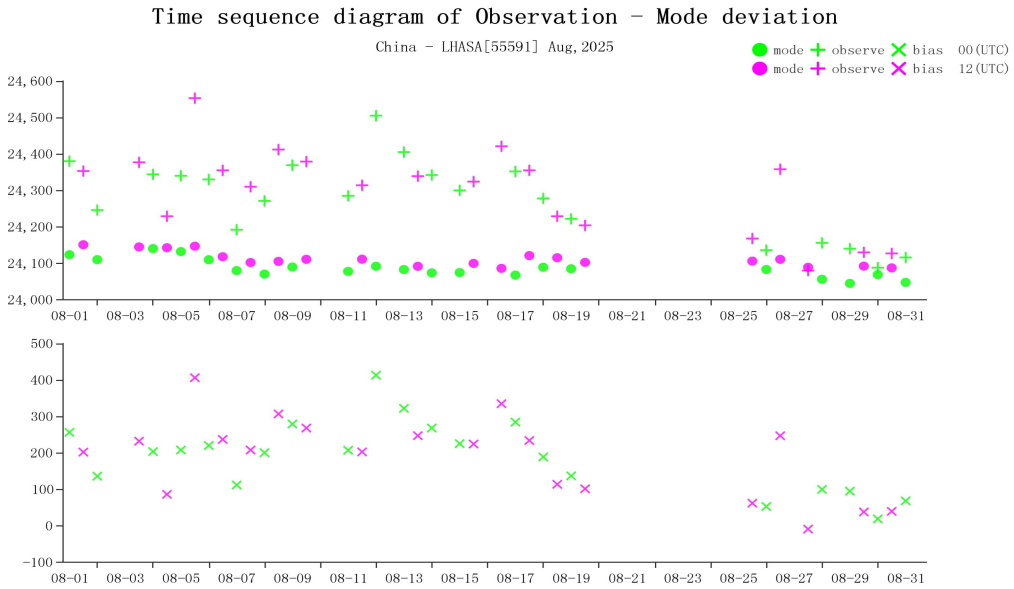

Figure 18 Time-series representation of GPH Obs minus first guess for station 55591(Level:30)

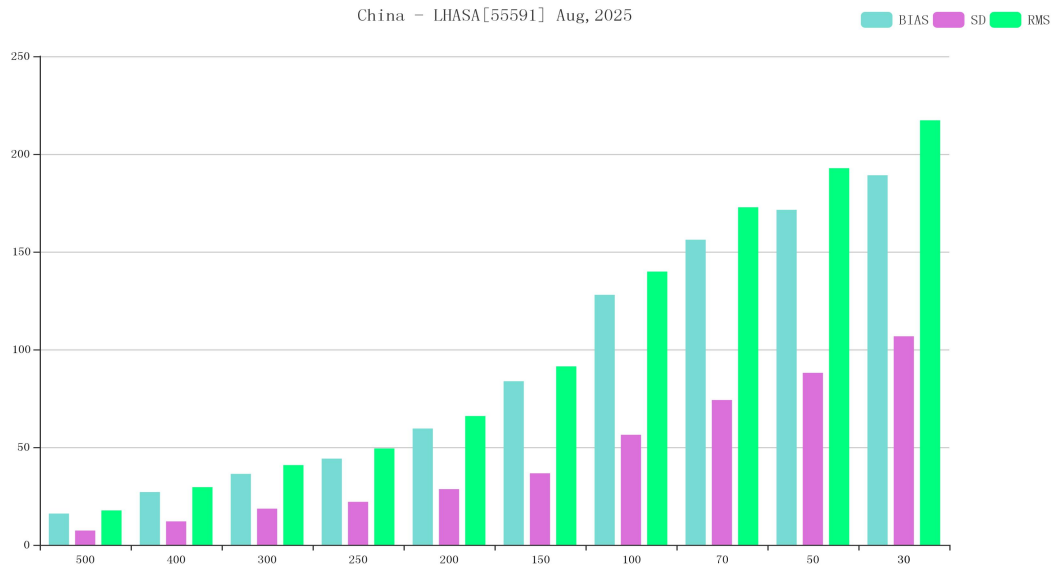

Figure 19 BIAS、SD and RMS of GPH for station 55591(OBS-TIME:12)

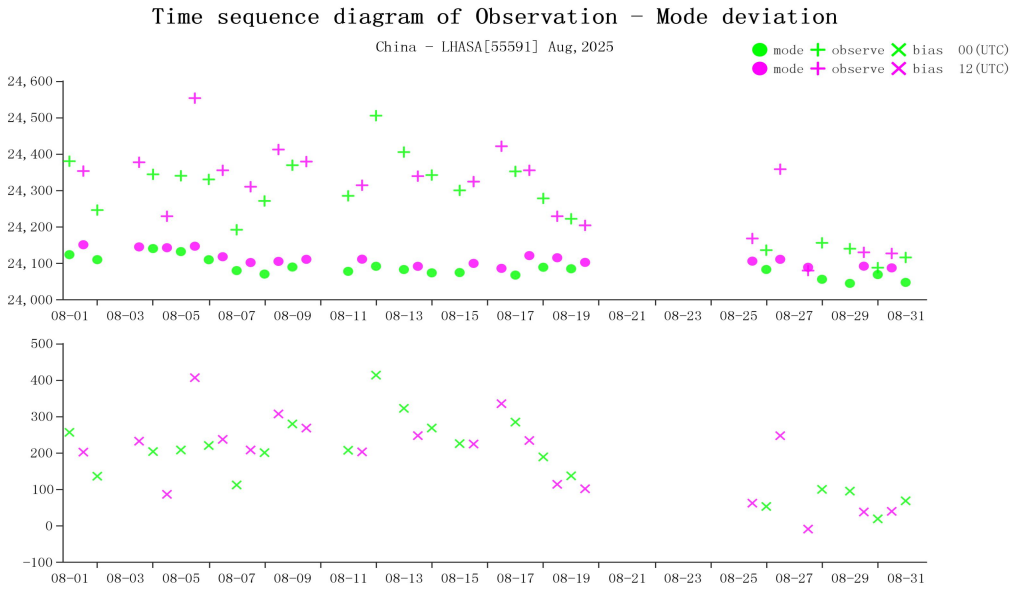

Figure 20 Time-series representation of GPH Obs minus first guess for station 55591(Level:30)

3.3 Vector Wind (WIN_S)

3.3.1 List of Suspect Stations

Table 3 List of WIN_S suspected in August 2025

INDEX	STATION_CODE	MEMBER	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ（%）	BIAS	SD	RMS
1	38341*	Kazakhstan	00	300	18	1	0	6	16	17.1
2	38341*	Kazakhstan	12	500	16	2	0	10.7	12.5	16.4

3.3.2 Suspect Station Analysis

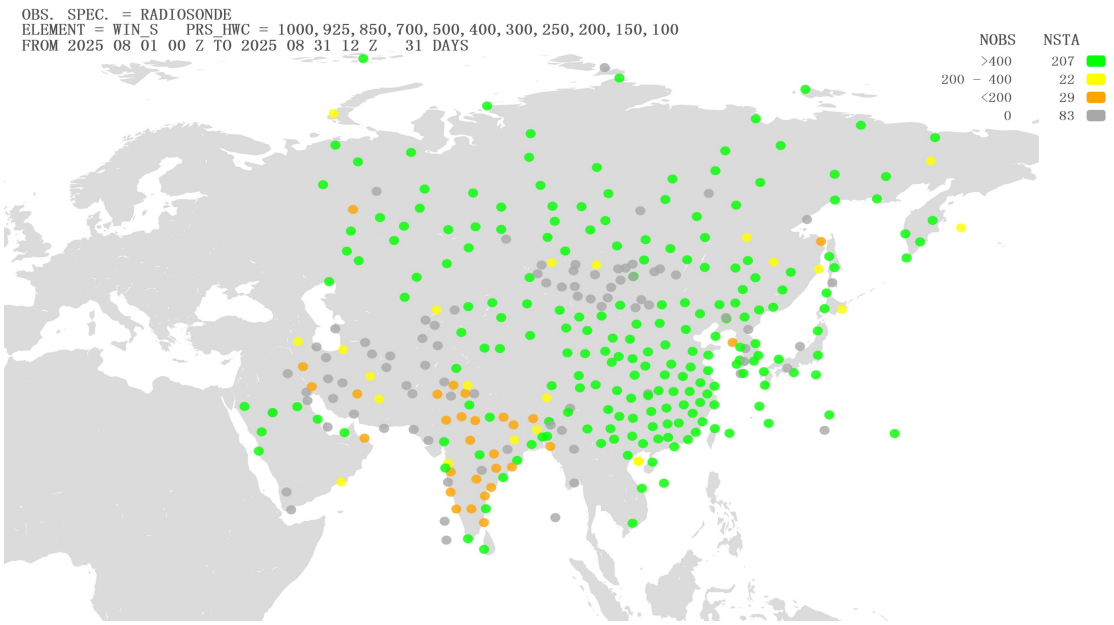

Figure 21 Location of all radiosonde stations reporting vector wind observations in Region II over the month of August 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green 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

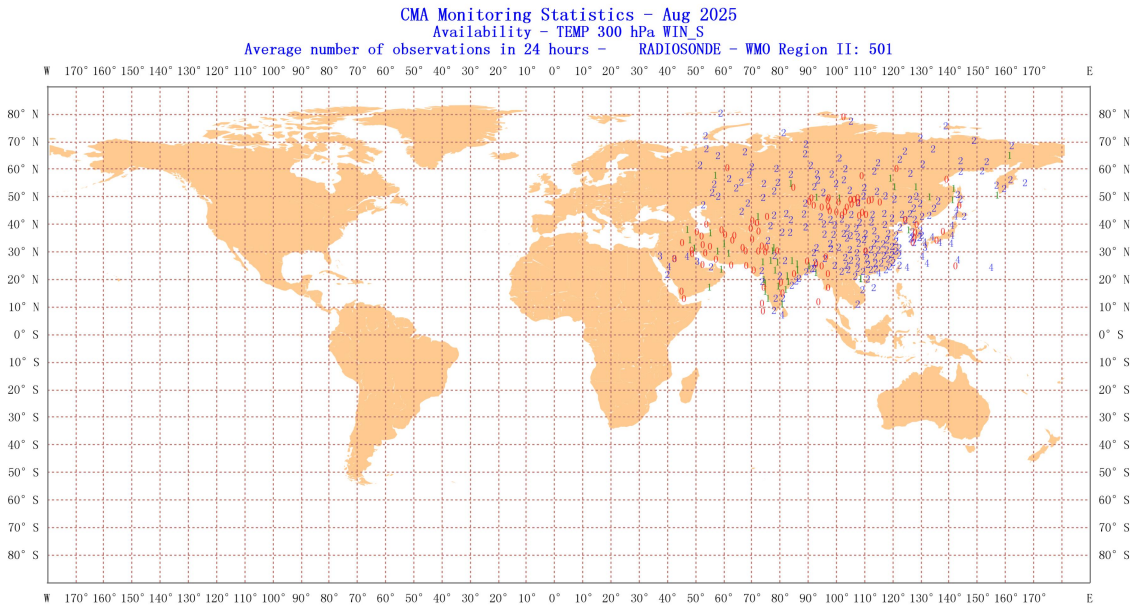

Figure 22 Location of all radiosonde stations reporting vector wind average number of observations in 24 hours in Region II over the month of August 2025

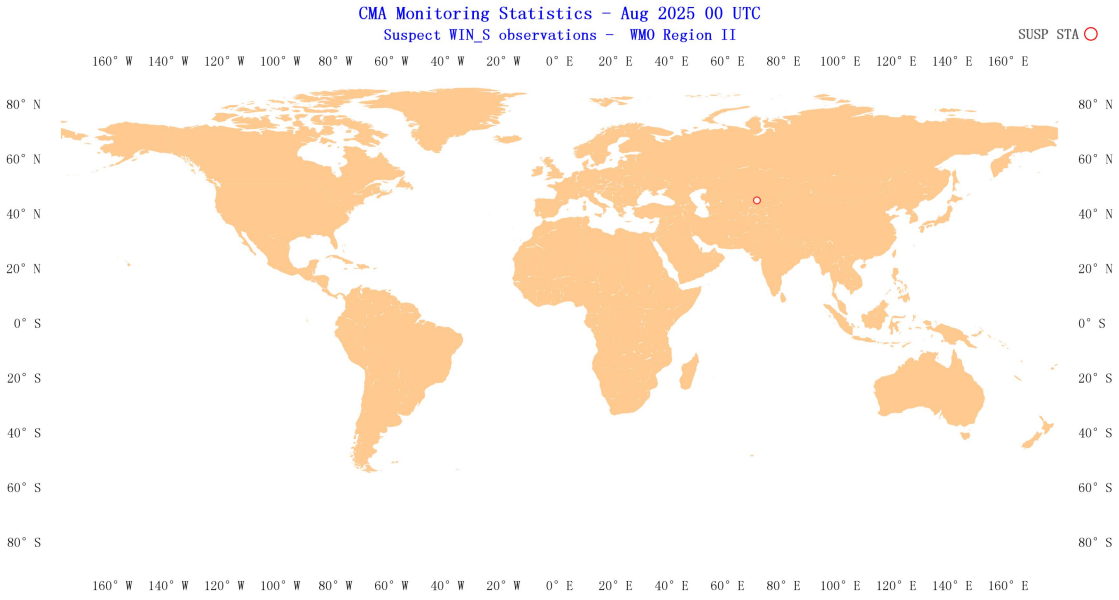

Figure 23 Distribution of suspect stations - Vector Wind 00 UTC

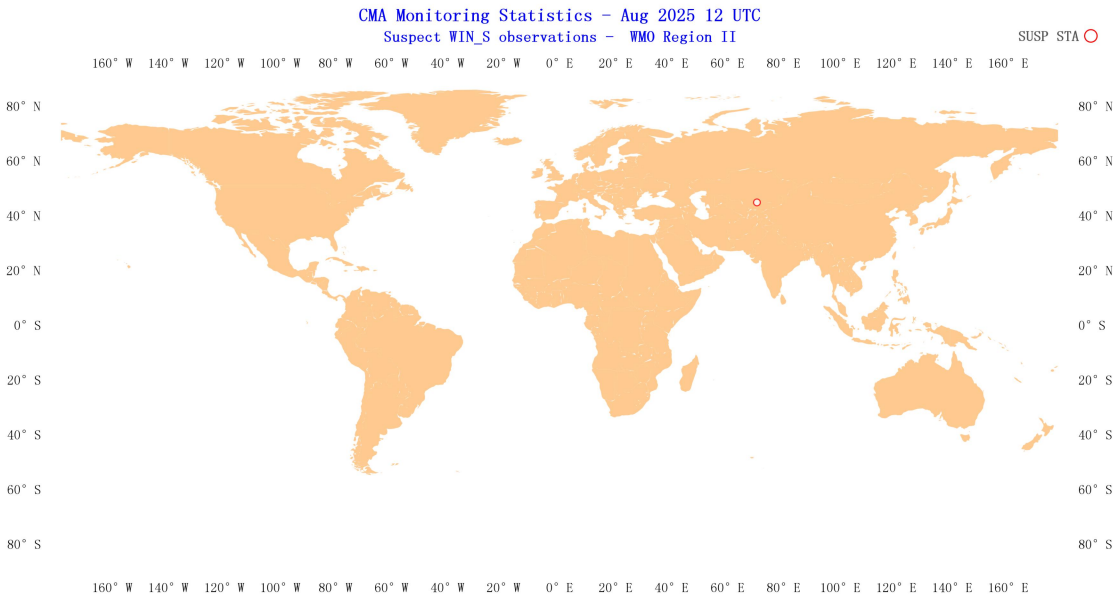

Figure 24 Distribution of suspect stations - Vector Wind 12 UTC

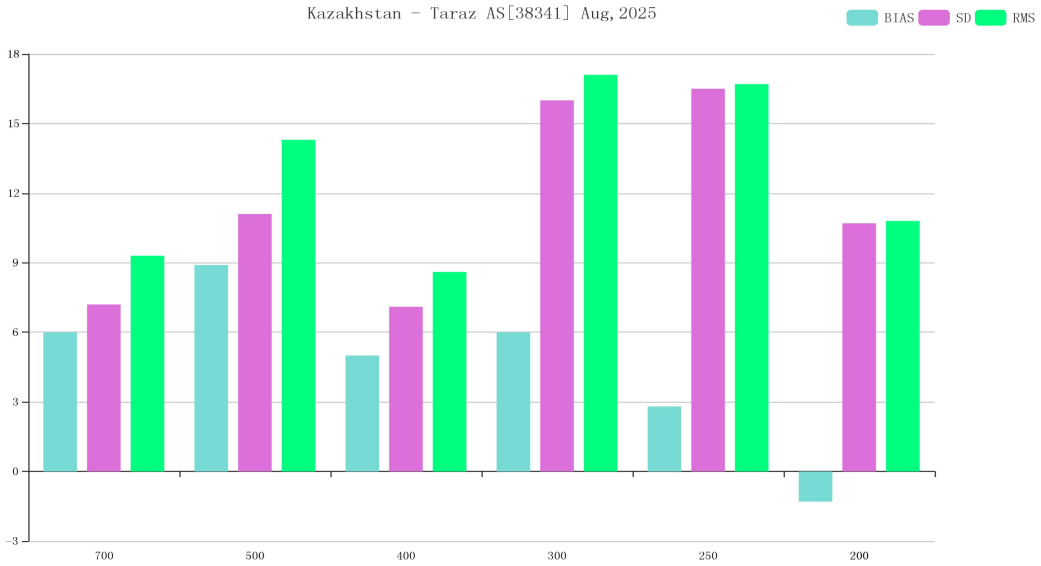

Figure 25 BIAS、SD and RMS of WIN_S for station 38341*(OBS-TIME:00)

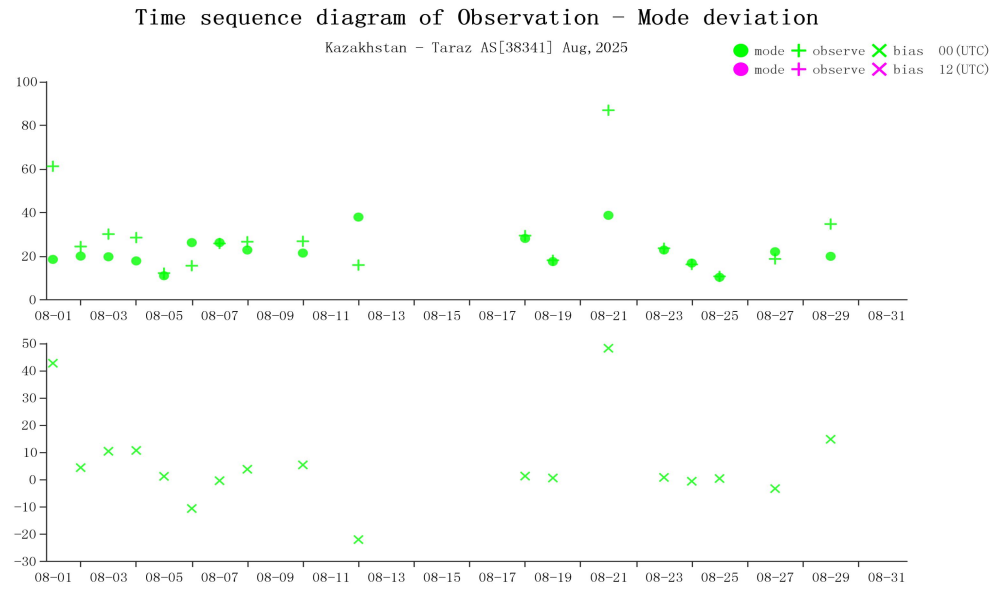

Figure 26 Time-series representation of WIN_S Obs minus first guess for station 38341*(Level:300)

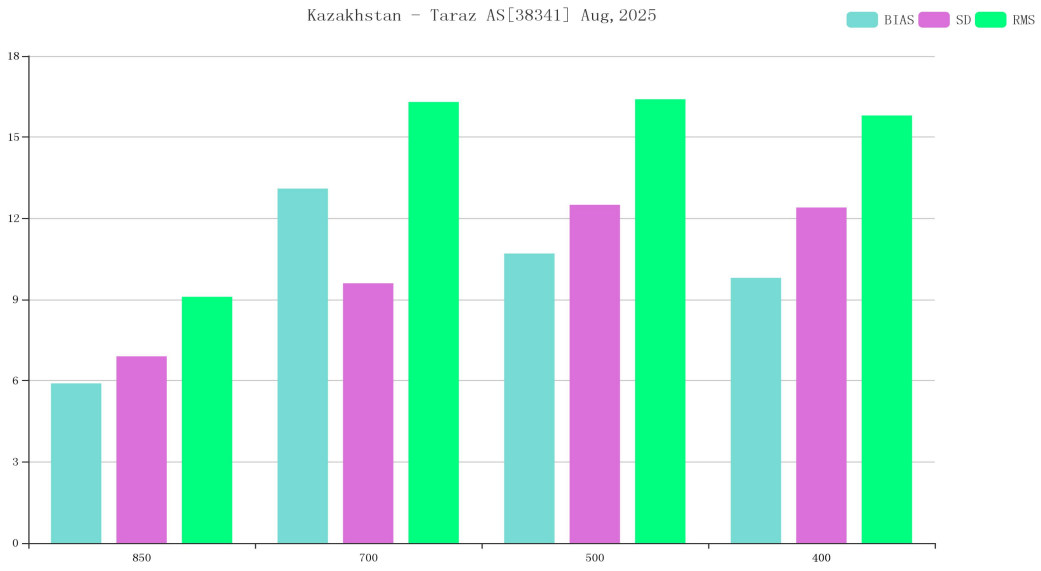

Figure 27 BIAS、SD and RMS of WIN_S for station 38341*(OBS-TIME:12)

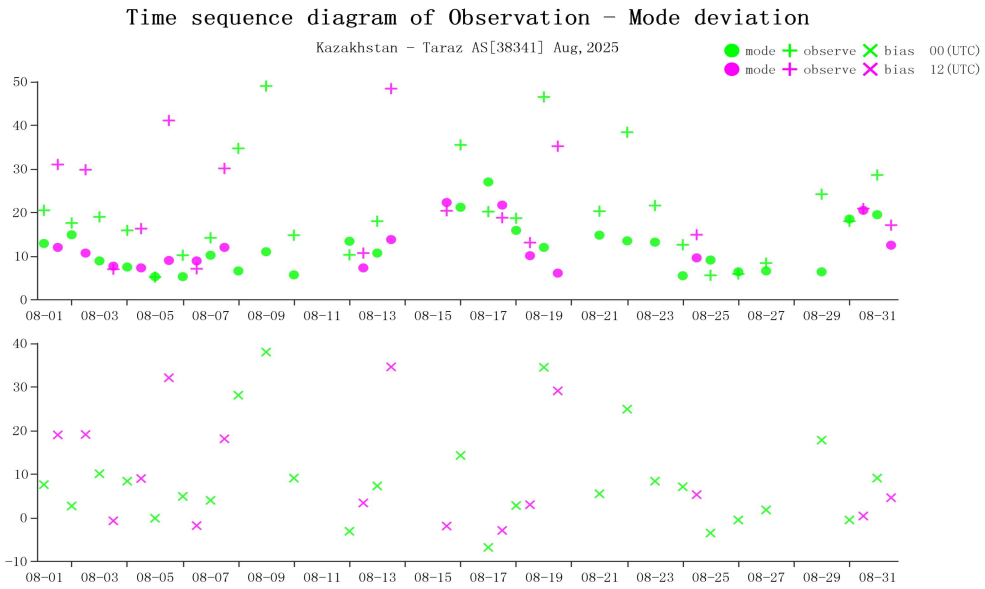

Figure 28 Time-series representation of WIN_S Obs minus first guess for station 38341*(Level:500)

3.4 Wind Direction (WIN_D)

3.4.1 List of Suspect Stations

Table 4 List of WIN_D suspected in August 2025

INDEX	STATION_CODE	MEMBER	OBS TIME	NUM OBS	BIAS	SD	MAX SPREAD
1	43049	India	00	10	10.2	8.2	0.4

3.4.2 Suspect Station Analysis

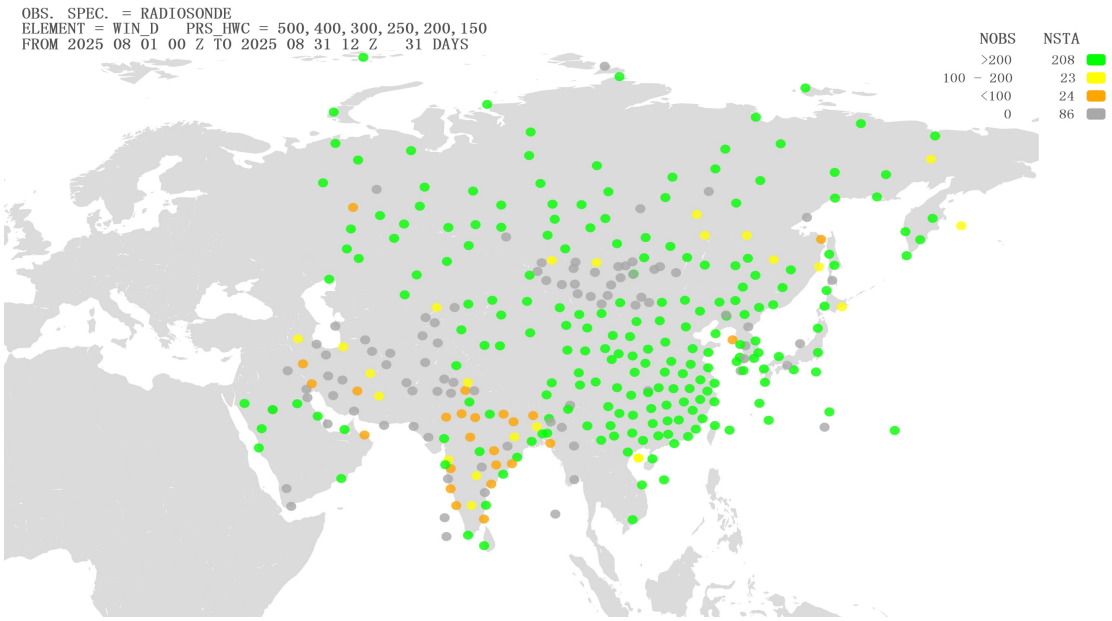

Figure 29 Location of all radiosonde stations reporting wind direction observations in Region II over the month of August 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color 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

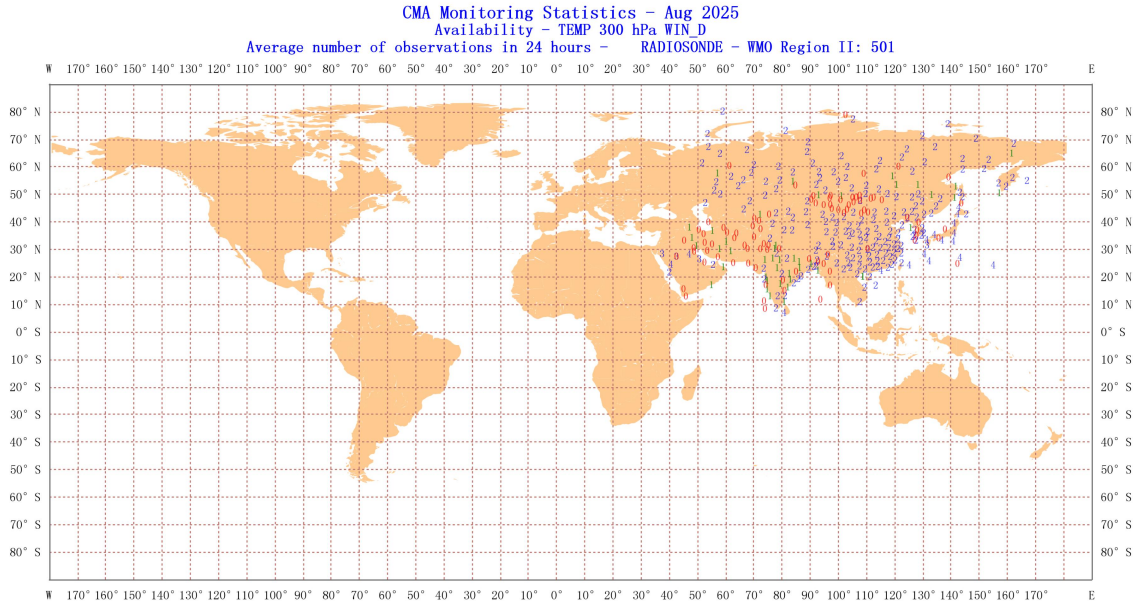

Figure 30 Location of all radiosonde stations reporting wind direction average number of observations in 24 hours in Region II over the month of August 2025

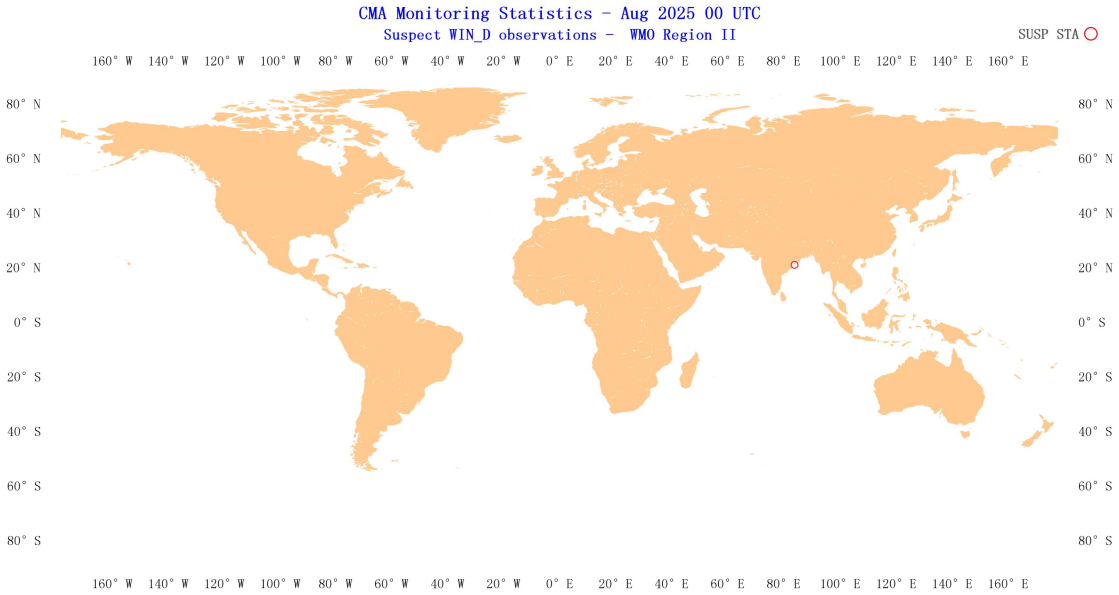

Figure 31 Distribution of suspect stations - Wind Direction 00 UTC

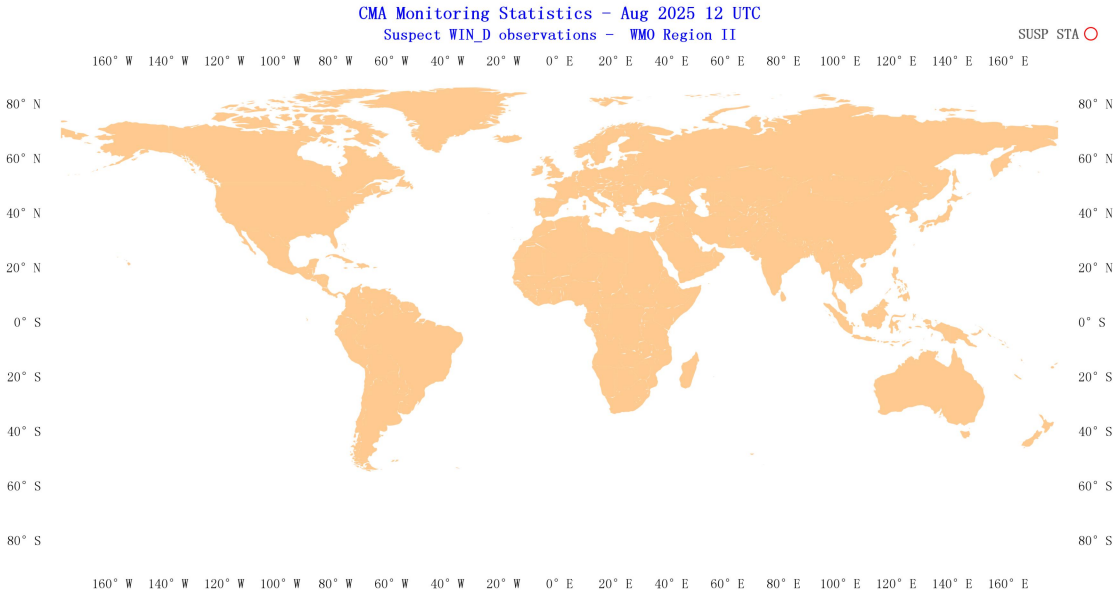

Figure 32 Distribution of suspect stations - Wind Direction 12 UTC

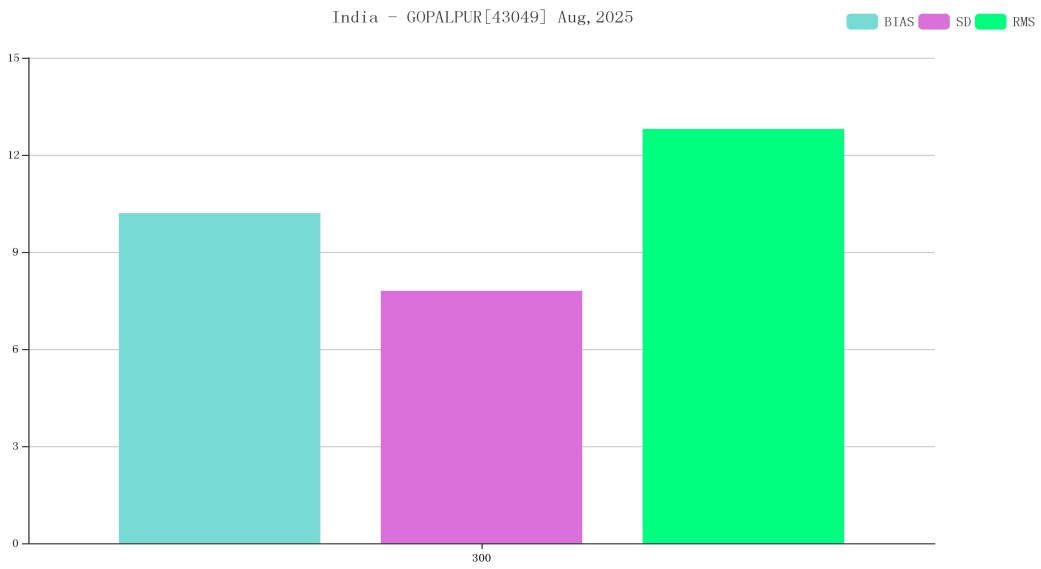

Figure 33 BIAS、SD and RMS of WIN_D for station 43049(OBS-TIME:00)

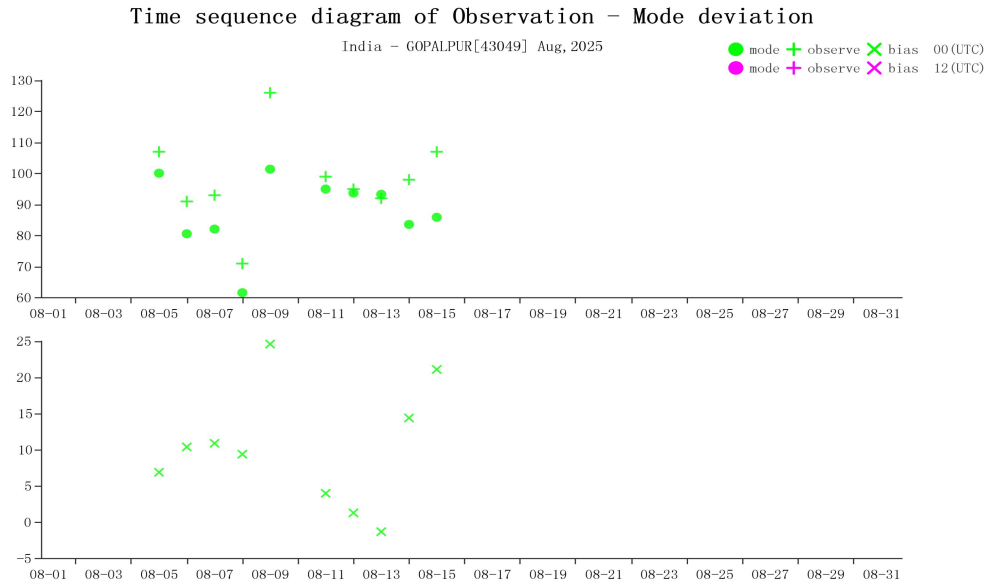

Figure 34 Time-series representation of WIN_D Obs minus first guess for station 43049(Level:300)

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	23933	00	250	Russian Federation	23933	00	250
	Russian Federation	23933	12	250	Russian Federation	23933	12	250				
	Russian Federation	25913	00	30								
									Russian Federation	24688	00	30
					Russian Federation	30673	12	150	Russian Federation	30673	12	150
	Russian Federation	31770	00	70	Russian Federation	31770	00	150	Russian Federation	31770	00	150
	Russian Federation	31977	00	70								
	Kazakhstan	38341	00	200	Kazakhstan	38341	00	200	Kazakhstan	38341	00	200
	Iran, Islamic Republic of	40811	12	30	Iran, Islamic Republic of	40811	12	200	Iran, Islamic Republic of	40811	12	200
					India	42726	00	850				
					Korea, Republic of	47102	00	50	Korea, Republic of	47102	00	50
					Korea, Republic of	47102	12	30	Korea, Republic of	47102	12	30
	China	55591	00	30	China	55591	00	30	China	55591	00	30
	China	55591	12	30	China	55591	12	50	China	55591	12	50
Vector Wind	Kazakhstan	38341	00	300	Kazakhstan	38341	00	200				
	Kazakhstan	38341	12	500	Kazakhstan	38341	12	500				
Wind Direction	India	43049	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:

Project Leader:

Shi Lijuan (Ms.), Yao Dan (Mr.)

Tech Support Staff:

Cui Xiai (Ms.), Dai Zhiying (Ms.), Guan Yunong (Ms.), Ding Yuhao(Mr.), Guo Qiyun (Mr.)

Tel: 86-10-58991513

E-mail: rwc-bj@cma.gov.cn

Regional WIGOS Centre in RA II (Beijing)

CMA Meteorological Observation Centre