

Radiosonde-No.3-MOC-CMA(2025)

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

March 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 March 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  $\geq$  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 (°)
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 Non-Reporting Stations with Operational Status

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

INDEX	STATION_CODE	STATION_NAME	COUNTRY	LAT	LON
1	40948	KABUL AIRPORT	Afghanistan	34.55	69.22
2	40938	HERAT	Afghanistan	34.22	62.22
3	42667	BHOPAL/BAIRAGHAR	India	23.28	77.35
4	43192	GOA/PANJIM	India	15.48	73.82
5	43311	AMINIDIVI	India	11.12	72.73
6	42724	AGARTALA	India	23.88	91.25
7	42701	M.O. RANCHI	India	23.32	85.32
8	43285	MANGALORE/PANAMBUR	India	12.95	74.83
9	43369	MINICOY	India	8.28	73.06
10	42101* <sup>1</sup>	PATIALA	India	30.33	76.47
11	42492	PATNA	India	25.60	85.17
12	47418*	KUSHIRO (47418-1)	Japan	42.95	144.44
13	47600*	WAJIMA	Japan	37.39	136.90
14	40582	KUWAIT INTERNATIONAL AIRPORT (40582-1)	Kuwait	29.24	47.97
15	48097*	YANGON	Myanmar	16.86	96.15
16	48042*	MANDALAY	Myanmar	21.94	96.09
17	41780	KARACHI AIRPORT	Pakistan	24.90	67.13
18	41661	QUETTA (SHEIKH MANDA)	Pakistan	30.27	66.92
19	41594	SARGODHA (41594-0)	Pakistan	32.05	72.67

<sup>1</sup> "\*" represents GBON station

20	24944	OLEKMINSK (24944-1)	Russian Federation	60.37	120.42
21	30935*	KRASNYJ CHIKOJ	Russian Federation	50.37	108.75
22	30230*	KIRENSK	Russian Federation	57.77	108.07
23	31168	AYAN	Russian Federation	56.45	138.15
24	30715*	ANGARSK	Russian Federation	52.48	103.85
25	38954	KHOROG	Tajikistan	37.50	71.50
26	38836	DUSHANBE	Tajikistan	38.58	68.73
27	38507	TURKMENBASHI (38507-1)	Turkmenistan	40.03	52.98

The list is the stations that did not receive data from March, 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.

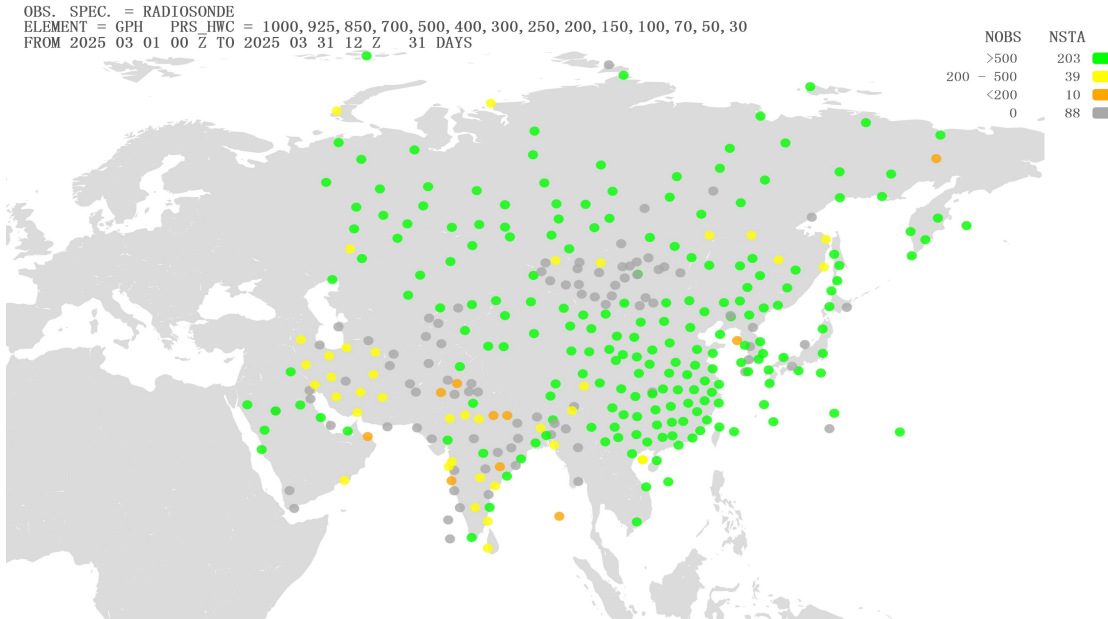
## 3.2 Geopotential Height (GPH)

### 3.2.1 List of Suspect Stations

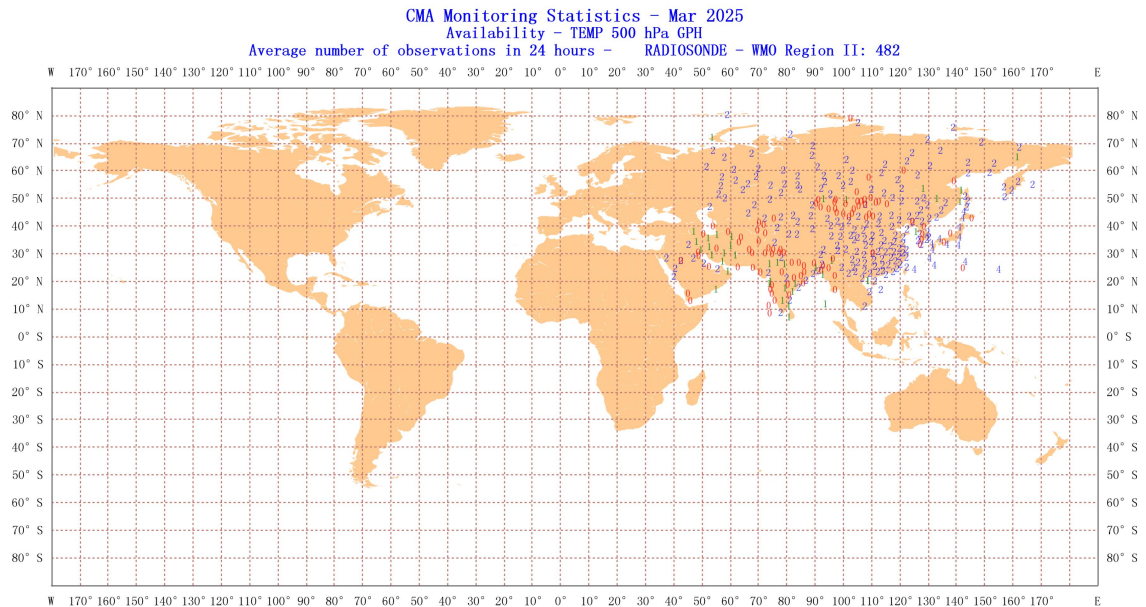
Table 2 List of GPH suspected in March 2025

INDEX	WMO IDENT	COUNTRY	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ (%)	BIAS	SD	RMS
1	31770*	Russian Federation	00	150	29	0	0	68.2	51.7	85.6
2	38341*	Kazakhstan	00	200	11	9	25	-53	95	108.7
3	38341*	Kazakhstan	12	300	12	11	4.3	-51.9	97.7	110.6
4	42348	India	00	700	25	0	0	37.2	12.7	39.3
5	47230	Korea, Republic of	00	500	23	0	0	49.6	51.3	71.3
6	47230	Korea, Republic of	12	500	22	0	0	58	52.1	78
7	54374	China	00	30	28	0	0	186.3	82.7	203.8
8	58027	China	00	30	28	0	0	129.3	149.9	197.9

### 3.2.2 Suspect Station Analysis

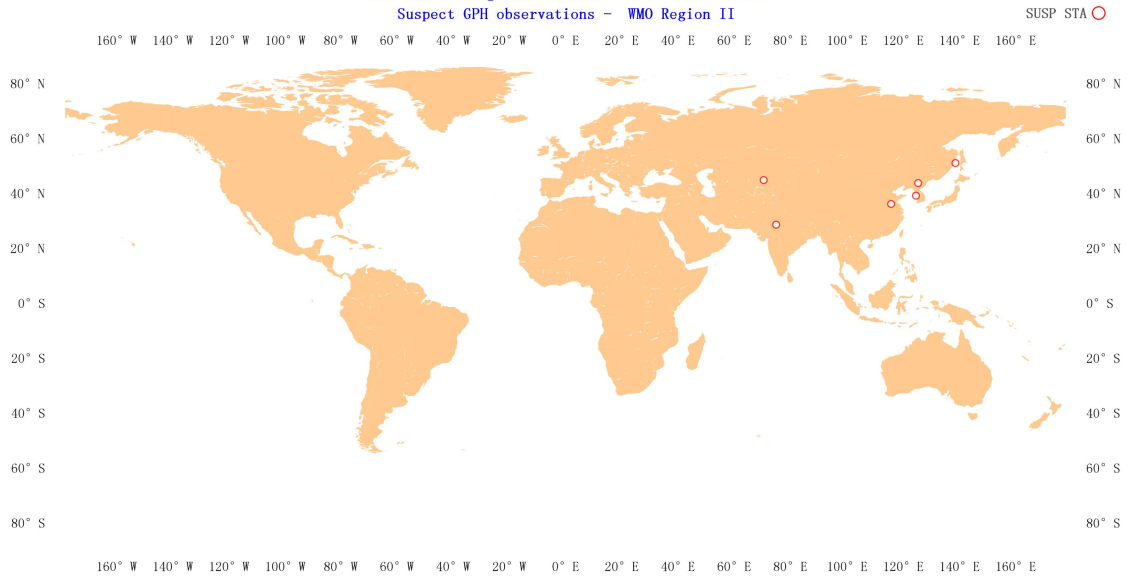


Location of all radiosonde stations reporting geopotential height observations in Region II over the month of March 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green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



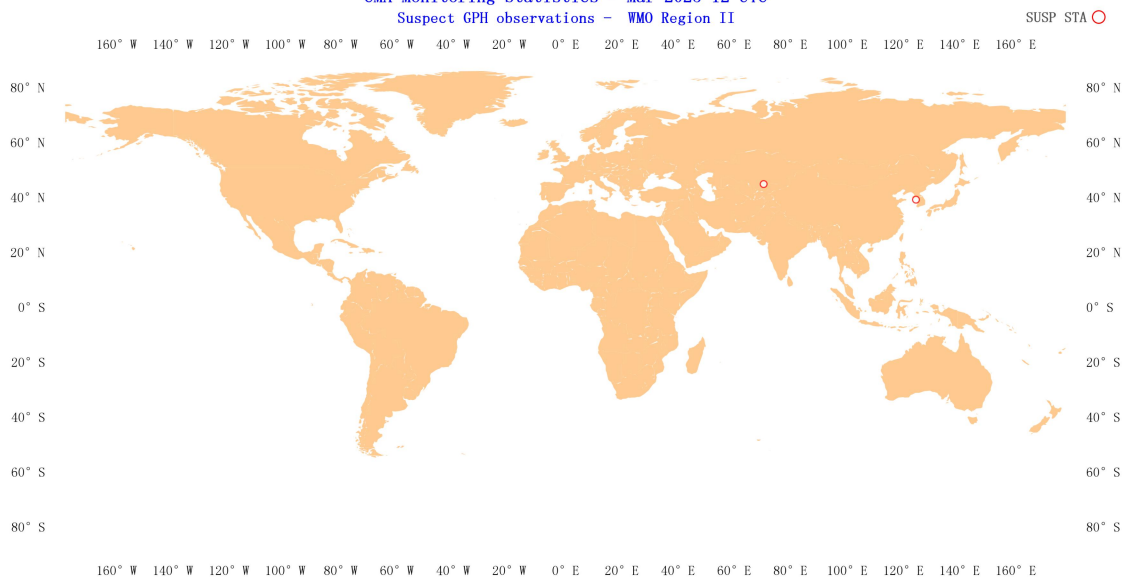
Location of all radiosonde stations reporting geopotential height average number of observations in 24 hours in Region II over the month of March 2025.

CMA Monitoring Statistics - Mar 2025 00 UTC  
Suspect GPH observations - WMO Region II

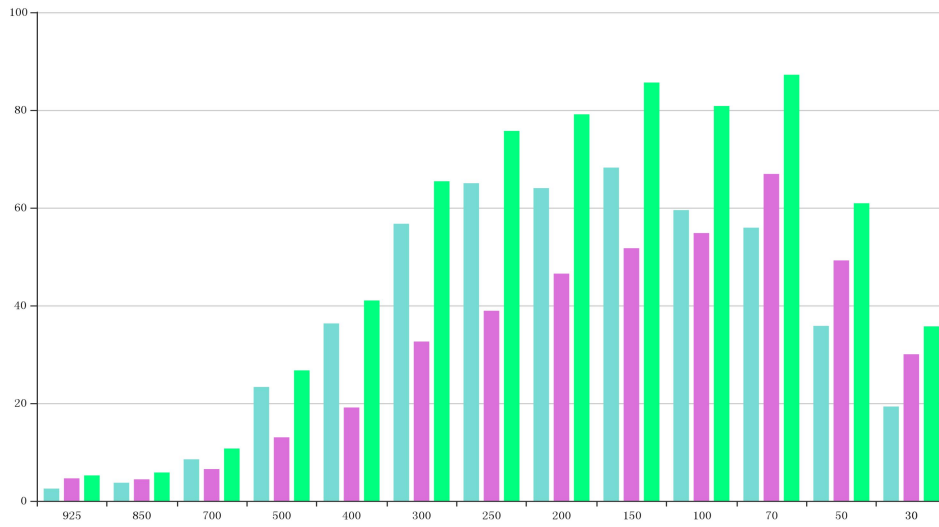


Distribution of suspect stations - Geopotential Height 00 UTC

CMA Monitoring Statistics - Mar 2025 12 UTC  
Suspect GPH observations - WMO Region II

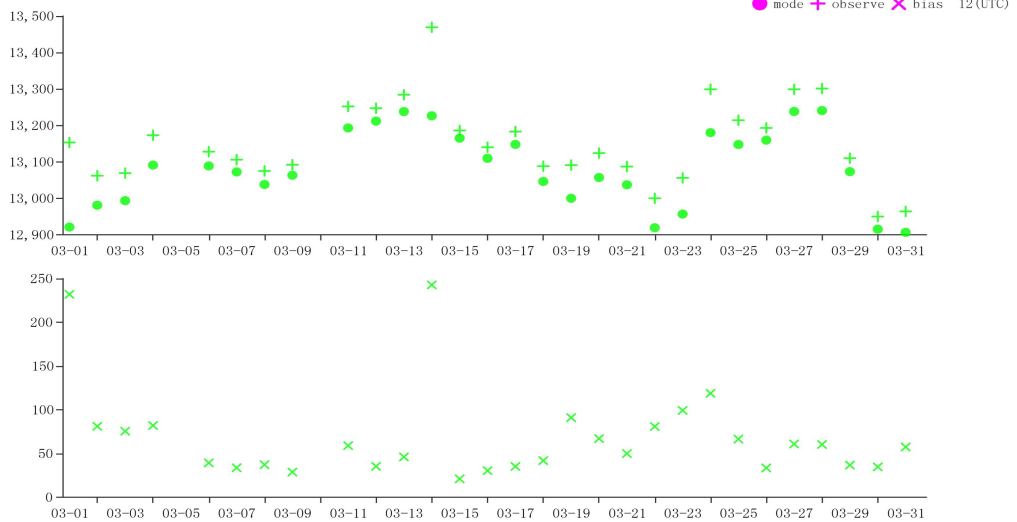


Distribution of suspect stations - Geopotential Height 12 UTC

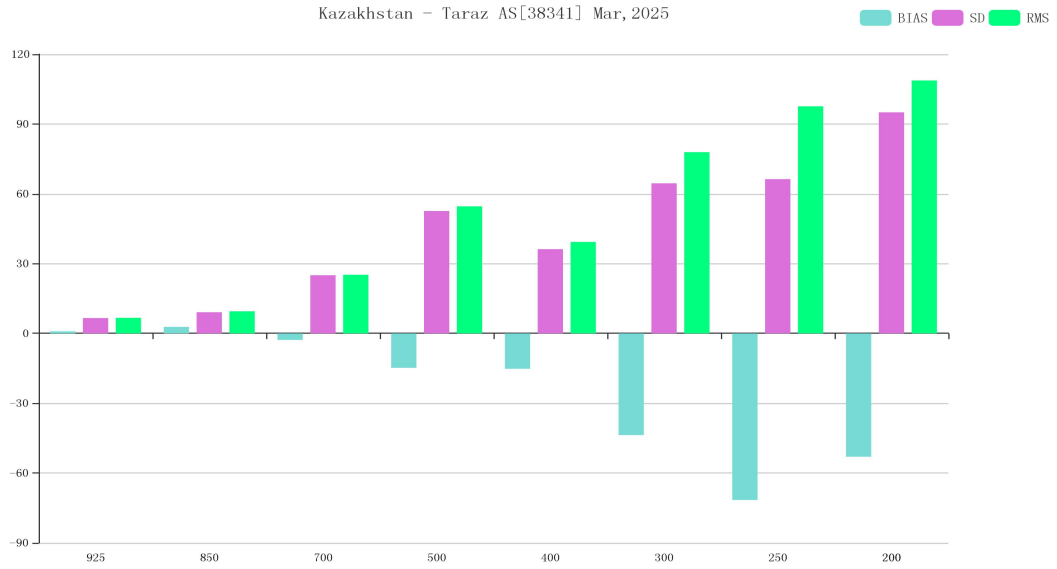


BIAS、SD and RMS of GPH for station 31770\*(OBS-TIME:00)

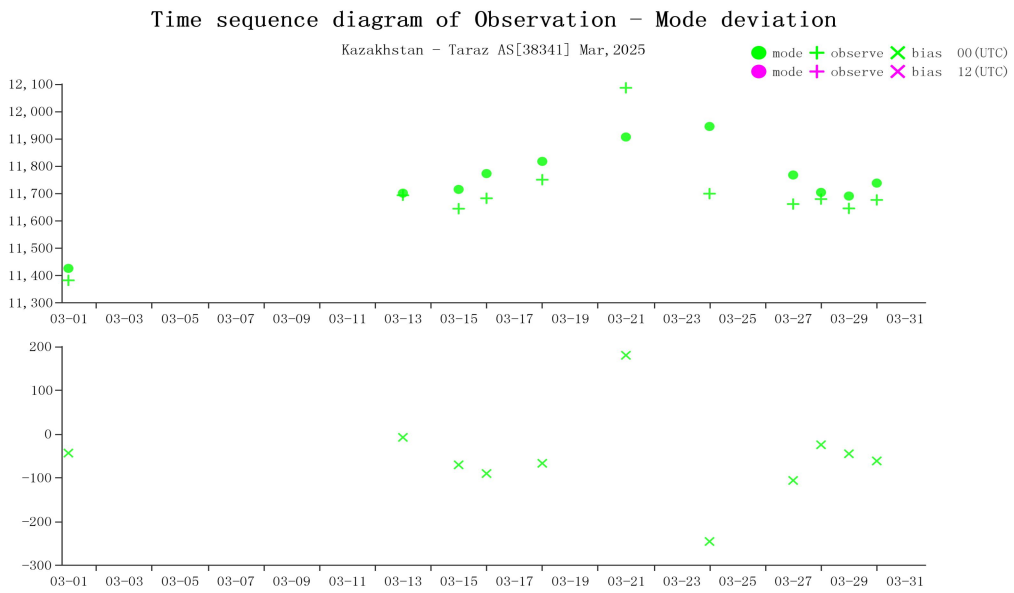
Time sequence diagram of Observation - Mode deviation



Time-series representation of GPH Obs minus first guess for station 31770\*(Level:150)



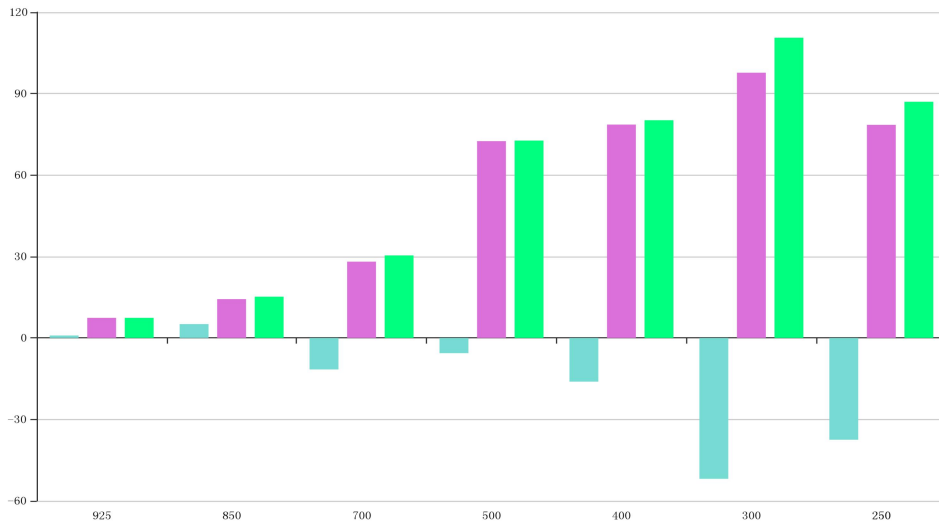
BIAS、SD and RMS of GPH for station 38341\*(OBS-TIME:00)



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

Kazakhstan - Taraz AS[38341] Mar, 2025

BIAS SD RMS

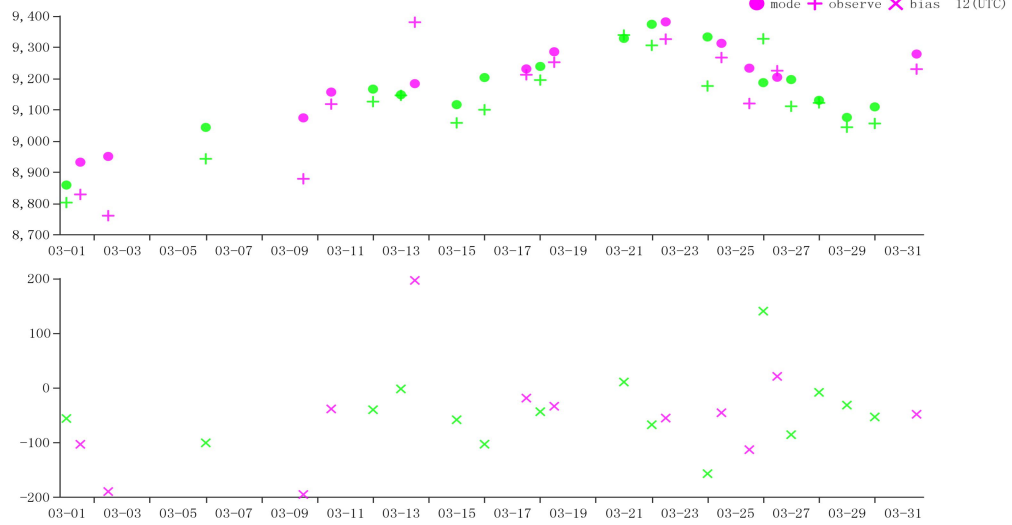


BIAS、SD and RMS of GPH for station 38341\*(OBS-TIME:12)

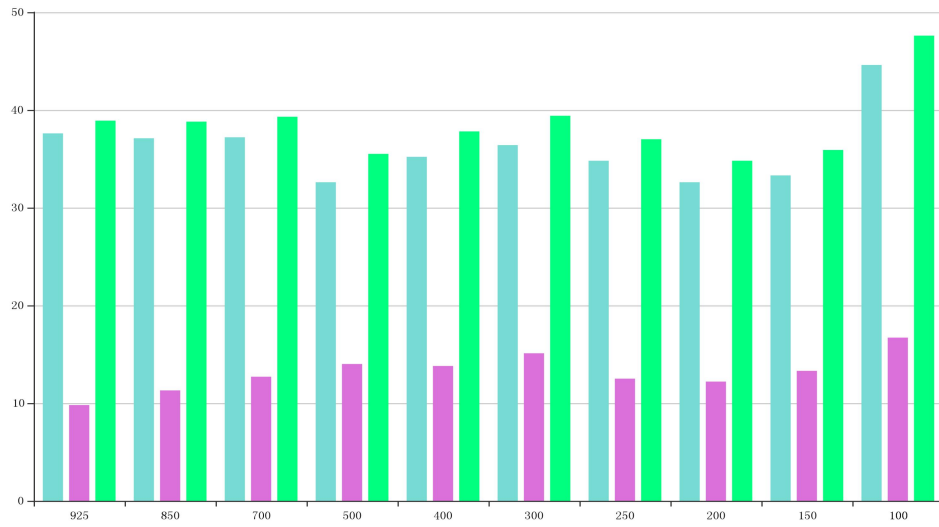
Time sequence diagram of Observation - Mode deviation

Kazakhstan - Taraz AS[38341] Mar, 2025

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

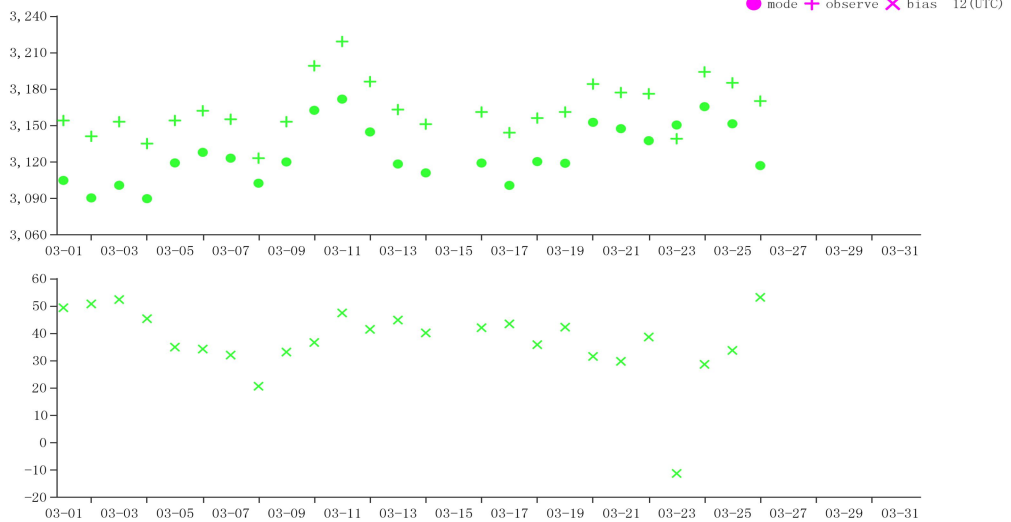


Time-series representation of GPH Obs minus first guess for station 38341\*(Level:300)

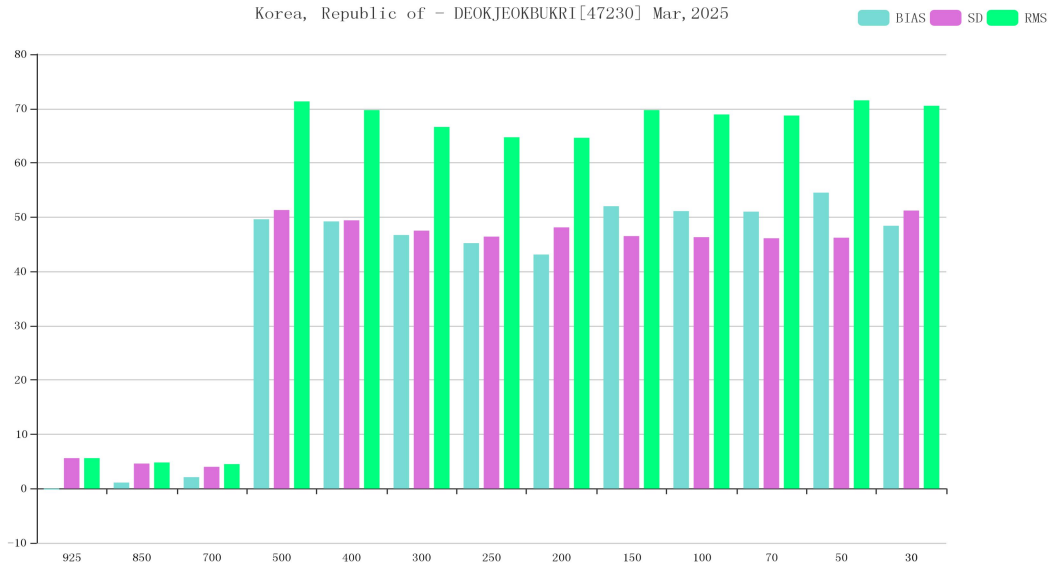


BIAS、SD and RMS of GPH for station 42348(OBS-TIME:00)

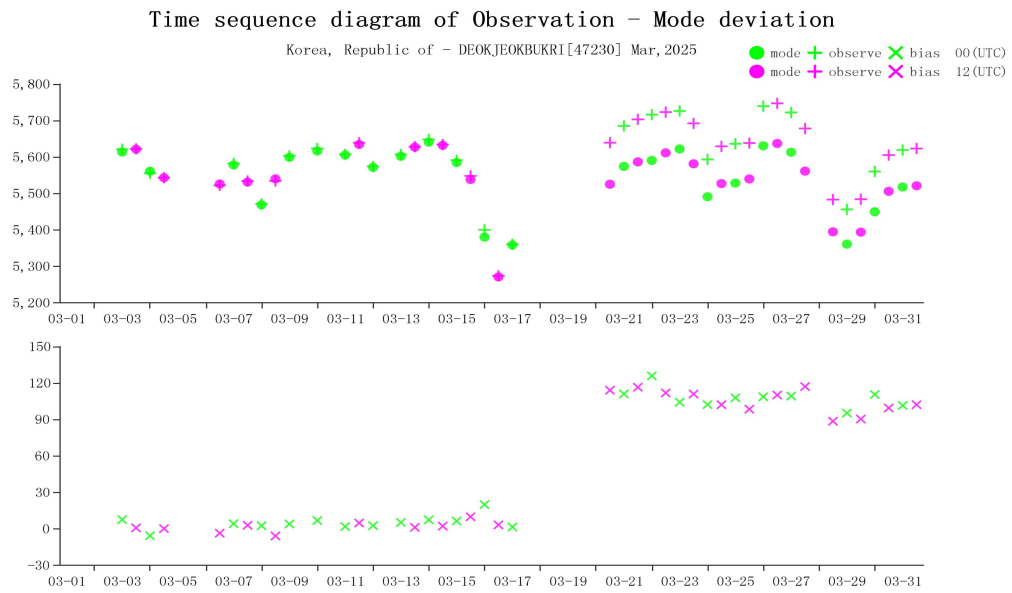
Time sequence diagram of Observation - Mode deviation



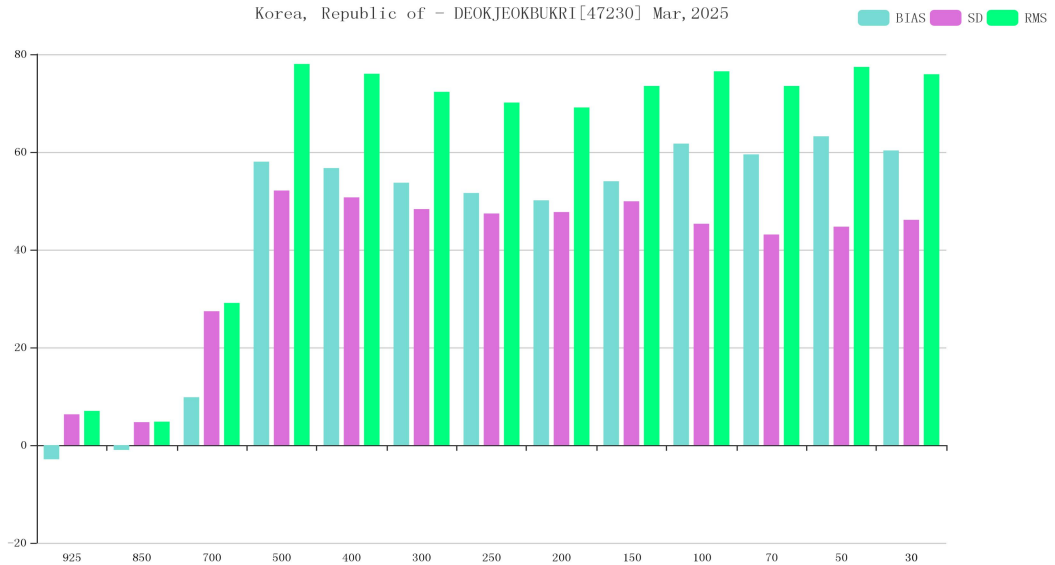
Time-series representation of GPH Obs minus first guess for station 42348(Level:700)



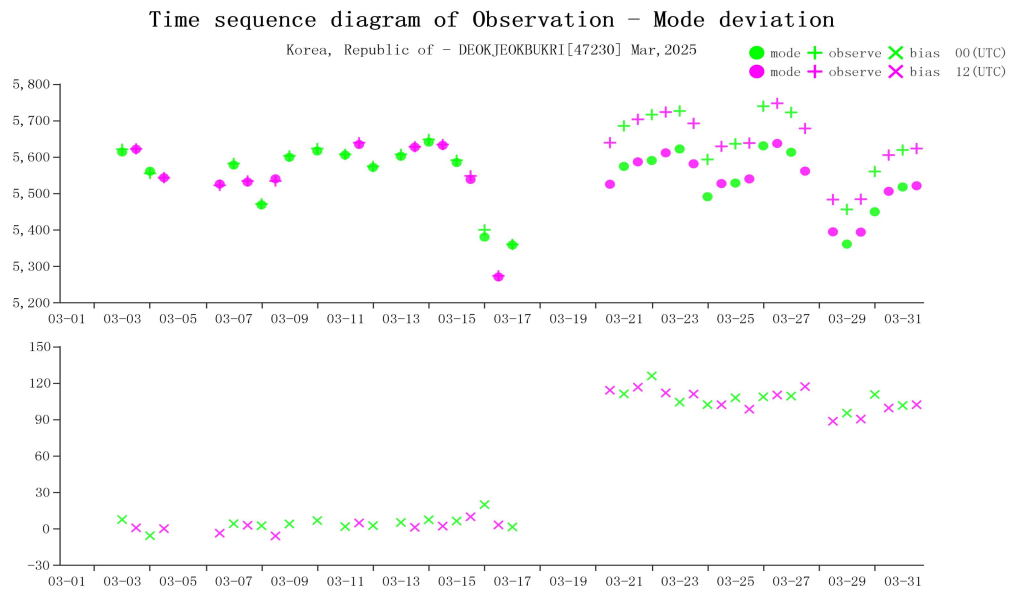
BIAS、SD and RMS of GPH for station 47230(OBS-TIME:00)



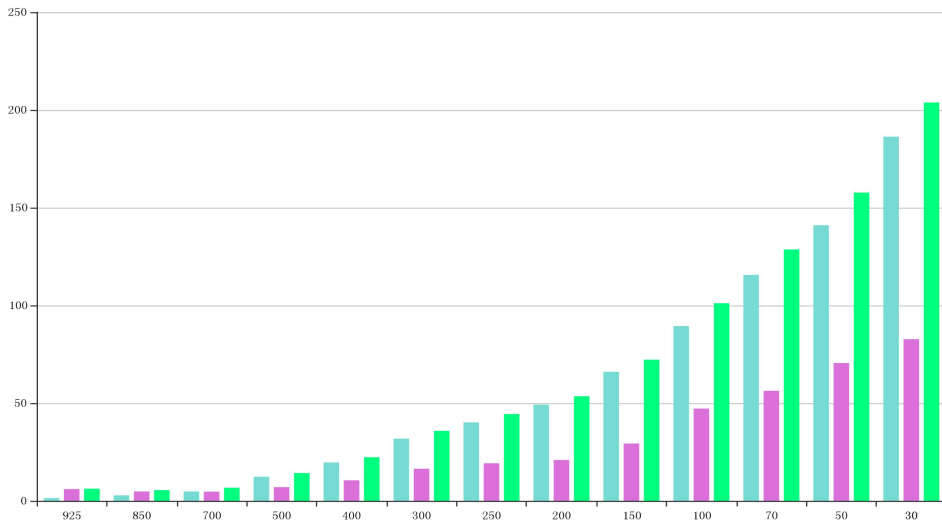
Time-series representation of GPH Obs minus first guess for station 47230(Level:500)



BIAS、SD and RMS of GPH for station 47230(OBS-TIME:12)

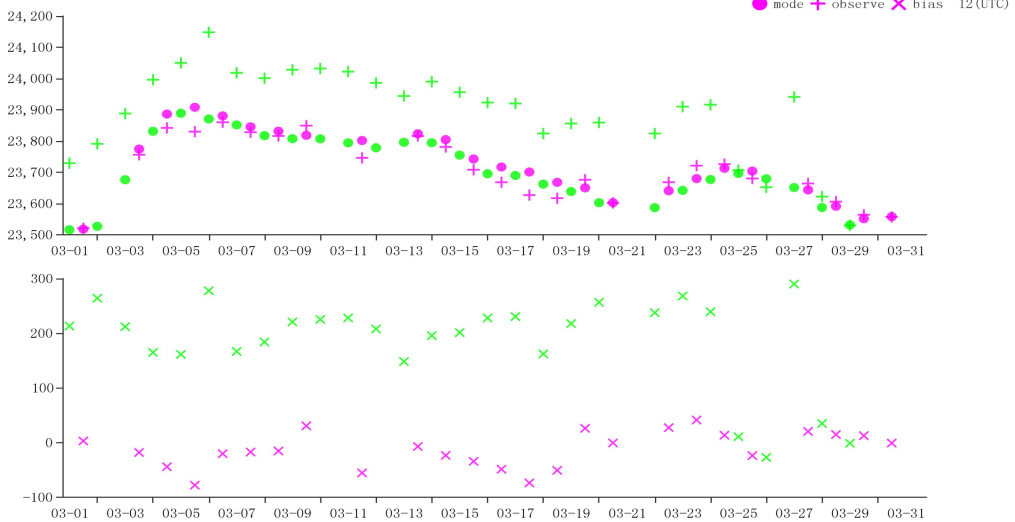


Time-series representation of GPH Obs minus first guess for station 47230(Level:500)



BIAS、SD and RMS of GPH for station 54374(OBS-TIME:00)

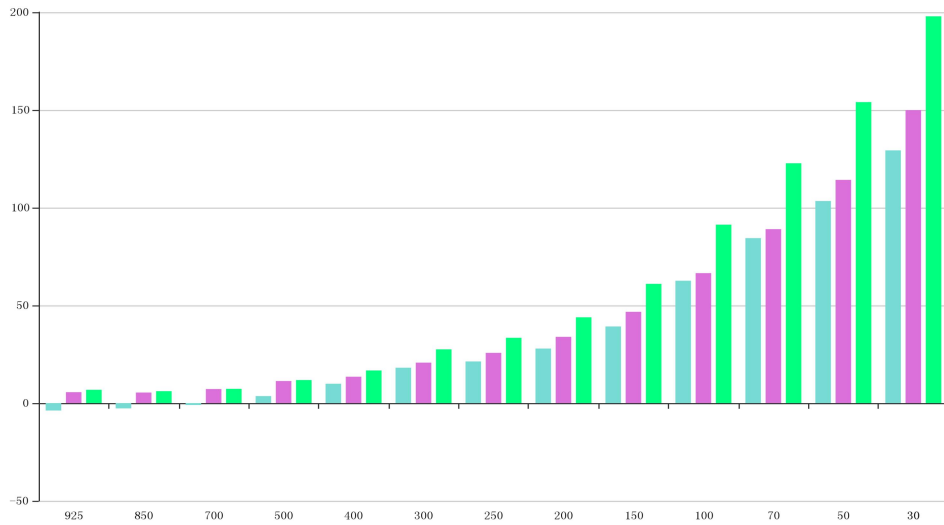
Time sequence diagram of Observation - Mode deviation



Time-series representation of GPH Obs minus first guess for station 54374(Level:30)

China - XUZHOU[58027] Mar, 2025

BIAS SD RMS

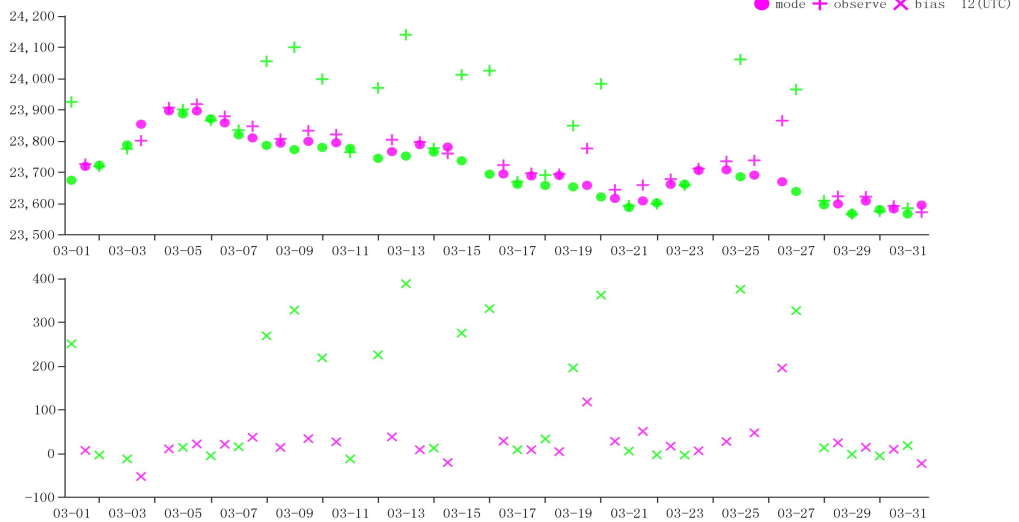


BIAS、SD and RMS of GPH for station 58027(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

China - XUZHOU[58027] Mar, 2025

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)

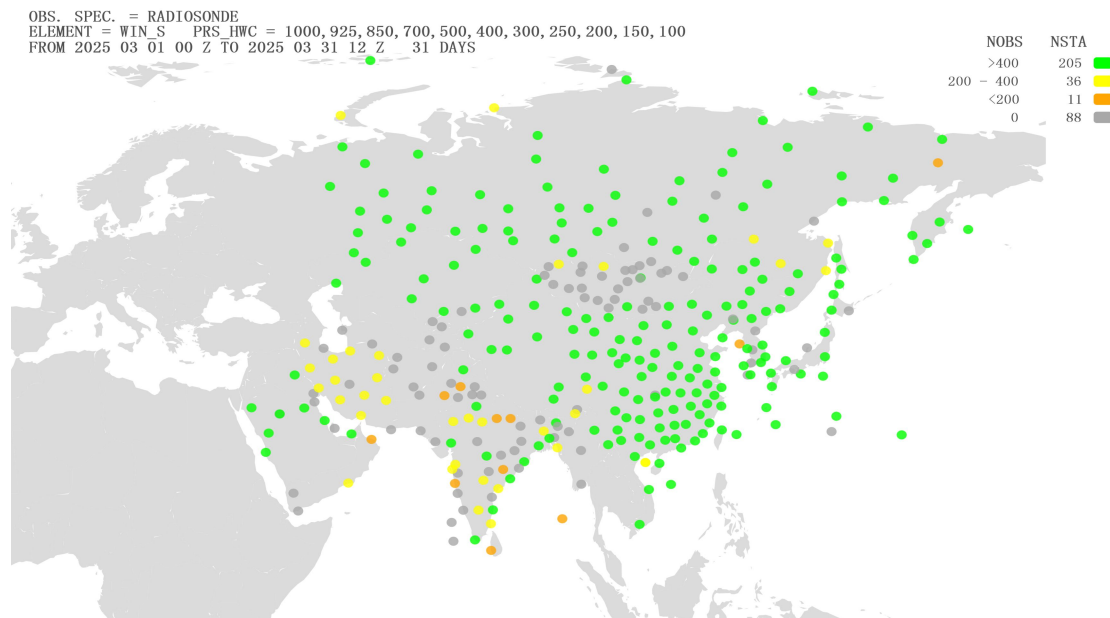
### 3.3 Vector Wind (WIN\_S)

#### 3.3.1 List of Suspect Stations

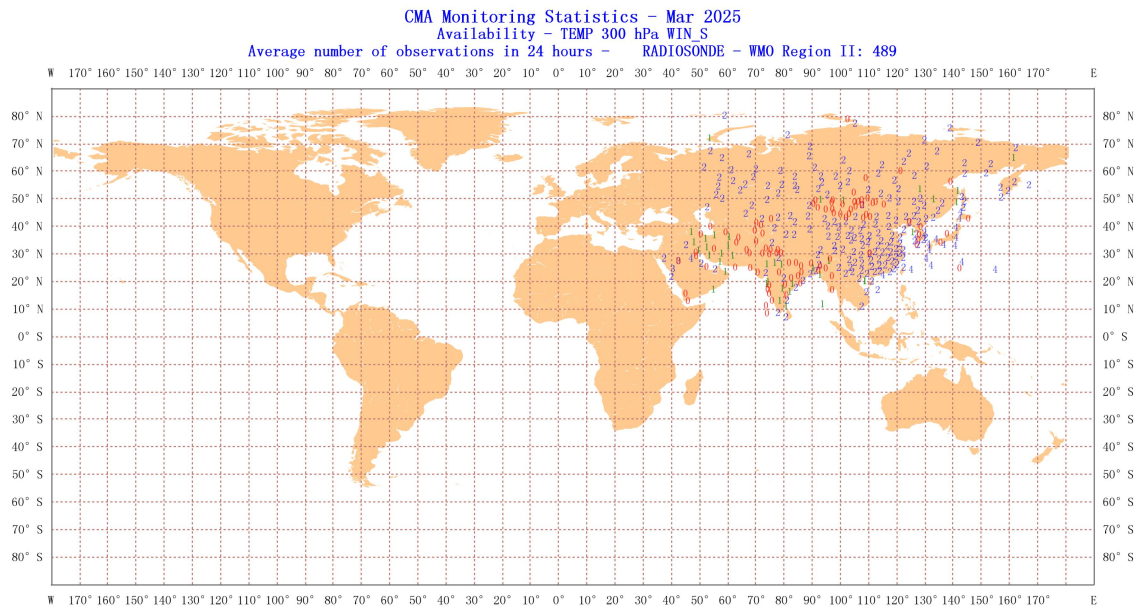
Table 3 List of WIN\_S suspected in March 2025

INDEX	WMO IDENT	COUNTRY	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ (%)	BIAS	SD	RMS
1	38341*	Kazakhstan	12	300	21	1	0	8.1	14.4	16.5

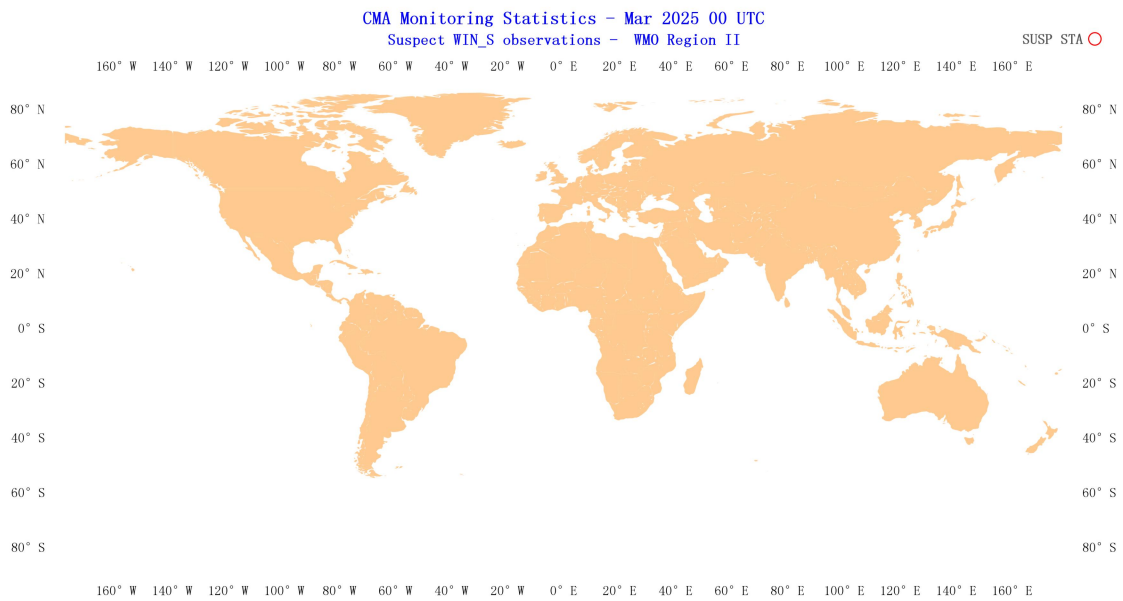
#### 3.3.2 Suspect Station Analysis



Location of all radiosonde stations reporting vector wind observations in Region II over the month of March 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.

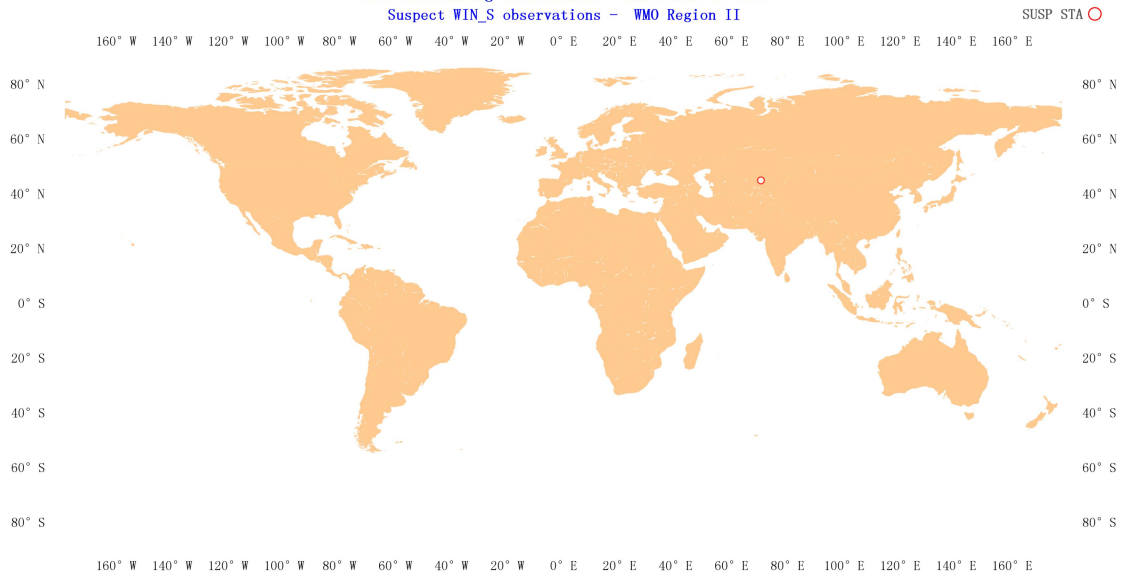


Location of all radiosonde stations reporting vector wind average number of observations in 24 hours in Region II over the month of March 2025.

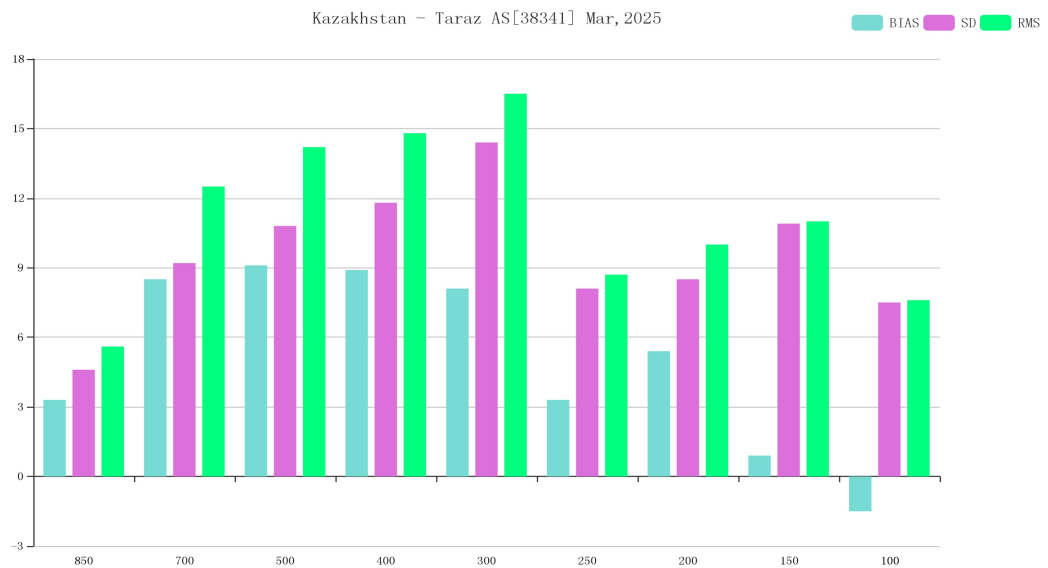


Distribution of suspect stations - Vector Wind 00 UTC

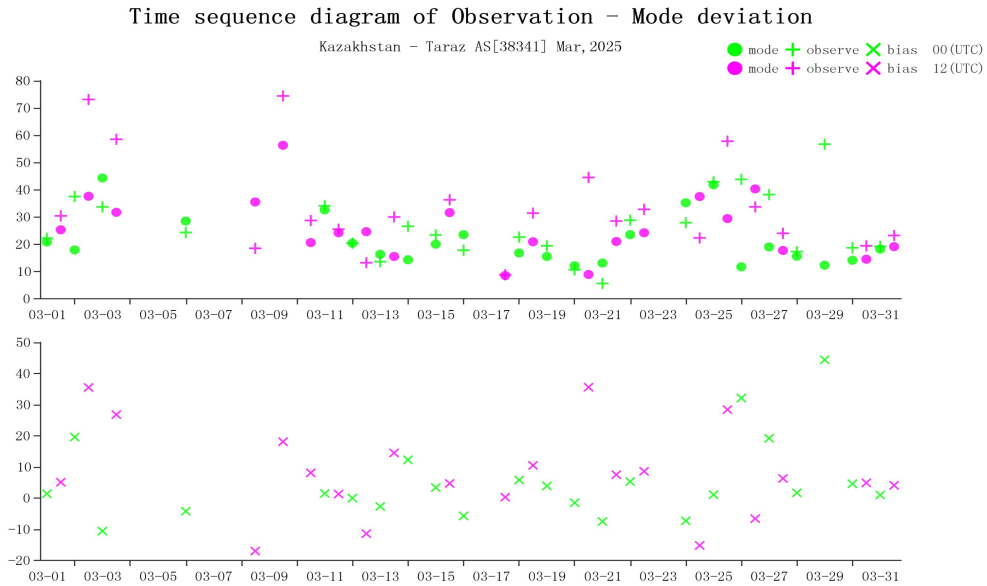
CMA Monitoring Statistics - Mar 2025 12 UTC  
 Suspect WIN\_S observations - WMO Region II



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:300)

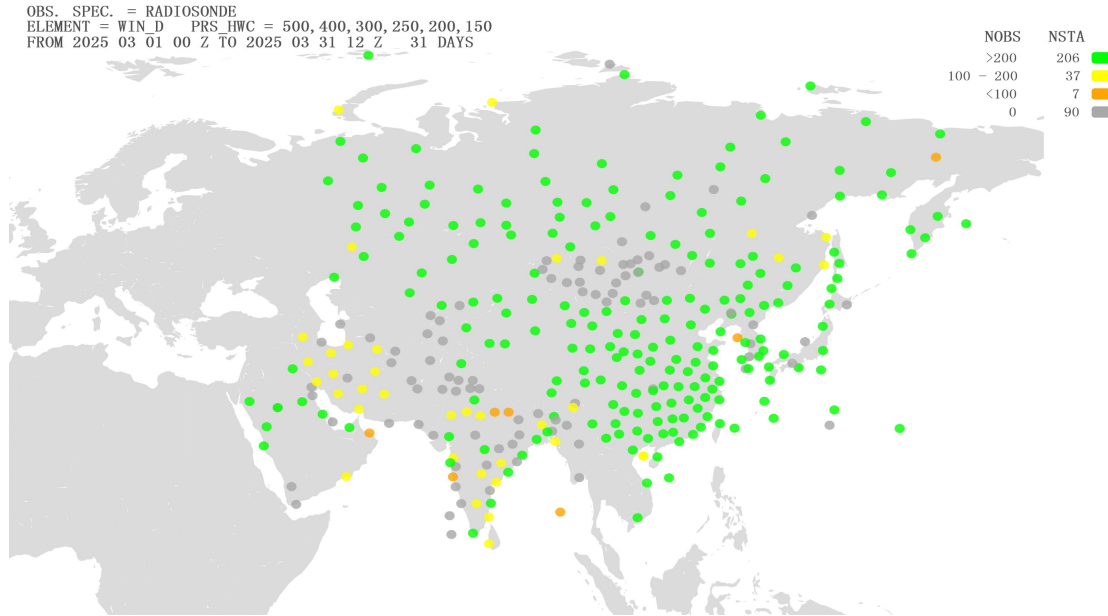
### 3.4 Wind Direction (WIN\_D)

#### 3.4.1 List of Suspect Stations

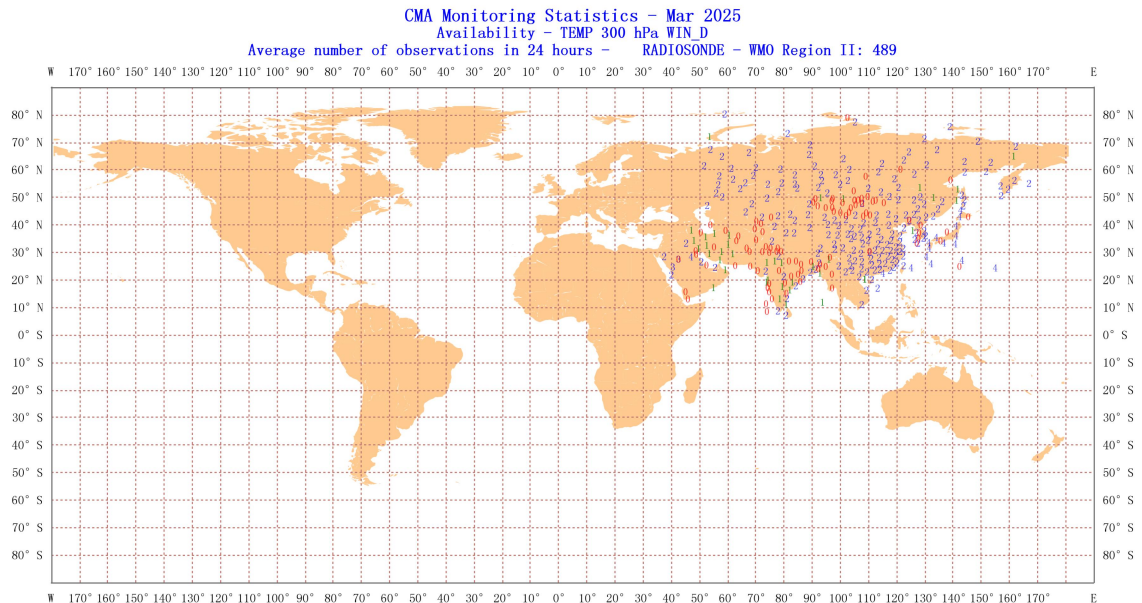
Table 4 List of WIN\_D suspected in March 2025

INDEX	WMO IDENT	COUNTRY	OBS TIME	NUM OBS	BIAS	SD	MAX SPREAD
1	38341*	Kazakhstan	00	20	13	16.2	4.8
2	38341*	Kazakhstan	12	15	11.1	20	5.2
3	51463	China	00	21	10.1	8	5.6
4	51463	China	12	29	11.7	9.4	4.6

### 3.4.2 Suspect Station Analysis

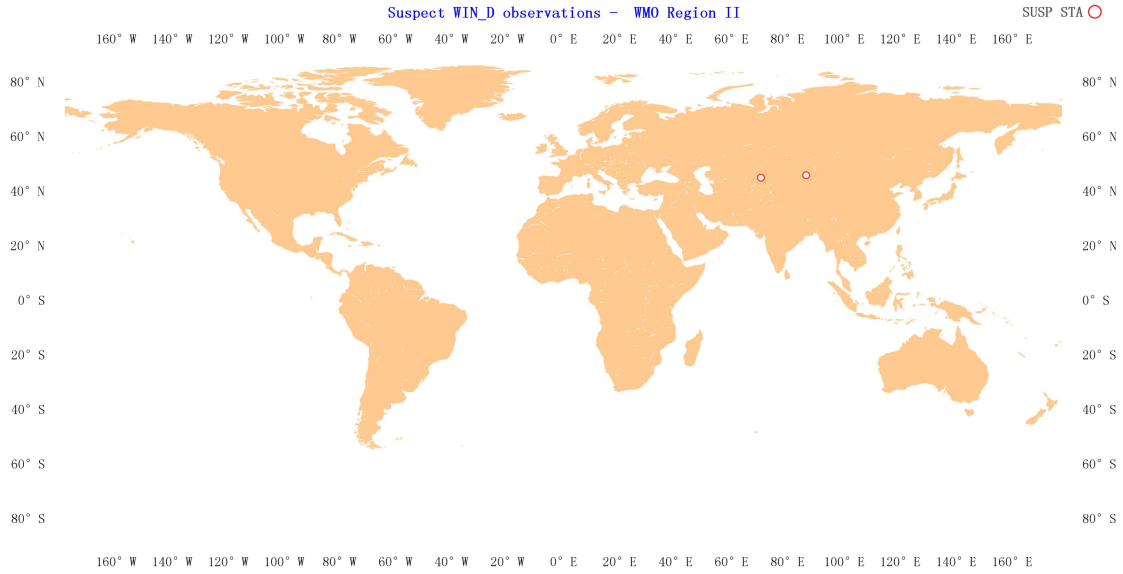


Location of all radiosonde stations reporting wind direction observations in Region II over the month of March 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers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



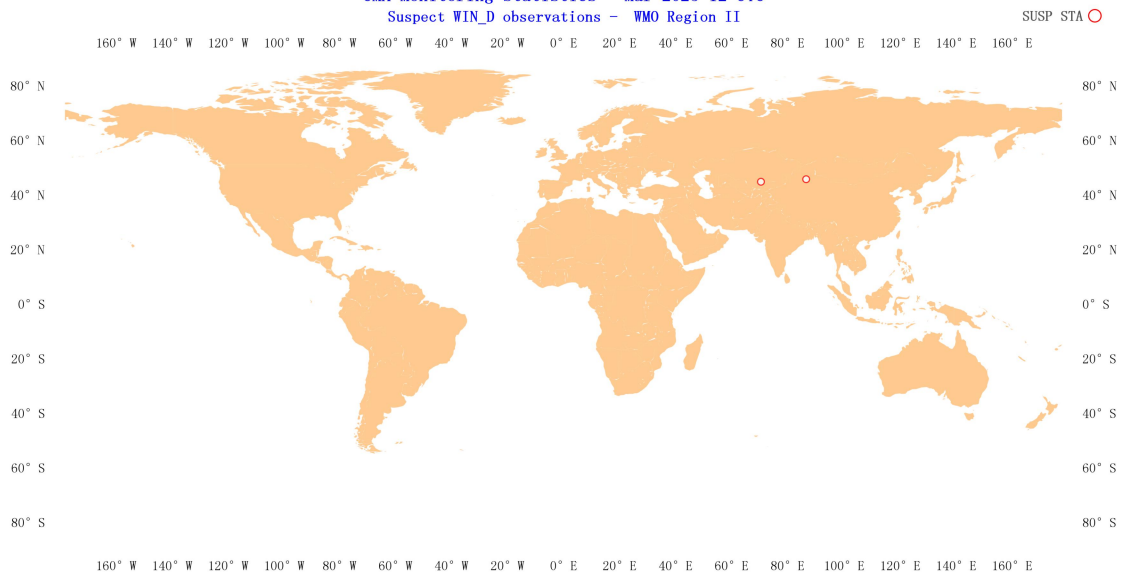
Location of all radiosonde stations reporting wind direction average number of observations in 24 hours in Region II over the month of March 2025.

CMA Monitoring Statistics - Mar 2025 00 UTC  
Suspect WIN\_D observations - WMO Region II

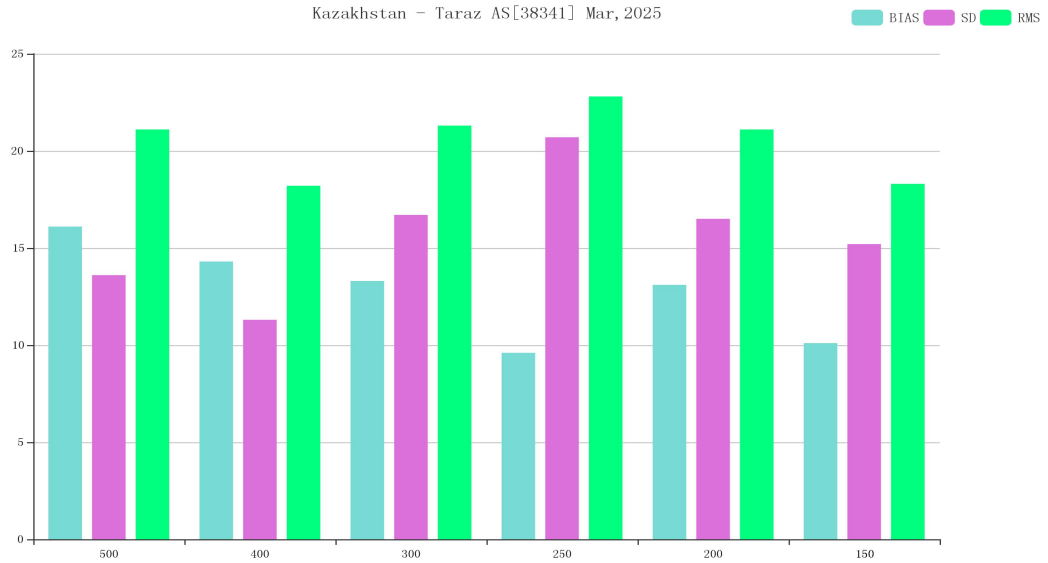


Distribution of suspect stations - Wind Direction 00 UTC

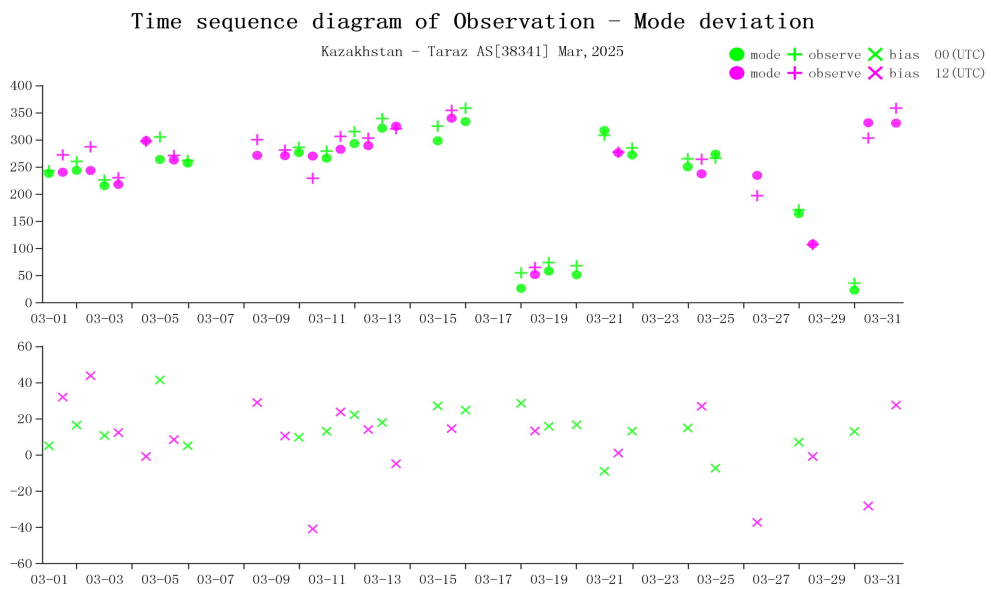
CMA Monitoring Statistics - Mar 2025 12 UTC  
Suspect WIN\_D observations - WMO Region II



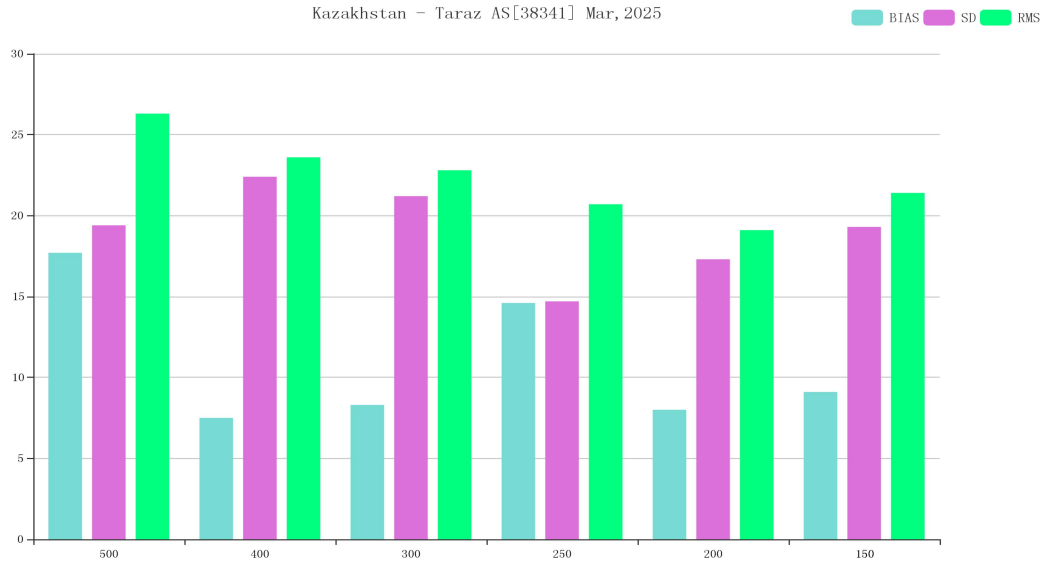
Distribution of suspect stations - Wind Direction 12 UTC



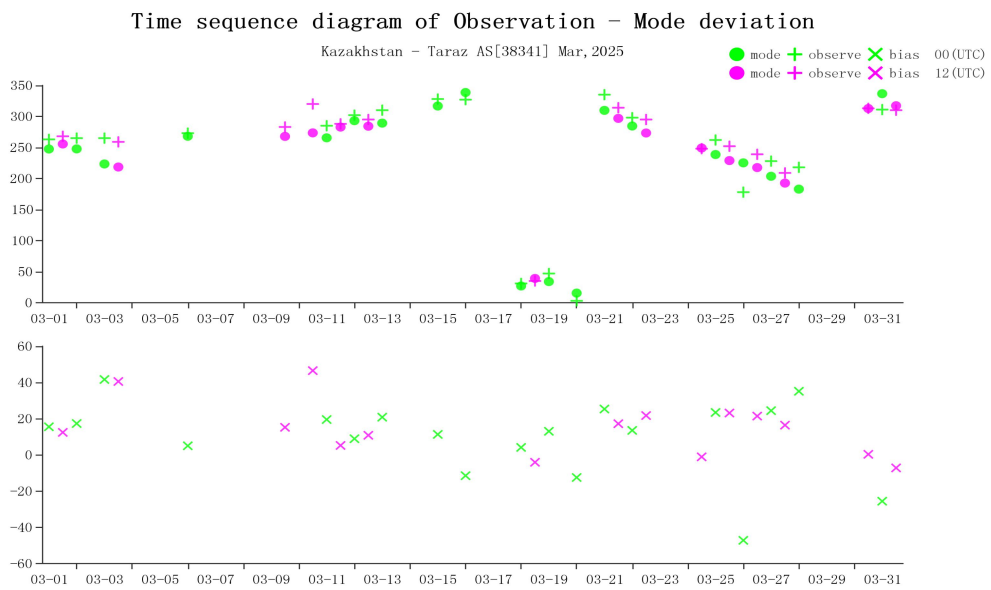
BIAS、SD and RMS of WIN\_D for station 38341\*(OBS-TIME:00)



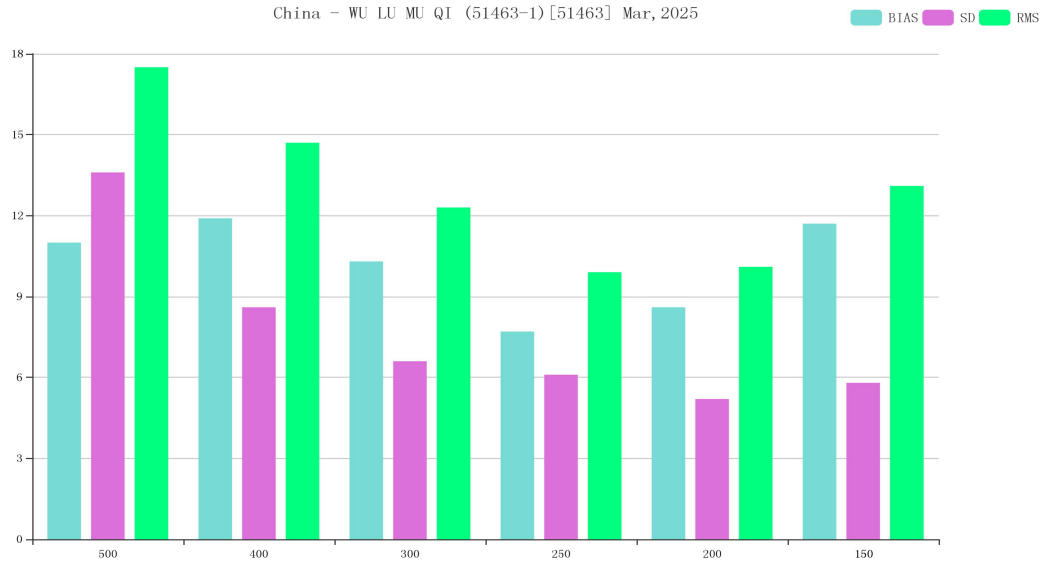
Time-series representation of WIN\_D Obs minus first guess for station 38341\*(Level:400)



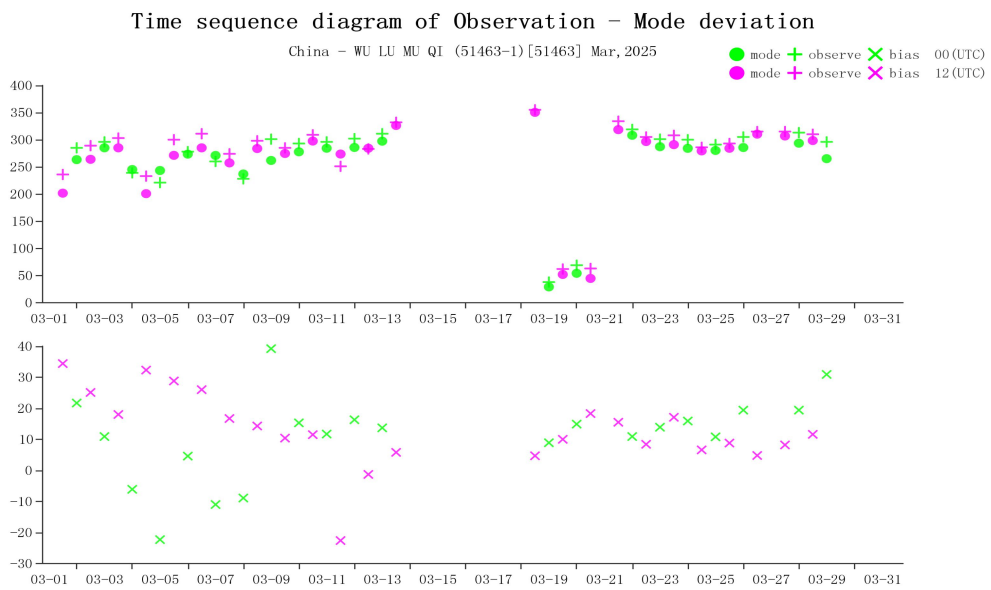
BIAS、SD and RMS of WIN\_D for station 38341\*(OBS-TIME:12)



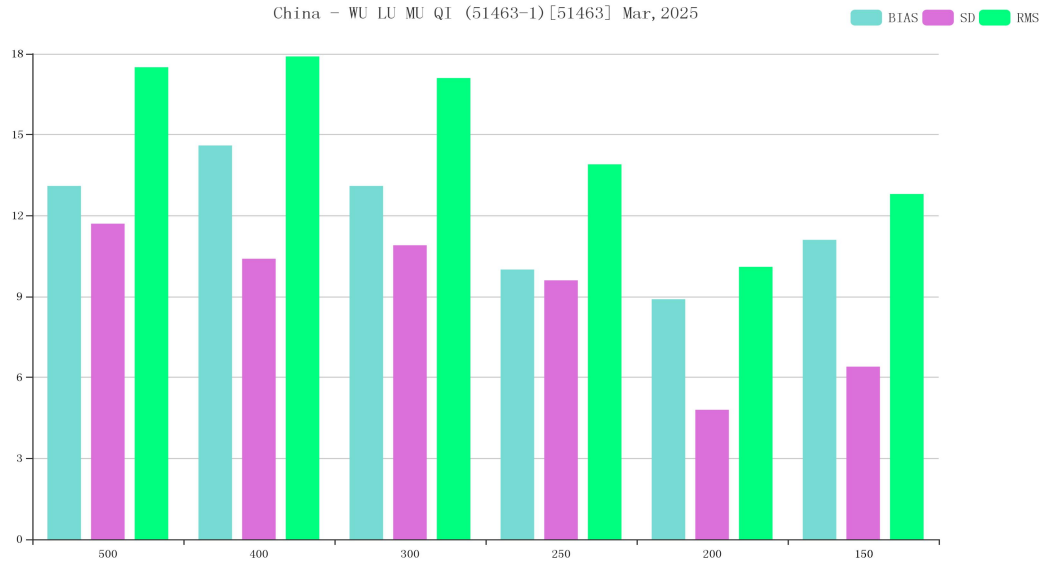
Time-series representation of WIN\_D Obs minus first guess for station 38341\*(Level:250)



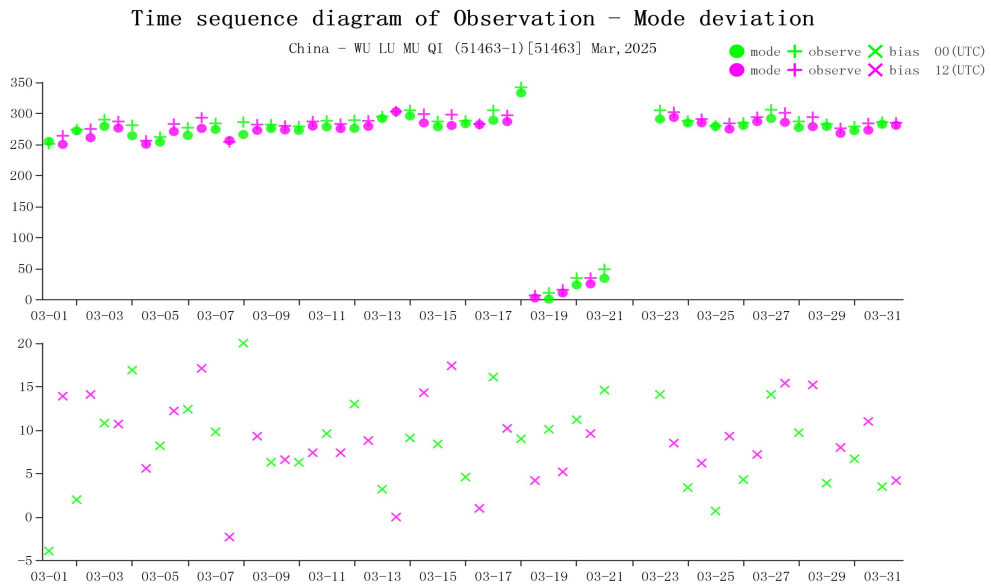
BIAS、SD and RMS of WIN\_D for station 51463(OBS-TIME:00)



Time-series representation of WIN\_D Obs minus first guess for station 51463(Level:500)



BIAS、SD and RMS of WIN\_D for station 51463(OBS-TIME:12)



Time-series representation of WIN\_D Obs minus first guess for station 51463(Level:200)

## 4. Comparison with Other Results

Element	CMA				EC				JMA			
	Country	Station	Time	Level	Country	Station	Time	Level	Country	Station	Time	Level
Geopotential Height	Russian Federation	31770	00	150	Russian Federation	23933	00	300	Russian Federation	31770	00	250
	Kazakhstan	38341	00	200	Russian Federation	31770	00	250	Kazakhstan	38341	00	70
	Kazakhstan	38341	12	300	Kazakhstan	38341	12	300	Kazakhstan	38341	12	300
	India	42348	00	700	Kazakhstan	38341	00	70	Korea, Republic of	47230	00	500
	Korea, Republic of	47230	00	500	Korea, Republic of	47230	12	500	Korea, Republic of	47230	12	500
	Korea, Republic of	47230	12	500	Korea, Republic of	47230	00	500	China	58027	00	30
	China	54374	00	30	China	54374	00	30				
	China	58027	00	30	China	58027	00	30				
Vector Wind	Kazakhstan	38341	12	300	Kazakhstan	38341	00	150				
					Kazakhstan	38341	12	100				
Wind Direction	Kazakhstan	38341	00		China	51463	00		China	51463	00	
	Kazakhstan	38341	12		China	51463	12		China	51463	12	
	China	51463	00									
	China	51463	12									

## 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

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