

Radiosonde-No.5-MOC-CMA(2025)

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

May 2025

**Regional WIGOS Centre, Beijing**

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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 May 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 May

INDEX	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	42701	M.O. RANCHI	India	23.32	85.32
4	42379	GORAKHPUR	India	26.75	83.37
5	42667	BHOPAL/BAIRAGHAR	India	23.28	77.35
6	43285	MANGALORE/PANAMBUR	India	12.95	74.83
7	43369	MINICOY	India	8.28	73.06
8	47418*	KUSHIRO (47418-1)	Japan	42.95	144.44
9	47600*	WAJIMA	Japan	37.39	136.9
10	48097*	YANGON	Myanmar	16.86	96.15
11	48042*	MANDALAY	Myanmar	21.94	96.09
12	41780	KARACHI AIRPORT	Pakistan	24.9	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	37.5	71.5
19	38836	DUSHANBE	Tajikistan	38.58	68.73
20	38507	TURKMENBASHI (38507-1)	Turkmenistan	40.03	52.98

The list is the stations that did not receive data from May, 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. In addition, “\*” represents GBON station.

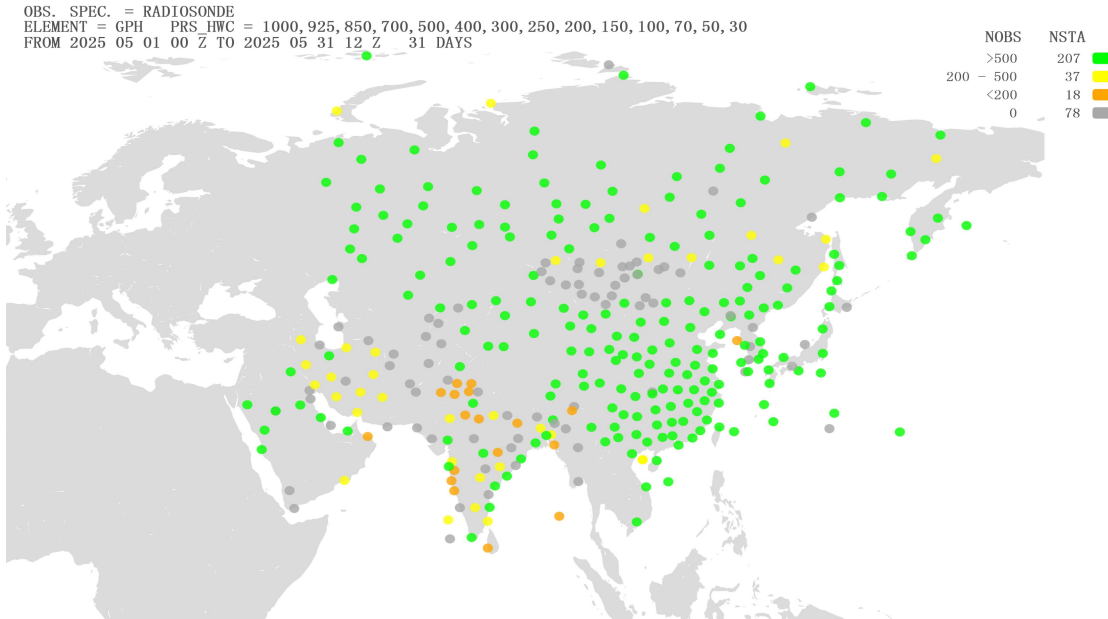
## 3.2 Geopotential Height (GPH)

### 3.2.1 List of Suspect Stations

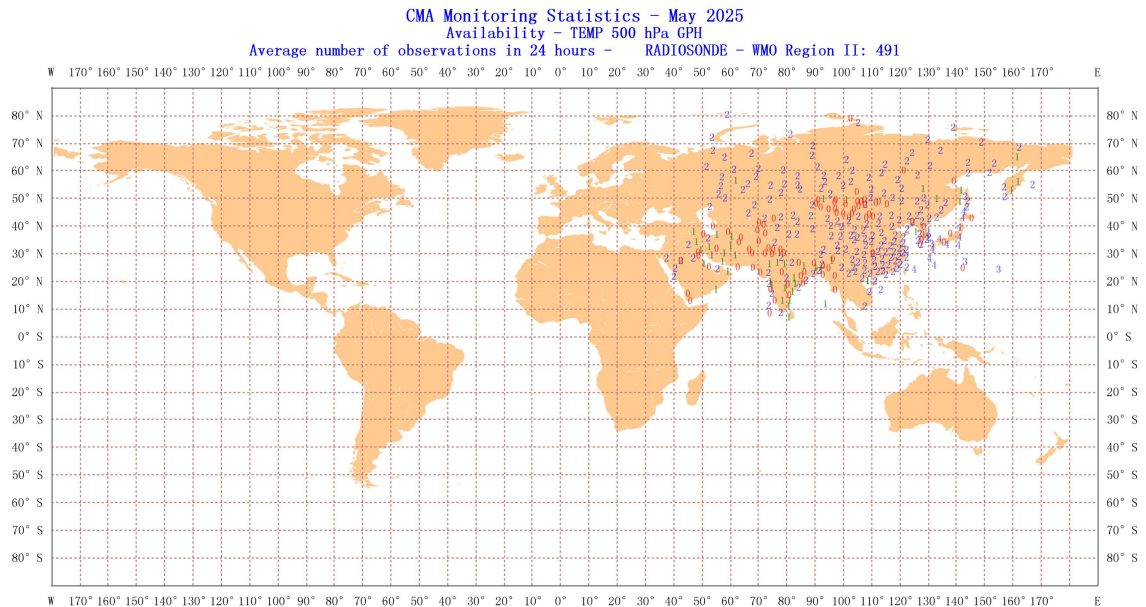
Table 2 List of GPH suspected in May 2025

INDEX	WMO IDENT	COUNTRY	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ (%)	BIAS	SD	RMS
1	21432*	Russian Federation	12	150	26	0	0	58.3	91.2	108.2
2	29839*	Russian Federation	00	50	25	0	0	129.1	16.8	130.2
3	29839*	Russian Federation	12	30	25	0	0	166.2	25.7	168.2
4	31770*	Russian Federation	00	200	27	0	0	67.6	88.4	111.3
5	32540*	Russian Federation	00	30	27	1	0	187	81.5	204
6	32540*	Russian Federation	12	30	11	0	0	201.6	84.1	218.4
7	36003*	Kazakhstan	12	100	25	1	0	62.2	80.2	101.5
8	38341*	Kazakhstan	00	50	13	11	0	-41.3	175.6	180.4
9	38341*	Kazakhstan	12	70	11	3	0	-19.9	188.9	189.9
10	42348	India	00	925	23	0	0	45.6	6.8	46.1
11	52323	China	00	30	24	5	6.9	200.1	148.6	249.3
12	52323	China	12	30	22	4	0	216.2	156.9	267.1

### 3.2.2 Suspect Station Analysis

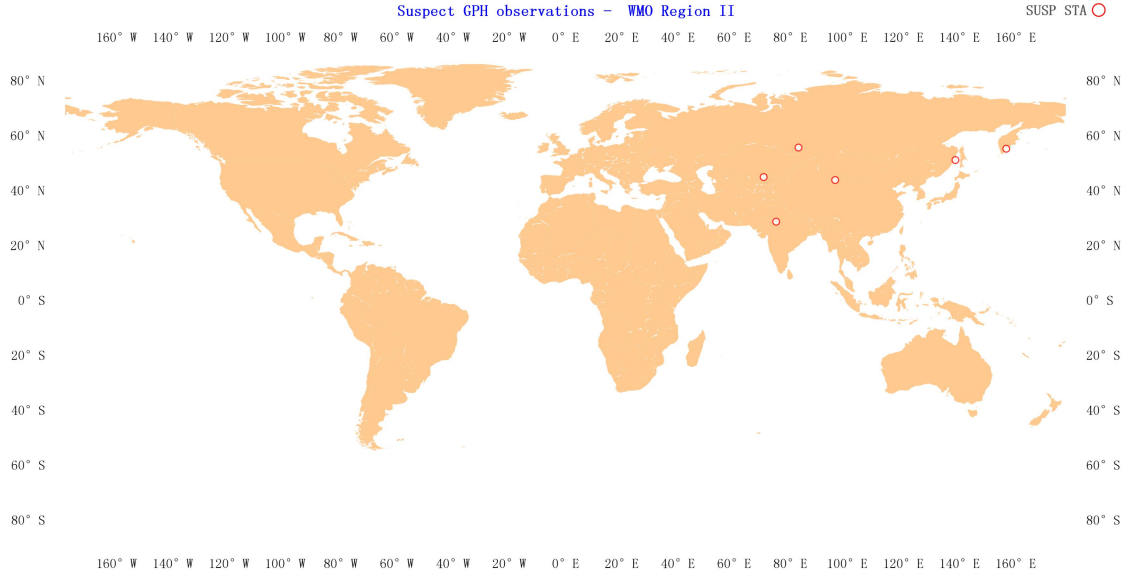


Location of all radiosonde stations reporting geopotential height observations in Region II over the month of May 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers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



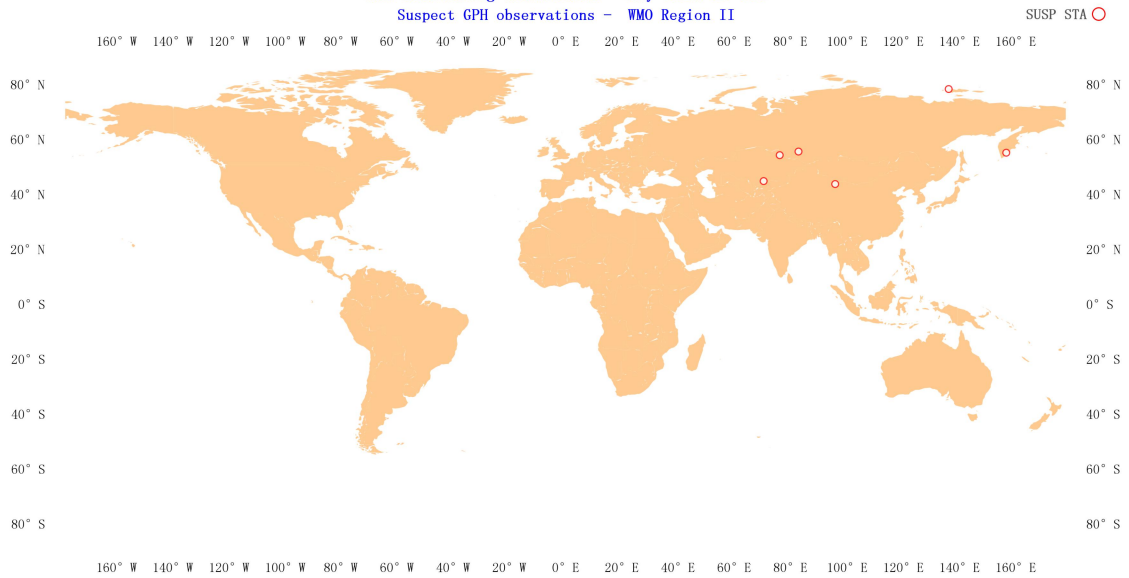
Location of all radiosonde stations reporting geopotential height average number of observations in 24 hours in Region II over the month of May 2025.

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

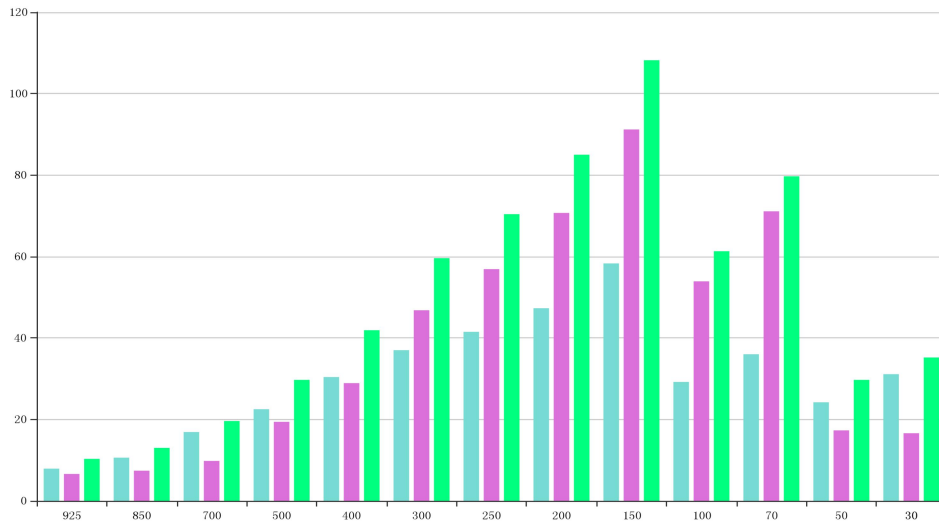


Distribution of suspect stations - Geopotential Height 00 UTC

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

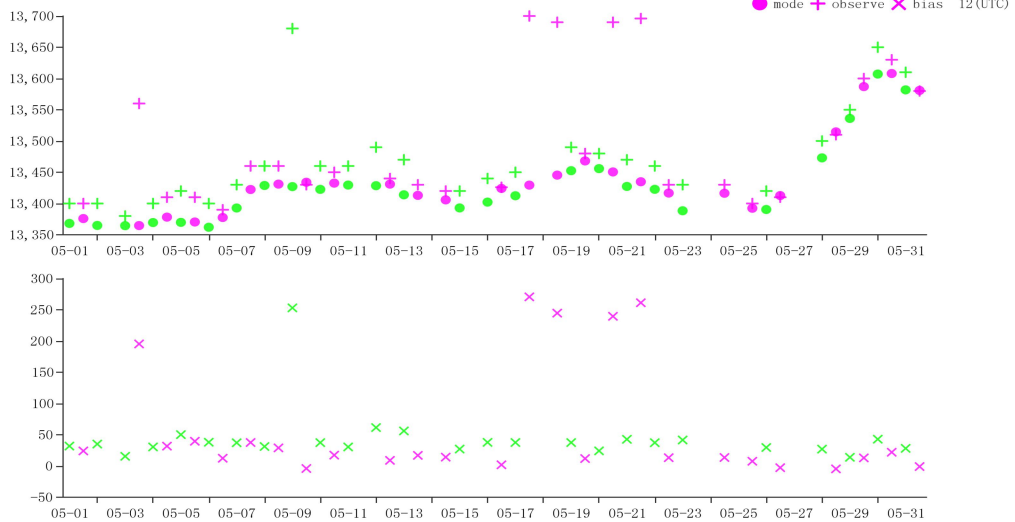


Distribution of suspect stations - Geopotential Height 12 UTC

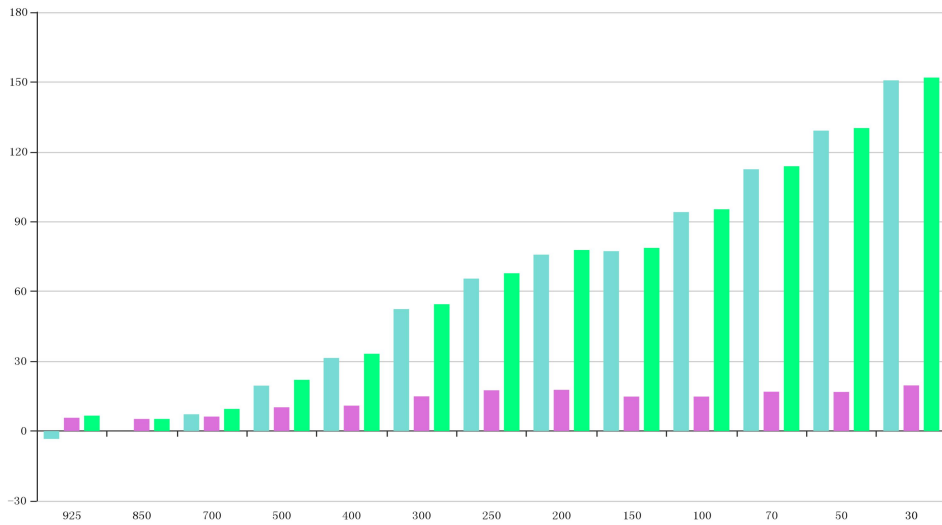


BIAS、SD and RMS of GPH for station 21432\*(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

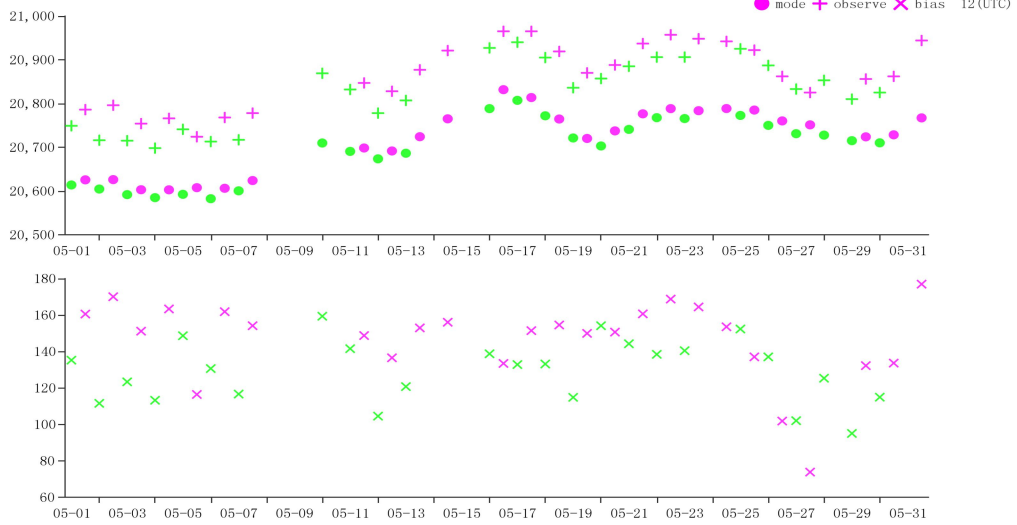


Time-series representation of GPH Obs minus first guess for station 21432\*(Level:150)

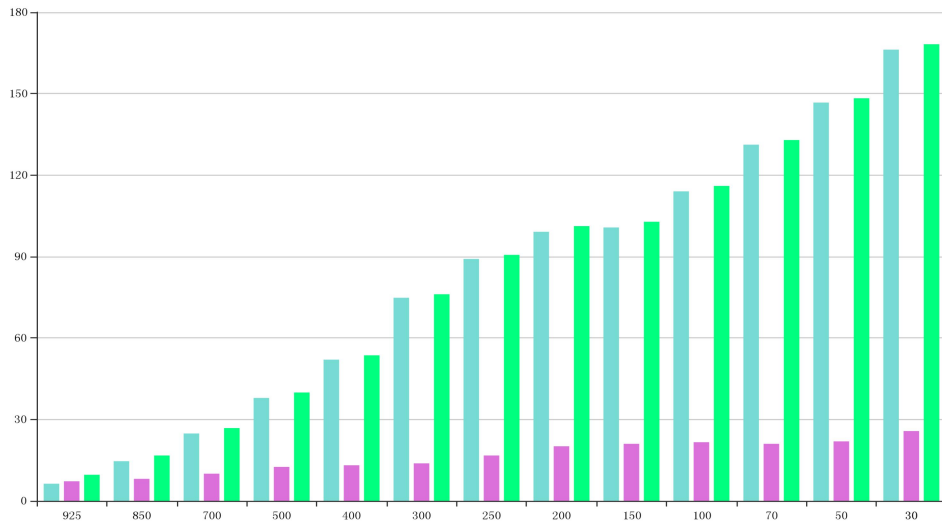


BIAS、SD and RMS of GPH for station 29839\*(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

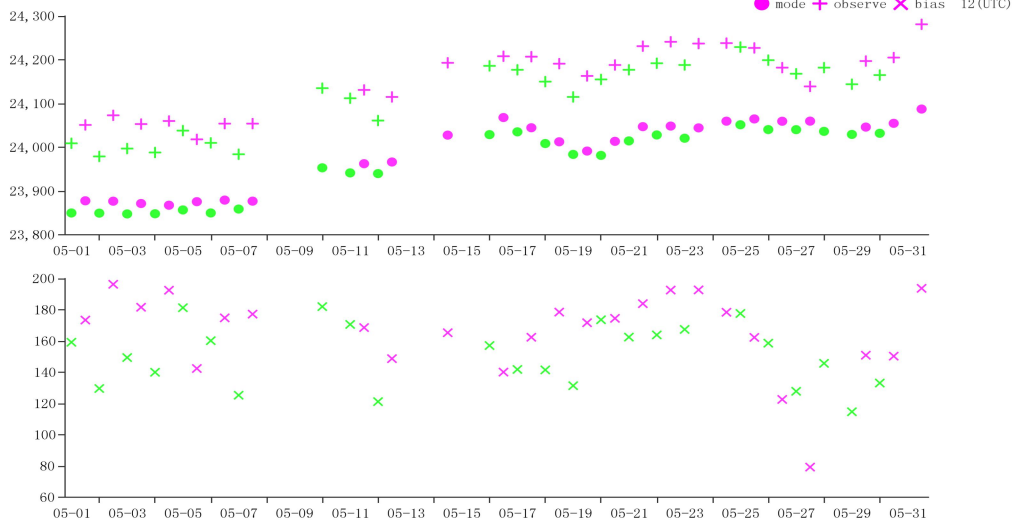


Time-series representation of GPH Obs minus first guess for station 29839\*(Level:50)

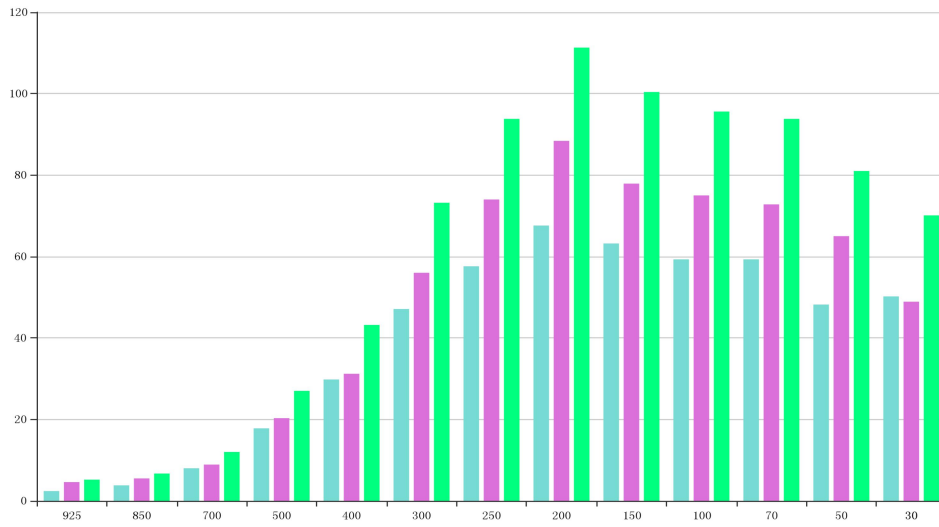


BIAS、SD and RMS of GPH for station 29839\*(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

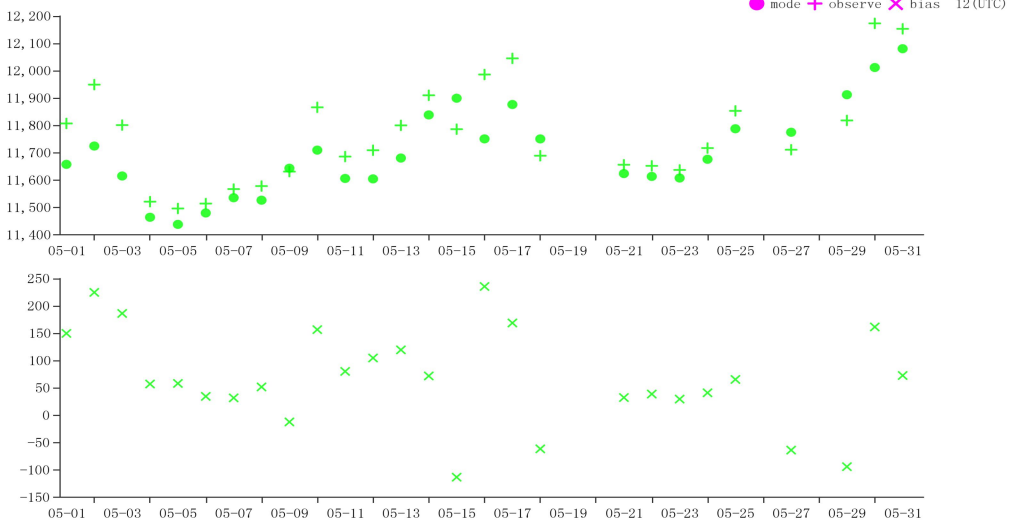


Time-series representation of GPH Obs minus first guess for station 29839\*(Level:30)

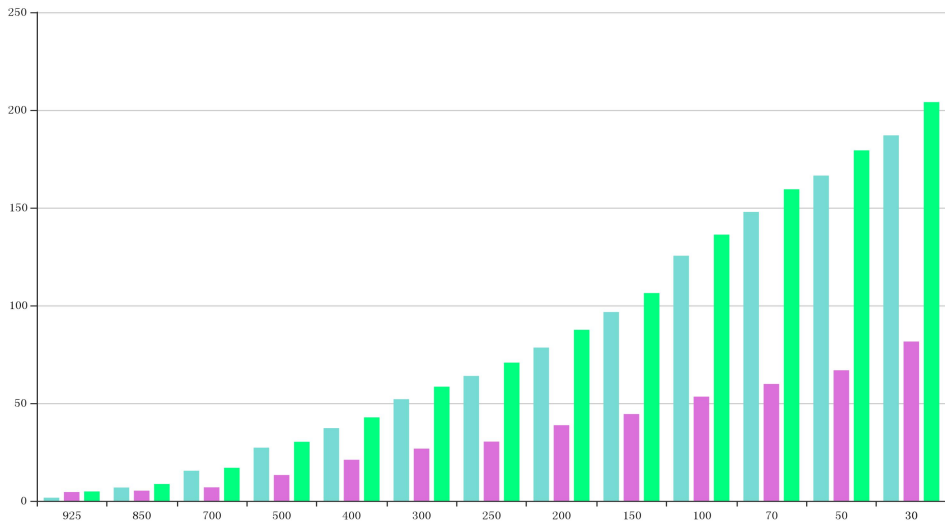


BIAS、SD and RMS of GPH for station 31770\*(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

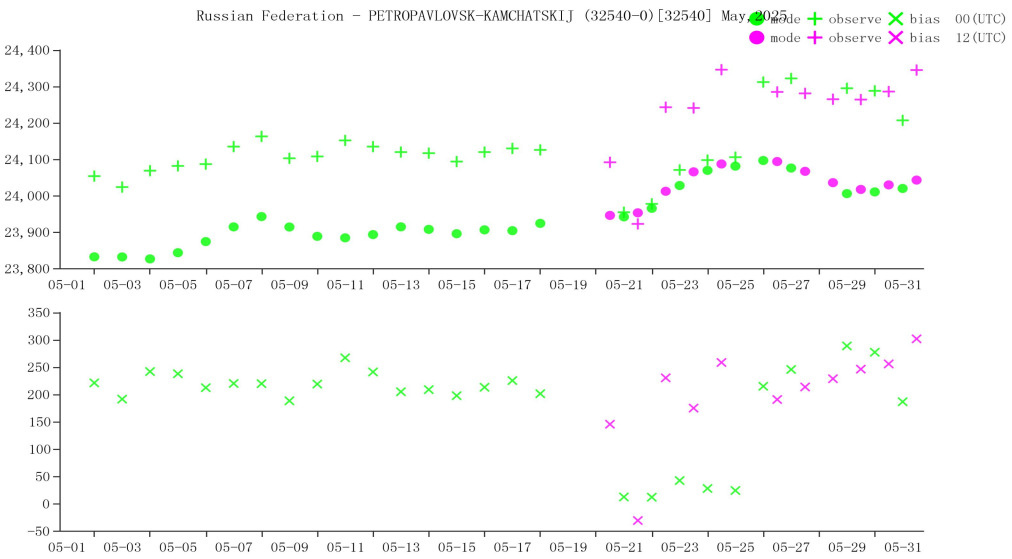


Time-series representation of GPH Obs minus first guess for station 31770\*(Level:200)

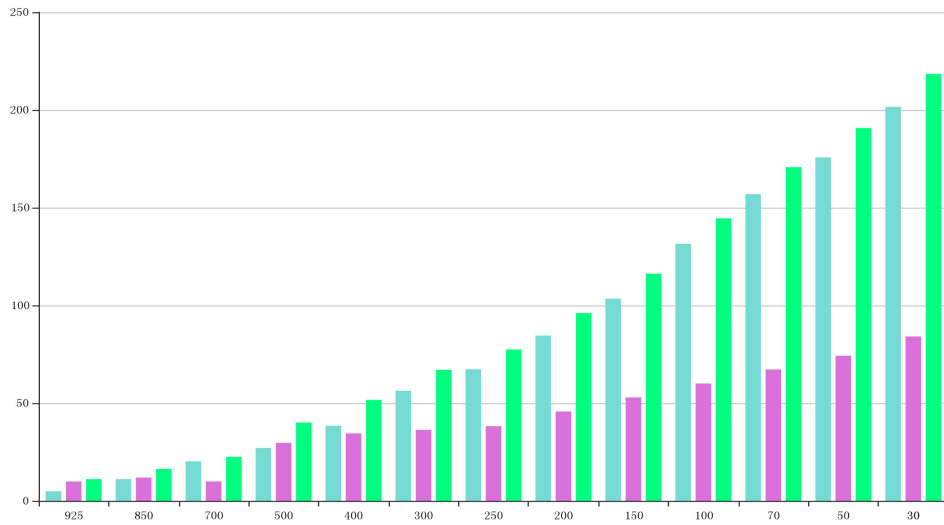


BIAS、SD and RMS of GPH for station 32540\*(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

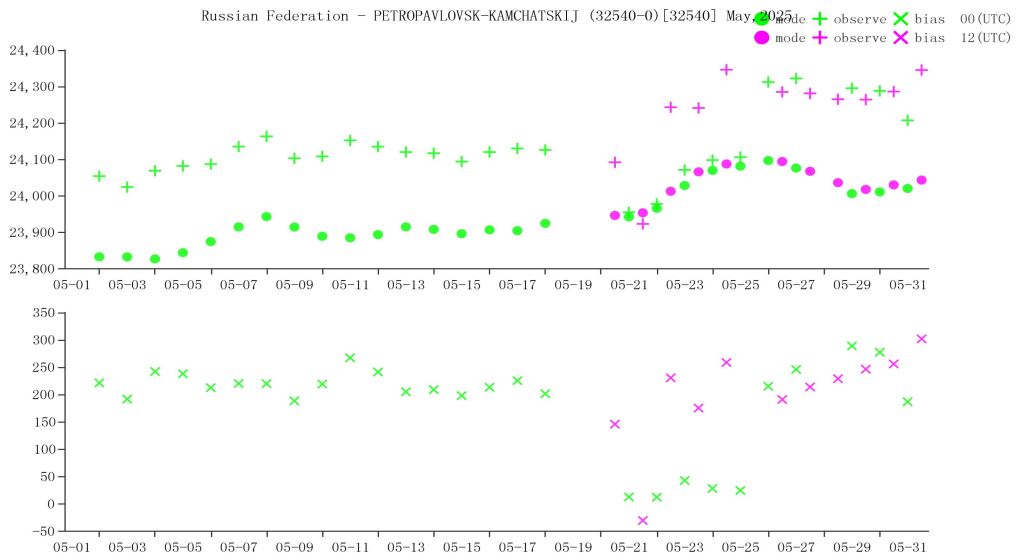


Time-series representation of GPH Obs minus first guess for station 32540\*(Level:30)

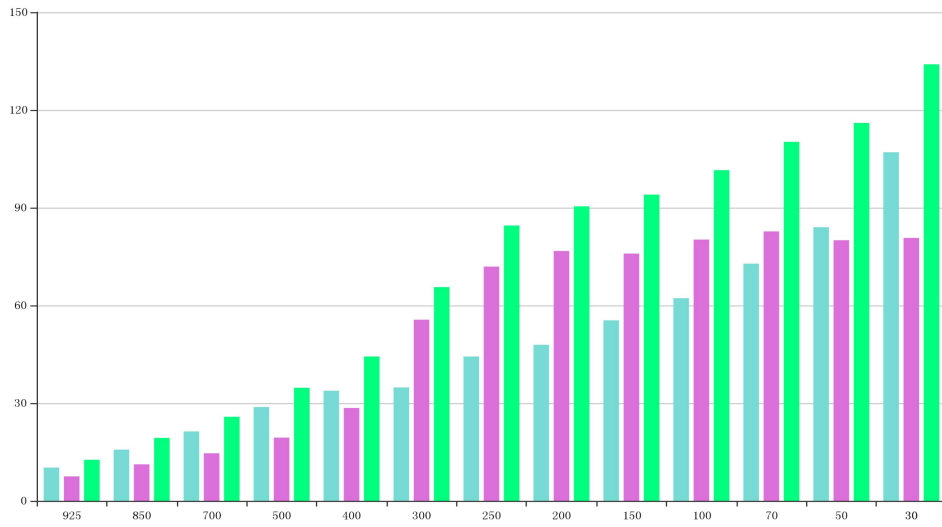


BIAS、SD and RMS of GPH for station 32540\*(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

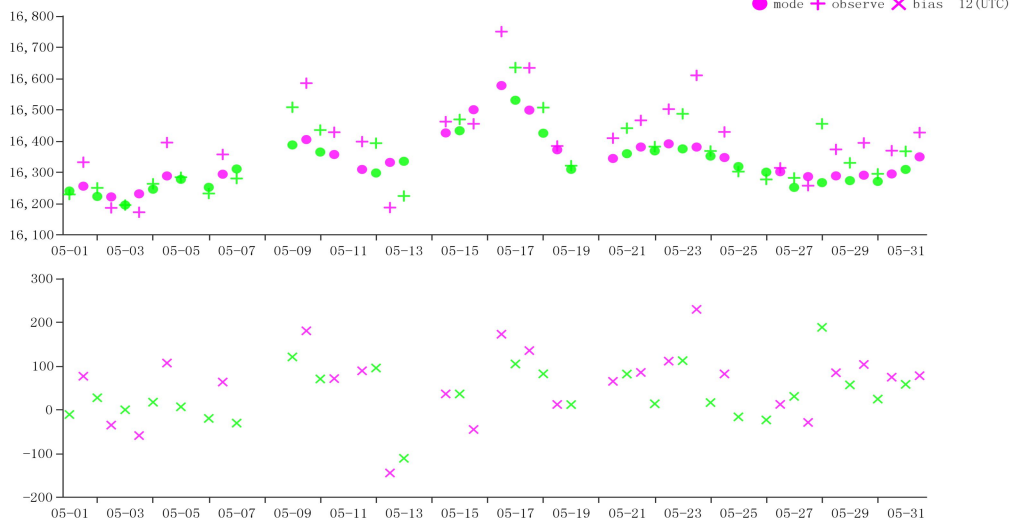


Time-series representation of GPH Obs minus first guess for station 32540\*(Level:30)

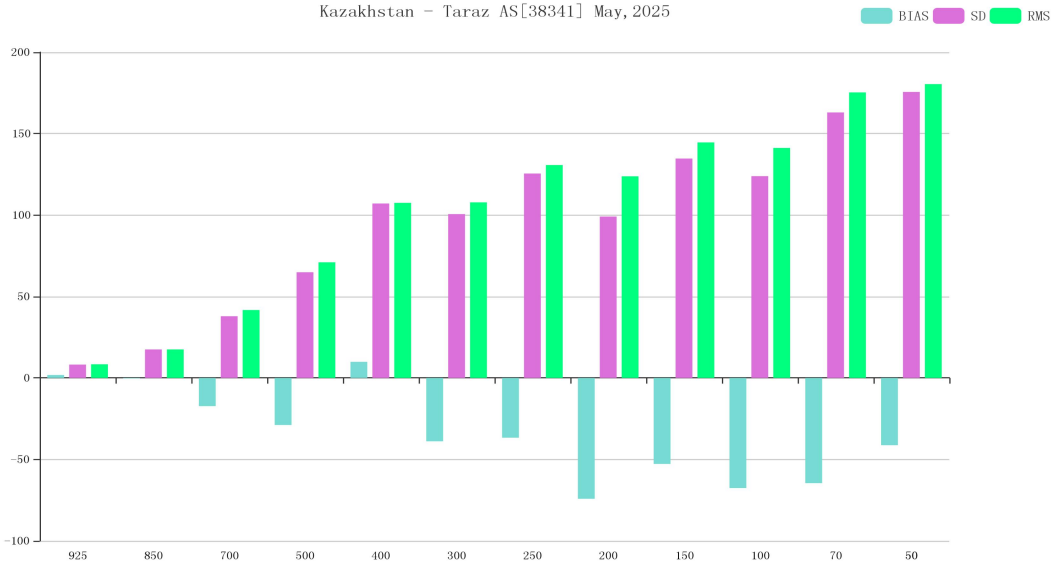


BIAS、SD and RMS of GPH for station 36003\*(OBS-TIME:12)

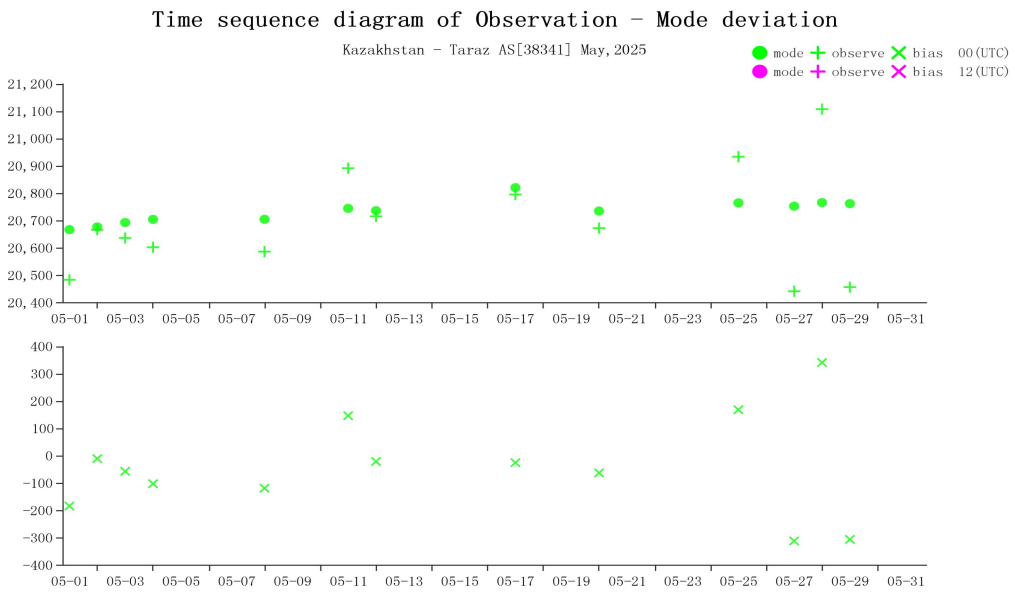
Time sequence diagram of Observation - Mode deviation



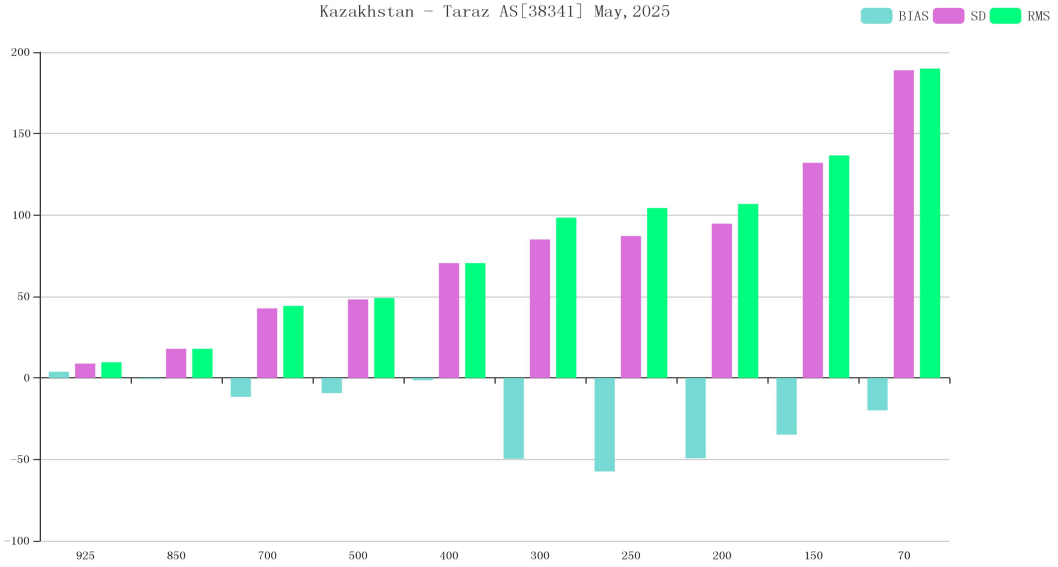
Time-series representation of GPH Obs minus first guess for station 36003\*(Level:100)



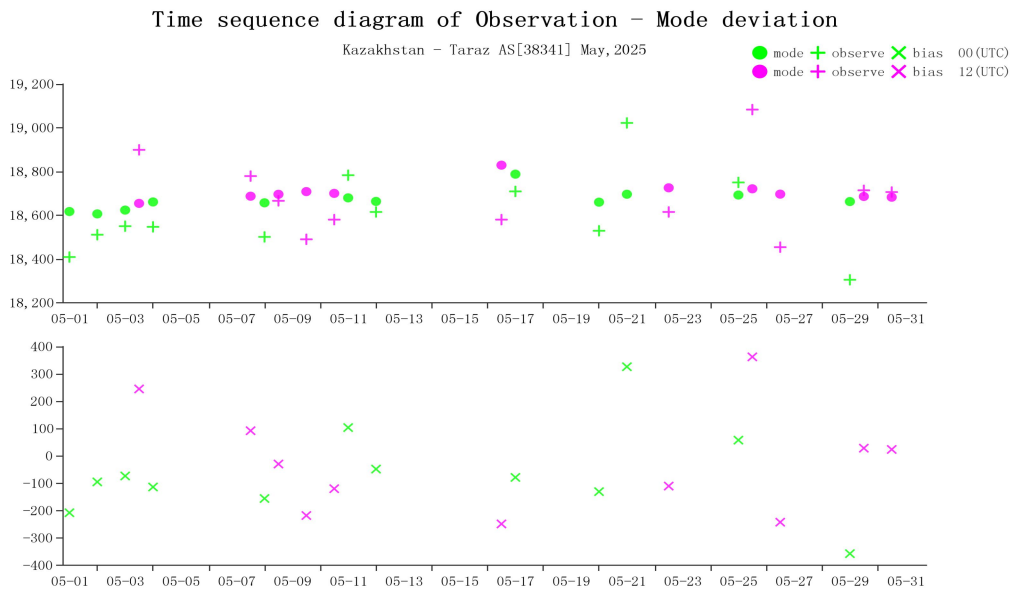
BIAS、SD and RMS of GPH for station 38341\*(OBS-TIME:00)



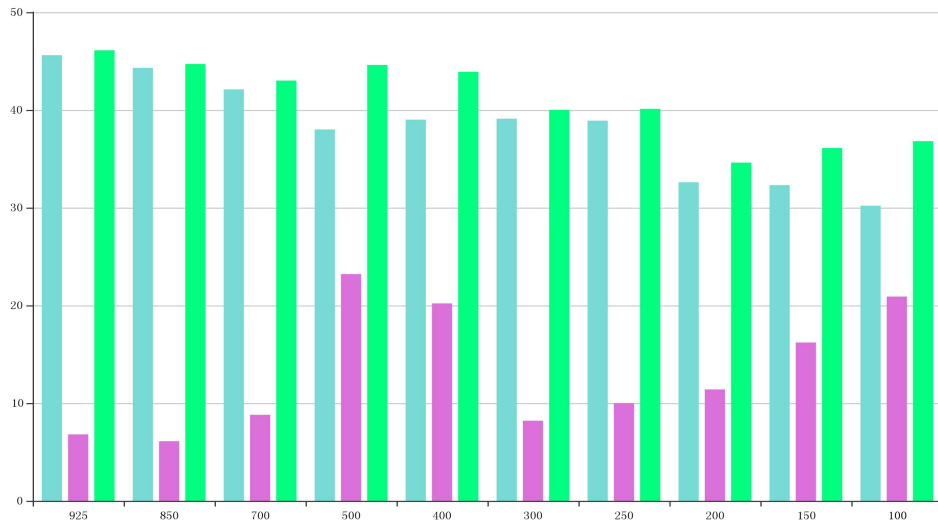
Time-series representation of GPH Obs minus first guess for station 38341\*(Level:50)



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

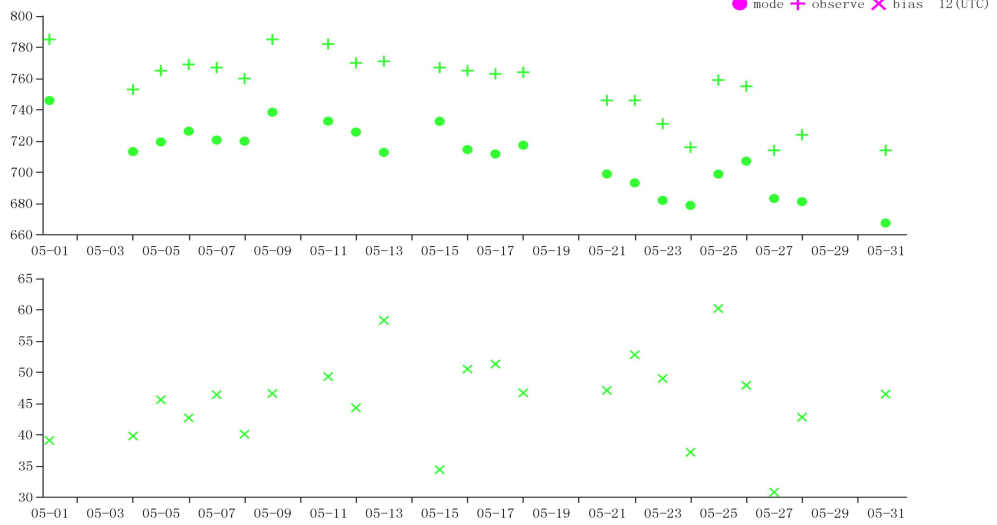


Time-series representation of GPH Obs minus first guess for station 38341\*(Level:70)

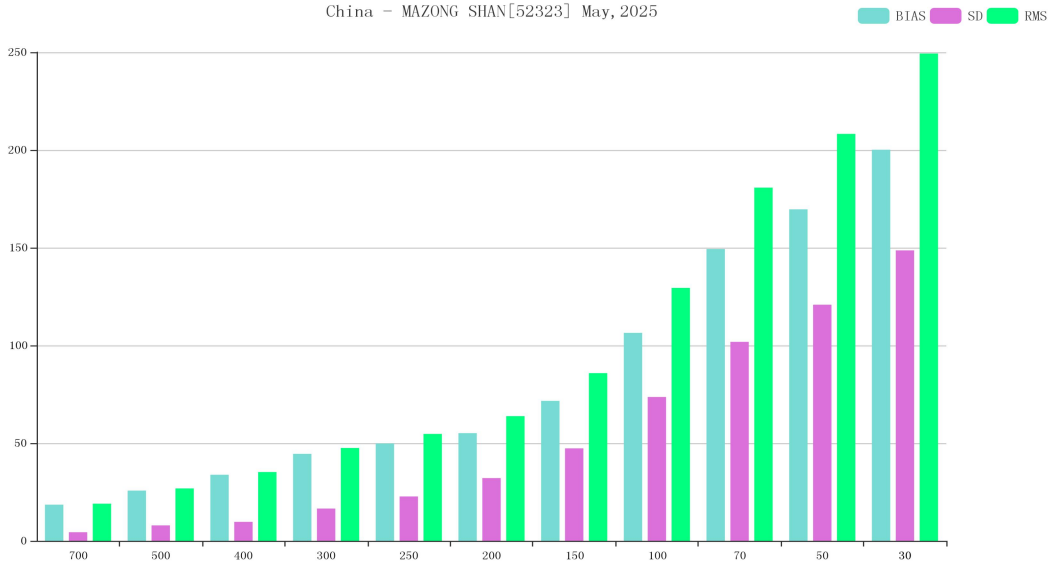


BIAS、SD and RMS of GPH for station 42348(OBS-TIME:00)

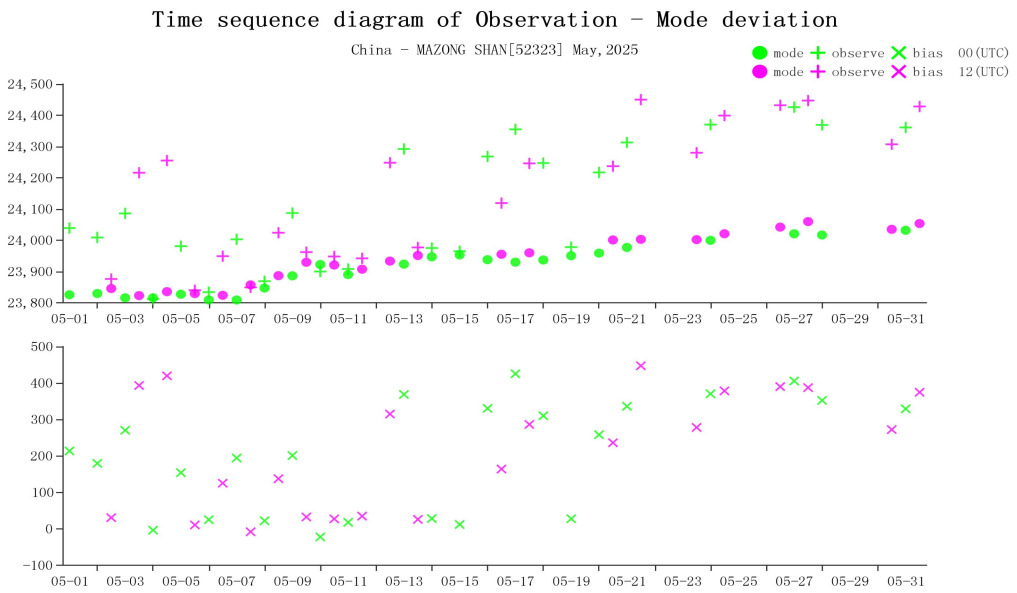
Time sequence diagram of Observation - Mode deviation



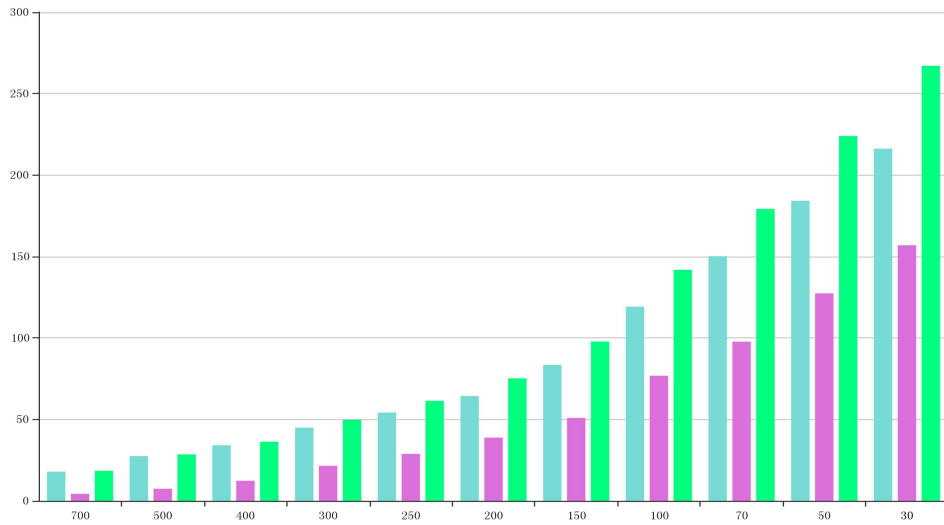
Time-series representation of GPH Obs minus first guess for station 42348(Level:925)



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

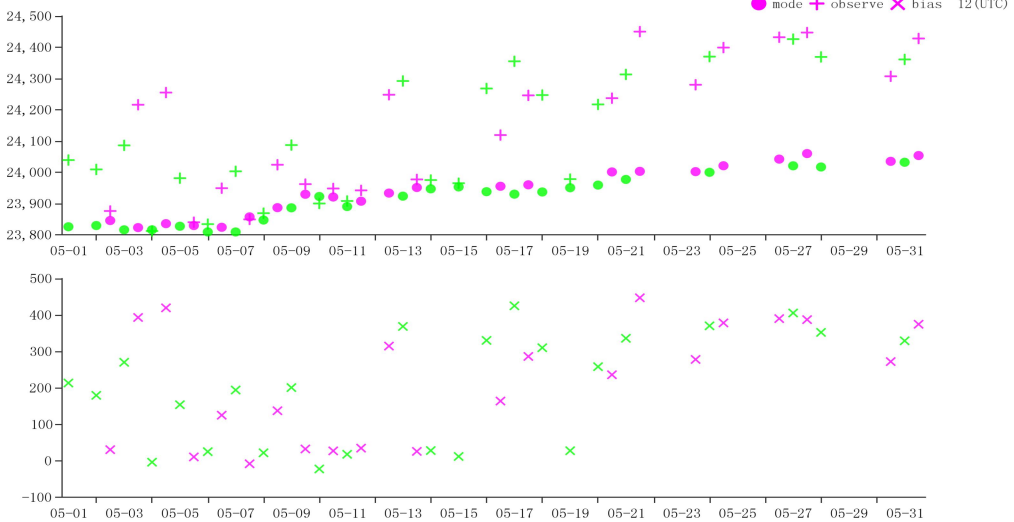


Time-series representation of GPH Obs minus first guess for station 52323(Level:30)



BIAS、SD and RMS of GPH for station 52323(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation



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

### 3.3 Vector Wind (WIN\_S)

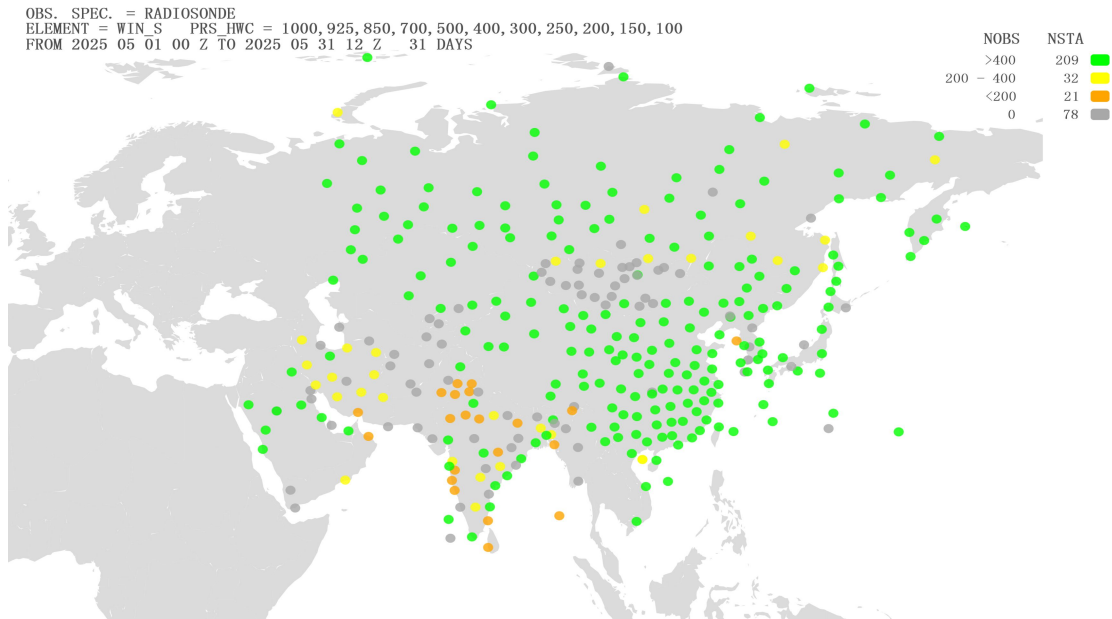
#### 3.3.1 List of Suspect Stations

Table 3 List of WIN\_S suspected in May 2025

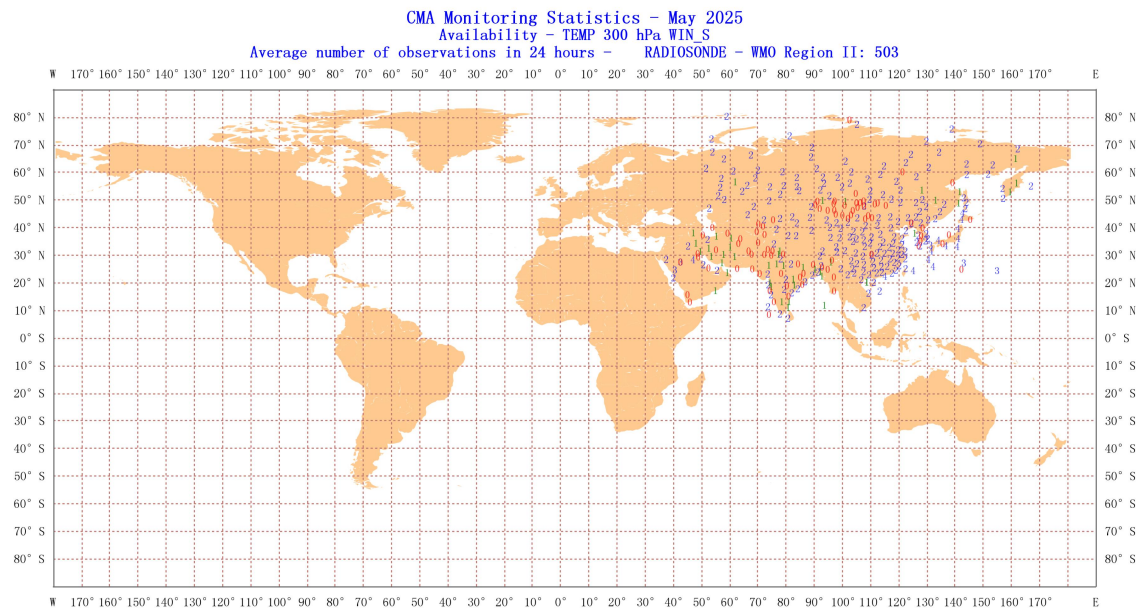
INDEX	WMO IDENT	COUNTRY	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ (%)	BIAS	SD	RMS
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1	38341*	Kazakhstan	00	300	27	0	0	7.2	14	15.8
2	38341*	Kazakhstan	12	250	19	0	0	3.8	17.8	18.2

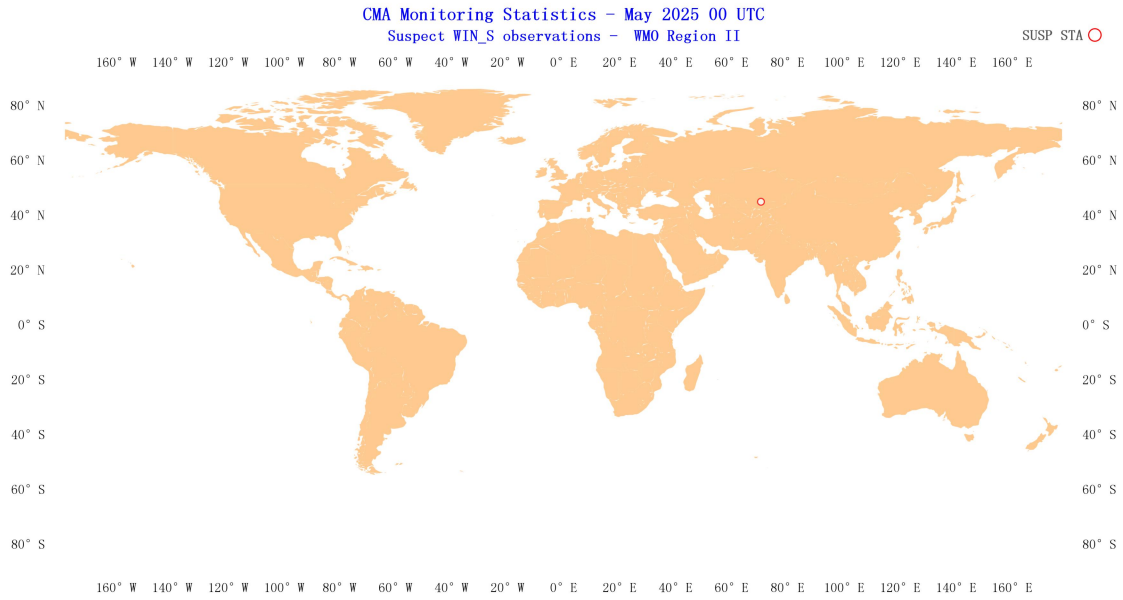
### 3.3.2 Suspect Station Analysis



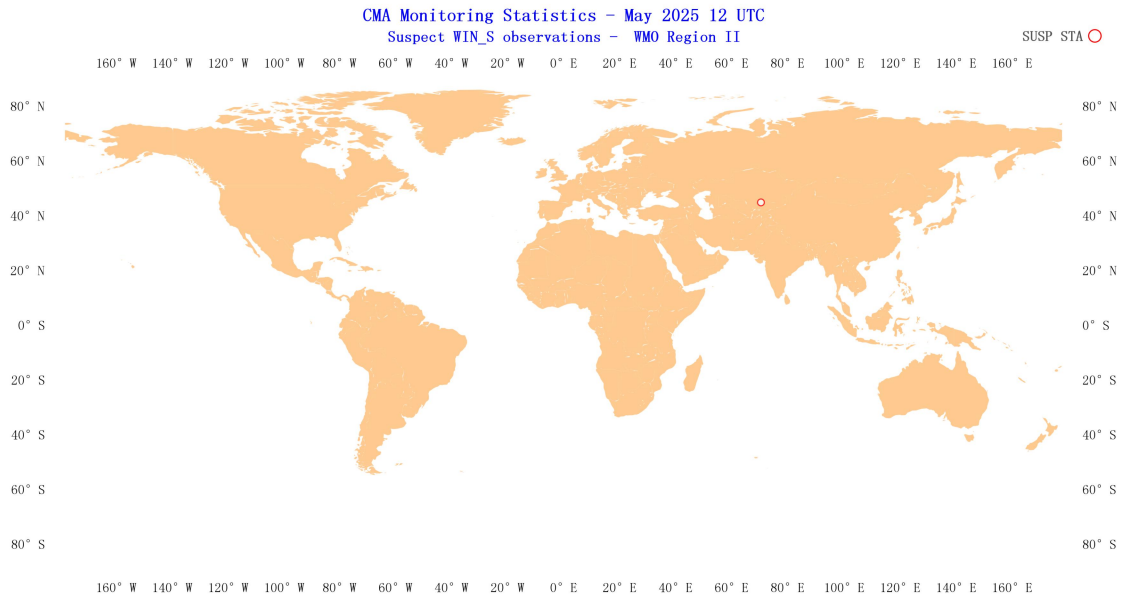
Location of all radiosonde stations reporting vector wind observations in Region II over the month of May 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers to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



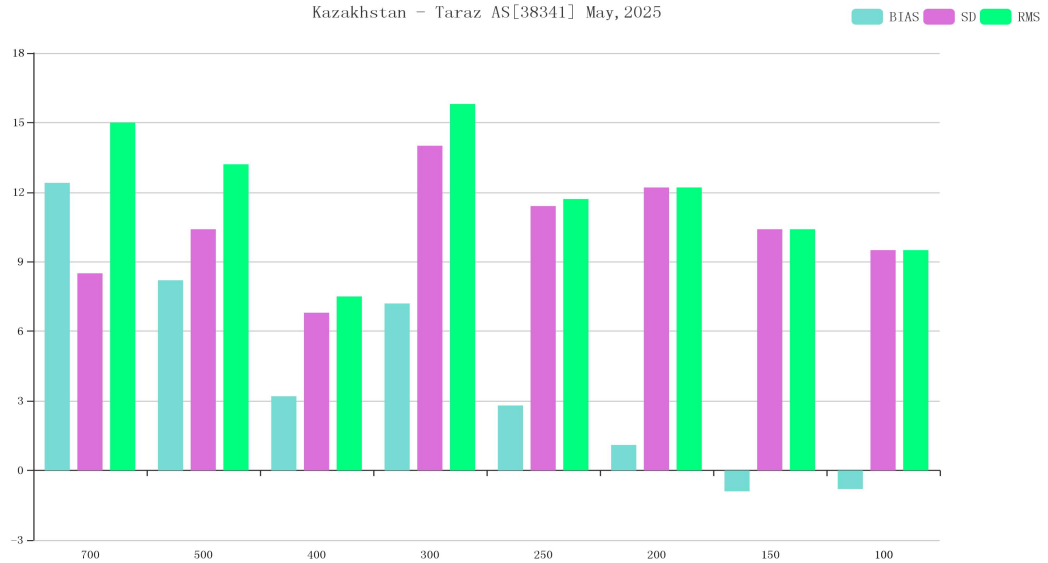
Location of all radiosonde stations reporting vector wind average number of observations in 24 hours in Region II over the month of May 2025.



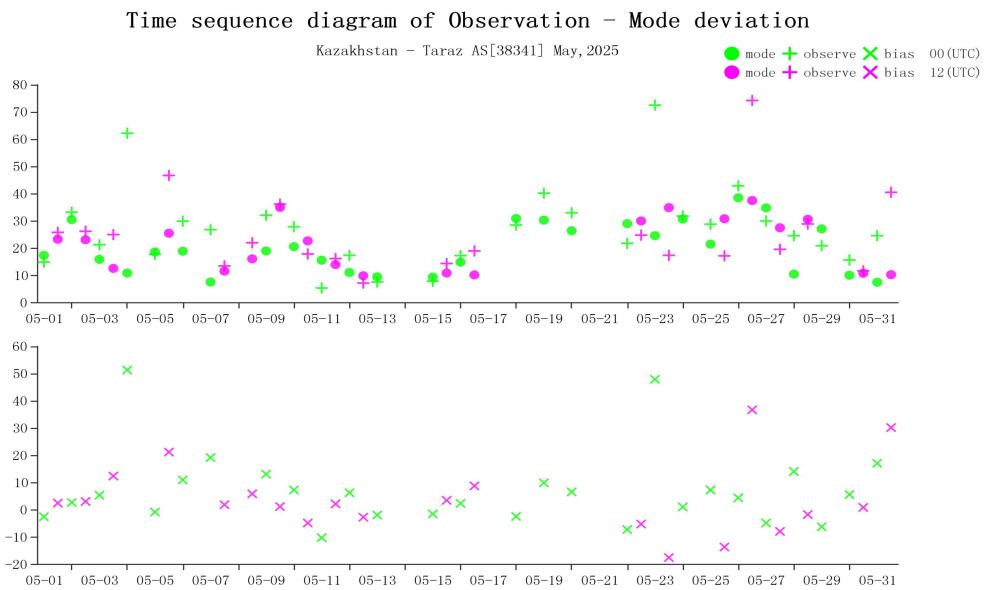
Distribution of suspect stations - Vector Wind 00 UTC



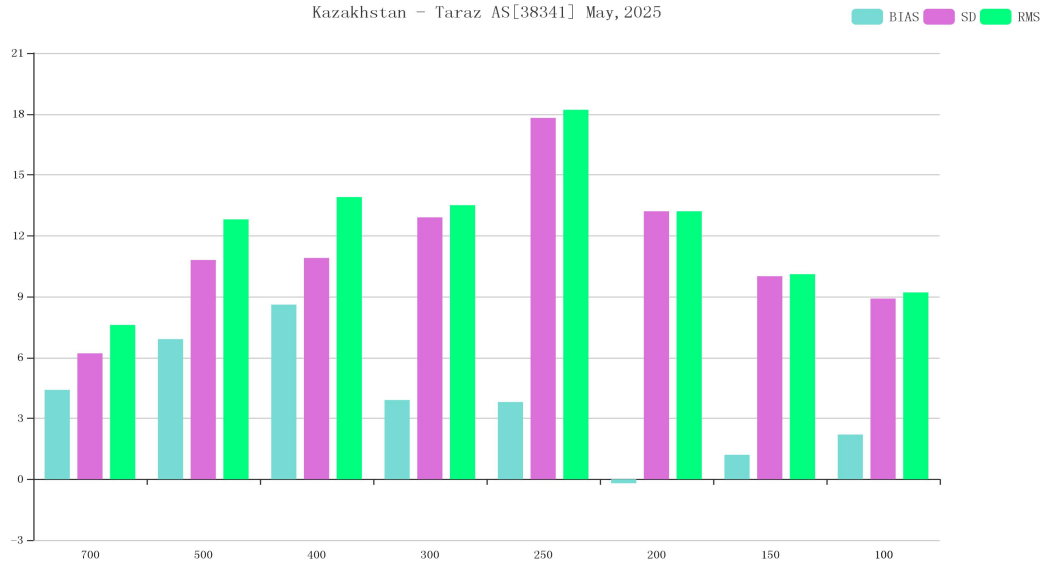
Distribution of suspect stations - Vector Wind 12 UTC



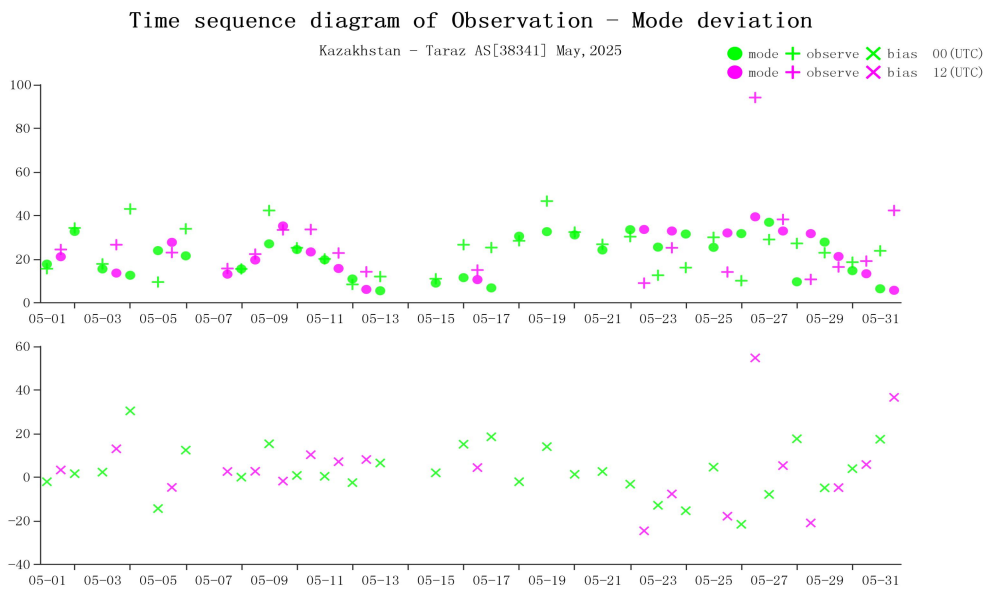
BIAS、SD and RMS of WIN\_S for station 38341\*(OBS-TIME:00)



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



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:250)

### 3.4 Wind Direction (WIN\_D)

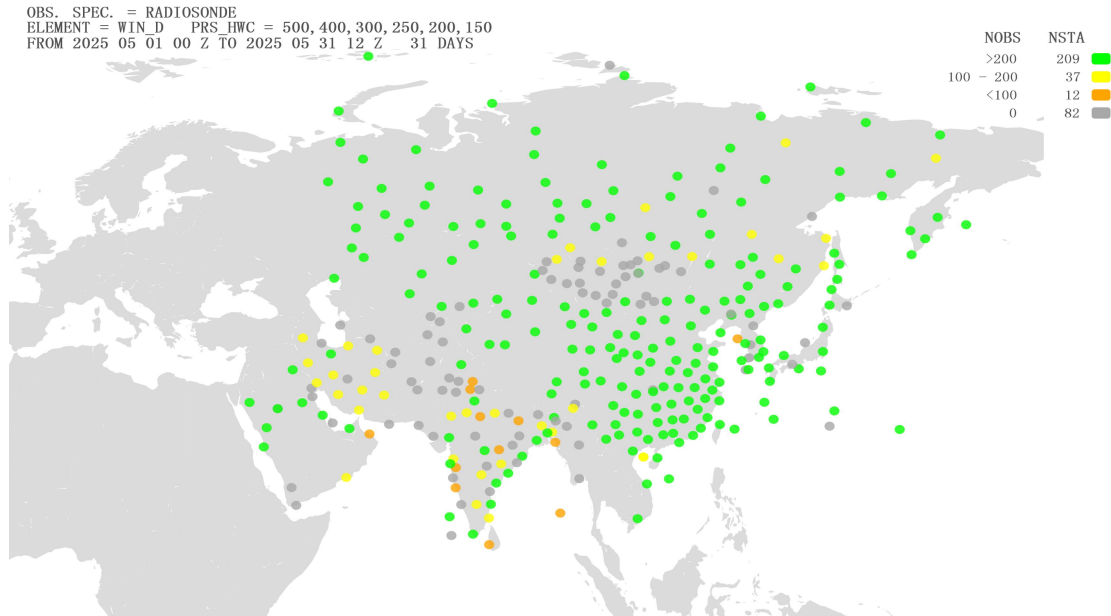
#### 3.4.1 List of Suspect Stations

Table 4 List of WIN\_D suspected in May 2025

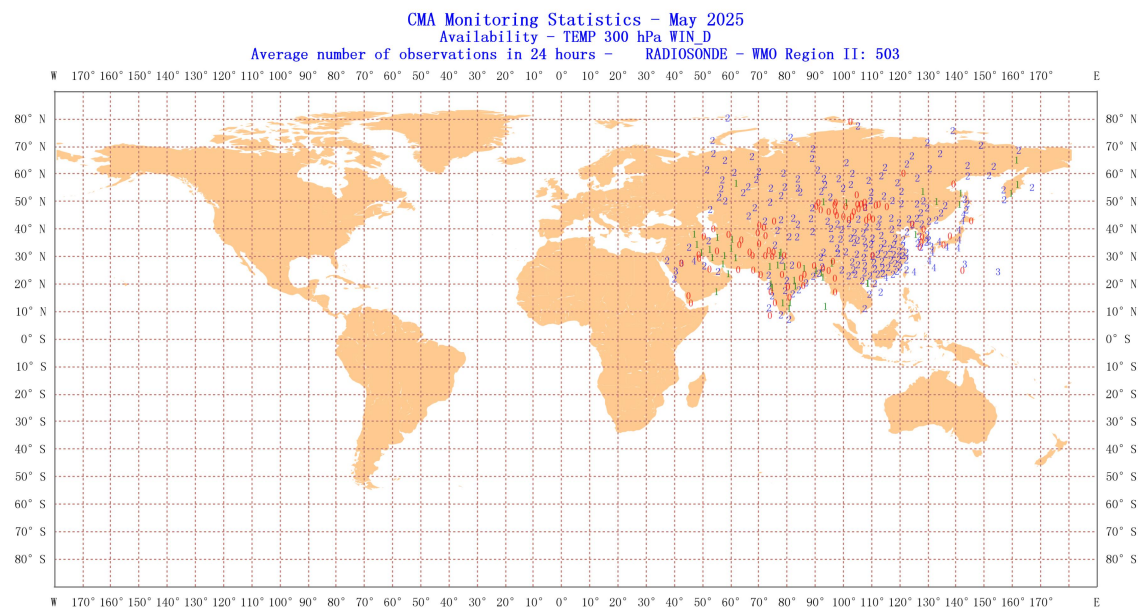
INDEX	WMO IDENT	COUNTRY	OBS TIME	NUM OBS	BIAS	SD	MAX SPREAD
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1	38341*	Kazakhstan	00	23	10.5	18	5.6
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### 3.4.2 Suspect Station Analysis

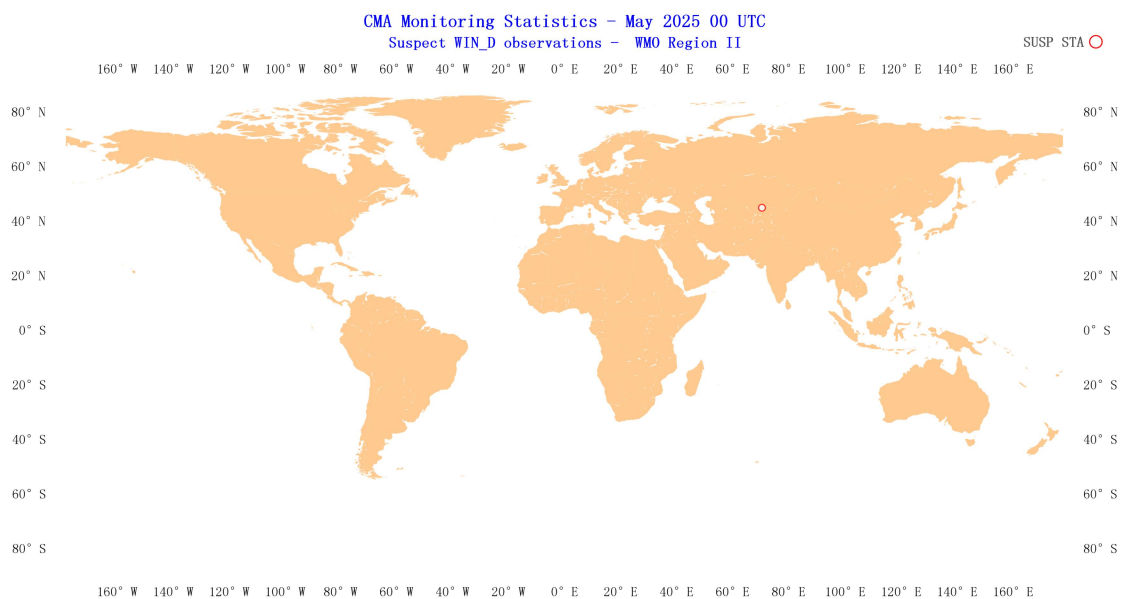


Location of all radiosonde stations reporting wind direction observations in Region II over the month of May 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers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

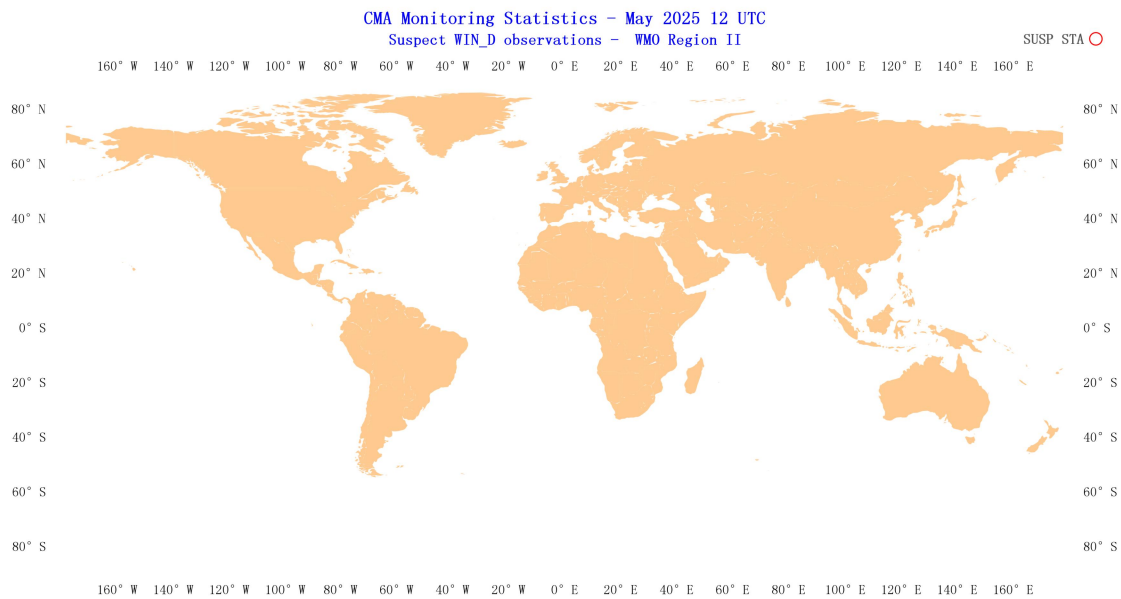


Location of all radiosonde stations reporting wind direction average number of

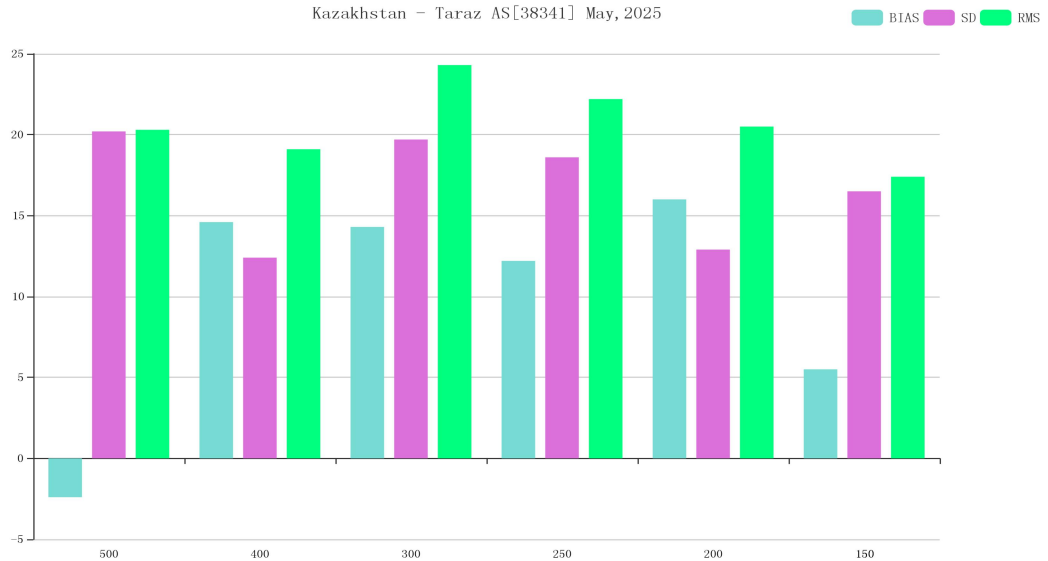
observations in 24 hours in Region II over the month of May 2025.



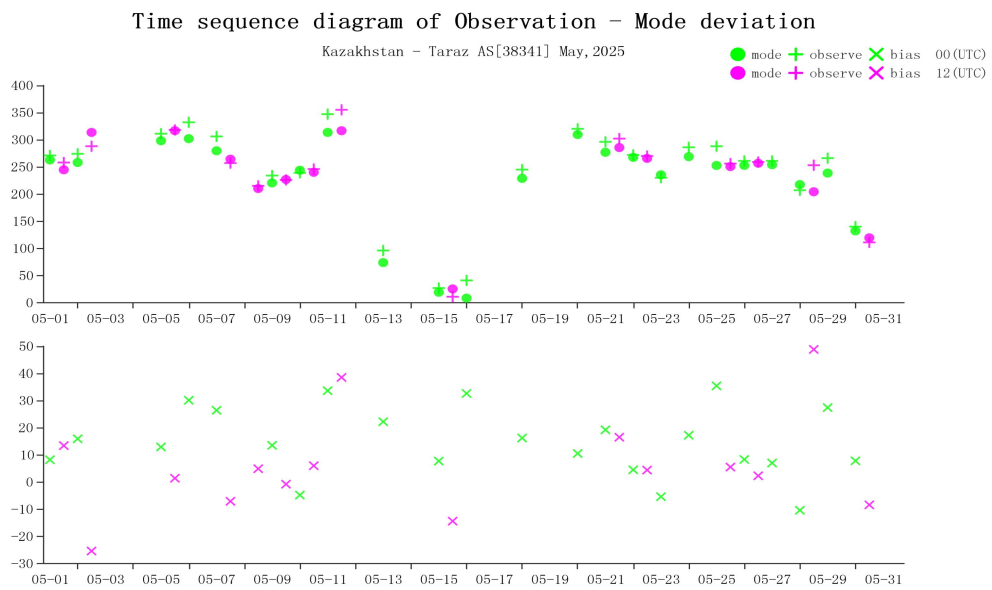
### Distribution of suspect stations - Wind Direction 00 UTC



### 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:400)

## 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	21432	12	150	Russian Federation	21432	12	150	Russian Federation	21432	12	150
	Russian Federation	29839	00	50	Russian Federation	23933	12	300	Russian Federation	29839	12	250
	Russian Federation	29839	12	30	Russian Federation	23933	00	300	Russian Federation	31770	00	200
	Russian Federation	31770	00	200	Russian Federation	29839	12	200	Russian Federation	32540	00	50
	Russian Federation	32540	00	30	Russian Federation	31770	00	200	Russian Federation	32540	12	50
	Russian Federation	32540	12	30	Russian Federation	32540	00	50	Kazakhstan	36003	12	200
	Kazakhstan	36003	12	100	Russian Federation	32540	12	50	Kazakhstan	38341	00	400
	Kazakhstan	38341	00	50	Russian Federation	32540	12	50	Kazakhstan	38341	12	70
	Kazakhstan	38341	12	70	Kazakhstan	36003	12	200	China	52323	00	50
	India	42348	00	925	Kazakhstan	38341	12	70	China	52323	12	30
	China	52323	00	30	Kazakhstan	38341	00	250				
	China	52323	12	30	China	52323	12	50				
					China	52323	00	50				
	Vector Wind	Kazakhstan	38341	00	300	Russian Federation	36096	12	250	Russian Federation	36096	12
Kazakhstan		38341	12	250	Kazakhstan	38341	12	150				
					Kazakhstan	38341	00	150				
Wind Direction	Kazakhstan	38341	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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