

Radiosonde-No.12-MOC-CMA(2024)

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

December 2024

Regional WIGOS Centre, Beijing

China Meteorological Administration

No. 46 Zhongguancun Nandajie

Beijing, CHINA

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

December 2024

Introduction

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

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

1. Data Acquisition

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

2. Monitoring Standard

2.1 Geopotential Height

*Standard of comparison: First guess field from CMA_GFS model

*Observation times : 00, 12 UTC

*Levels monitored : Standard levels from 1000 - 30 hPa

*Element monitored : Geopotential Height (m)

*Parameters monitored :

NUM OBS: Number of observations received excluding duplicates

NUM GRS: Number of observations with gross errors

% REJ: Percentage of observations rejected by quality control

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

BIAS: Mean difference of observations from first guess field

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

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

*GROSS ERROR LIMIT :

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

*SELECTION CRITERIA :

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

2.2 Vector Wind

*Standard of comparison: First guess field from CMA_GFS model

*Observation times : 00, 12 UTC

*Levels monitored : Standard levels from 1000 - 100 hPa

*Element monitored : Vector Wind (m/s)

*Parameters monitored :

NUM OBS: Number of observations received excluding duplicates

NUM GRS: Number of observations with gross errors

% REJ: Percentage of observations rejected by quality control

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

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

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

*GROSS ERROR LIMIT :

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

SELECTION CRITERIA :

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

2.3 Wind Direction

*Standard of comparison: First guess field from CMA_GFS model

*Observation times : 00, 12 UTC

*Levels monitored : Standard levels from 500 - 150 hPa

*Element monitored : Wind Direction (degrees, clockwise)

*Parameters monitored :

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

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

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

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

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

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

GROSS ERROR LIMIT :

Level (hPa)	Wind Direction (°)
500	45
400	50
300	60
250	60
200	50
150	50

SELECTION CRITERIA :

NUM OBS \geq 5 and

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

3. Monitoring Results

3.1 Silent Stations

Table 1 List of silent stations from December

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	41883	BOGRA	Bangladesh	24.85	89.37
4	43285	MANGALORE/PANAMBUR	India	12.95	74.83
5	42701	M.O. RANCHI	India	23.32	85.32
6	43333	PORT BLAIR	India	11.67	92.72
7	42101	PATIALA	India	30.33	76.47
8	43192	GOA/PANJIM	India	15.48	73.82
9	43311	AMINIDIVI	India	11.12	72.73
10	42361	GWALIOR	India	26.23	78.25
11	43295	BENGALURU	India	12.97	77.58
12	42667	BHOPAL/BAIRAGHAR	India	23.28	77.35
13	47418	KUSHIRO	Japan	42.95	144.44
14	47600	WAJIMA	Japan	37.39	136.90
15	40582	KUWAIT INTERNATIONAL AIRPORT	Kuwait	29.24	47.97
16	43599	GAN	Maldives	-0.69	73.16
17	48042	MANDALAY	Myanmar	21.94	96.09
18	48097	YANGON	Myanmar	16.86	96.15
19	41316	SALALAH AIRPORT	Oman	17.03	54.07
20	41661	QUETTA (SHEIKH MANDA)	Pakistan	30.27	66.92
21	41594	SARGODHA	Pakistan	32.05	72.67

22	30715	ANGARSK	Russia	52.48	103.85
23	31168	AYAN	Russia	56.45	138.15
24	24944	OLEKMINSK	Russia	60.37	120.42
25	25428	OMOLON	Russia	65.23	160.53
26	38836	DUSHANBE	Tajikistan	38.58	68.73
27	38954	KHOROG	Tajikistan	37.50	71.50
28	38507	TURKMENBASHI	Turkmenistan	40.03	52.98

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

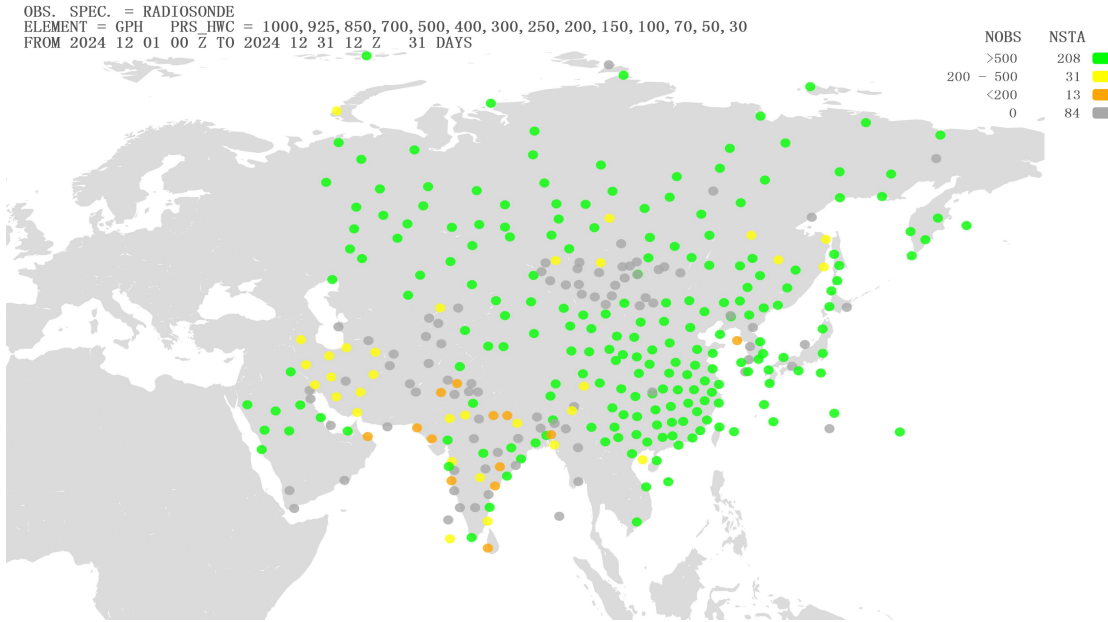
3.2 Geopotential Height (GPH)

3.2.1 List of Suspect Stations

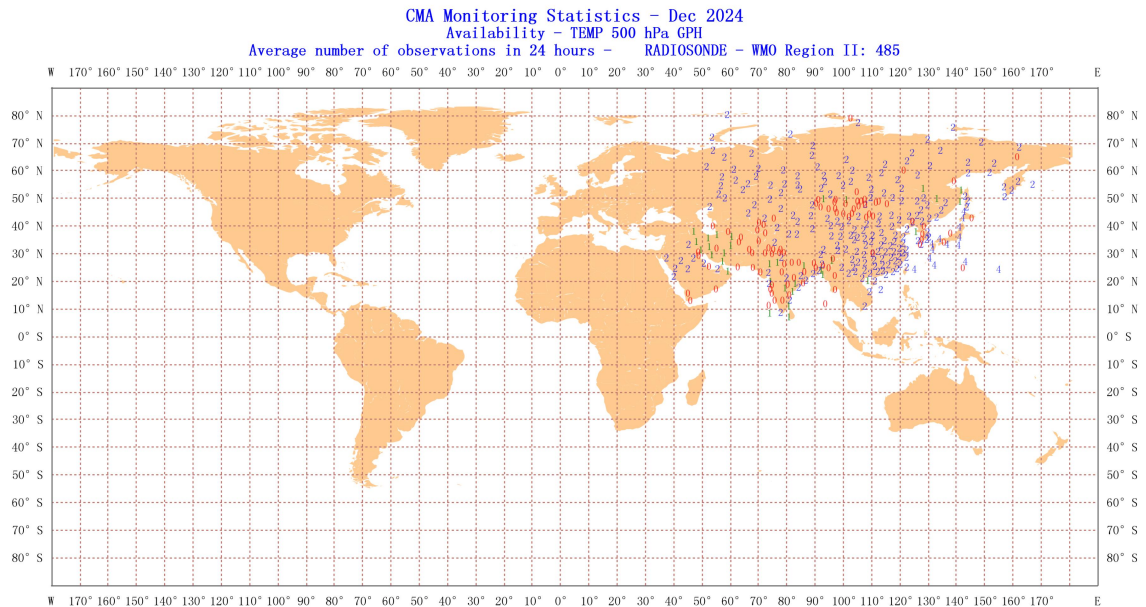
Table 2 List of GPH suspected in December 2024

INDEX	WMO IDENT	COUNTRY	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ (%)	BIAS	SD	RMS
1	38341	Kazakhstan	00	400	10	11	4	-33.4	64.5	72.6
2	38341	Kazakhstan	12	250	11	9	21.7	-59.5	123.1	136.7
3	42348	India	00	700	24	0	0	35	11.2	36.7

3.2.2 Suspect Station Analysis

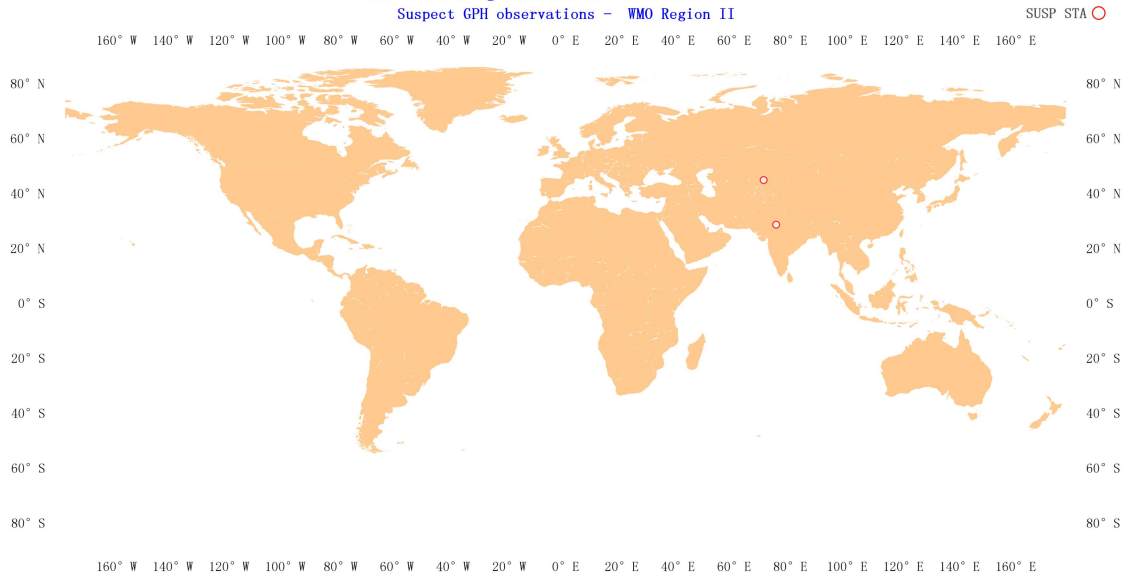


Location of all radiosonde stations reporting geopotential height observations in Region II over the month of December 2024. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green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



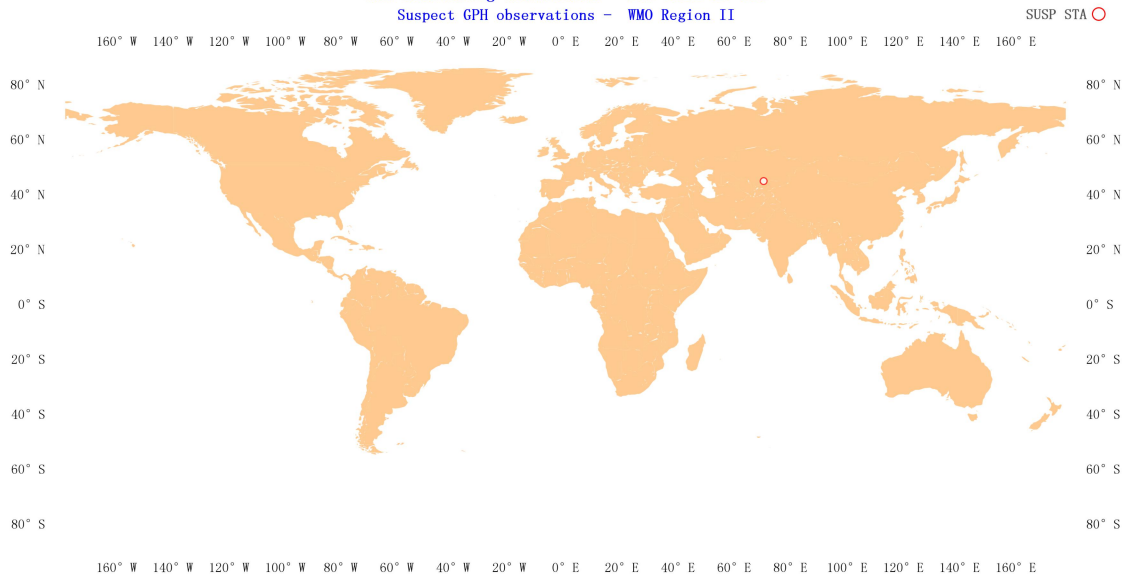
Location of all radiosonde stations reporting geopotential height average number of observations in 24 hours in Region II over the month of December 2024.

CMA Monitoring Statistics - Dec 2024 00 UTC
Suspect GPH observations - WMO Region II



Distribution of suspect stations - Geopotential Height 00 UTC

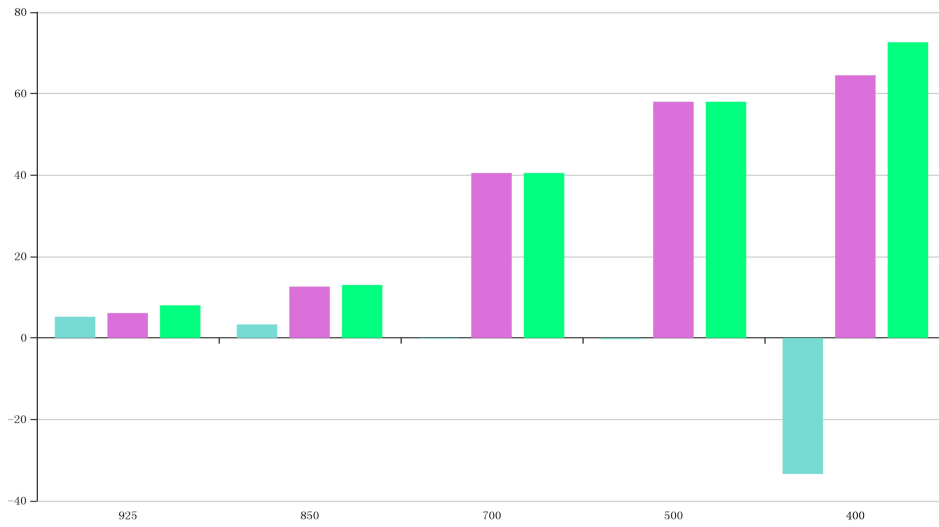
CMA Monitoring Statistics - Dec 2024 12 UTC
Suspect GPH observations - WMO Region II



Distribution of suspect stations - Geopotential Height 12 UTC

Kazakhstan - Taraz AS[38341] Dec, 2024

BIAS SD RMS

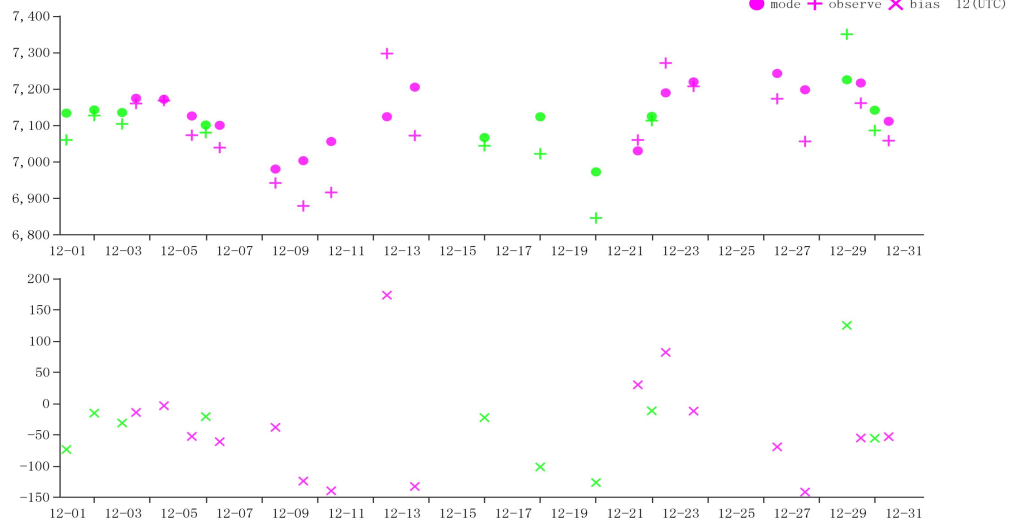


BIAS、SD and RMS of GPH for station 38341(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

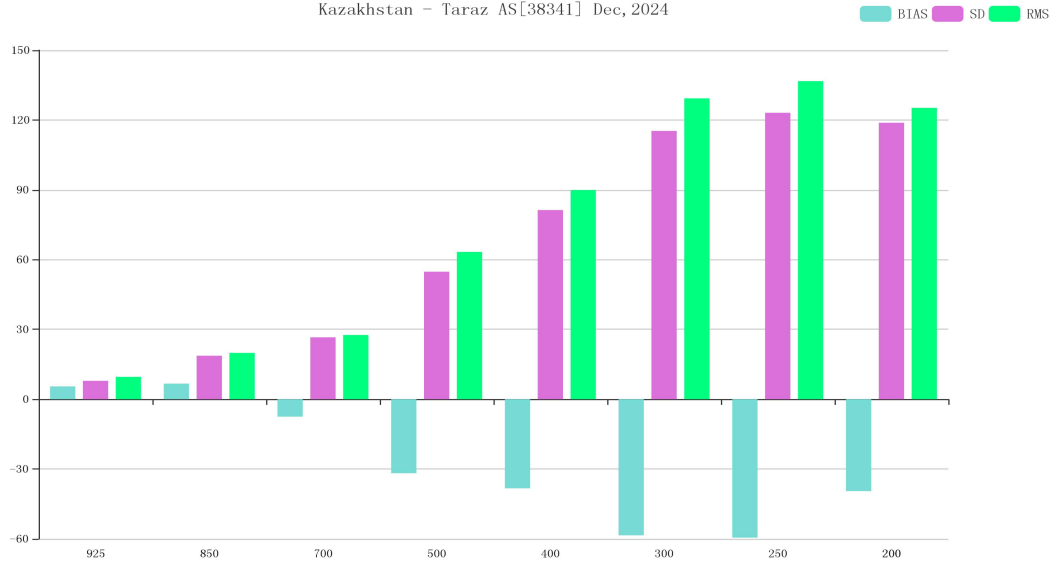
Kazakhstan - Taraz AS[38341] Dec, 2024

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



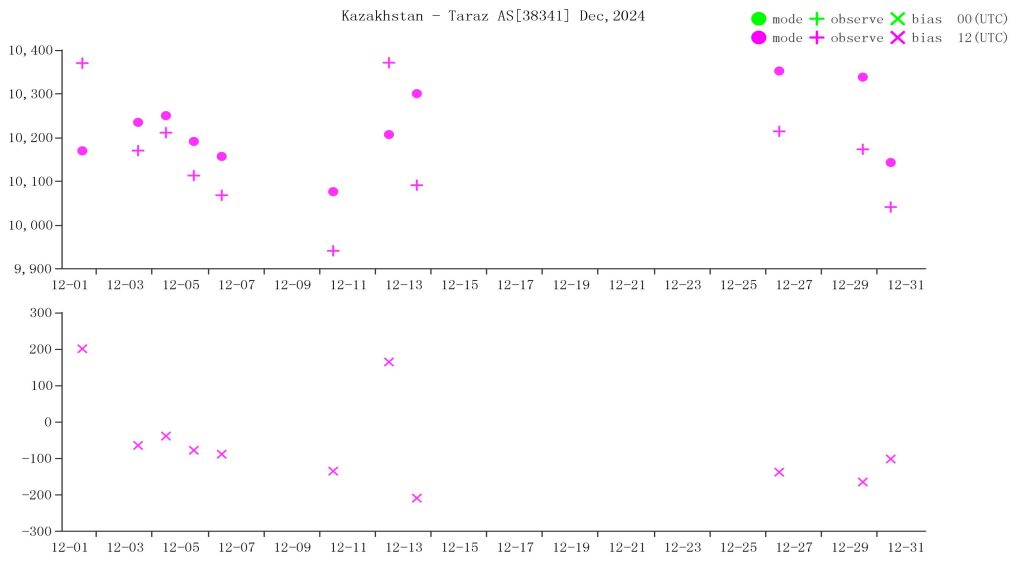
Time-series representation of GPH Obs minus first guess for station 38341(Level:400)

Kazakhstan - Taraz AS[38341] Dec, 2024

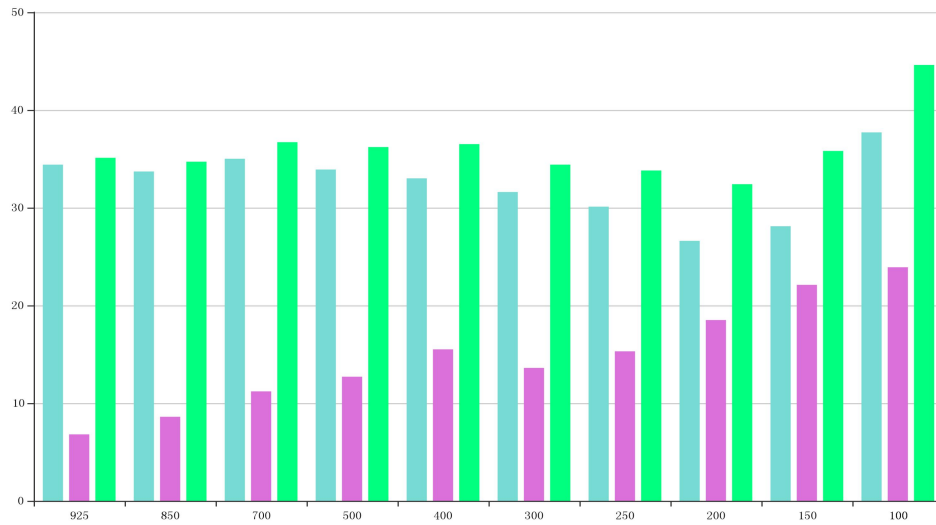


BIAS、SD and RMS of GPH for station 38341(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

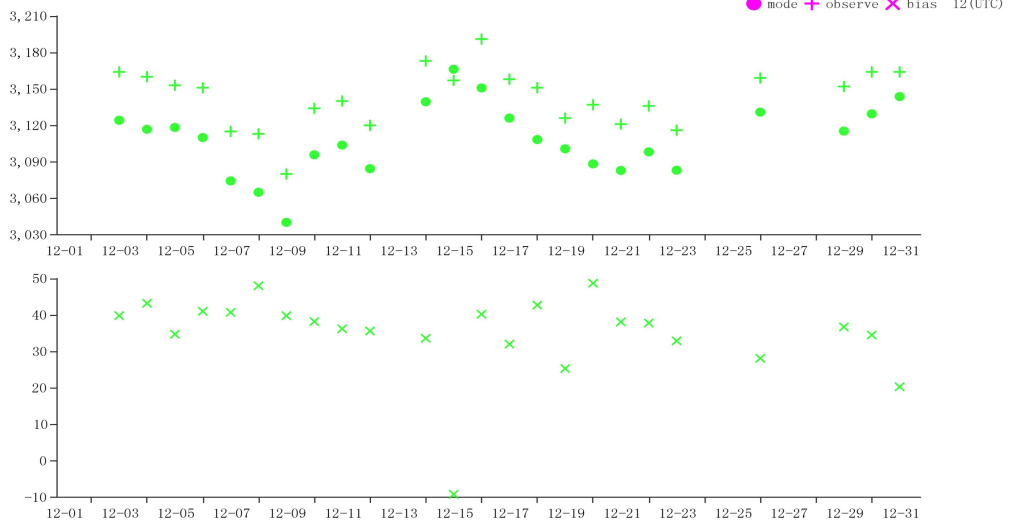


Time-series representation of GPH Obs minus first guess for station 38341(Level:250)



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)

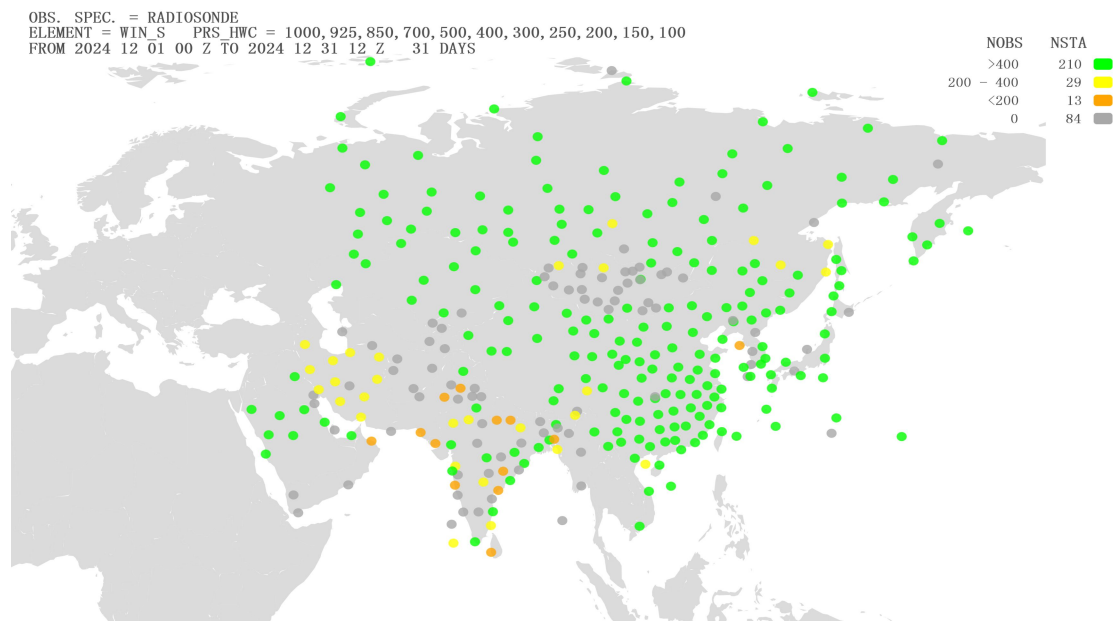
3.3 Vector Wind (WIN_S)

3.3.1 List of Suspect Stations

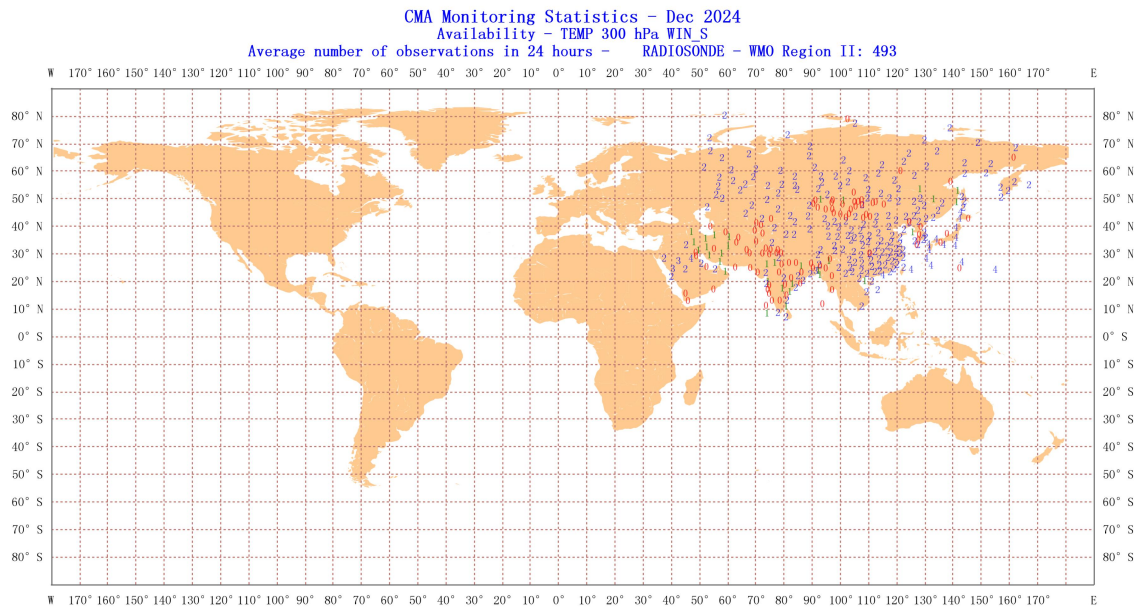
Table 3 List of WIN_S suspected in December 2024

INDEX	WMO IDENT	COUNTRY	OBS TIME	LEVEL	NUM OBS	NUM GRS	REJ (%)	BIAS	SD	RMS
1	38341	Kazakhstan	12	300	22	0	0	6.3	14.2	15.5
2	40800	Iran, Islamic Republic of	00	250	17	0	0	0.3	15.3	15.3
3	42027	India	00	250	12	1	0	-8.1	16.3	18.2
4	53915	China	00	200	15	0	0	-9.6	15.6	18.3
5	53915	China	12	200	15	0	0	-12.9	15.1	19.8

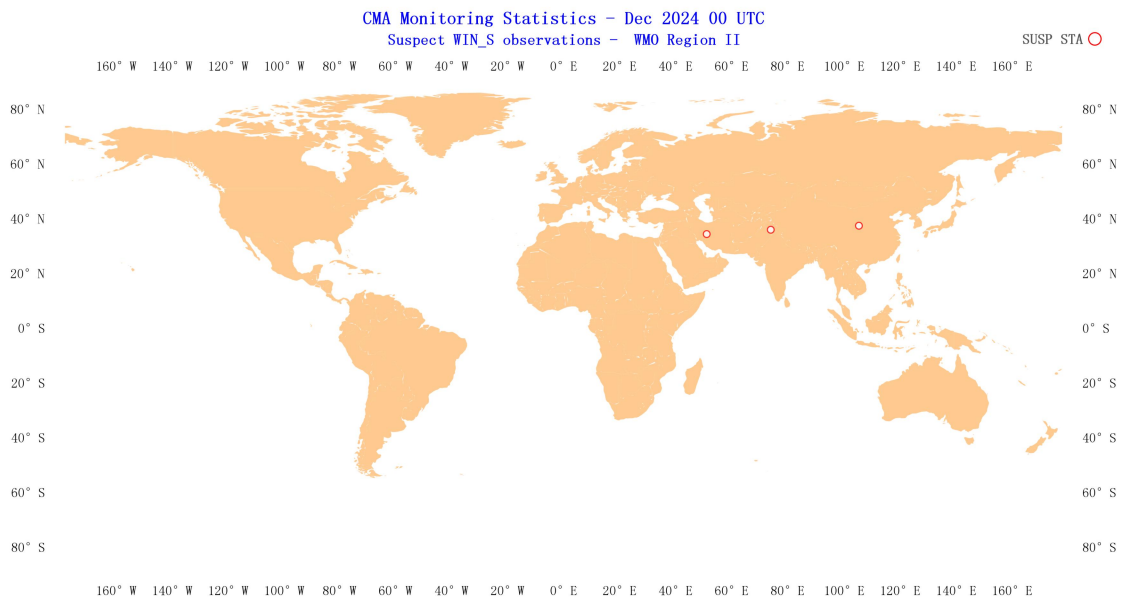
3.3.2 Suspect Station Analysis



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

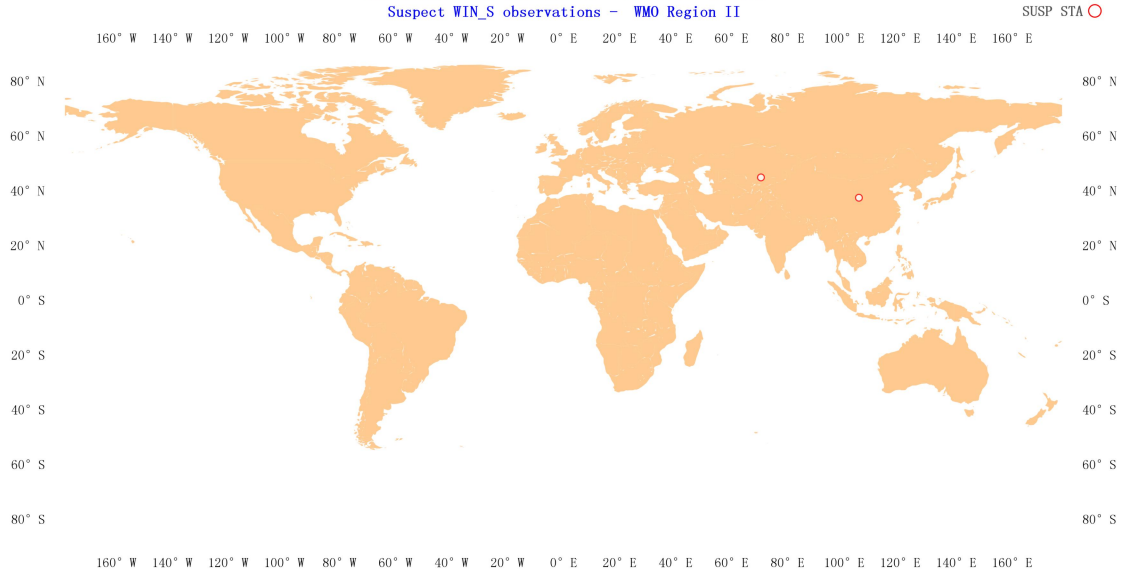


Location of all radiosonde stations reporting vector wind average number of observations in 24 hours in Region II over the month of December 2024.

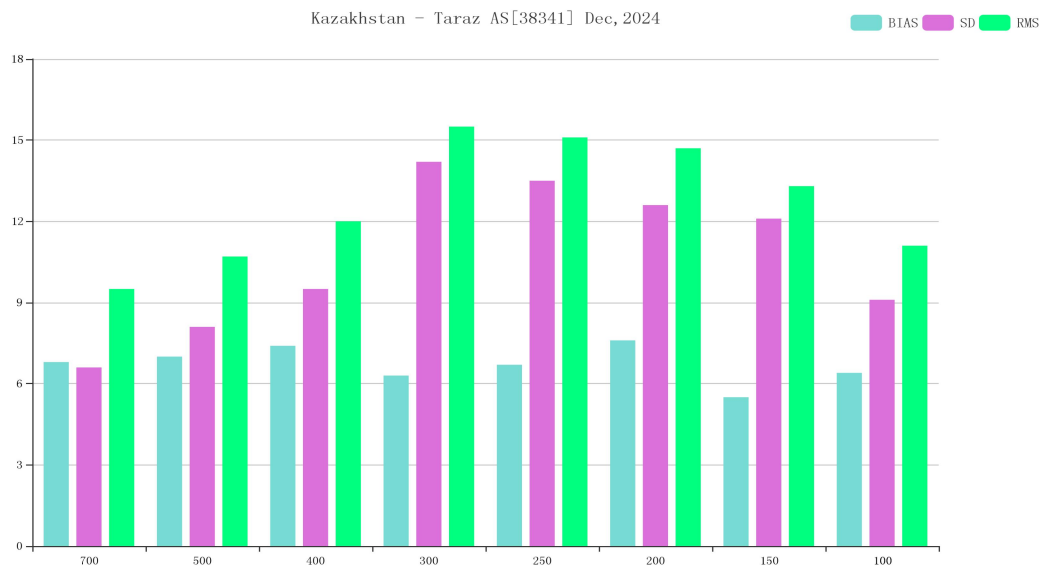


Distribution of suspect stations - Vector Wind 00 UTC

CMA Monitoring Statistics - Dec 2024 12 UTC
 Suspect WIN_S observations - WMO Region II

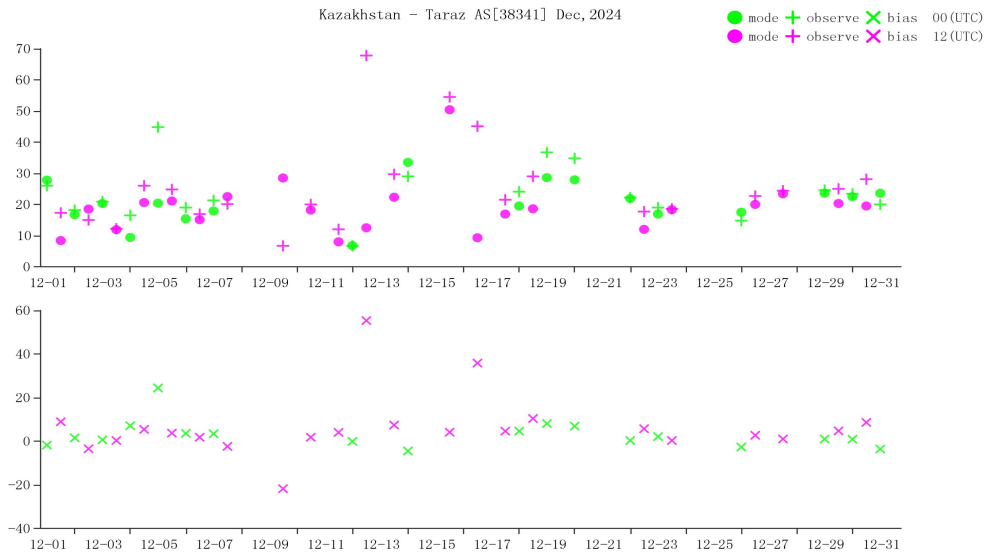


Distribution of suspect stations - Vector Wind 12 UTC

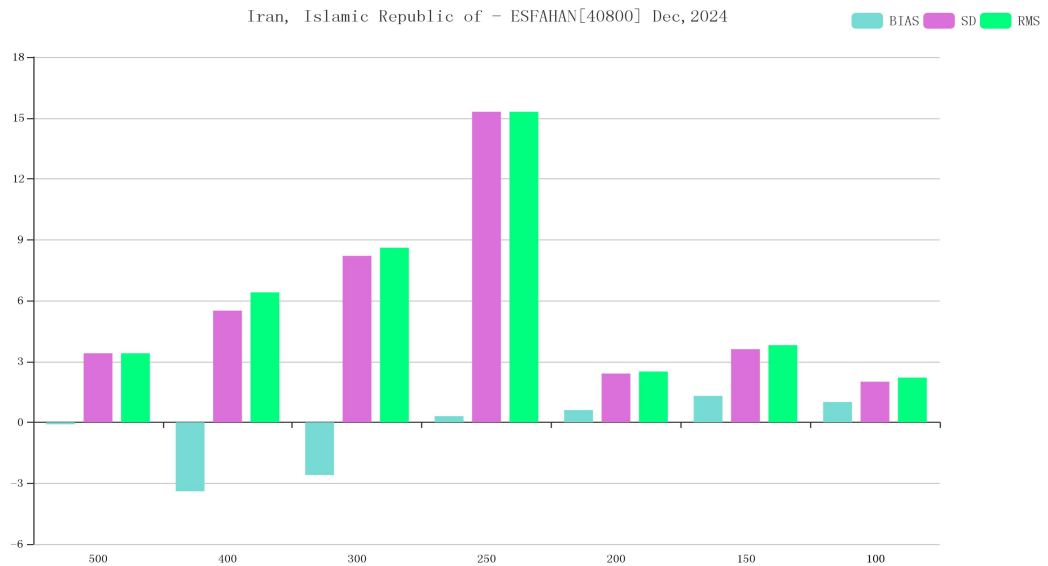


BIAS、SD and RMS of WIN_S for station 38341(OBS-TIME:12)

Time sequence diagram of Observation - Mode deviation

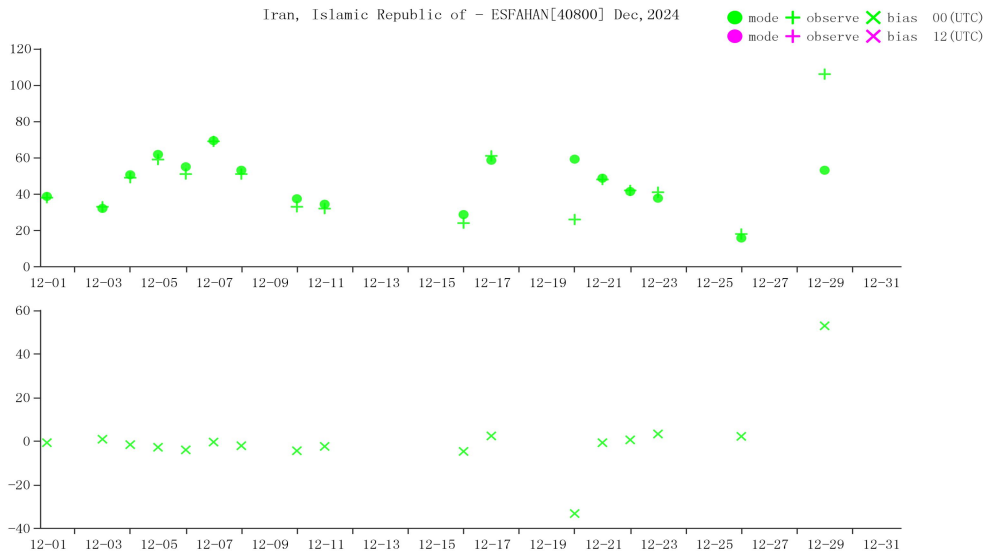


Time-series representation of WIN_S Obs minus first guess for station 38341(Level:300)

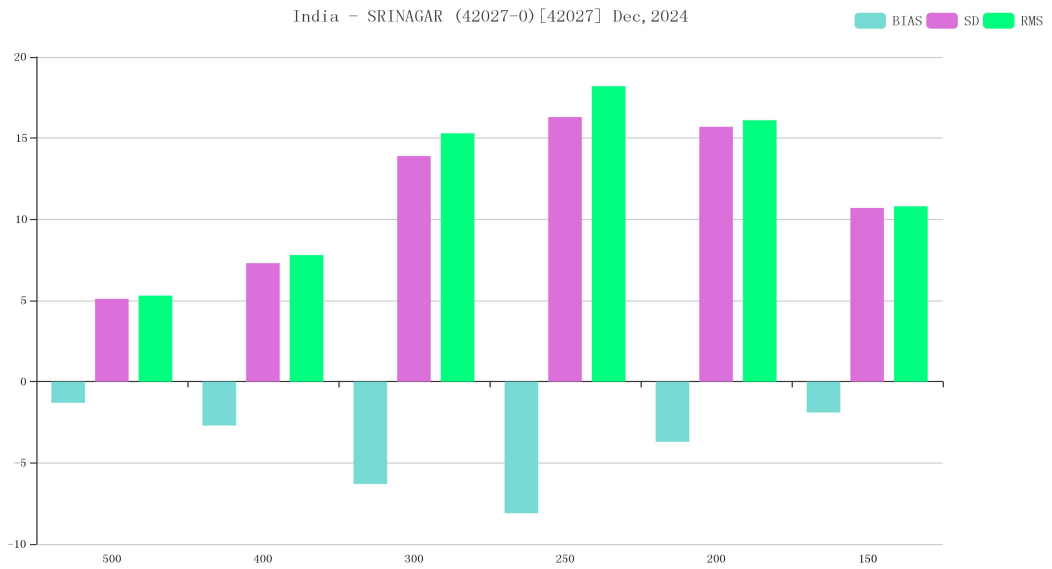


BIAS、SD and RMS of WIN_S for station 40800(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

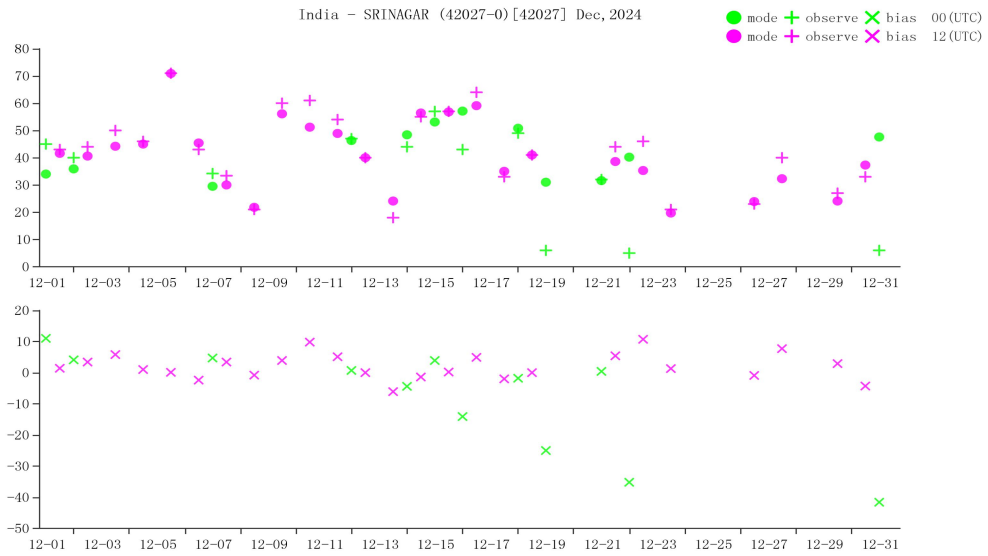


Time-series representation of WIN_S Obs minus first guess for station 40800(Level:250)

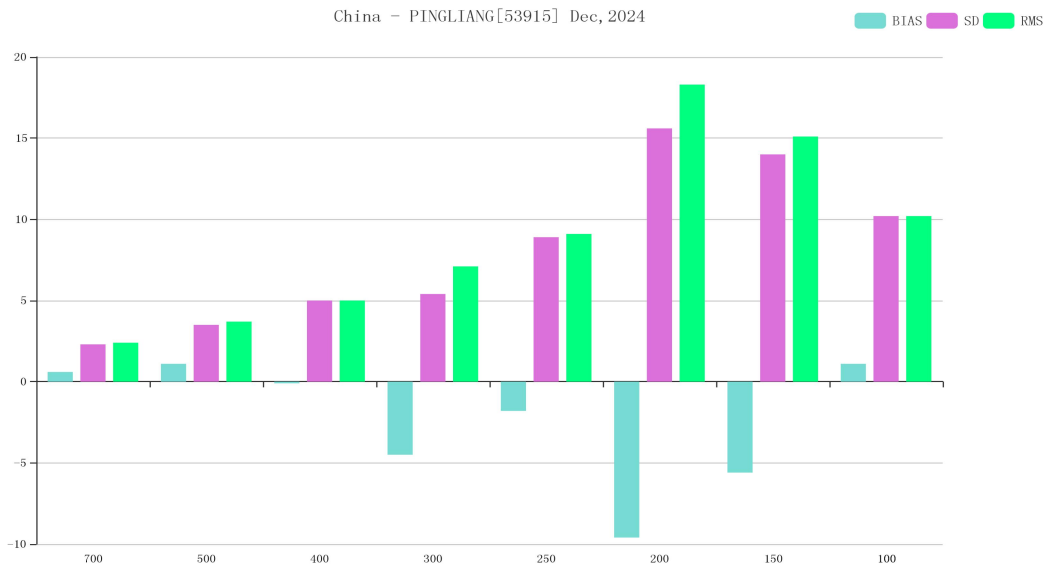


BIAS、SD and RMS of WIN_S for station 42027(OBS-TIME:00)

Time sequence diagram of Observation - Mode deviation

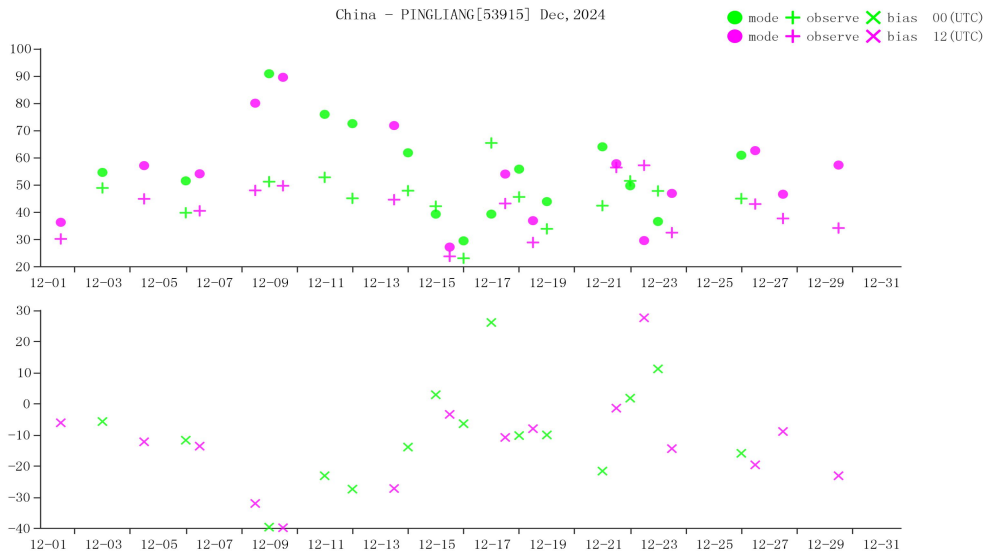


Time-series representation of WIN_S Obs minus first guess for station 42027(Level:250)

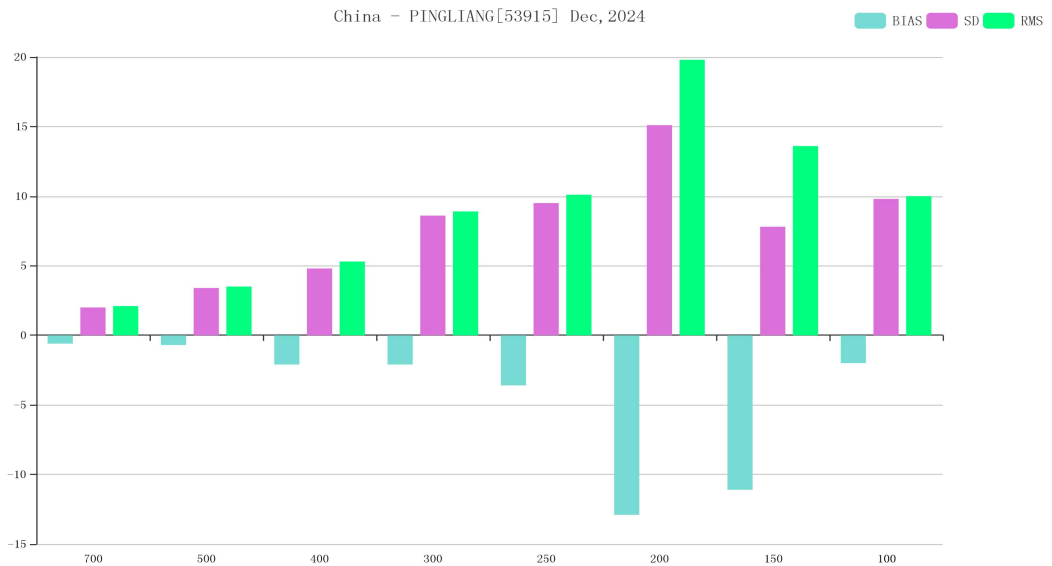


BIAS、SD and RMS of WIN_S for station 53915(OBS-TIME:00)

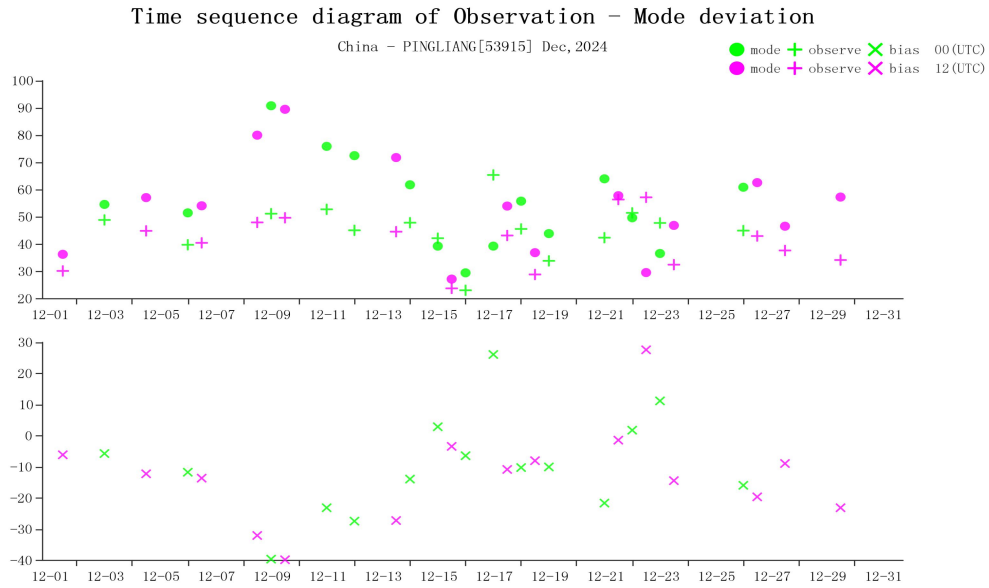
Time sequence diagram of Observation - Mode deviation



Time-series representation of WIN_S Obs minus first guess for station 53915(Level:200)



BIAS、SD and RMS of WIN_S for station 53915(OBS-TIME:12)



Time-series representation of WIN_S Obs minus first guess for station 53915(Level:200)

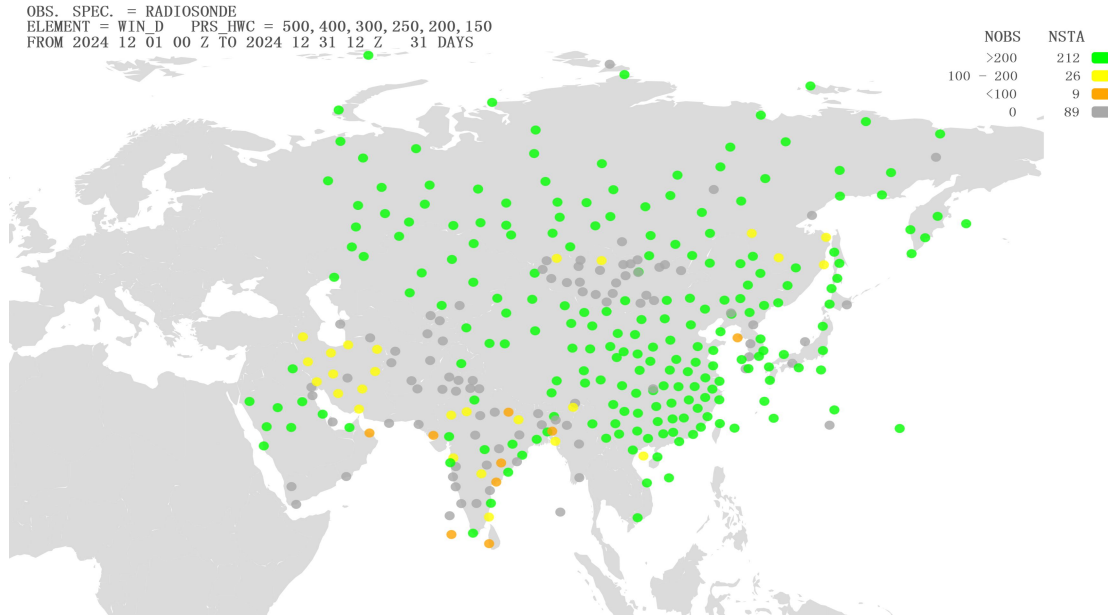
3.4 Wind Direction (WIN_D)

3.4.1 List of Suspect Stations

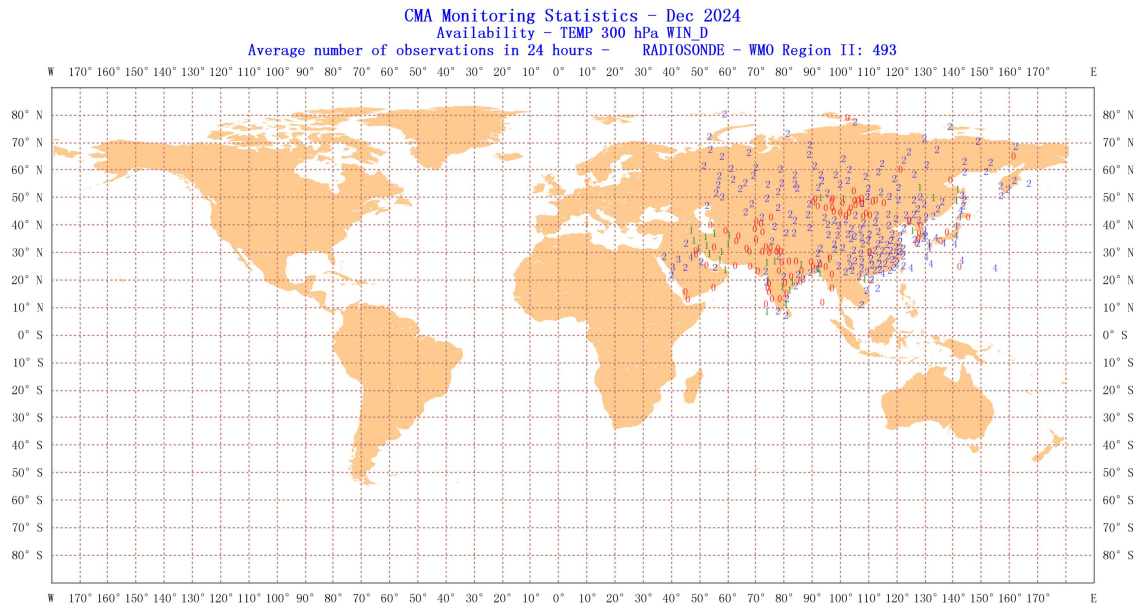
Table 4 List of WIN_D suspected in December 2024

INDEX	WMO IDENT	COUNTRY	OBS TIME	NUM OBS	BIAS	SD	MAX SPREAD
1	38341	Kazakhstan	00	19	13.9	14.3	5.5
2	38341	Kazakhstan	12	19	13	16.1	8
3	51463	China	00	19	11.1	8.7	5.3
4	51463	China	12	22	11.5	8.5	3.8
5	54340	China	00	24	11.6	5	2.4
6	54340	China	12	24	12.6	4.5	1

3.4.2 Suspect Station Analysis



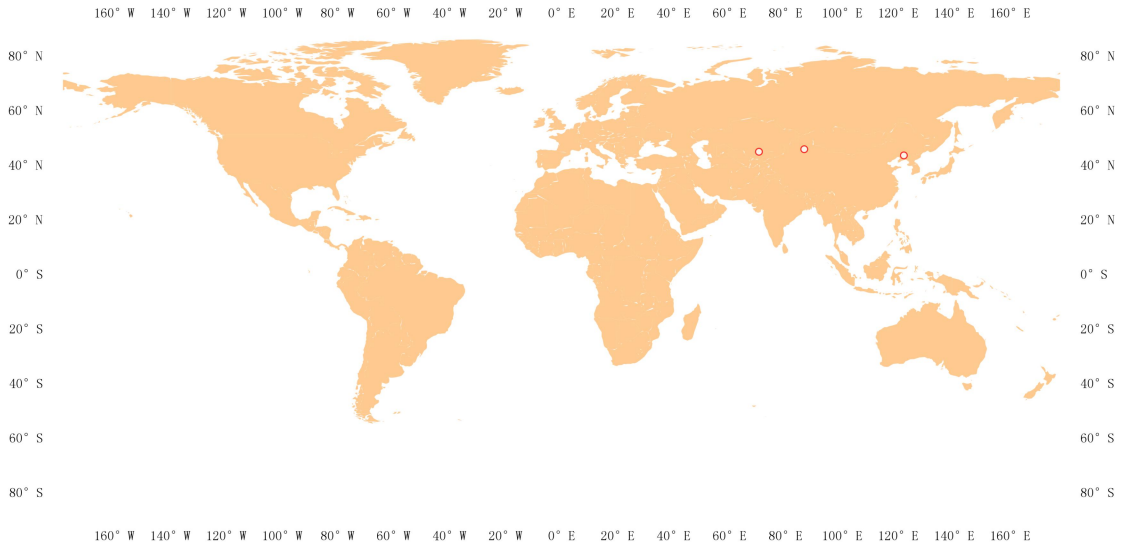
Location of all radiosonde stations reporting wind direction observations in Region II over the month of December 2024. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers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



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

CMA Monitoring Statistics - Dec 2024 00 UTC
Suspect WIN_D observations - WMO Region II

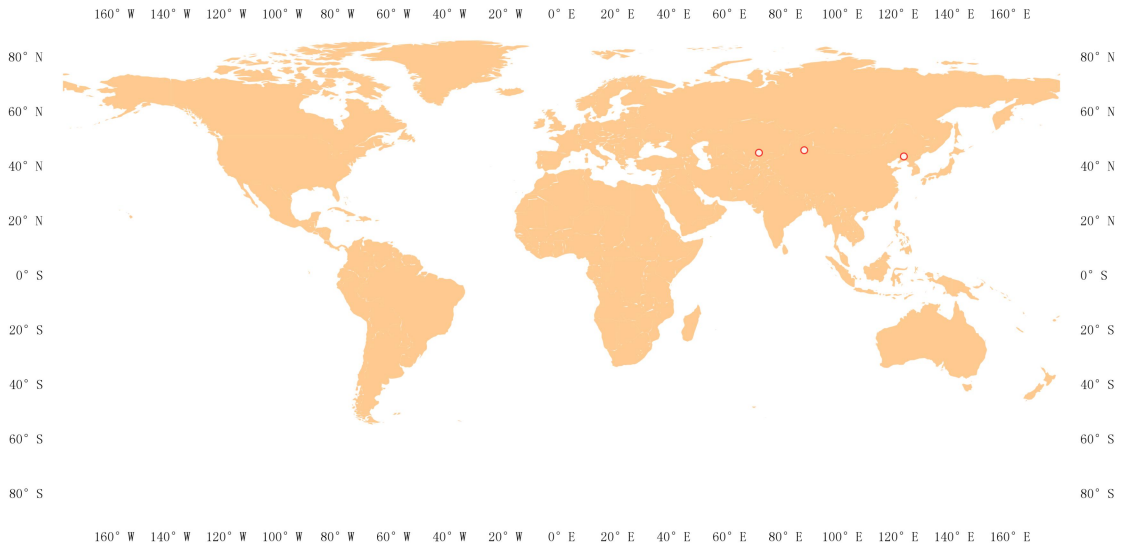
SUSP STA ○



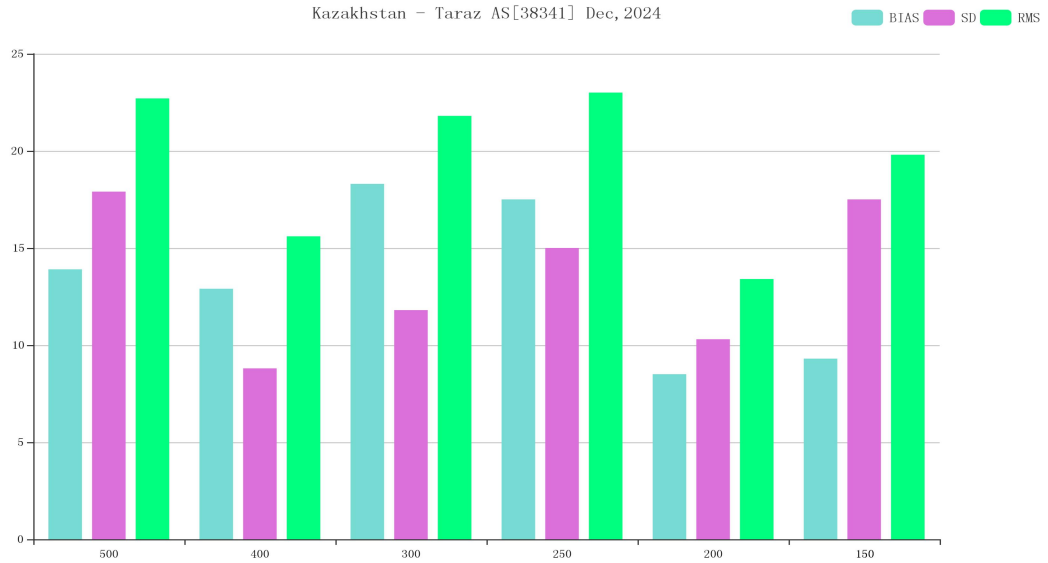
Distribution of suspect stations - Wind Direction 00 UTC

CMA Monitoring Statistics - Dec 2024 12 UTC
Suspect WIN_D observations - WMO Region II

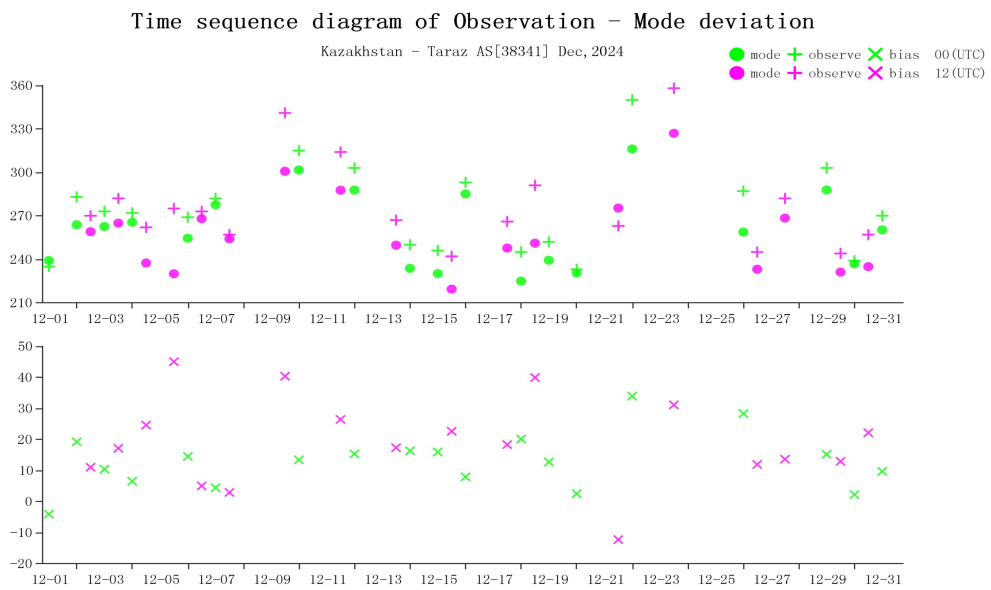
SUSP STA ○



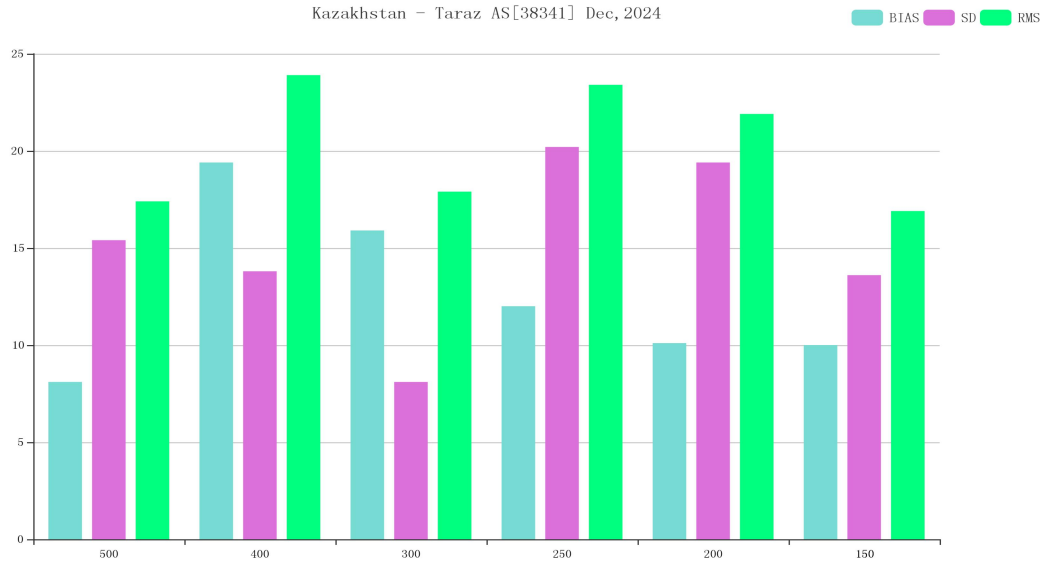
Distribution of suspect stations - Wind Direction 12 UTC



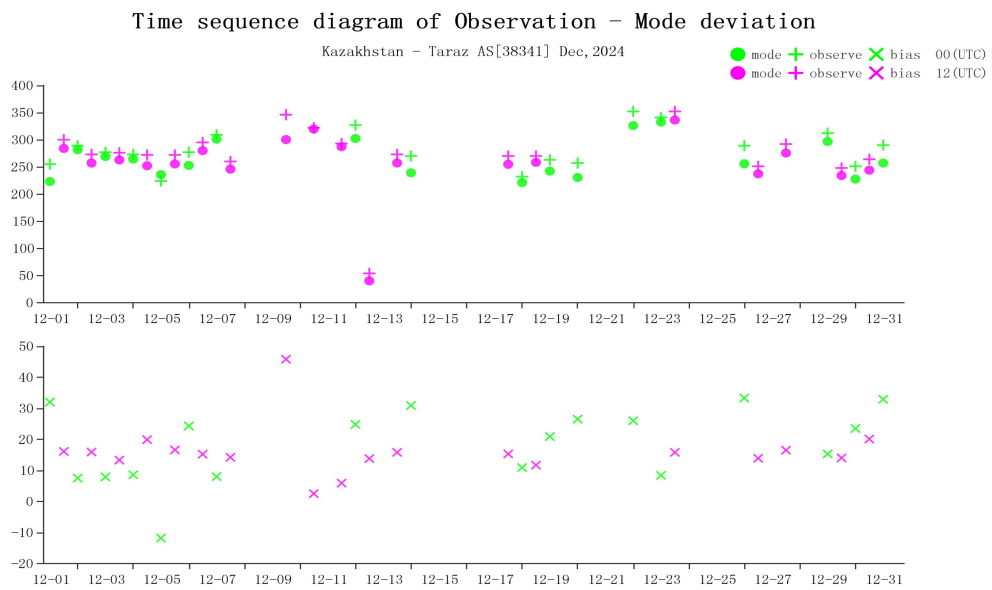
BIAS、SD and RMS of WIN_D for station 38341(OBS-TIME:00)



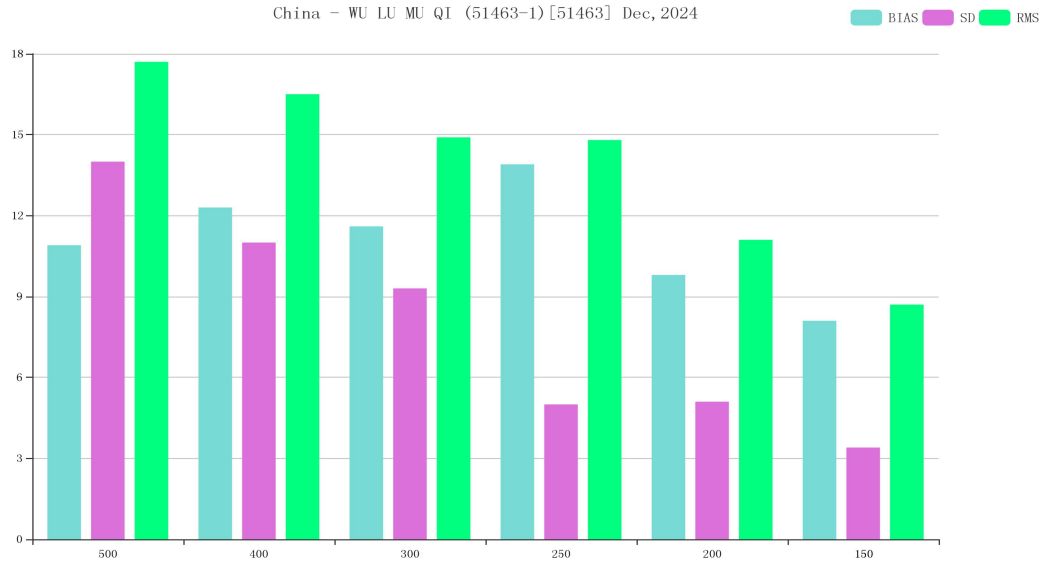
Time-series representation of WIN_D Obs minus first guess for station 38341(Level:400)



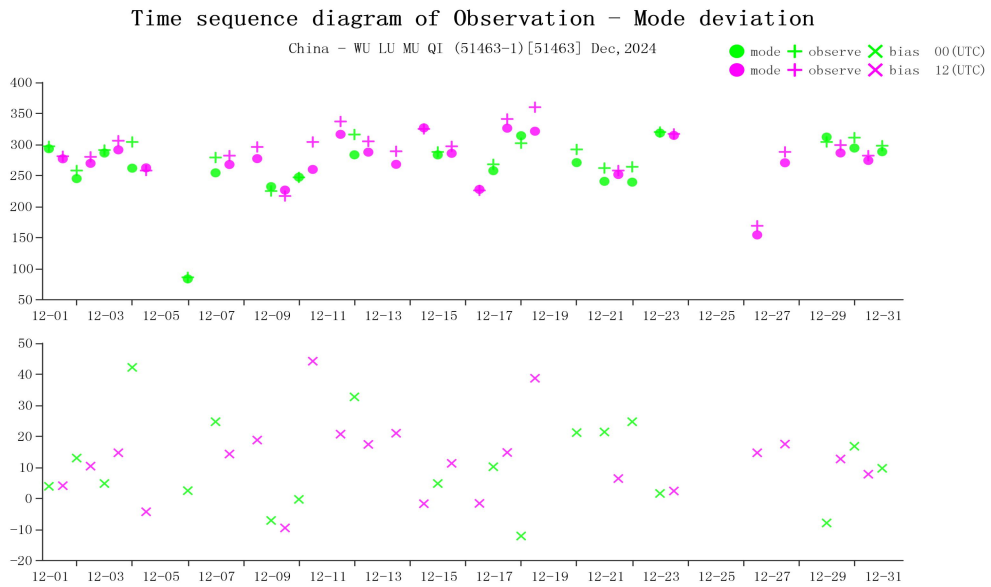
BIAS、SD and RMS of WIN_D for station 38341(OBS-TIME:12)



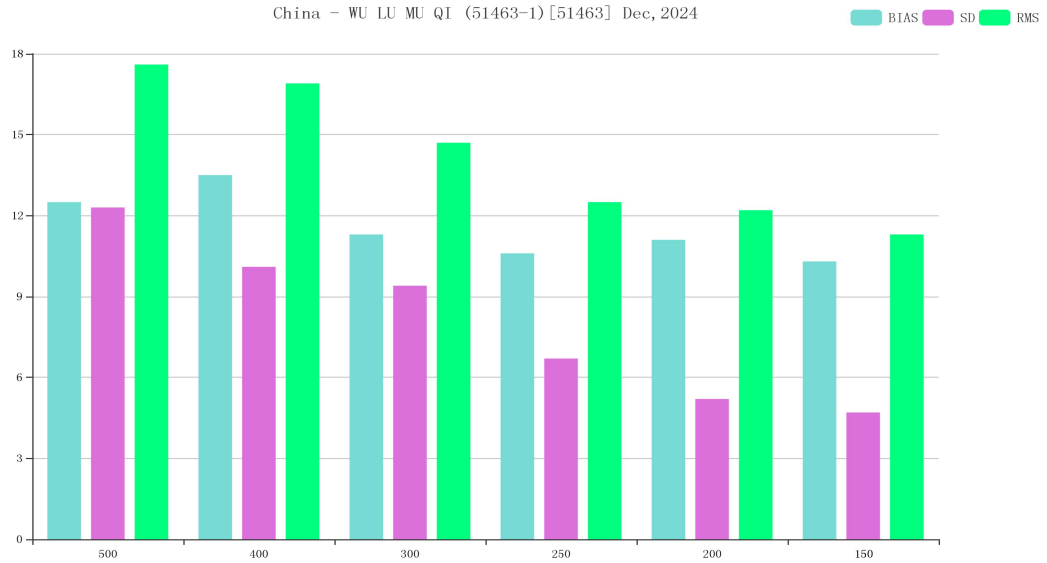
Time-series representation of WIN_D Obs minus first guess for station 38341(Level:300)



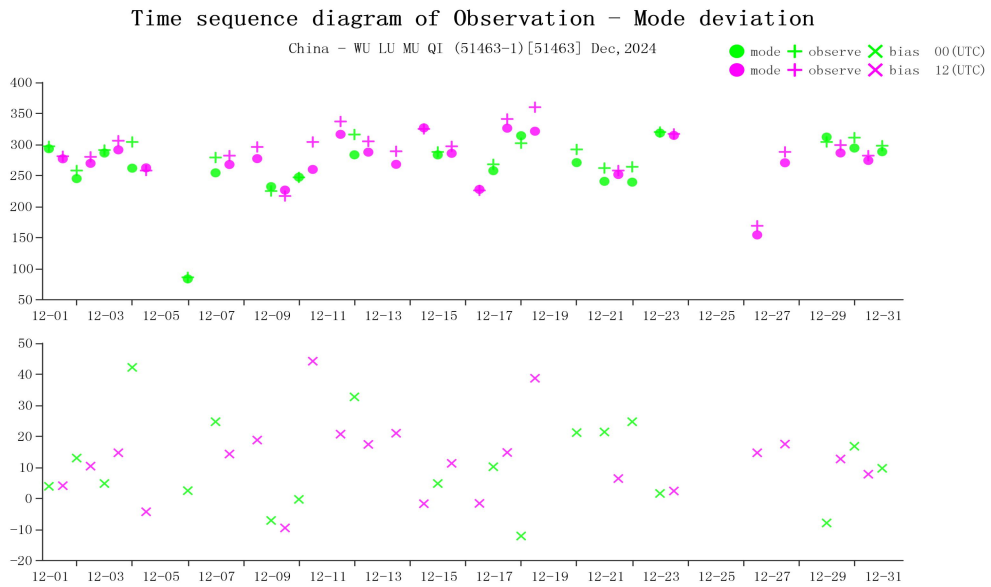
BIAS、SD and RMS of WIN_D for station 51463(OBS-TIME:00)



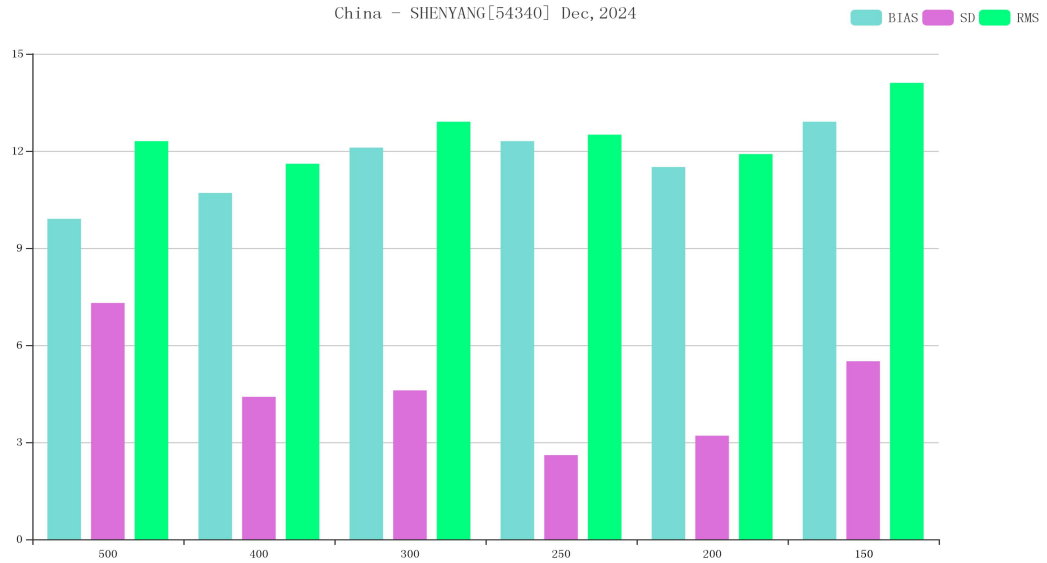
Time-series representation of WIN_D Obs minus first guess for station 51463(Level:500)



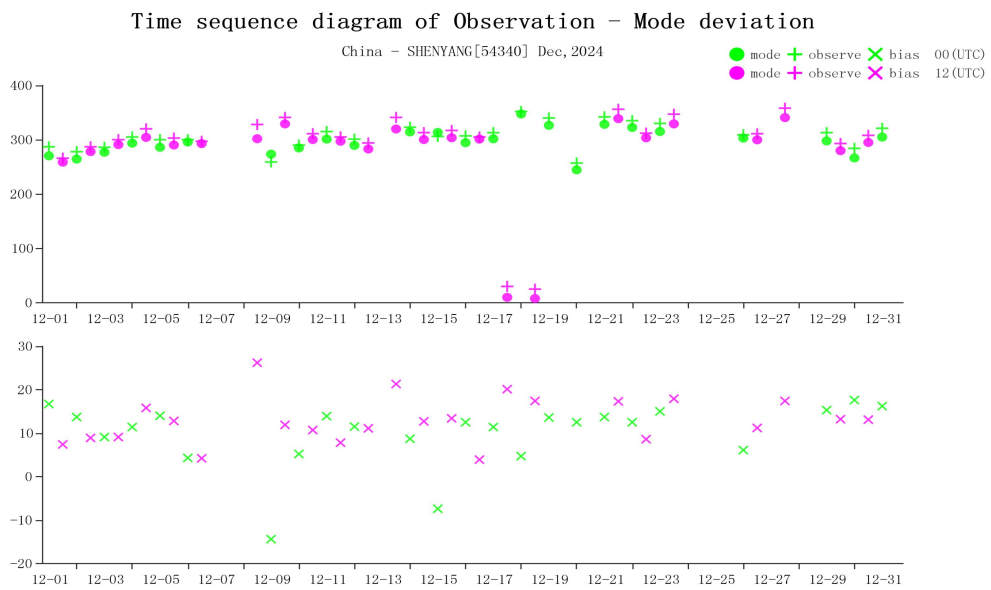
BIAS、SD and RMS of WIN_D for station 51463(OBS-TIME:12)



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



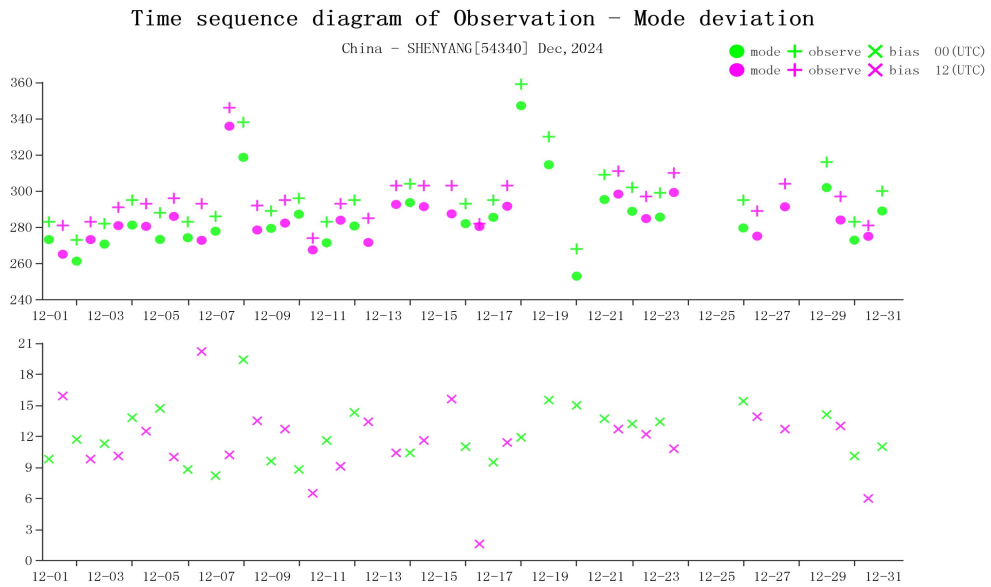
BIAS、SD and RMS of WIN_D for station 54340(OBS-TIME:00)



Time-series representation of WIN_D Obs minus first guess for station 54340(Level:500)



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



Time-series representation of WIN_D Obs minus first guess for station 54340(Level:250)

4. Comparison with Other Results

Element	CMA				EC				JMA			
	Country	Station	Time	Level	Country	Station	Time	Level	Country	Station	Time	Level
Geopotential Height	Kazakhstan	38341	00	400	Kazakhstan	38341	00	200	Kazakhstan	38341	00	500
	Kazakhstan	38341	12	250	Kazakhstan	38341	12	250	Kazakhstan	38341	12	250
	India	42348	00	700	Korea, Republic of	47230	12	300	Korea, Republic of	47230	00	400
					Korea, Republic of	47230	00	400				
Vector Wind	Kazakhstan	38341	12	300	Kazakhstan	38341	00	500	Iran, Islamic Republic of	40800	00	250
	Iran, Islamic Republic of	40800	00	250	Kazakhstan	38341	12	200	Korea, Republic of	47230	00	250
	India	42027	00	250	Mongolia	44373	12	150	Korea, Republic of	47230	12	250
	China	53915	00	200	Korea, Republic of	47230	12	400	China	53915	00	200
	China	53915	12	200	Korea, Republic of	47230	00	250	China	53915	12	200
					China	53915	12	150				
Wind Direction	Kazakhstan	38341	00		Kazakhstan	38341	00		Kazakhstan	38341	00	
	Kazakhstan	38341	12		Korea, Republic of	47230	12		China	51463	00	
	China	51463	00		China	51463	12		China	51463	12	
	China	51463	00		China	51463	00		China	54340	00	
	China	54340	00		China	54340	12		China	54340	12	
	China	54340	12		China	54340	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.), Qin Shiguang (Mr.)

Tech Support Staff:

Cui Xiai (Ms.), Sun Hao (Mr.), Dai Zhiying (Ms.), Guo Qiyun (Mr.)

Tel: 86-010-58991513

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

Regional WIGOS Centre in RA II (Beijing)

CMA Meteorological Observation Centre