Radiosonde-No.4-MOC-CMA(2025)

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

April 2025

**Regional WIGOS Centre, Beijing**

China Meteorological Administration

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Beijing, CHINA

# Contents

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April 2025

## 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 April 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 April

| 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 | 42379 | GORAKHPUR | India | 26.75 | 83.37 |
| 4 | 42701 | M.O. RANCHI | India | 23.32 | 85.32 |
| 5 | 43192 | GOA/PANJIM | India | 15.48 | 73.82 |
| 6 | 42667 | BHOPAL/BAIRAGHAR | India | 23.28 | 77.35 |
| 7 | 43285 | MANGALORE/PANAMBUR | India | 12.95 | 74.83 |
| 8 | 42101* | PATIALA | India | 30.33 | 76.47 |
| 9 | 43369 | MINICOY | India | 8.28 | 73.06 |
| 10 | 47418* | KUSHIRO (47418-1) | Japan | 42.95 | 144.44 |
| 11 | 47600* | WAJIMA | Japan | 37.39 | 136.90 |
| 12 | 40582 | KUWAIT INTERNATIONAL AIRPORT (40582-1) | Kuwait | 29.24 | 47.97 |
| 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 | 30935* | KRASNYJ CHIKOJ | Russian Federation | 50.37 | 108.75 |
| 20 | 30230* | KIRENSK | Russian Federation | 57.77 | 108.07 |

| | | | | | |
|---|---|---|---|---|---|
| 21 | 31168 | AYAN | Russian Federation | 56.45 | 138.15 |
| 22 | 30715* | ANGARSK | Russian Federation | 52.48 | 103.85 |
| 23 | 30965* | BORZYA | Russian Federation | 50.40 | 116.52 |
| 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 |

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

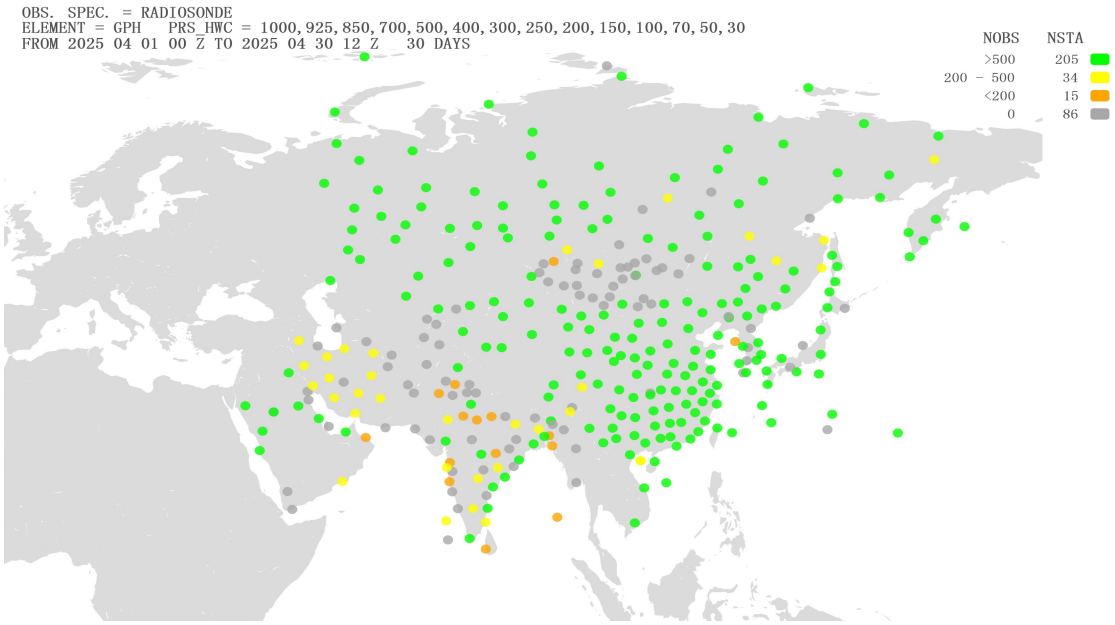
## 3.2 Geopotential Height (GPH)

### 3.2.1 List of Suspect Stations

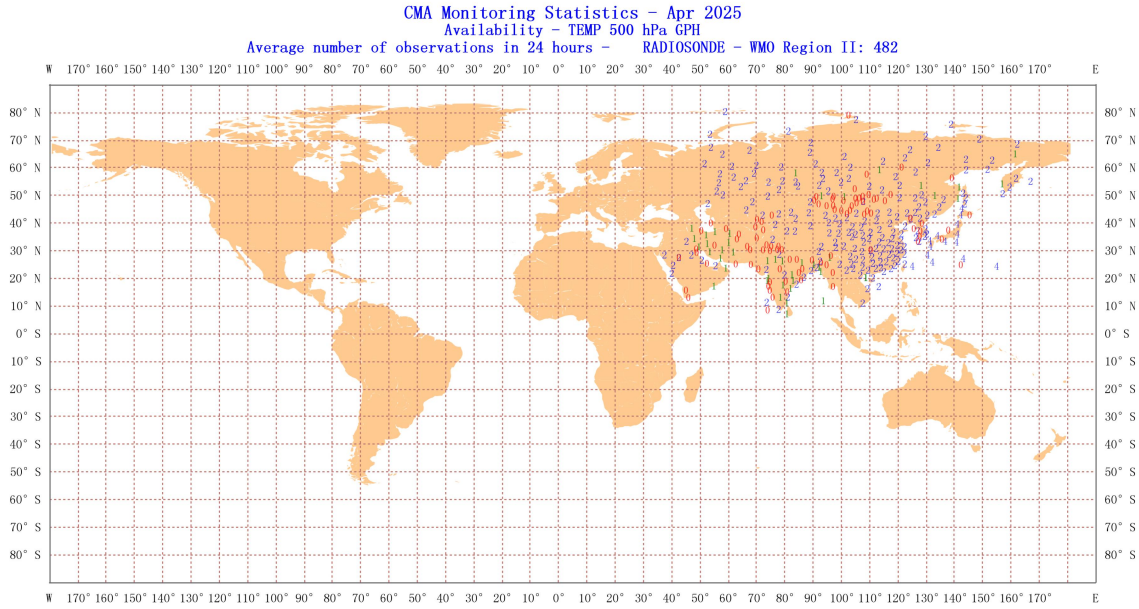
Table 2 List of GPH suspected in April 2025

| INDEX | WMO IDENT | COUNTRY | OBS TIME | LEVEL | NUM OBS | NUM GRS | REJ（%） | BIAS | SD | RMS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 29839* | Russian Federation | 12 | 200 | 28 | 0 | 0 | 81.6 | 26 | 85.7 |
| 2 | 36003* | Kazakhstan | 12 | 70 | 21 | 1 | 0 | 54.7 | 102.9 | 116.5 |
| 3 | 38341* | Kazakhstan | 00 | 70 | 10 | 5 | 0 | 47.8 | 213.5 | 218.8 |
| 4 | 38341* | Kazakhstan | 12 | 70 | 10 | 5 | 0 | -66 | 123.7 | 140.3 |
| 5 | 42348 | India | 00 | 925 | 15 | 0 | 0 | 45.7 | 10.5 | 46.9 |
| 6 | 47230 | Korea, Republic of | 00 | 70 | 26 | 0 | 0 | 115.9 | 11.9 | 116.5 |
| 7 | 47230 | Korea, Republic of | 12 | 70 | 25 | 0 | 0 | 113.1 | 23.3 | 115.5 |
| 8 | 52323 | China | 00 | 30 | 29 | 1 | 0 | 209.8 | 164.9 | 266.9 |
| 9 | 52323 | China | 12 | 30 | 28 | 1 | 0 | 179.1 | 129.1 | 220.8 |

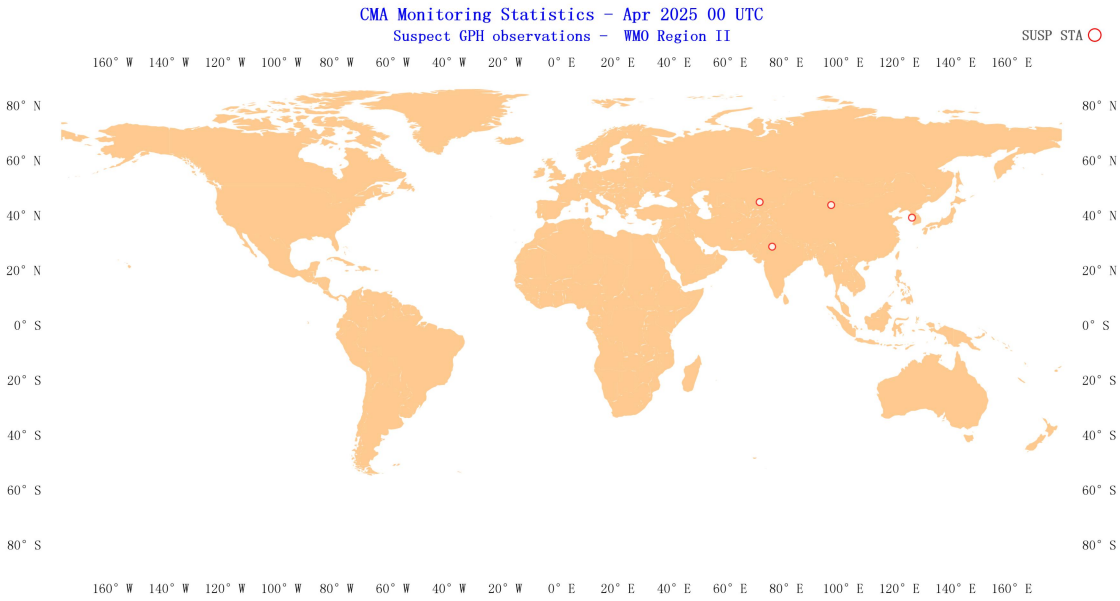
## 3.2.2 Suspect Station Analysis



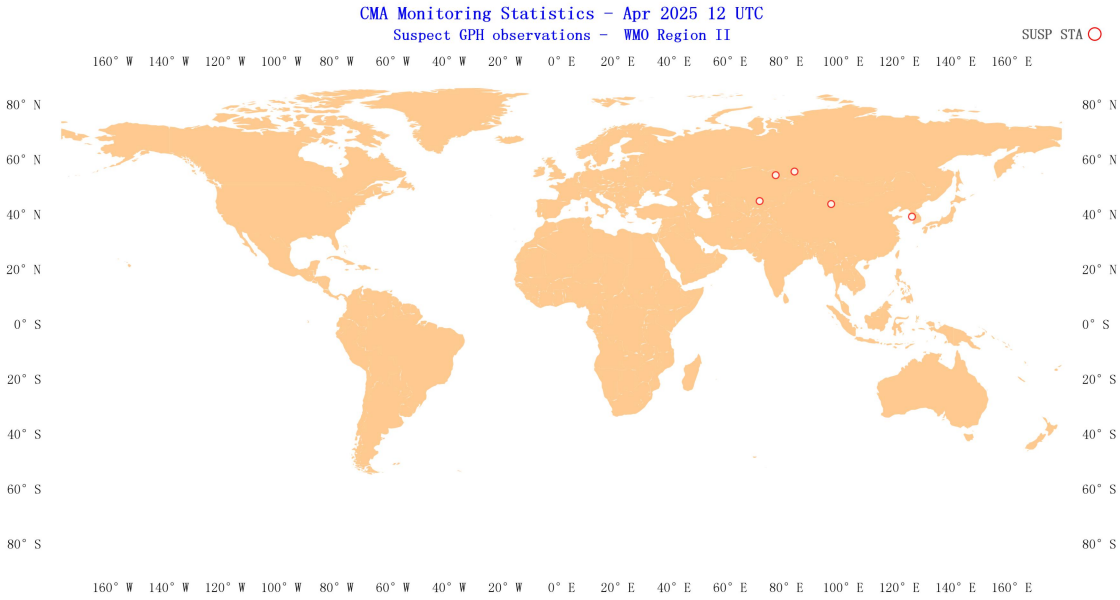

Location of all radiosonde stations reporting geopotential height observations in Region II over the month of April 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green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



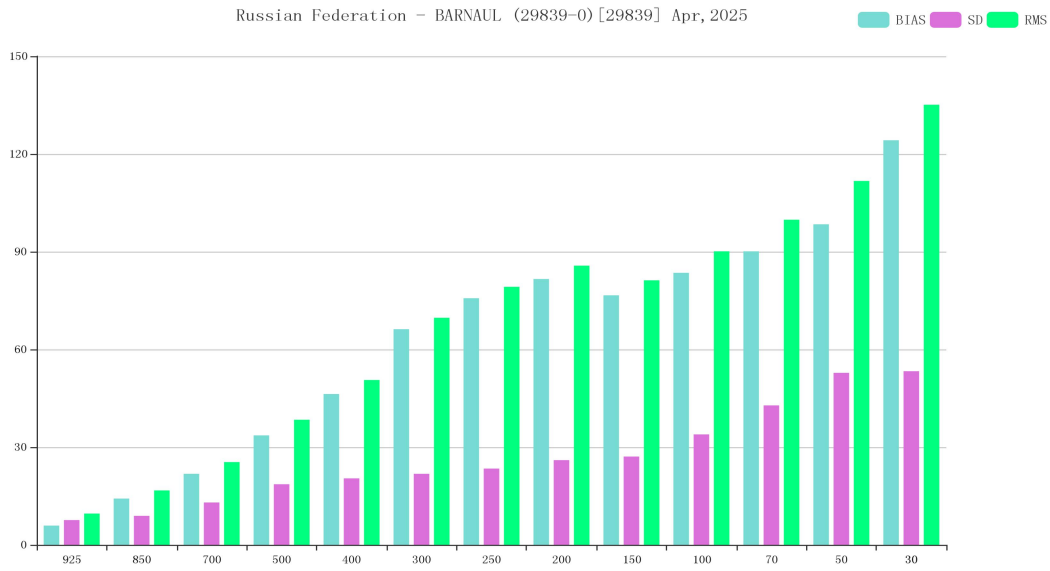

Location of all radiosonde stations reporting geopotential height average number of observations in 24 hours in Region II over the month of April 2025.



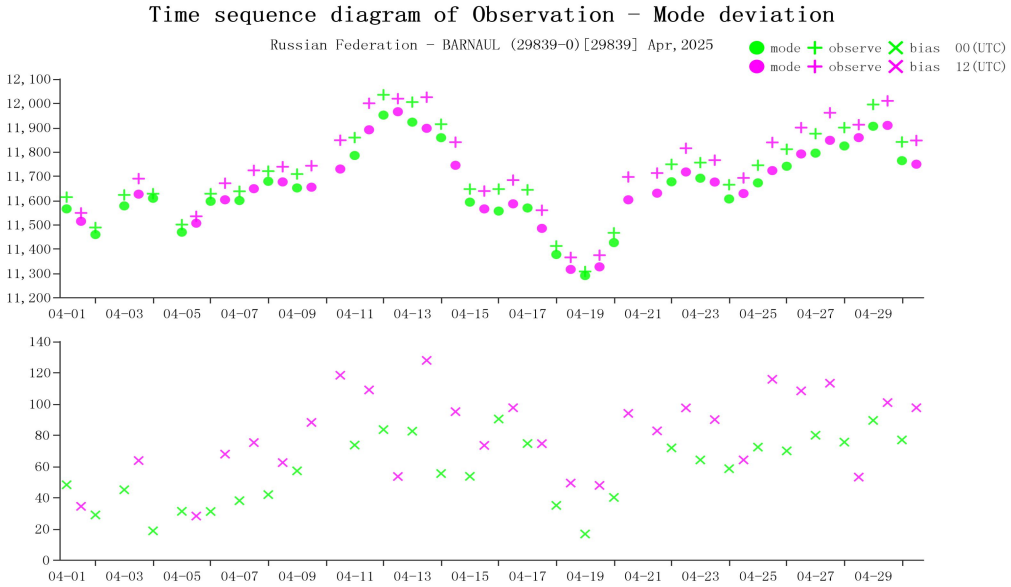

Distribution of suspect stations - Geopotential Height 00 UTC



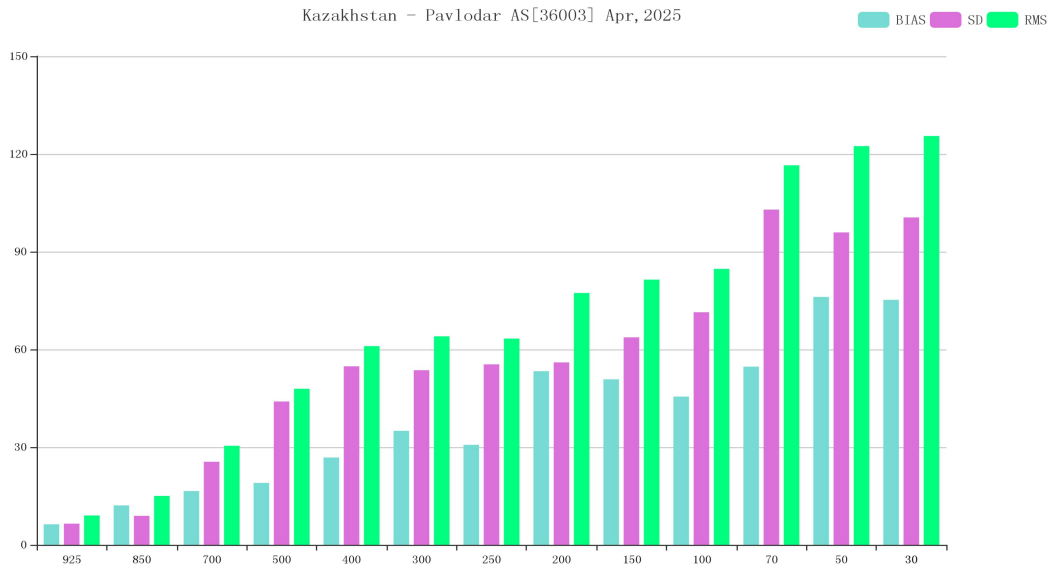

Distribution of suspect stations - Geopotential Height 12 UTC



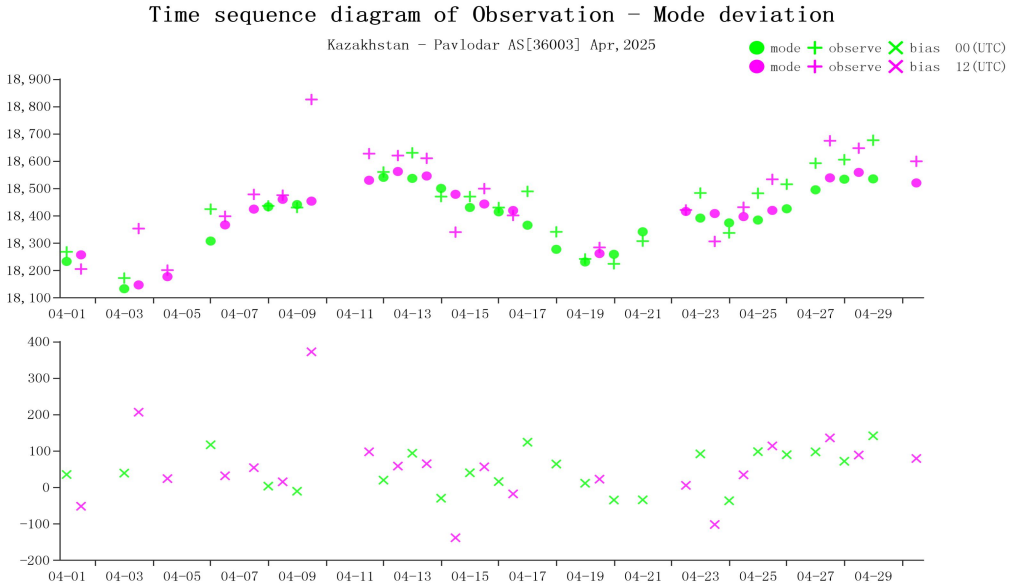

BIAS、SD and RMS of GPH for station 29839*(OBS-TIME:12)



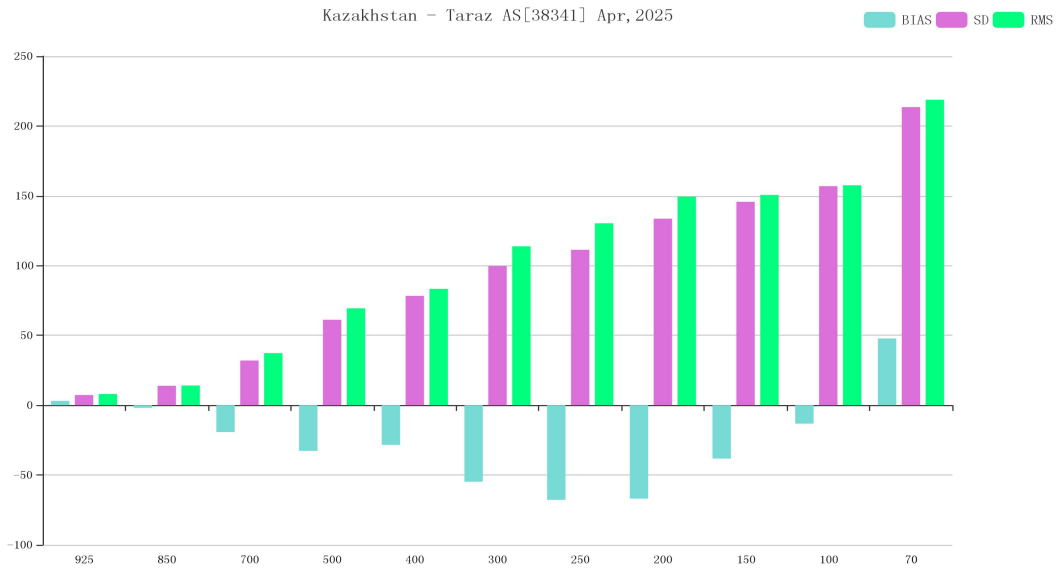

Time-series representation of GPH Obs minus first guess for station 29839*(Level:200)



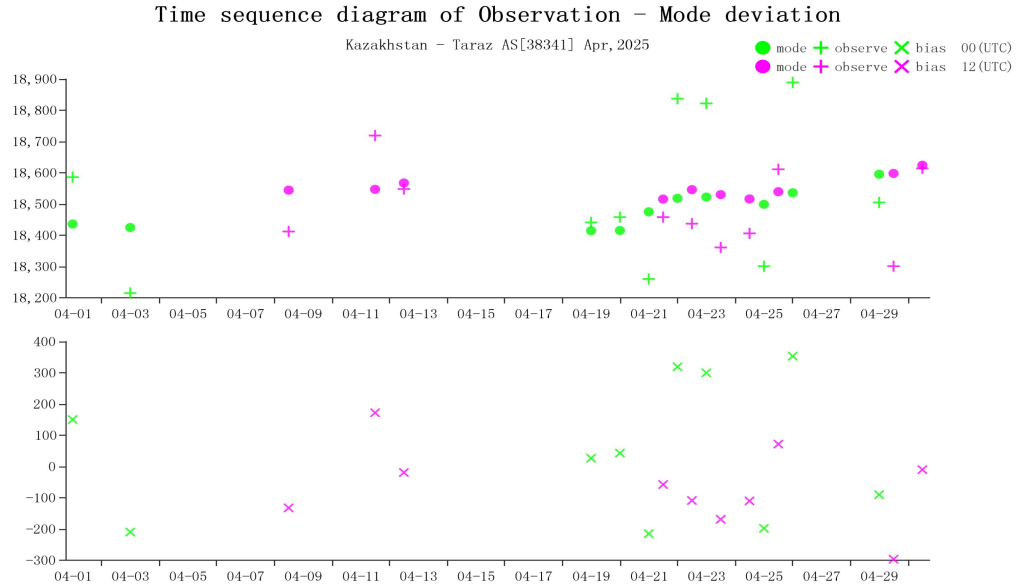

BIAS、SD and RMS of GPH for station 36003*(OBS-TIME:12)



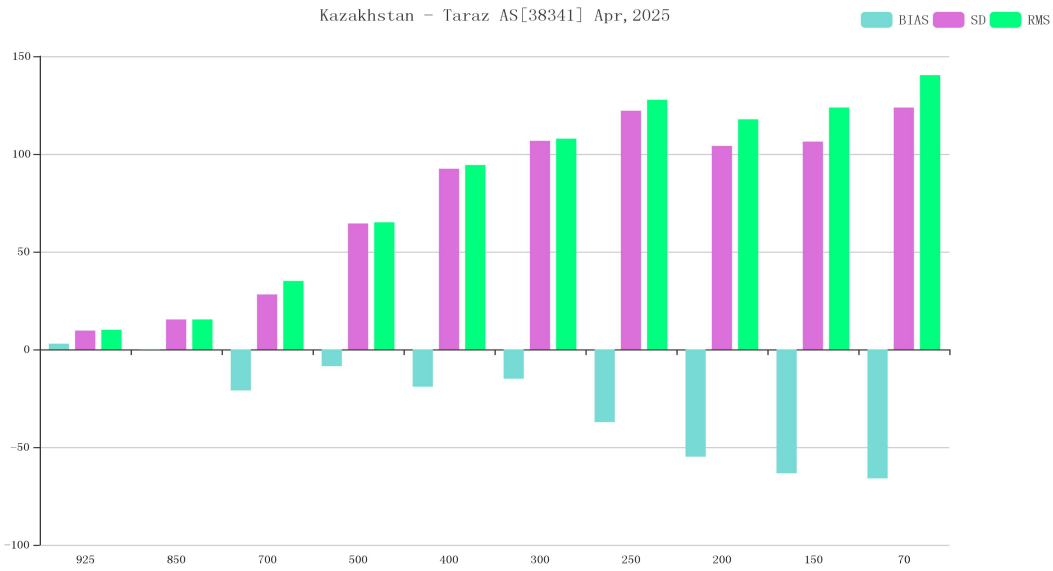

Time-series representation of GPH Obs minus first guess for station 36003*(Level:70)



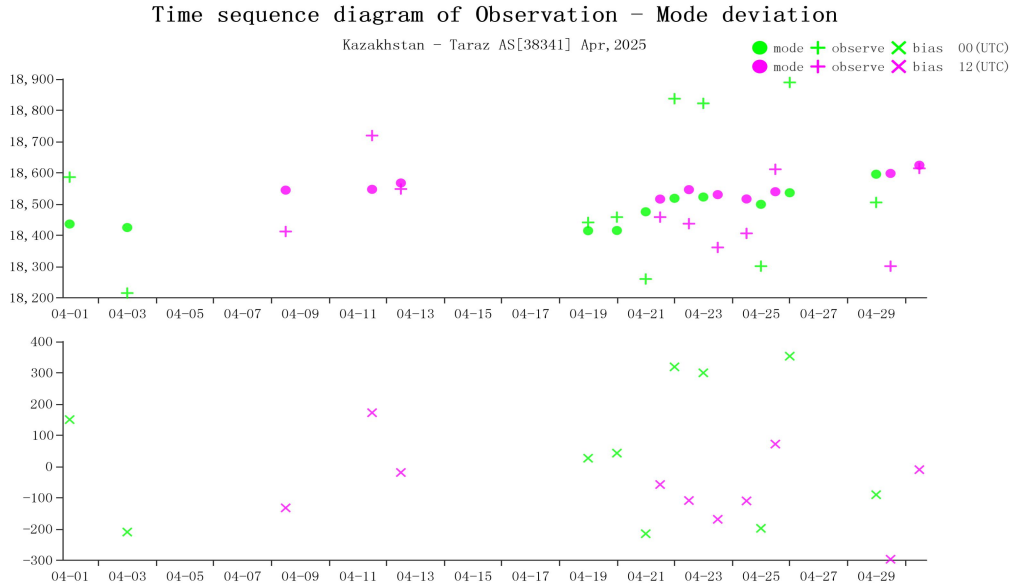

BIAS、SD and RMS of GPH for station 38341*(OBS-TIME:00)



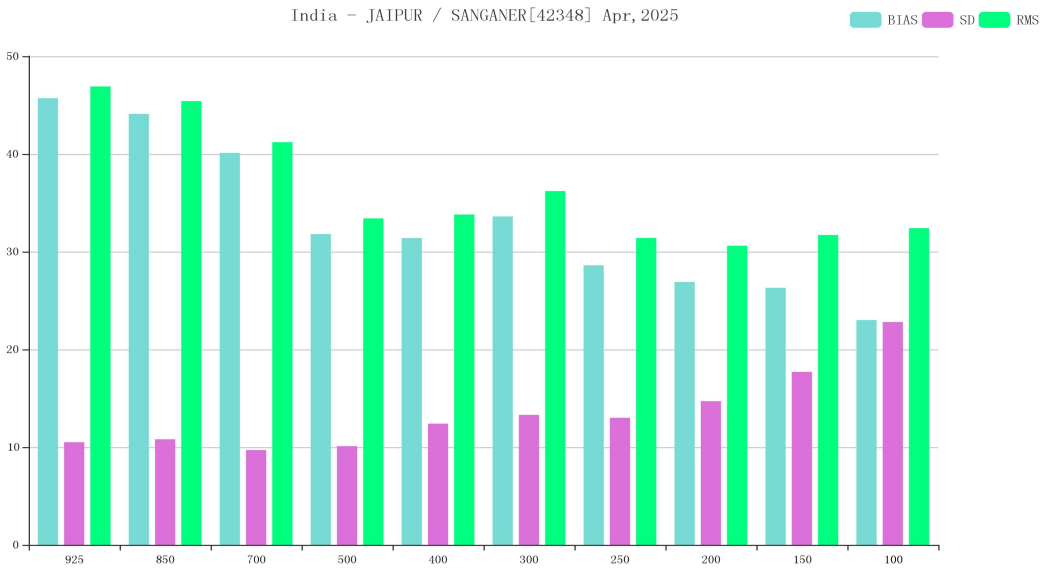

Time-series representation of GPH Obs minus first guess for station 38341*(Level:70)



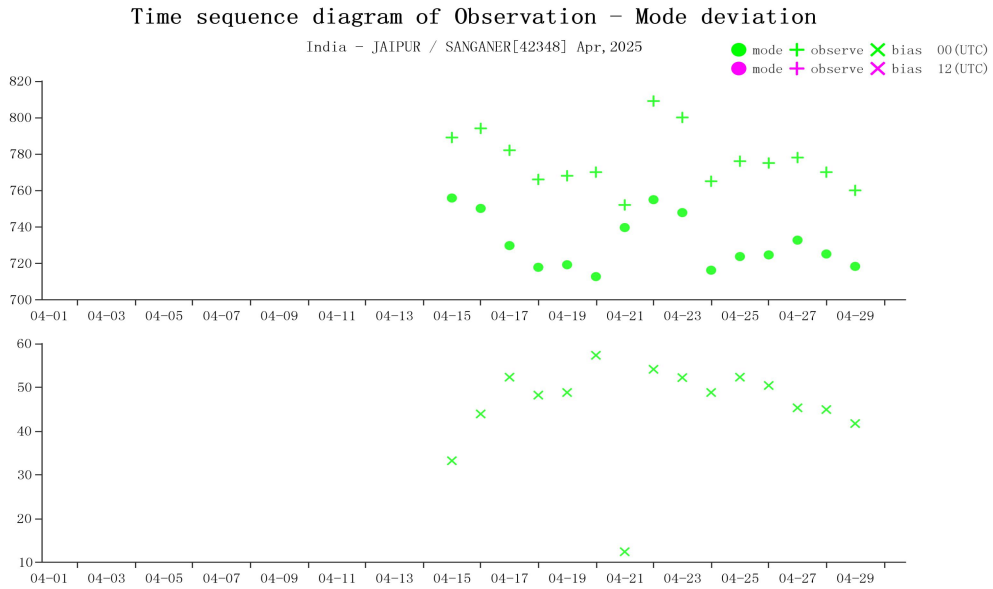

BIAS、SD and RMS of GPH for station 38341*(OBS-TIME:12)



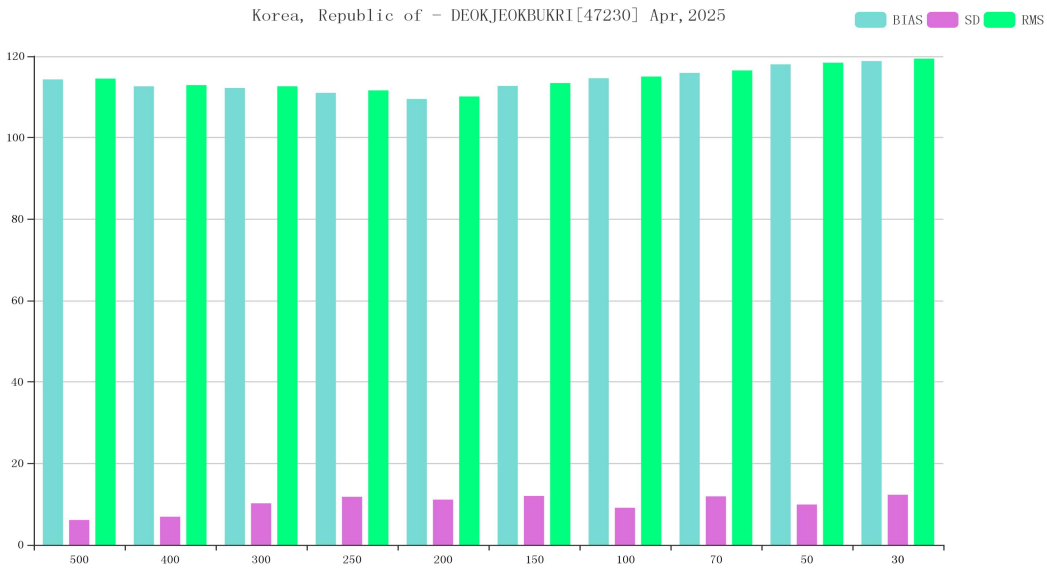

Time-series representation of GPH Obs minus first guess for station 38341*(Level:70)



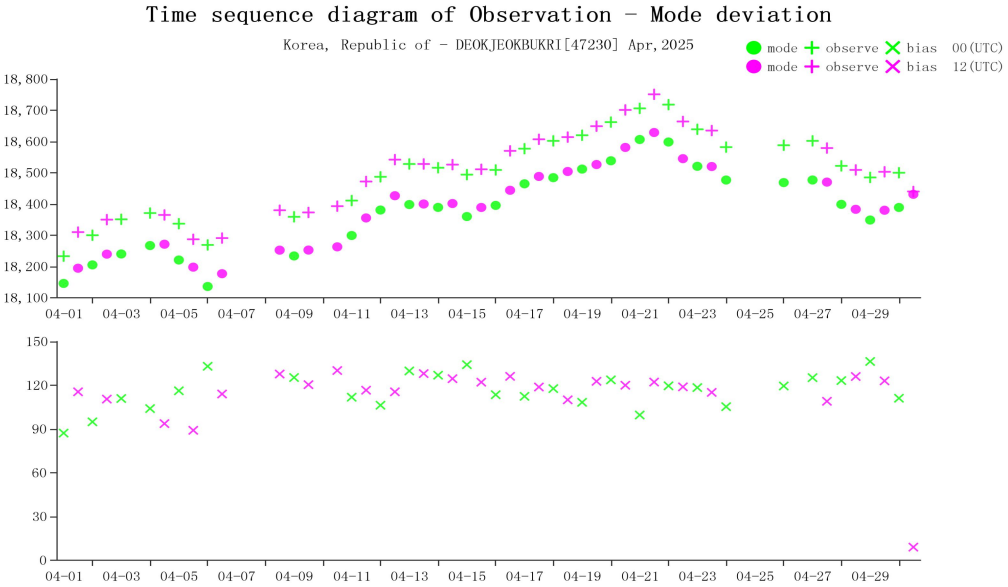

BIAS、SD and RMS of GPH for station 42348(OBS-TIME:00)



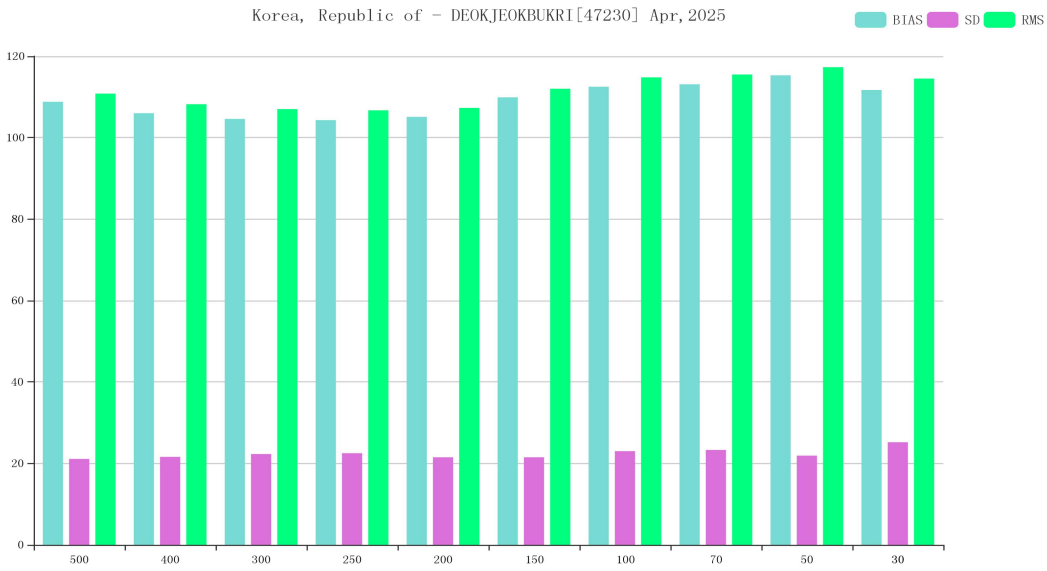

Time-series representation of GPH Obs minus first guess for station 42348(Level:925)



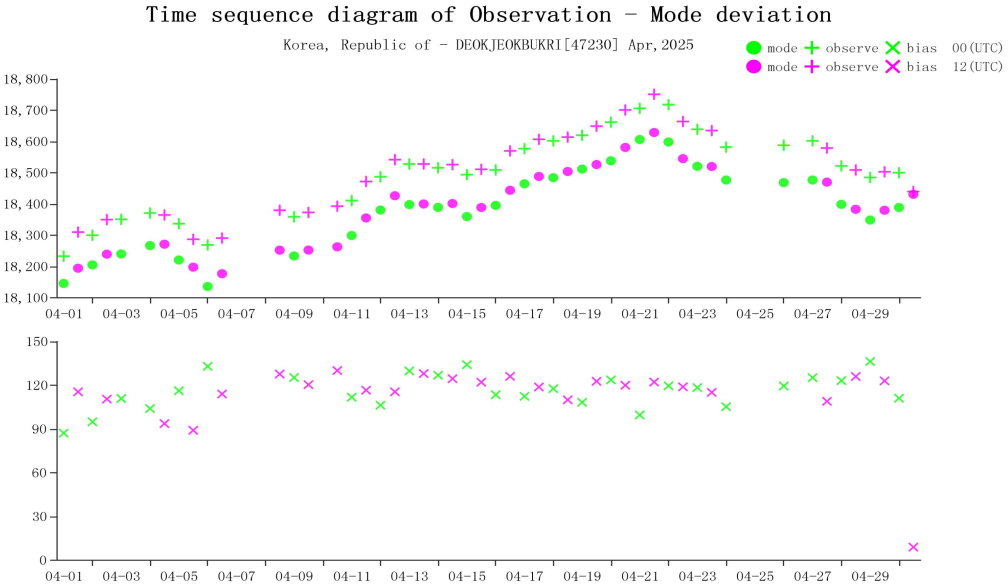

BIAS、SD and RMS of GPH for station 47230(OBS-TIME:00)



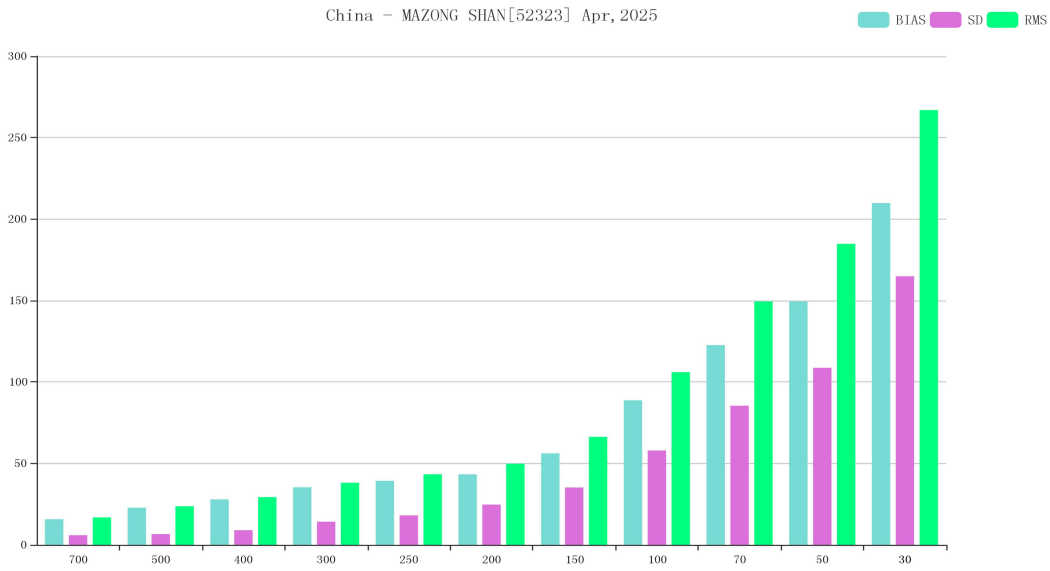

Time-series representation of GPH Obs minus first guess for station 47230(Level:70)



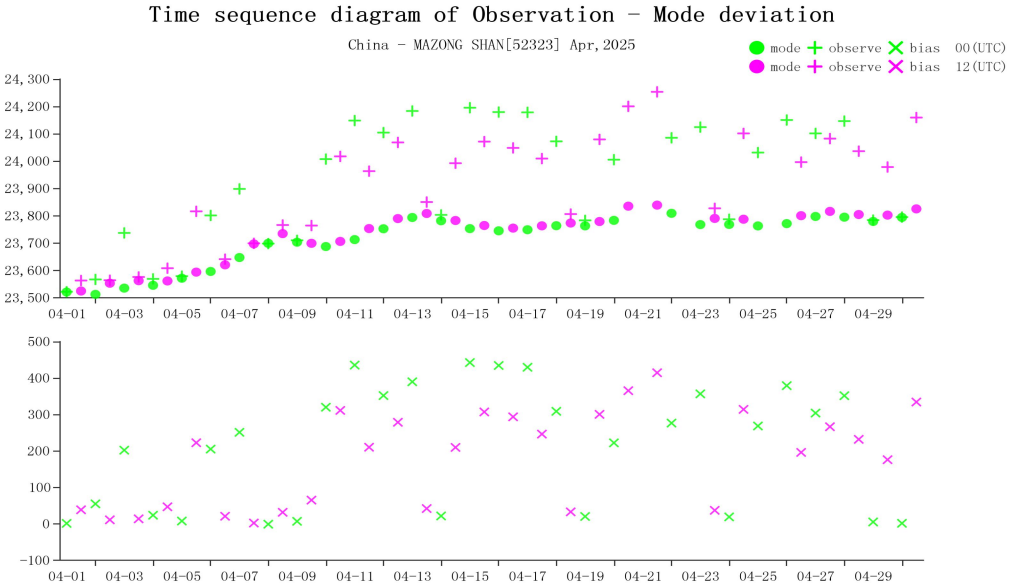

BIAS、SD and RMS of GPH for station 47230(OBS-TIME:12)



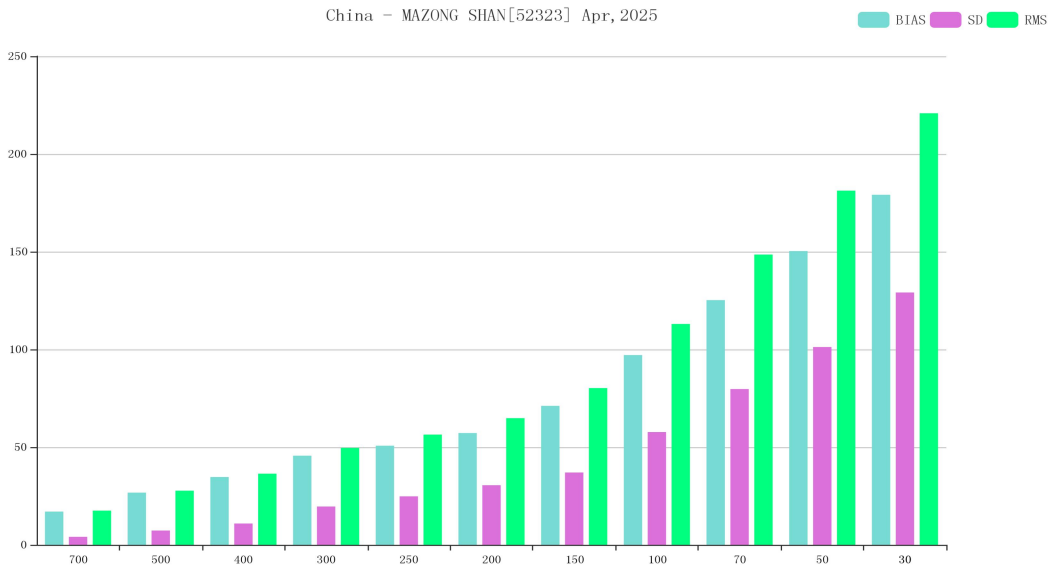

Time-series representation of GPH Obs minus first guess for station 47230(Level:70)



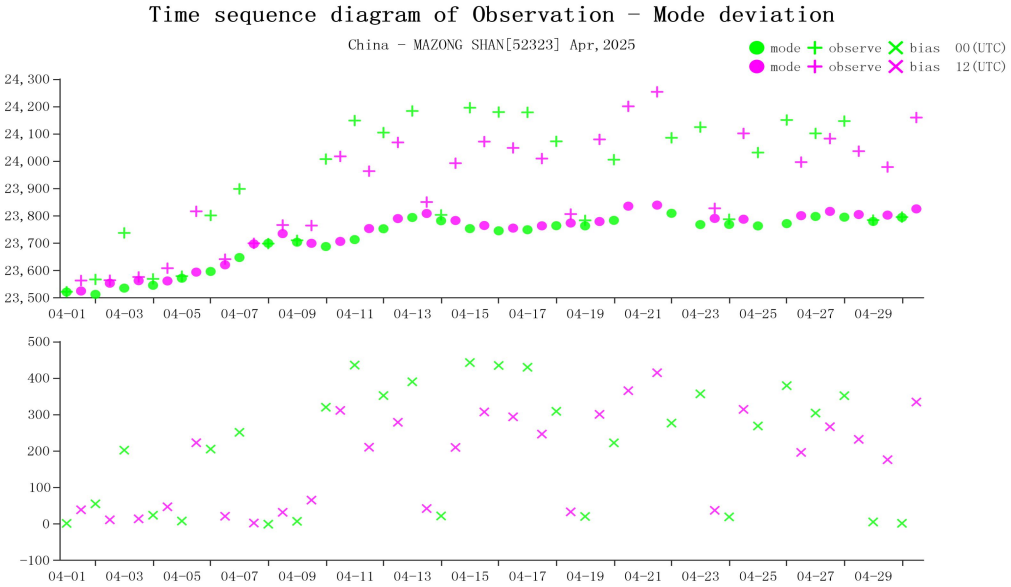

BIAS、SD and RMS of GPH for station 52323(OBS-TIME:00)




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

## 3.3 Vector Wind (WIN_S)

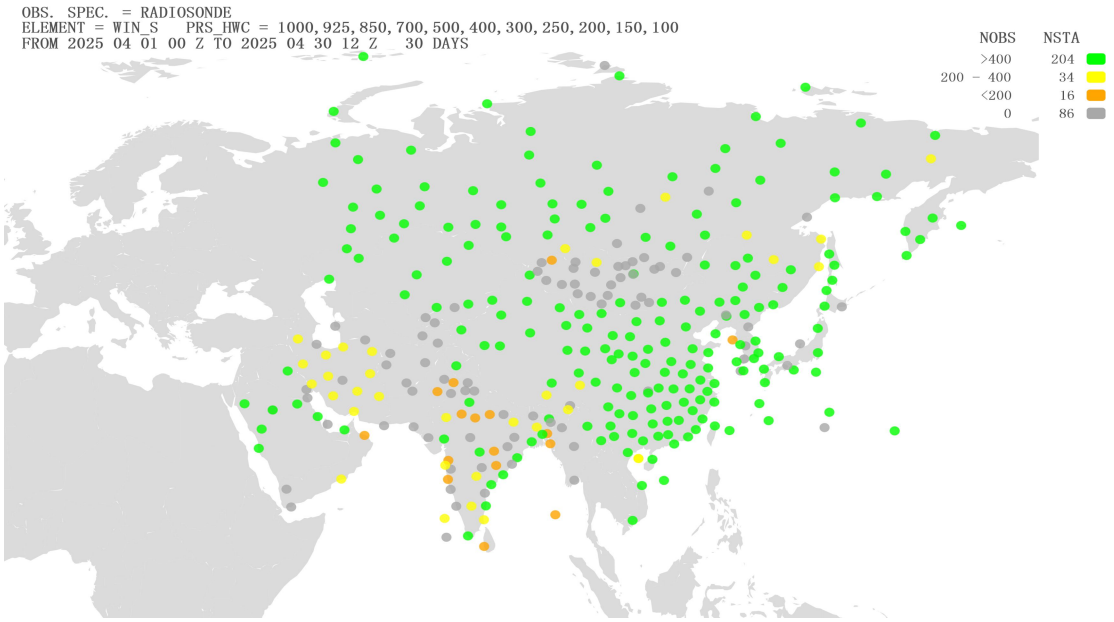
### 3.3.1 List of Suspect Stations

Table 3 List of WIN_S suspected in April 2025

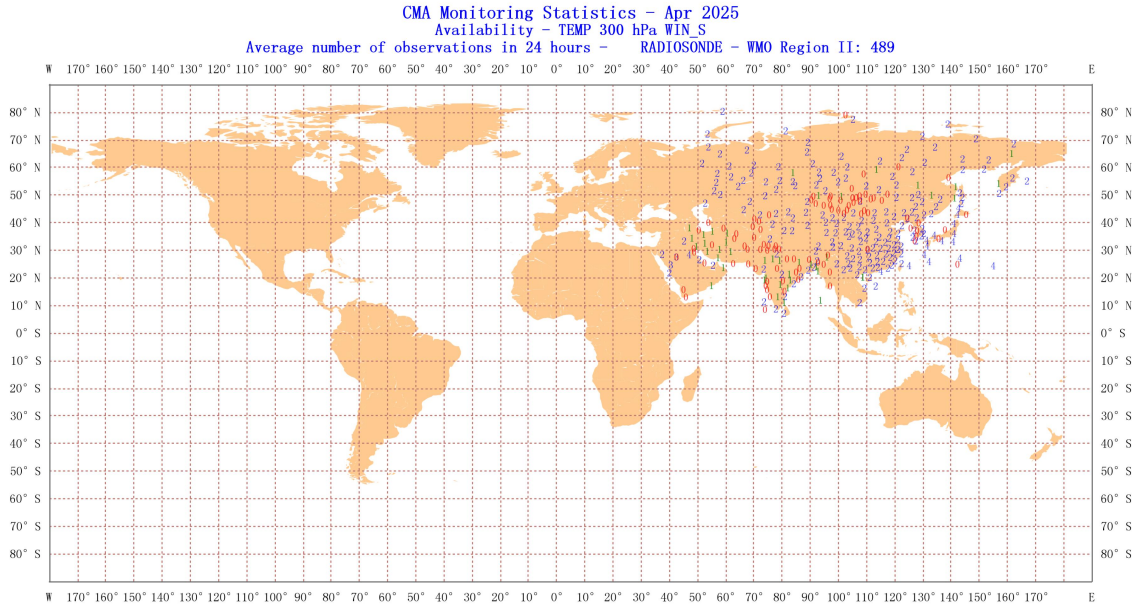
| INDEX | WMO IDENT | COUNTRY | OBS TIME | LEVEL | NUM OBS | NUM GRS | REJ （%） | BIAS | SD | RMS |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 38341* | Kazakhstan | 00 | 500 | 25 | 0 | 0 | 9.5 | 12.4 | 15.6 |
| 2 | 38341* | Kazakhstan | 12 | 200 | 22 | 0 | 0 | -1.5 | 17.3 | 17.3 |

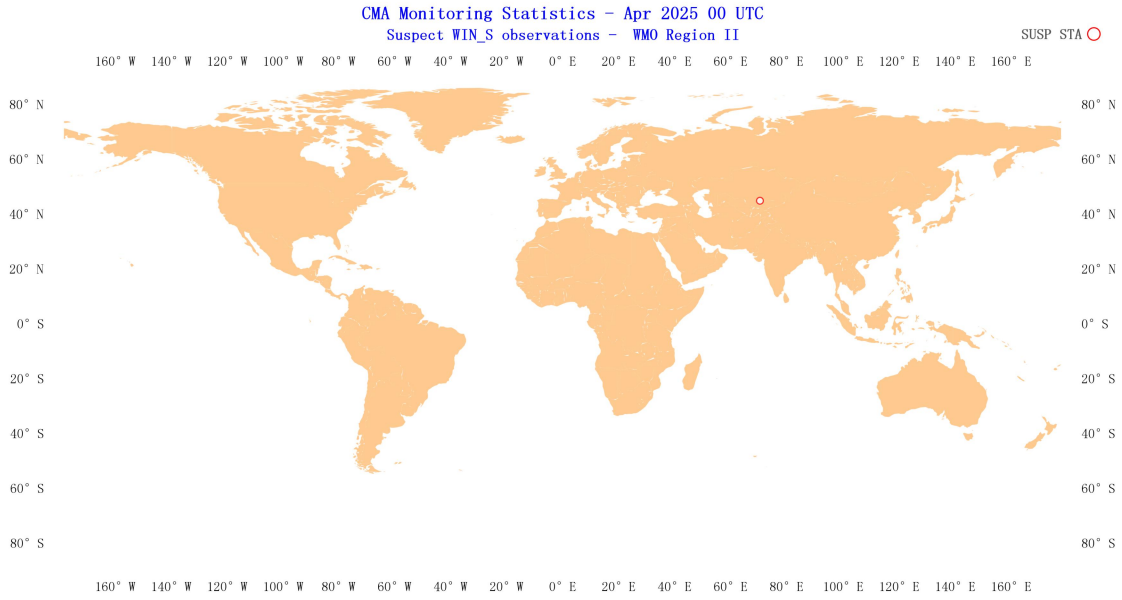
### 3.3.2 Suspect Station Analysis



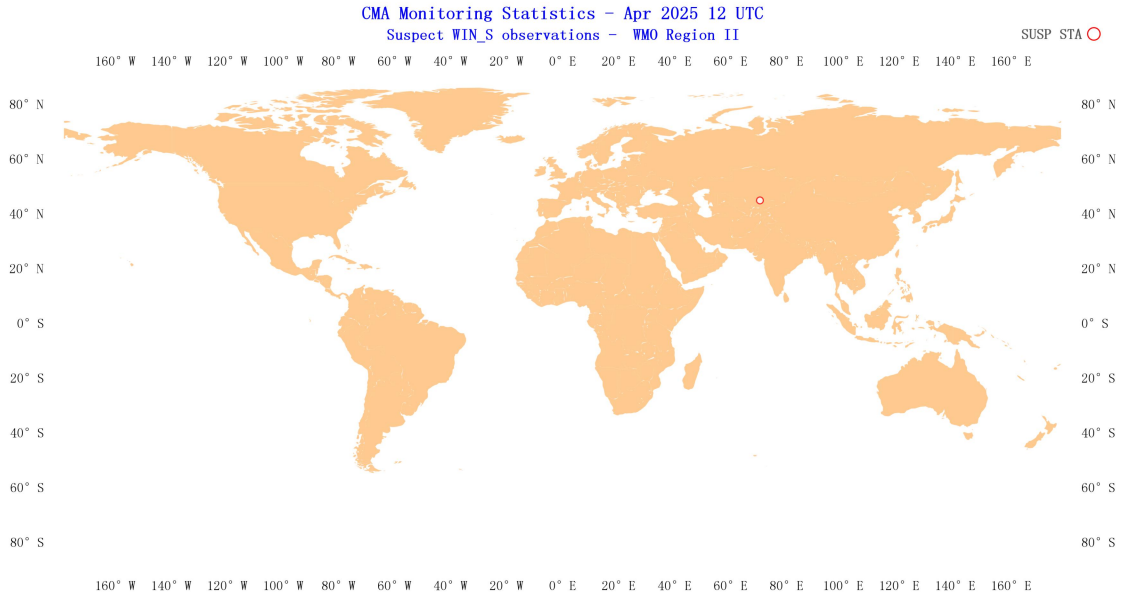

Location of all radiosonde stations reporting vector wind observations in Region II over the month of April 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers to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



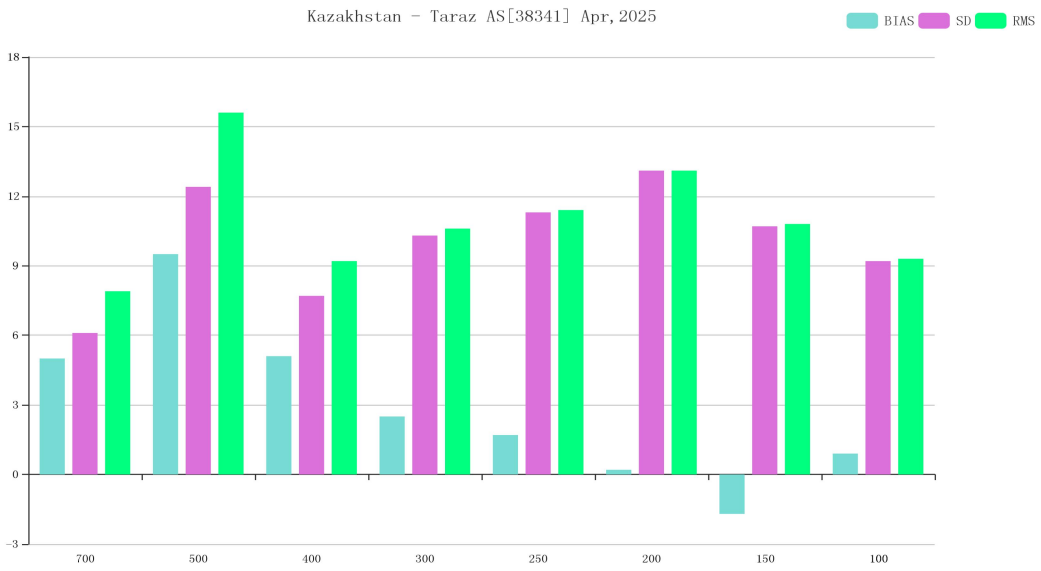
Location of all radiosonde stations reporting vector wind average number of observations in 24 hours in Region II over the month of April 2025.



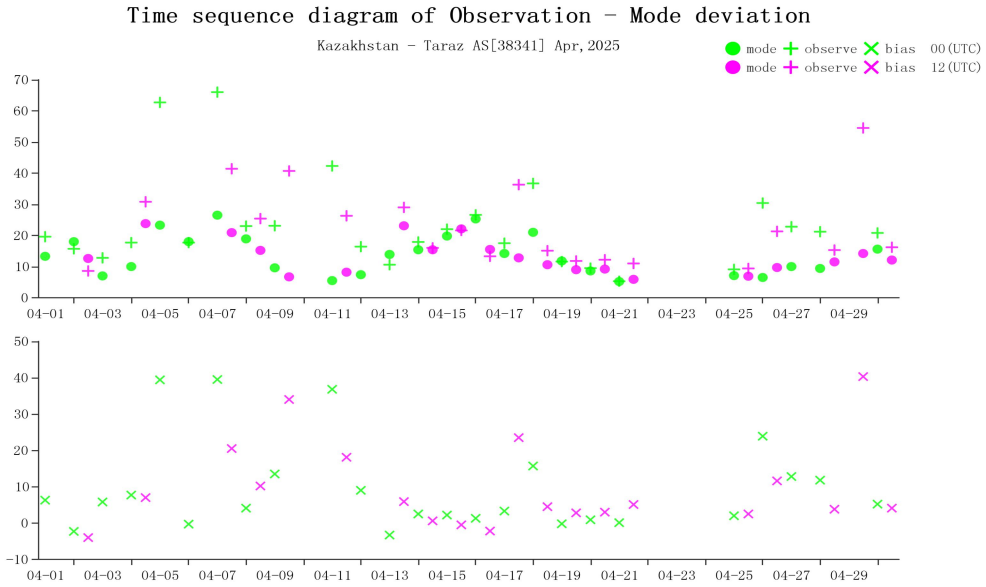

Distribution of suspect stations - Vector Wind 00 UTC



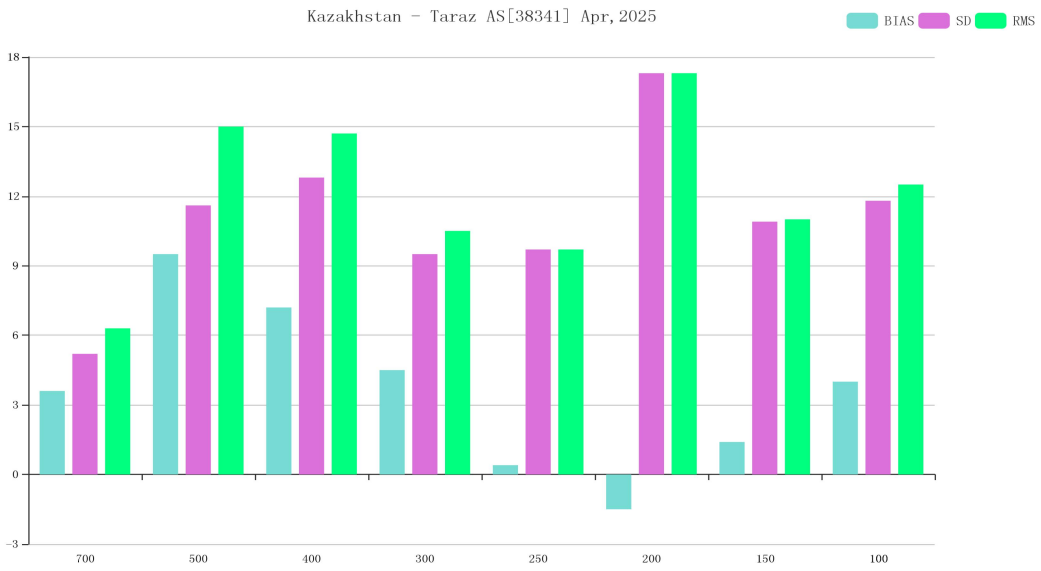

Distribution of suspect stations - Vector Wind 12 UTC



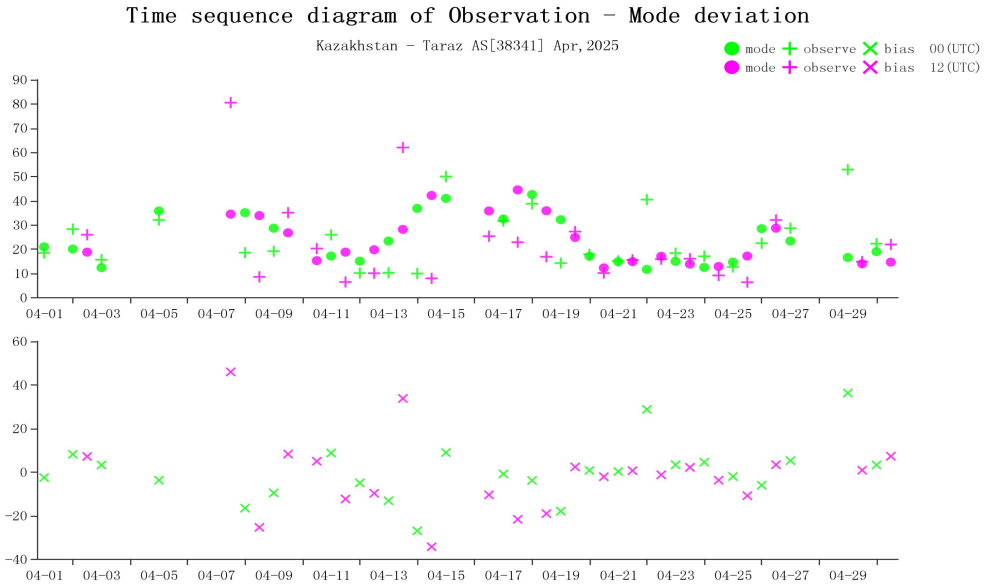

BIAS、SD and RMS of WIN_S for station 38341*(OBS-TIME:00)




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




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:200)

# 3.4 Wind Direction (WIN_D)

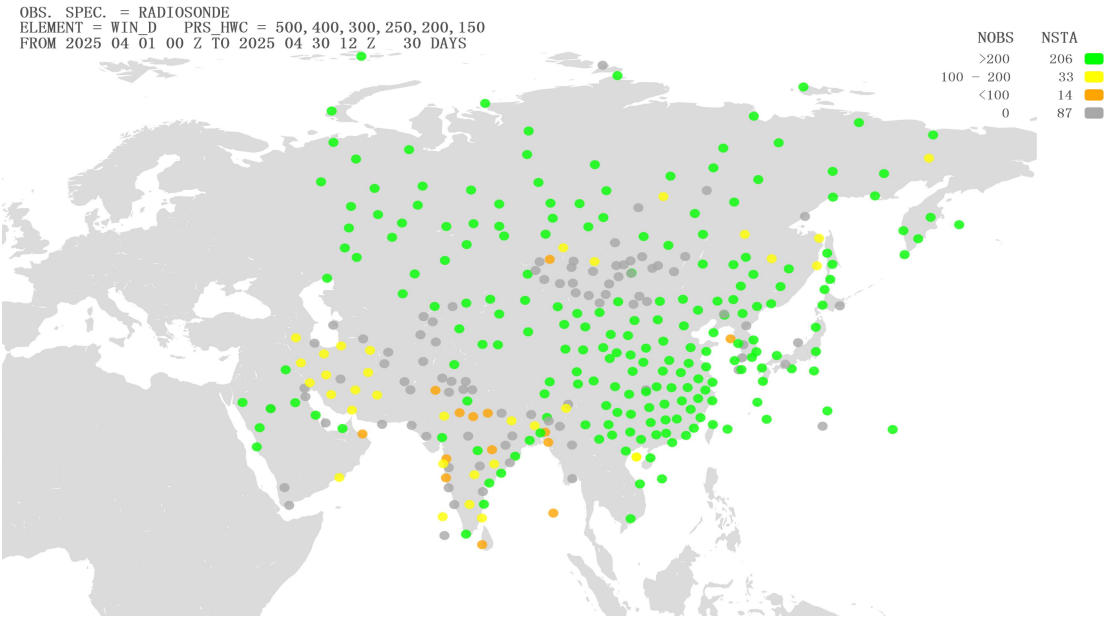
## 3.4.1 List of Suspect Stations

Table 4 List of WIN_D suspected in April 2025

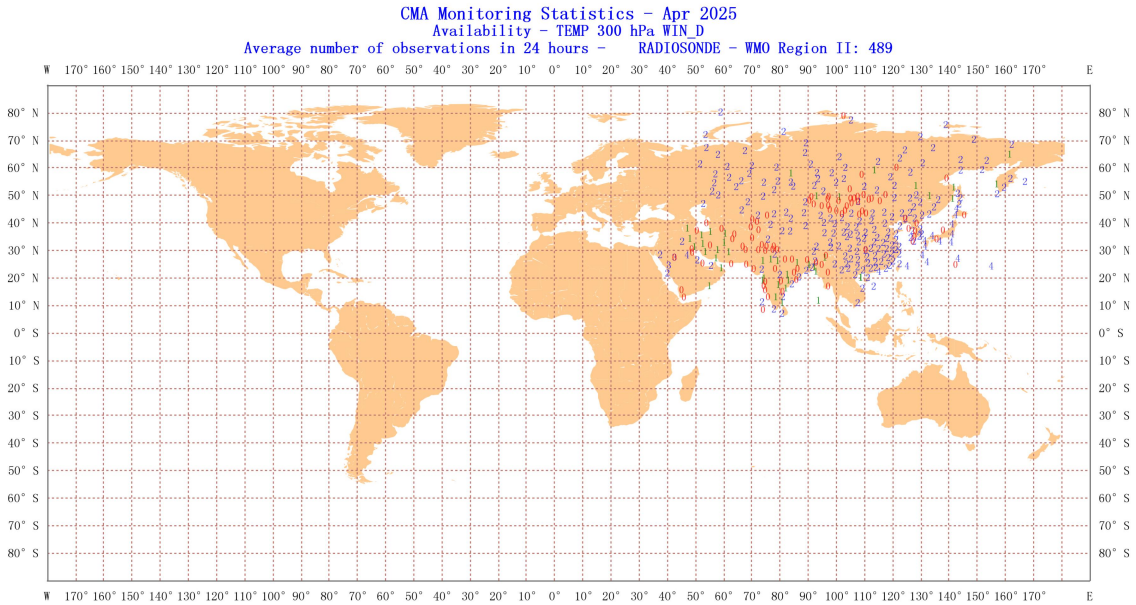
| INDEX | WMO IDENT | COUNTRY | OBS TIME | NUM OBS | BIAS | SD | MAX SPREAD |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 51463 | China | 00 | 25 | 11.2 | 10.4 | 6.6 |

## 3.4.2 Suspect Station Analysis

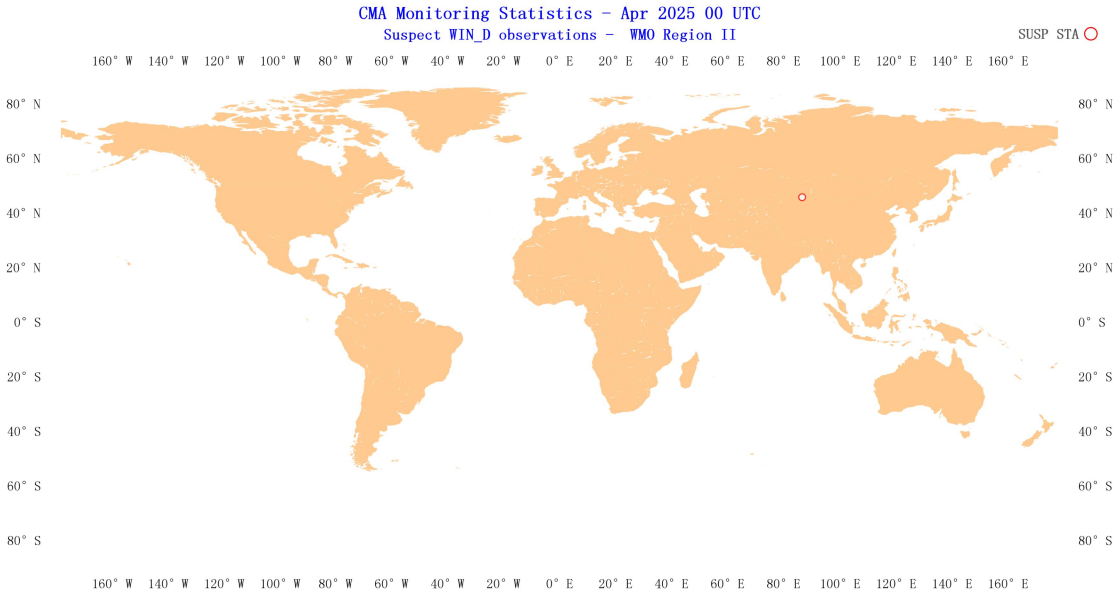



Location of all radiosonde stations reporting wind direction observations in Region II over the month of April 2025. NOBS shows the total number of observations received at RWC-Beijing, corresponding total number of stations (NSTA) and color scale are shown at the top of the figure, color green refers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

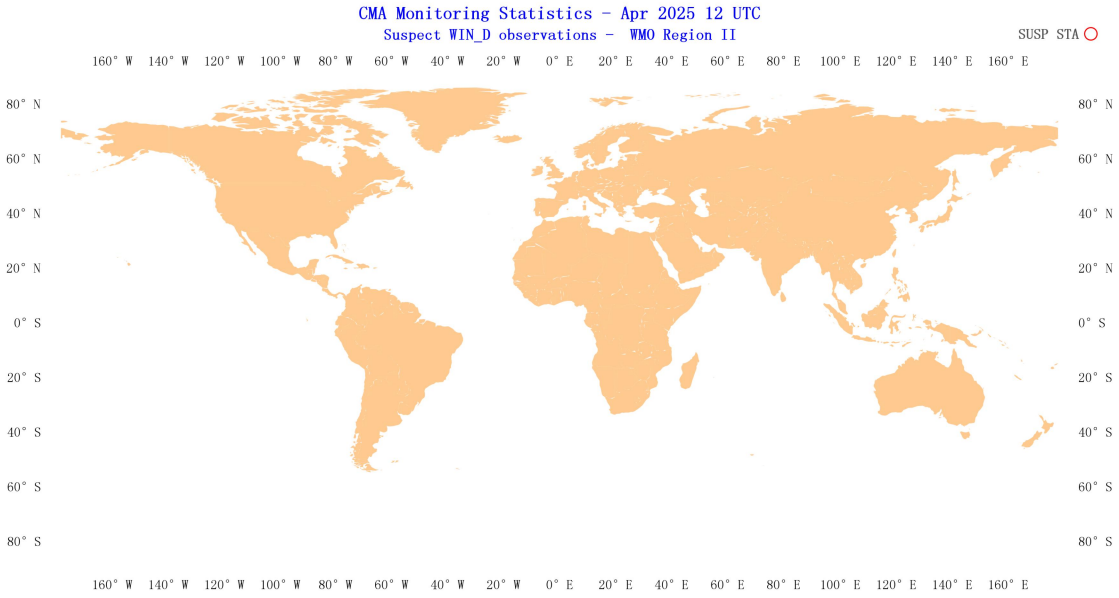



Location of all radiosonde stations reporting wind direction average number of

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

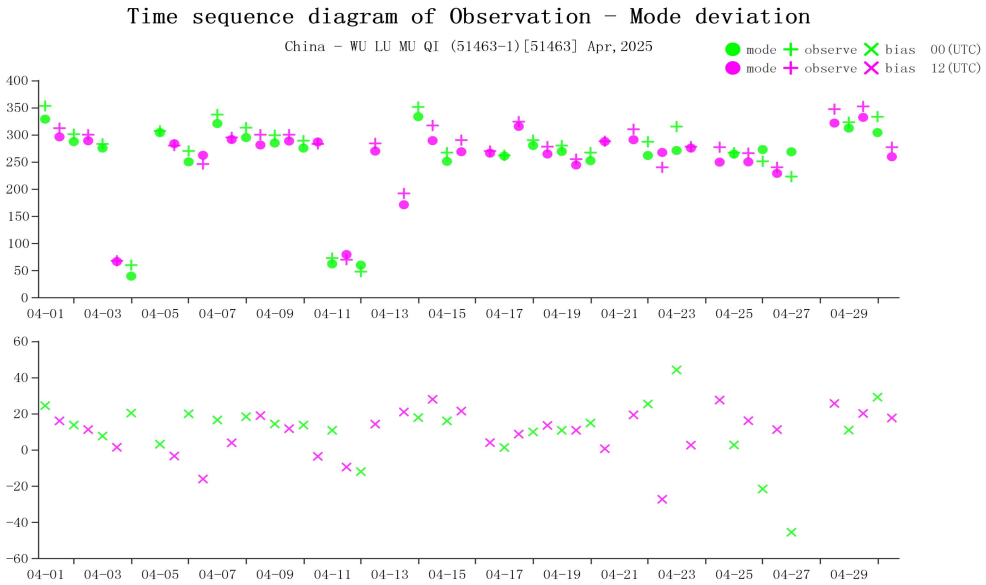



Distribution of suspect stations - Wind Direction 00 UTC




Distribution of suspect stations - Wind Direction 12 UTC


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




Time-series representation of WIN_D Obs minus first guess for station 51463(Level:300)

# 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 | 29839 | 12 | 200 | Russian Federation | 23933 | 00 | 250 | Russian Federation | 29839 | 12 | 250 |
| | Kazakhstan | 36003 | 12 | 70 | Russian Federation | 25403 | 12 | 300 | Kazakhstan | 36003 | 12 | 400 |
| | Kazakhstan | 38341 | 00 | 70 | Russian Federation | 29839 | 12 | 250 | Kazakhstan | 38341 | 00 | 50 |
| | Kazakhstan | 38341 | 12 | 70 | Kazakhstan | 36003 | 12 | 400 | Kazakhstan | 38341 | 12 | 250 |
| | India | 42348 | 00 | 925 | Kazakhstan | 38341 | 00 | 70 | Korea, Republic of | 47230 | 00 | 500 |
| | Korea, Republic of | 47230 | 00 | 70 | Kazakhstan | 38341 | 12 | 250 | Korea, Republic of | 47230 | 12 | 500 |
| | Korea, Republic of | 47230 | 12 | 70 | Korea, Republic of | 47230 | 12 | 500 | China | 52323 | 00 | 30 |
| | China | 52323 | 00 | 30 | Korea, Republic of | 47230 | 00 | 500 | China | 52323 | 12 | 30 |
| | China | 52323 | 12 | 30 | China | 52323 | 00 | 30 | | | | |
| | | | | | China | 52323 | 12 | 30 | | | | |
| | | | | | | | | | | | | |
| Vector Wind | Kazakhstan | 38341 | 00 | 500 | Kazakhstan | 36003 | 00 | 250 | Kazakhstan | 36003 | 00 | 250 |
| | Kazakhstan | 38341 | 12 | 200 | Kazakhstan | 36003 | 12 | 250 | Kazakhstan | 36003 | 12 | 250 |
| | | | | | Kazakhstan | 38341 | 12 | 200 | | | | |
| | | | | | Kazakhstan | 38341 | 00 | 100 | | | | |
| | | | | | Mongolia | 44373 | 12 | 300 | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Wind Direction | China | 51463 | 00 | | Thailand | 48327 | 12 | | Thailand | 48327 | 00 | |
| | | | | | China | 51463 | 00 | | Thailand | 48327 | 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

Any comments on the contents and the format of the report are welcome and should be contacted to:

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