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Session 3.3

the status and plans on RWC in RA II China

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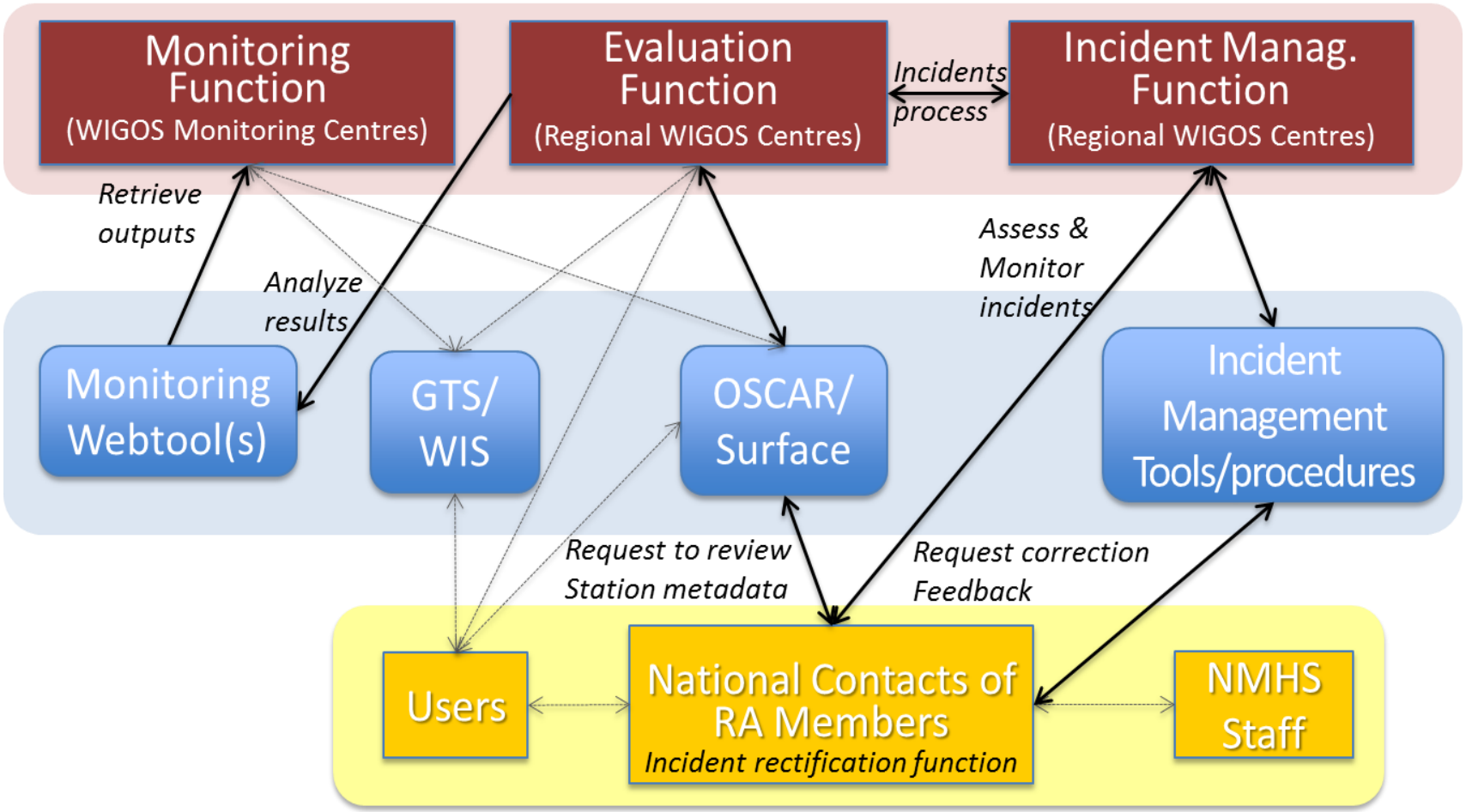
WMO WIGOS Data Quality Monitoring System (WDQMS)



Implementation Plan of The RWC Pilot Project of CMA

- Development of Regional WIGOS Center (RWC) Observation Data Quality Monitoring System
- Establishing the coordination mechanism for RA II observation data quality
- Establish a regular release mechanism for RA II observation data quality monitoring report

Work Goal ：

➢ To establish a mature operational observation data quality monitoring center in RA II region

Technical routes ：

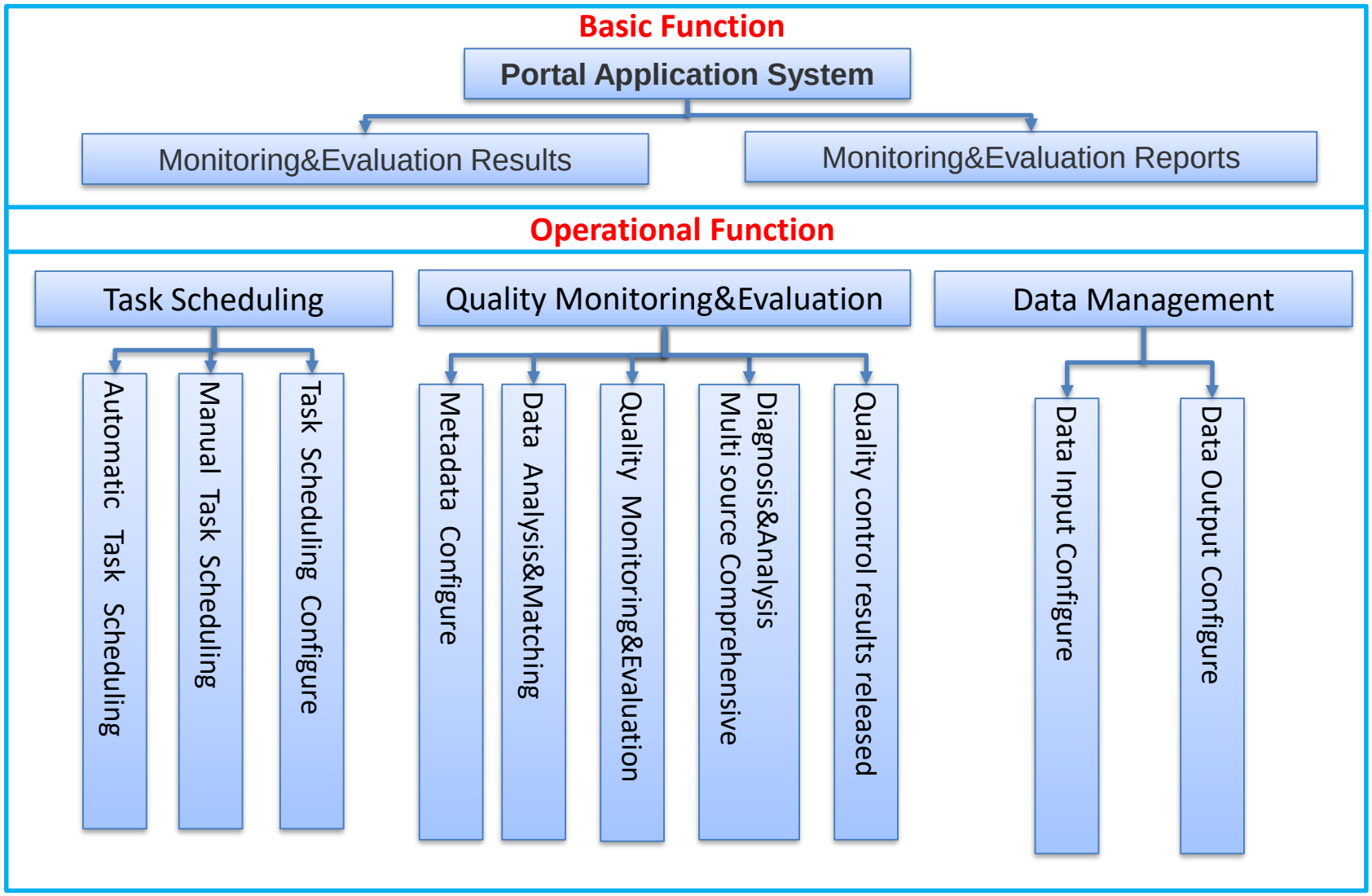
➢ Based on CMA GRAPES Model Forecast Products, monitoring and ev aluation algorithms and systems which are consistent with WMO requirements,

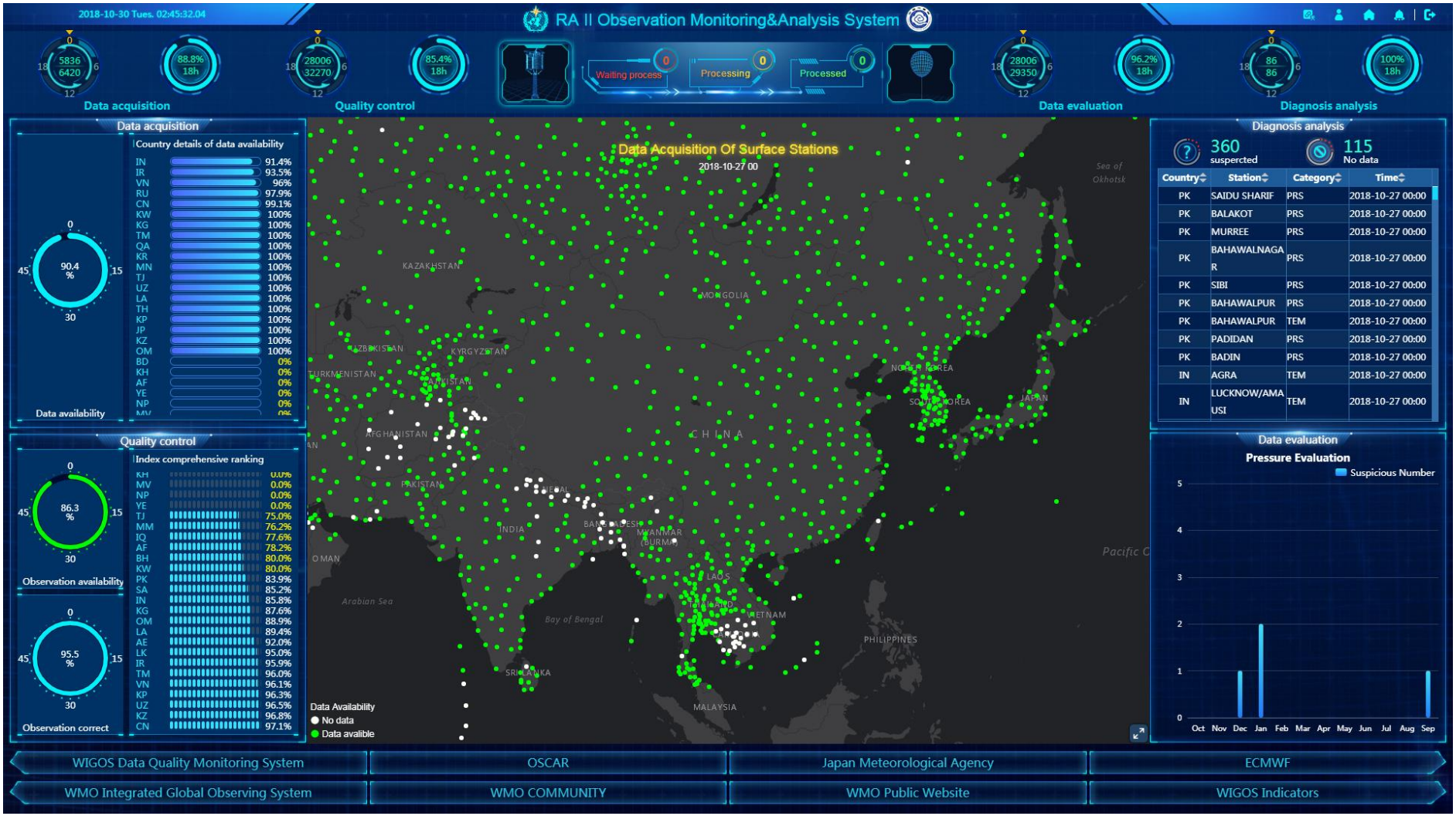
➢comprehensive diagnostic analysis of various means (WDQMS, OSCAR, etc.)

Overall Status of the implementation Plan

- the land surface observation evaluation algorithms: Completed
- the upper-air sounding evaluation algorithms: Completed
- the development of the RWC Quality Monitoring System: Completed
- the evaluation report of AWS in 2018: Completed

RA II Observation Monitoring & Analysis System





- Four operational links: data acquisition, quality control, data examination and diagnosis analysis
- Objective evaluation indicators
- Data of surface observation and sounding have been monitored in the system

List of the imported files since 2016

As per April 17, 2018, 8:22 a.m. reload

Date	ECMWF				JMA				DWD				NCEP			
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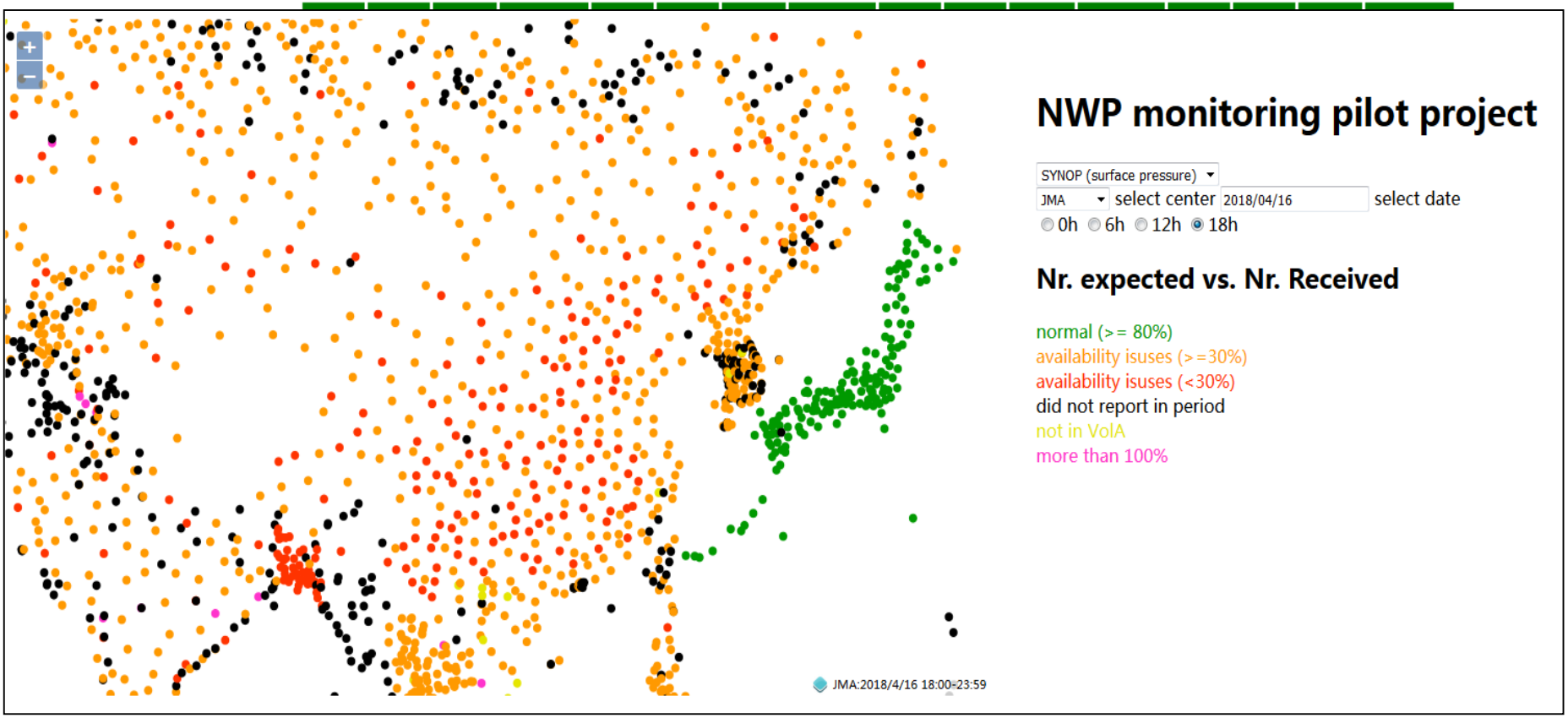
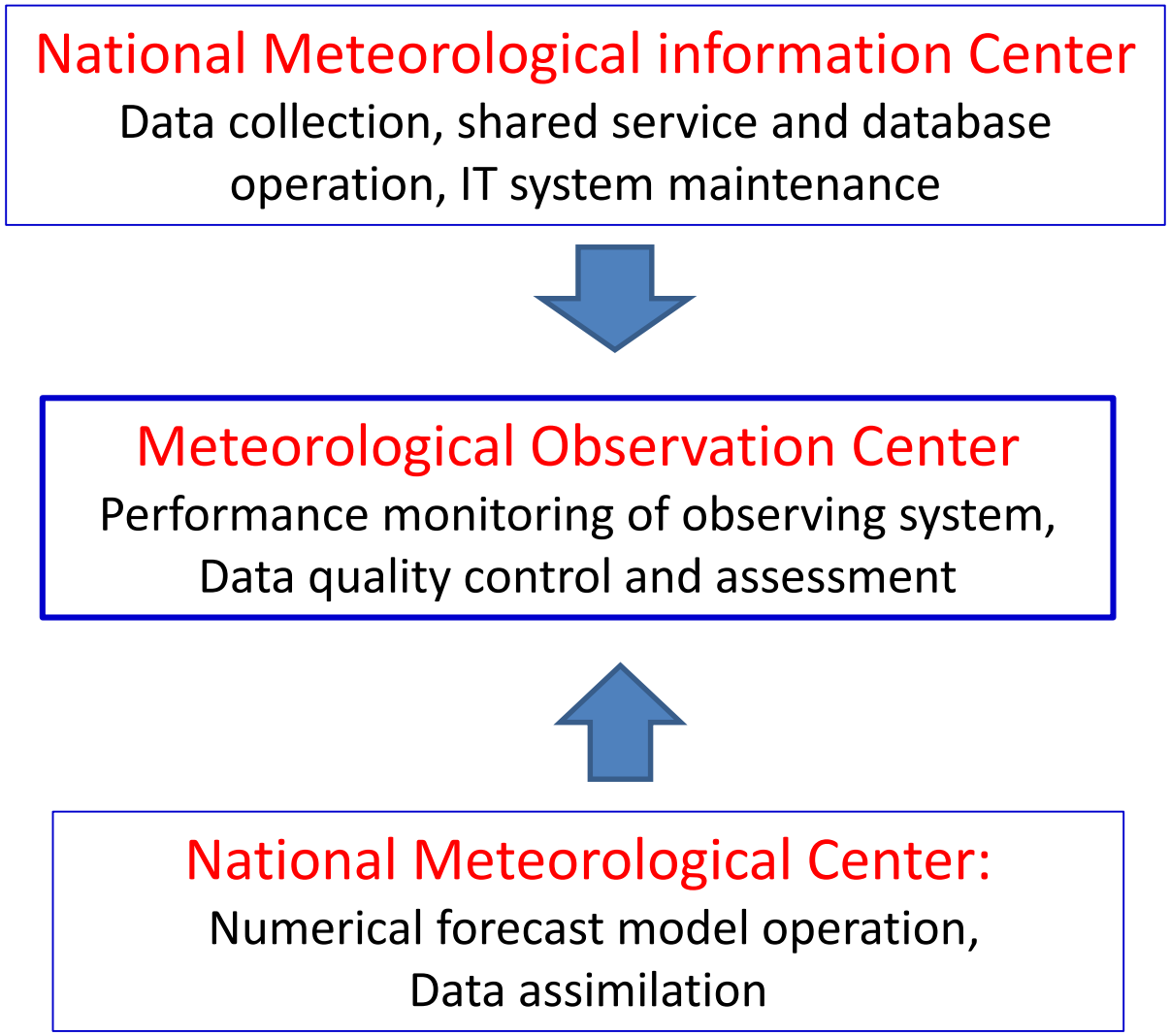
2018/04/17	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP								
2018/04/16	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP								
2018/04/15	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP	SYN TMP								




National Meteorological information Center
Data collection, shared service and database operation, IT system maintenance
Meteorological Observation Center
Performance monitoring of observing system, Data quality control and assessment
National Meteorological Center:
Numerical forecast model operation, Data assimilation

Meteorological Observation Center/CMA

- Observation network design： surface, upper-air, radar and airborne obser.
- Observation system operation: centralized monitor and control of system status
- Logistics support and repair organization of nationwide observation equipment
- Life-cycle technical support for the Doppler Weather Radar network
- R &D of observation technology and methods
- Traceability, calibration and test of observation instruments
- Observation standard, guide and manual definition
- Observation data quality control
- Integrated and merged observation product application and services
- Bilateral cooperation and international duty on observation affairs

Design of WIGOS Data Quality Monitoring System in CMA (WDQMS-CMA)

In order to get a high-quality observation data, we have to do:

Optimized and fit-for-purpose Observation Network

- the Rolling Review of Requirements process(RRR)
- Observing Systems Capability Analysis and Review tool (OSCAR)

Cost-effective instrument/observing system

- R & D of the new technology
- Observing test and inter-comparison, improvement

Quality Control and management

- Data QC & QA
- Metrology, calibration and validation
- Operation and maintenance
- Quality training

I. Progress on the RWC Pilot Project

1. Surface observation
2. Upper-air sounding
3. Weather radar observation
4. OSCAR/surface
5. RRR practice

(1) Surface Observation: data quality monitoring and assessment

To identify low-quality land surface problematic observation data on suspicious site, then to analyze, verify and trigger relevant quality improvement activities

To establish a closed loop of operational processes, timely discover and solve data quality problems from the source, and provide trusted data support for back-end applications

Using the WIGOS assessment technology method, to construct an observation and the GRAPES numerical forecasting model product deviation assessment model, and quantitatively monitor and evaluate the quality of surface data.

$$s = \left(\frac{1}{n-1} \sum_{i=1}^{n} \left(x_i - \bar{x} \right)^2 \right)^{\frac{1}{2}}$$

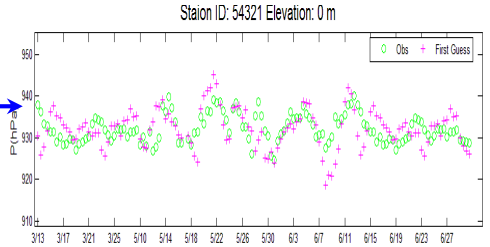
Standard ：P ≤ 4 hPa, T ≤ 6 ˚C

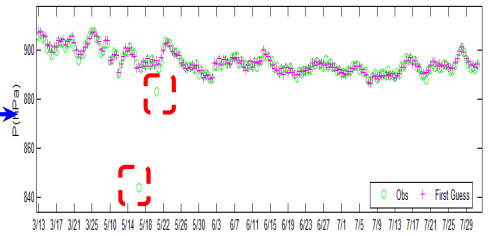
Observation / Background: Every 6 hours

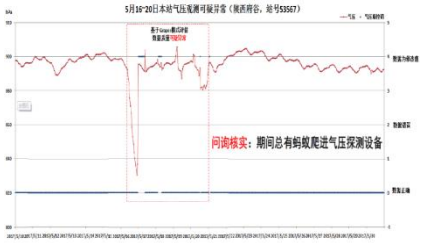
Observation: every 1 hour

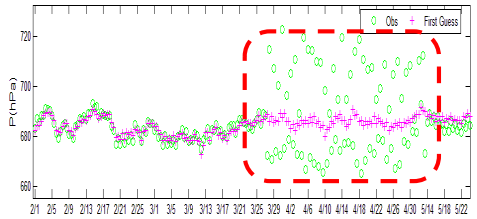
Evaluate Suspicious Station

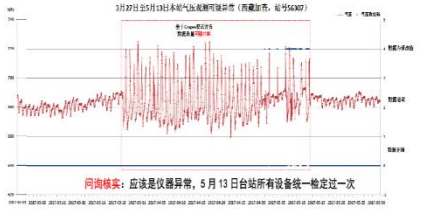
- Latitude and longitude error
- Short-term abnormality of air pressure
- Abnormal air pressure sensor
- Temperature equipment maintenance

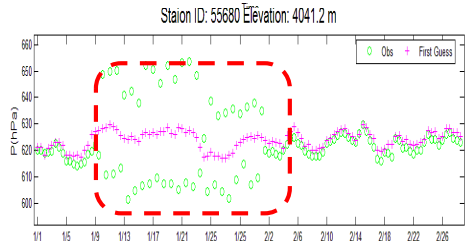


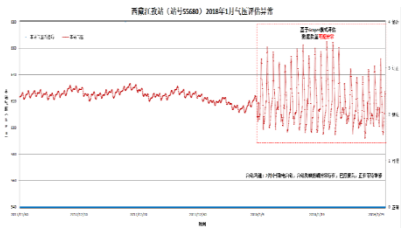


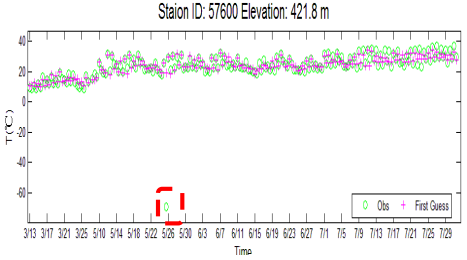


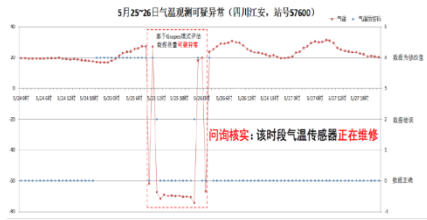




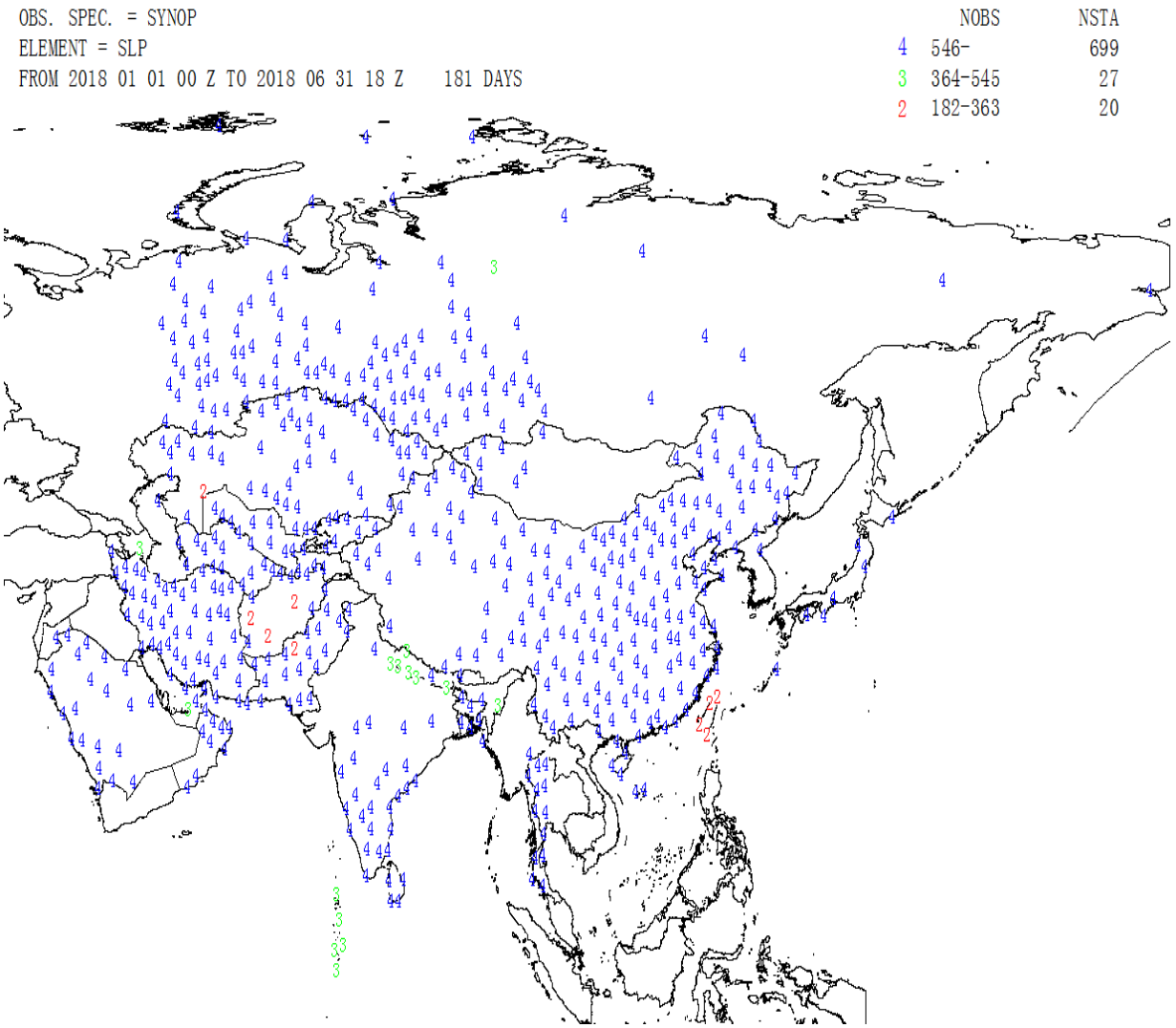








The numbers of stations in Region II：937



Location of all land surface stations reporting station level pressure (SLP) observations in Region II over the six-month period from January to June 2018

The numbers of suspect stations ： 12

Table 4 List of suspect land surface stations during the period from January to June 2018

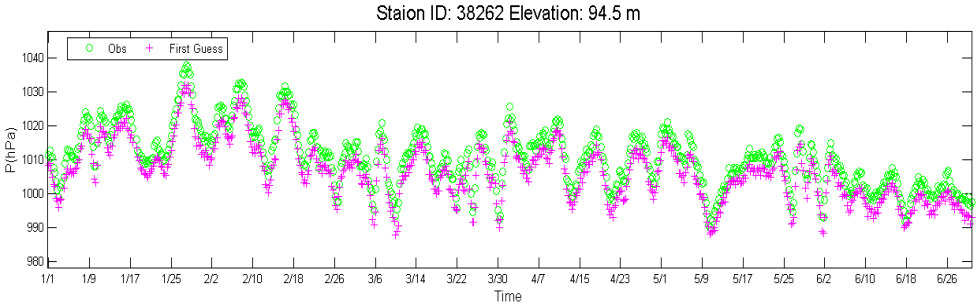
WMO IDENT	LAT (N)	LON (E)	H (m)	HM (m)	ELEM	NUM OBS	PGE %	SD	BIAS	RMS
38262	42.95	59.8	94.5	53	SLP	718	0	1.09	4.17	4.32
					MSLP	718	0	1.15	0.66	1.32
38880	37.98	58.35	312	522	SLP	710	4	1.10	12.64	12.69
					MSLP	710	0	1.82	-0.05	1.82
38944	37.48	69.38	447	448	SLP	720	0	1.68	-5.68	
					MSLP	720	0	2.38	-7.39	
38947	37.23	69.08	327	485	SLP	356	0	2.11	-3.10	
					MSLP	717	0	2.46	-0.37	
40945	34.82	67.82	2550	3196	SLP	255	2	1.25	-6.52	
					MSLP	254	1	5.17	-1.24	
42111	30.32	78.03	683	962	SLP	703	1	1.03	6.15	6.24
					MSLP	702	0	1.86	-4.52	4.89
43201	15.42	75.63	670	607	SLP	706	0	0.81	3.07	3.18
					MSLP	706	0	0.99	-1.34	1.66
43418	8.58	81.25	79	12	SLP	683	0	0.64	4.87	4.91
					MSLP	683	0	0.62	-0.10	0.63
44424	29.28	82.17	2300	3072	SLP	460	1	1.59	-4.37	4.65
					GZ850	457	0	14.81	-43.61	46.05
44429	28.05	82.5	634	784	SLP	386	1	0.83	-3.67	3.77
					MSLP	387	0	1.96	-1.52	2.48
48926	20.25	100.43	531.8	576	SLP	435	11	2.05	13.43	13.58
					MSLP	433	0	1.57	-1.31	2.04
41244	24.23	55.92	372	413	SLP	647	8	4.19	4.47	6.13
					MSLP	635	7	4.22	-1.85	4.61

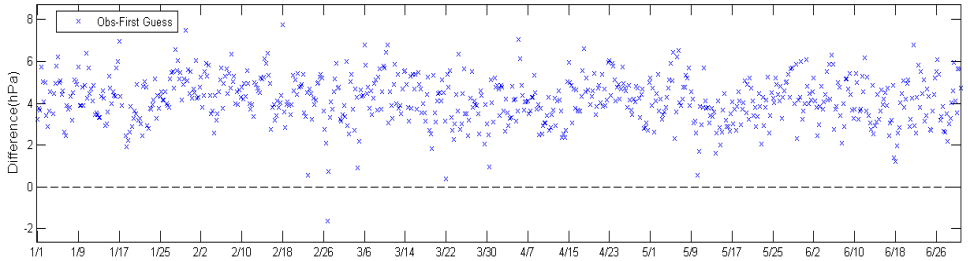
- BIAS
  - |BIAS| >= 3 hPa for SLP and MSLP
  - |BIAS| >= 30 gpm for GZ
  - |BIAS| >= 4 ℃ for T
- SD
  - SD >= 5 hPa for SLP and MSLP
  - SD >= 40 gpm for GZ
  - SD >= 6 ℃ for T

Abnormal pressure deviation

COUNTRT： Uzbekistan

STATION ： CHIMBAJ

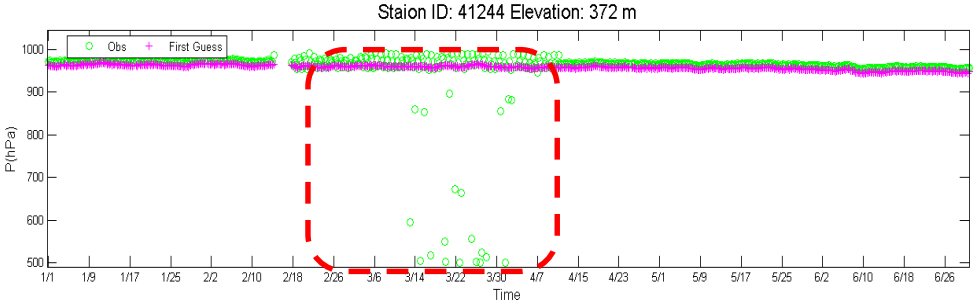


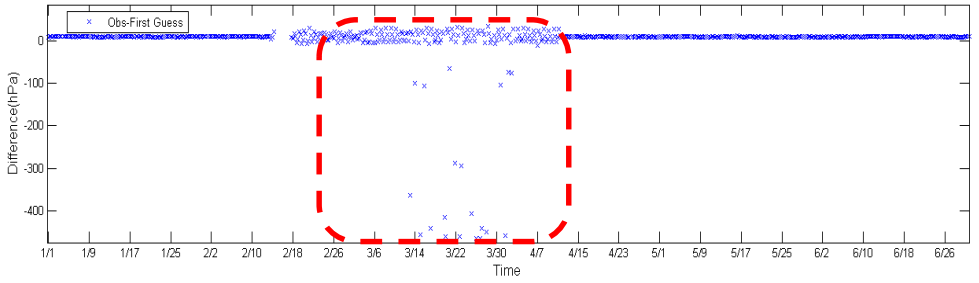


Air pressure sensor is abnormal

COUNTRY： Oman

STATION ： BURAIMI

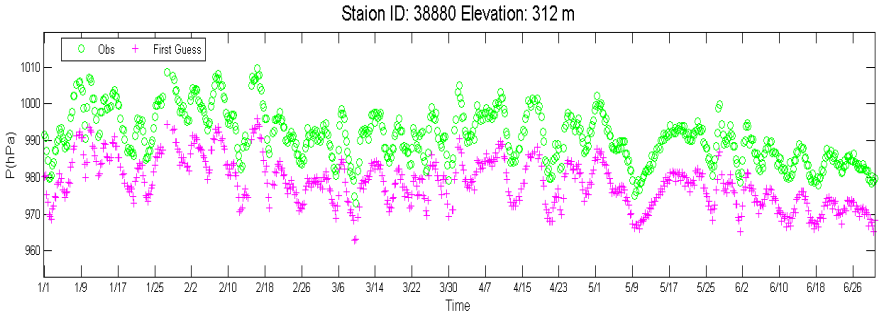


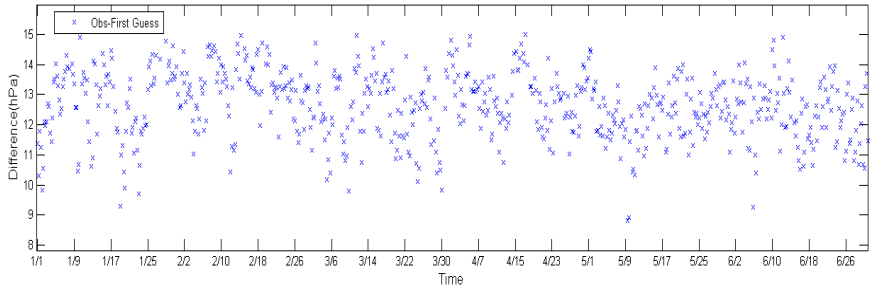


Abnormal pressure deviation

COUNTRY： Turkmenistan

STATION ： ASHGABAT

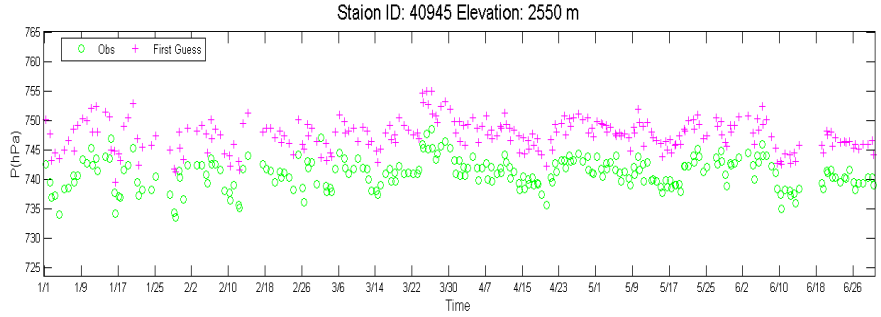


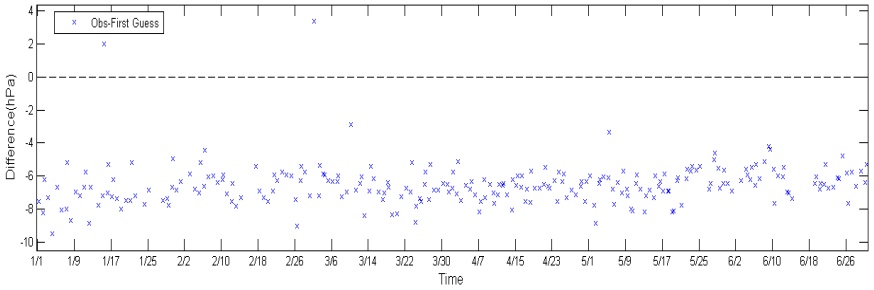


Abnormal pressure deviation

COUNTRY： Afghanistan

STATION ： BAMIYAN





Tracking & Improvement of Abnormal Pressure Data

1. Communicate with the station and repair the air pressure sensor.

56307、55680 station

2. Communicate with the station and check the surrounding environment of the air pressure sensor.

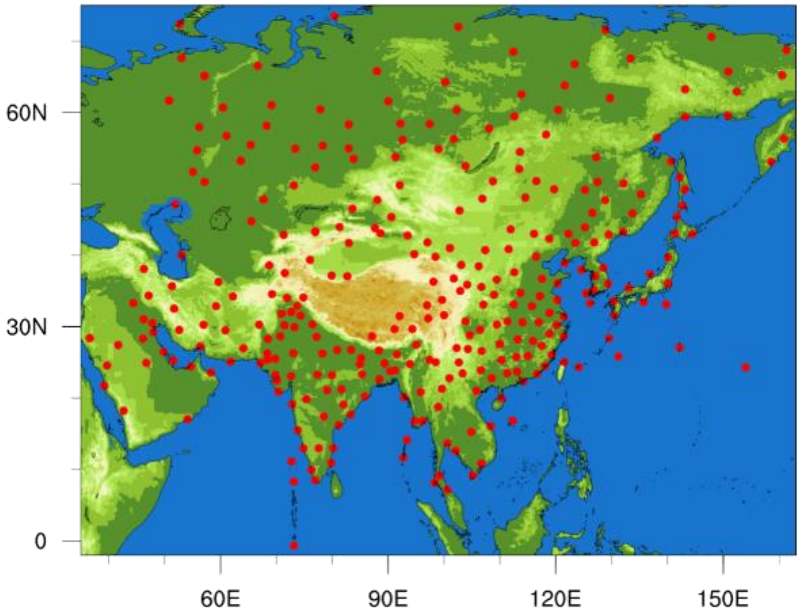
53567 station

3. Communicate with the data transmission department and check the data transmission operation software.

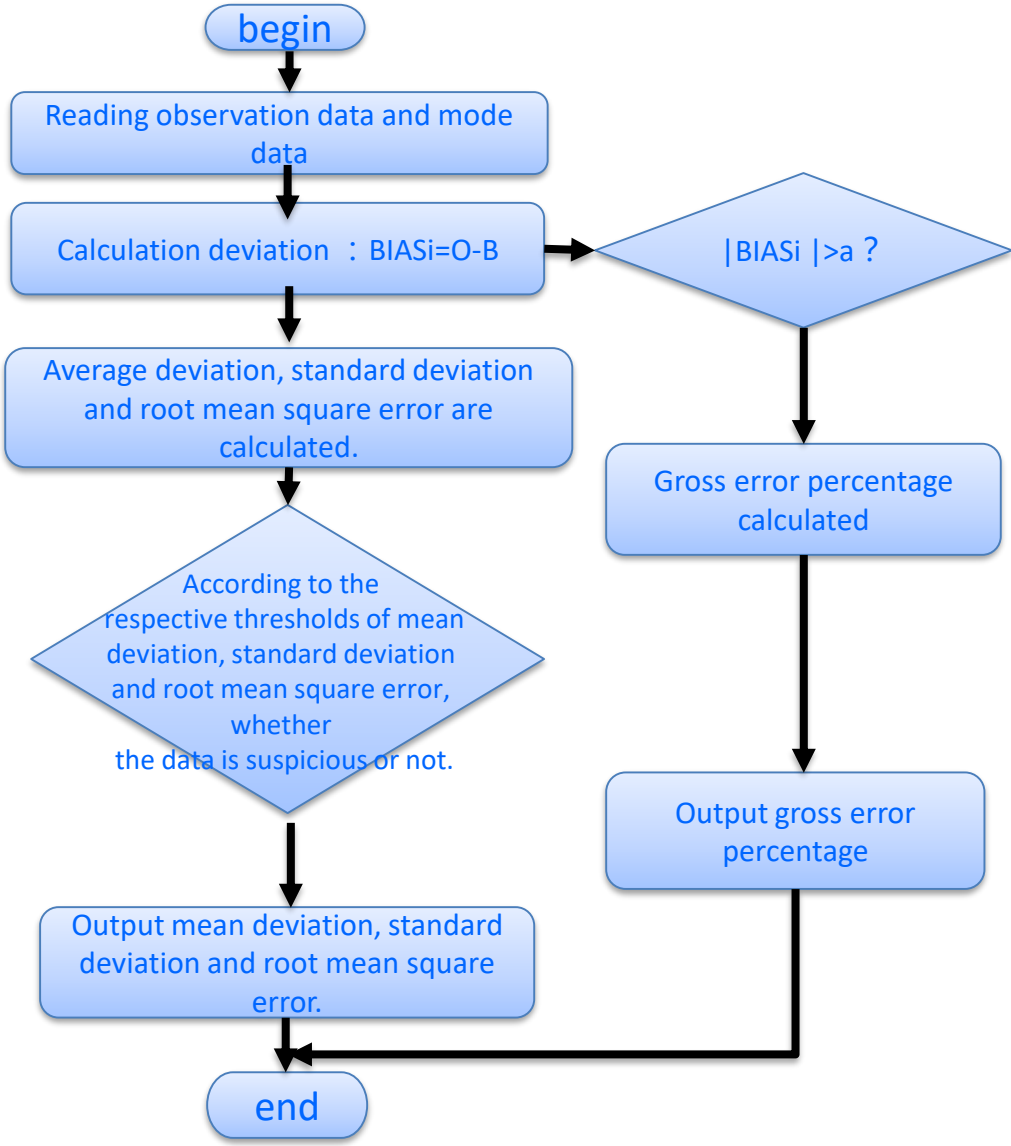
54321 station

(2) Radiosonde Data Quality Evaluation

Comparing the data quality evaluation methods of WMO, ECMWF and JMA, we can quantitatively evaluate and monitor data quality of radiosonde, find and solve the problem of data quality in time, improve the data service quality, and fully support the new requirements of the World Meteorological Center for global meteorological data service.



286 radiosonde stations of WIGOS II



Quality evaluation method of O-B

Comparison of evaluation (height)

June

China

IDENT	OBSTIME	ELEMENT	LEVEL
30758	12	Z	1000
31004	0	Z	100
31004	12	Z	100
32150	0	Z	200
40375	0	Z	1000
40375	12	Z	1000
40394	0	Z	1000
40430	0	Z	1000
40430	12	Z	1000
40437	0	Z	925
40437	12	Z	925
41112	0	Z	1000
41112	12	Z	1000
42369	12	Z	150
44292	12	Z	1000
47122	0	Z	1000
47122	12	Z	1000
47158	0	Z	30

EC

WMO IDENT	OBS TIME	ELM	LEV
01400	00	Z	1000
01400	12	Z	1000
04360	00	Z	1000
04360	12	Z	1000
17351	00	Z	70
22820	12	Z	200
22820	00	Z	200
27962	12	Z	50
34882	12	Z	50
40437	12	Z	850
42299	12	Z	925
42299	00	Z	925
47122	12	Z	1000
47122	00	Z	1000
47158	00	Z	30
78988	12	Z	1000
YLV96W	12	Z	400

Coincidence rate: 34%

JMA

WMO IDENT	OBS TIME	ELE-MENT	LEVEL
01400	00	Z	1000
01400	12	Z	1000
04360	00	Z	1000
04360	12	Z	925
27962	12	Z	50
40437	00	Z	850
40437	12	Z	925
47122	00	Z	1000
47122	12	Z	1000
47158	00	Z	30
78486	00	Z	850
78988	12	Z	1000

Coincidence rate: 84%

China has the ability to assess the height, but there is still a gap with the international level.

Comparison of evaluation （wind speed）

China

January

IDENT	OBSTIME	ELEMENT	LEVEL
31004	0	V	200
31004	12	V	200
42182	12	V	200

February

IDENT	OBSTIME	ELEMENT	LEVEL
31004	0	V	200
31004	12	V	250
42182	0	V	200
42182	12	V	200
57993	0	V	150

March

IDENT	OBSTIME	ELEMENT	LEVEL
31004	0	V	250
31004	12	V	200
40800	0	V	250
42182	12	V	200
57993	12	V	250

April

IDENT	OBSTIME	ELEMENT	LEVEL
31004	0	V	200
31004	12	V	250
42182	12	V	200

May

IDENT	OBSTIME	ELEMENT	LEVEL
31004	0	V	150
31004	12	V	150

June

IDENT	OBSTIME	ELEMENT	LEVEL
31004	0	V	150
31004	12	V	150

EC

WMO IDENT	OBS TIME	ELM	LEV
42182	12	V	100

WMO IDENT	OBS TIME	ELM	LEV
42182	12	V	150
42182	00	V	100

WMO IDENT	OBS TIME	ELM	LEV
42182	12	V	150

WMO IDENT	OBS TIME	ELM	LEV
42182	12	V	200

NO

NO

JMA

WMO IDENT	OBS TIME	ELE-MENT	LEVEL
41768	12	V	500
41859	12	V	700
41883	12	V	700
42182	12	V	200

WMO IDENT	OBS TIME	ELE-MENT	LEVEL
41768	12	V	500
41780	12	V	500
42182	00	V	200
42182	12	V	200
57993	12	V	300

WMO IDENT	OBS TIME	ELE-MENT	LEVEL
42182	00	V	200
42182	12	V	200

WMO IDENT	OBS TIME	ELE-MENT	LEVEL
42182	12	V	200

NO

NO

China has the ability to assess the wind speed, but there is still a gap with the international level.

Comparison of evaluation results——wind direction

April

China

IDENT	OBSTIME	ELEMENT	LEVEL
42867	0	DD	500
42874	0	DD	500
43192	0	DD	400
43599	12	DD	500
57972	0	DD	500
57972	0	DD	300
57972	0	DD	250
57972	12	DD	300
57972	12	DD	250
57972	12	DD	150

EC

WMO IDENT	OBS TIME	ELM
57972	00	DD
57972	12	DD

JMA

WMO IDENT	OBS TIME	ELE-MENT
57972	00	DD
57972	12	DD

May

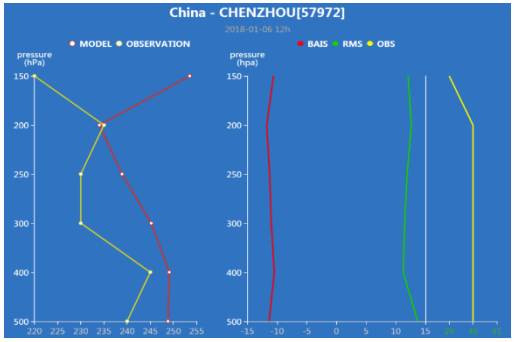
IDENT	OBSTIME	ELEMENT	LEVEL
54374	0	DD	300
57972	12	DD	300
59280	12	DD	150

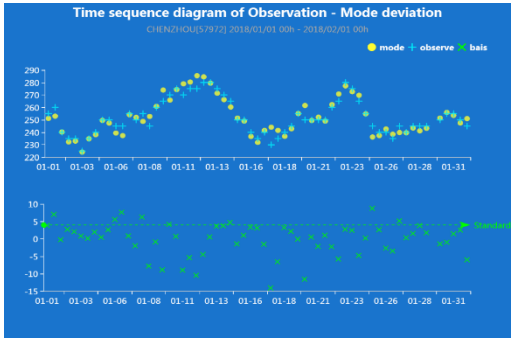
NO

WMO IDENT	OBS TIME	ELE-MENT
57972	00	DD

Tracking and Improvement of Abnormal Wind Direction Data

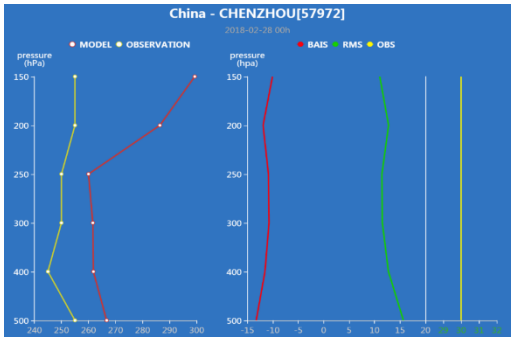
IDENT	OBSTIME	ELEMENT	LEVEL	LAT	LON	NUMOBS	BIAS	MAX_SPRE	SD
28951	12	DD	200	53.23	63.62	5.00	-10.50	3.08	10.03
35700	00	DD	500	47.12	51.92	23.00	13.28	8.37	17.09
43599	12	DD	200	-0.68	73.15	25.00	-19.03	8.08	17.34
48327	00	DD	400	18.77	98.97	7.00	11.64	6.15	10.99
48407	12	DD	150	15.25	104.87	5.00	-11.62	9.44	20.44
[illegible]	12	DD	300	7.17	100.60	6.00	19.17	3.10	6.41
57972	00	DD	150	25.73	112.97	31.00	-13.24	4.47	5.90
57972	00	DD	200	25.73	112.97	31.00	-11.26	3.21	4.64
57972	00	DD	250	25.73	112.97	31.00	-11.64	2.71	4.14
57972	00	DD	400	25.73	112.97	31.00	-13.75	5.74	7.17
57972	00	DD	500	25.73	112.97	31.00	-10.10	6.91	8.34
57972	12	DD	150	25.73	112.97	30.00	-10.60	4.36	5.79
57972	12	DD	200	25.73	112.97	30.00	-11.73	3.24	4.67
57972	12	DD	250	25.73	112.97	31.00	-11.25	2.54	3.97
57972	12	DD	300	25.73	112.97	31.00	-10.97	2.01	3.44
57972	12	DD	400	25.73	112.97	31.00	-10.46	2.73	4.16
57972	12	DD	500	25.73	112.97	31.00	-11.33	6.26	7.69

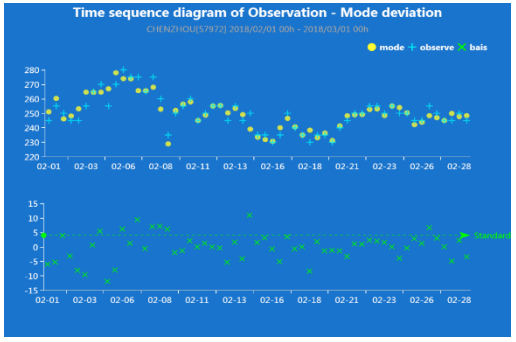




Jan

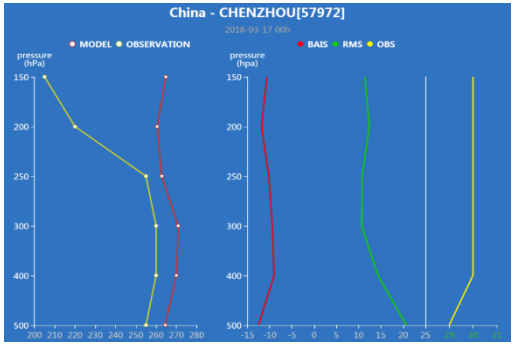
IDENT	OBSTIME	ELEMENT	LEVEL	LAT	LON	NUMOBS	BIAS	MAX_SPRE	SD
41256	0	DD	500	23.58	58.28	5.00	-11.48	8.02	9.76
56080	12	DD	400	35	102.9	28	10.78	7.24	11
57972	0	DD	500	25.7333	112.9667	28	-13.26	6.79	8.34
57972	0	DD	400	25.7333	112.9667	28	-11.54	3.84	5.39
57972	0	DD	300	25.7333	112.9667	28	-10.74	2.63	4.18
57972	0	DD	250	25.7333	112.9667	28	-10.86	2.05	3.6
57972	0	DD	200	25.7333	112.9667	28	-11.91	3.03	4.58
57972	0	DD	150	25.7333	112.9667	28	-10.06	2.94	4.49
57972	12	DD	500	25.7333	112.9667	28	-10.43	4.45	4.71
57972	12	DD	300	25.7333	112.9667	28	-10.85	4.14	4.4
57972	12	DD	250	25.7333	112.9667	28	-11.06	3.87	4.13
57972	12	DD	200	25.7333	112.9667	28	-10.54	4.36	4.62

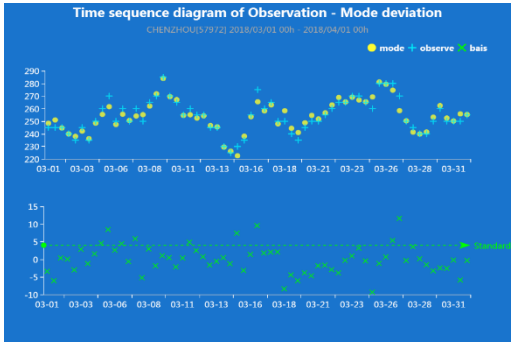




Feb

IDENT	OBSTIME	ELEMENT	LEVEL	LAT	LON	NUMOBS	BIAS	MAX_SPRE	SD
43369	0	DD	400	8.30	73.15	6.00	-15.65	8.15	20.94
48453	0	DD	200	13.65	100.60	19.00	13.81	7.26	13.84
48453	12	DD	500	13.65	100.60	14.00	19.95	9.10	14.36
51839	0	DD	300	37.07	82.68	30.00	11.13	3.02	13.96
55299	12	DD	400	31.48	92.07	28.00	10.86	8.71	17.59
57972	0	DD	250	25.7333	112.9667	31	-10.17	-1.34	3.49
57972	0	DD	200	25.7333	112.9667	31	-11.8	-1.01	3.82
57972	0	DD	150	25.7333	112.9667	31	-10.62	-0.72	4.11
57972	12	DD	500	25.7333	112.9667	31	-10.64	8.32	10.89
57972	12	DD	400	25.7333	112.9667	31	-10.87	6.15	8.72
57972	12	DD	300	25.7333	112.9667	31	-10.52	3.02	5.59
57972	12	DD	200	25.7333	112.9667	31	-10.36	1.63	4.2
57972	12	DD	150	25.7333	112.9667	31	-10.86	1.64	4.21





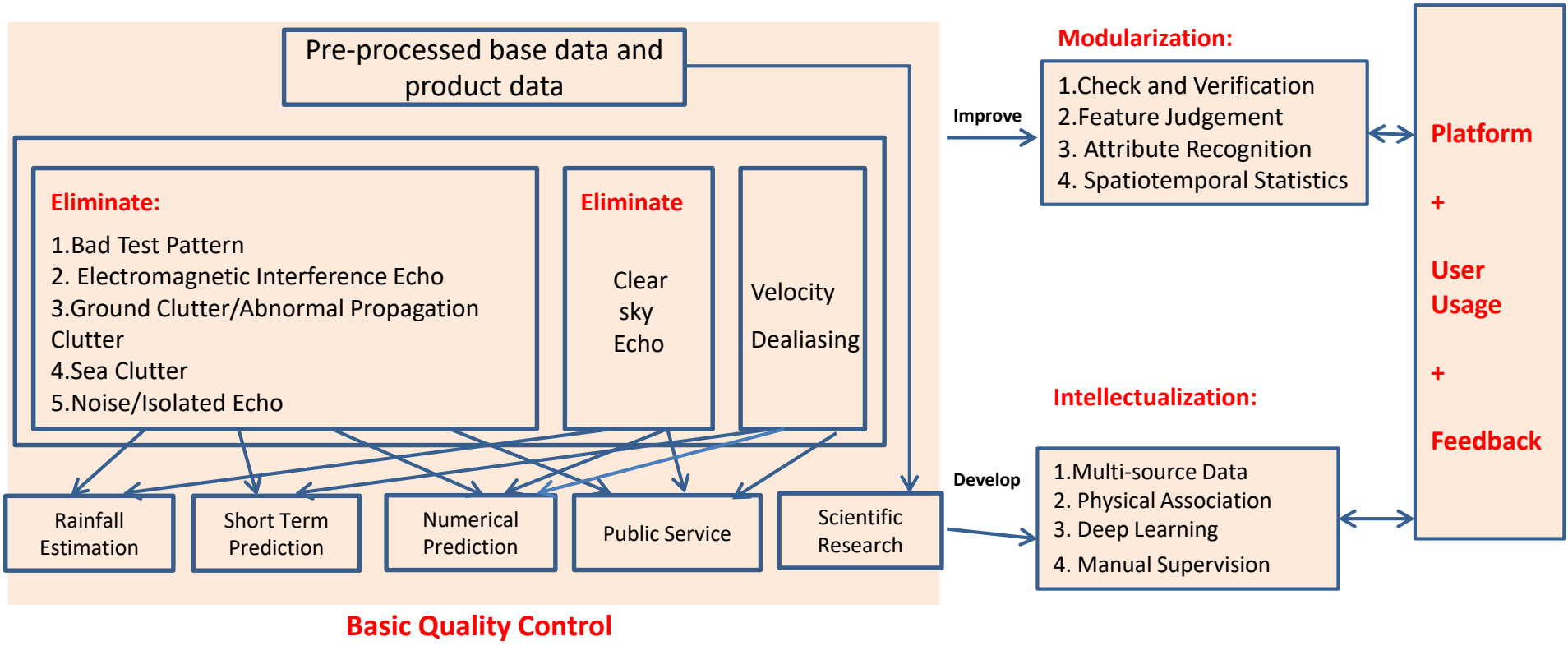
Mar

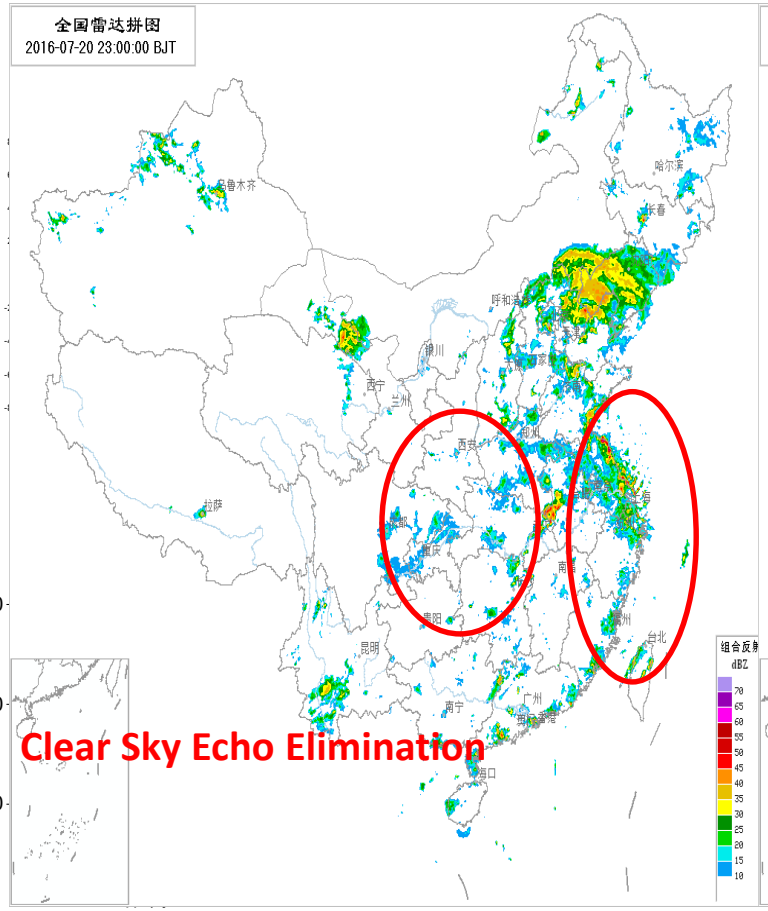
Suspicious station

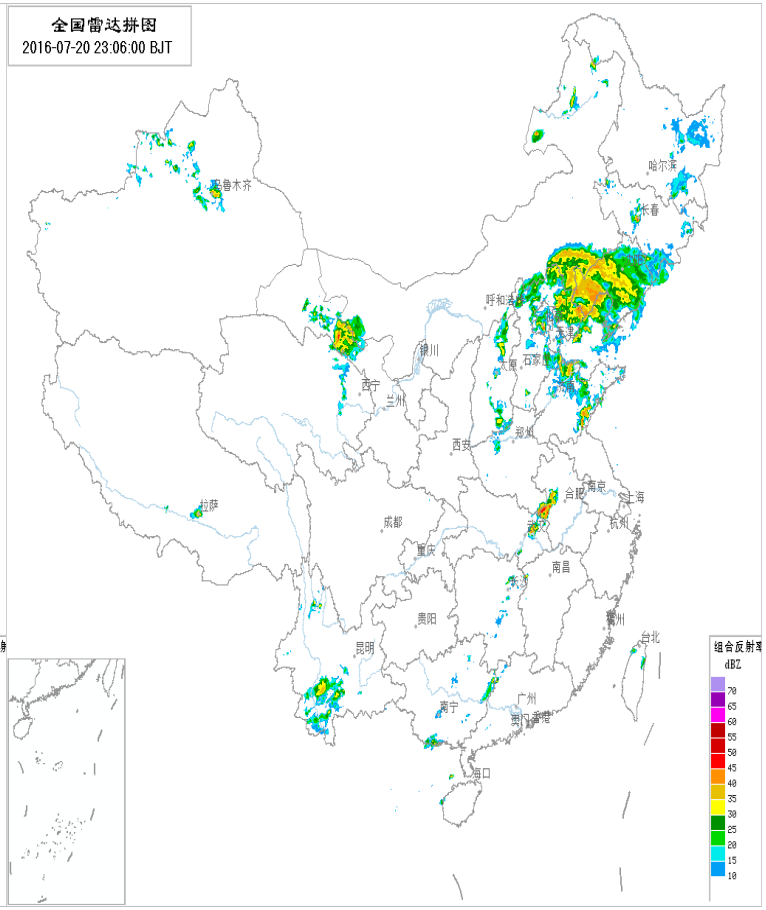
Station id：57972（China）

(3) Doppler Weather Radar Data Quality Control —Only for China

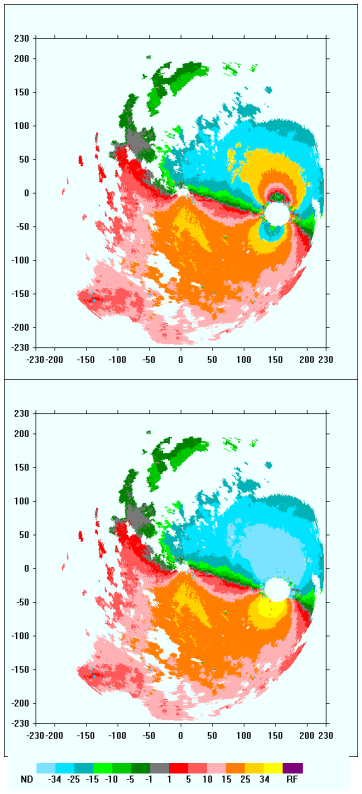
Technical Route: Basic Quality Control, Modularization, Intellectualization







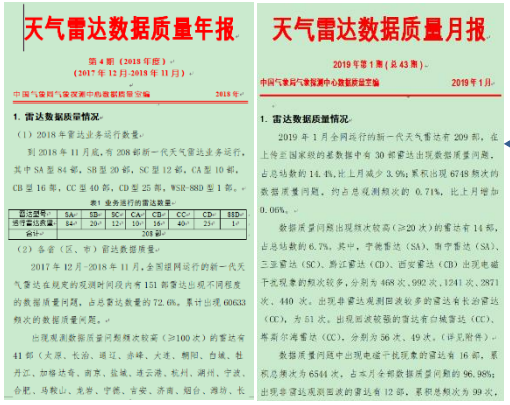
Velocity Dealiasing



Data Acquisition Monitoring

Data Quality Monitoring

Reports Publishing



天气雷达数据质量年报

第 4 期（2018 年度）
（2017 年 12 月-2018 年 11 月）

1. 雷达数据质量情况

（1）2018 年雷达业务运行数量

到 2018 年 11 月底，有 208 部新一代天气雷达业务运行，其中 SA 型 84 部，SB 型 20 部，SC 型 12 部，CA 型 10 部，CB 型 16 部，CC 型 40 部，CD 型 25 部，WSR-88D 型 1 部。

表1 业务运行的雷达数量

雷达型号	SA	SB	SC	CA	CB	CC	CD	88D
运行雷达数量	84	20	12	10	16	40	25	1
合计	208 部							

（2）各省（区、市）雷达数据质量

2017 年 12 月-2018 年 11 月，全国组网运行的新一代天气雷达在规定的观测时间段内有 151 部雷达达到不同程度的数据质量问题，占总雷达数量的 72.6%。累计出现 60633 频次的数据质量问题。

出现观测数据质量问题频次较高（≥100 次）的雷达有 41 部（太原、长治、运城、赤峰、大连、朝阳、白城、牡丹江、加格达奇、南京、盐城、连云港、杭州、湖州、宁波、合肥、马鞍山、龙岩、宁德、吉安、济南、烟台、潍坊、长

天气雷达数据质量月报

2019 年第 1 期（总 43 期）

中国气象局气象探测中心数据质量室编　　2019 年 1 月

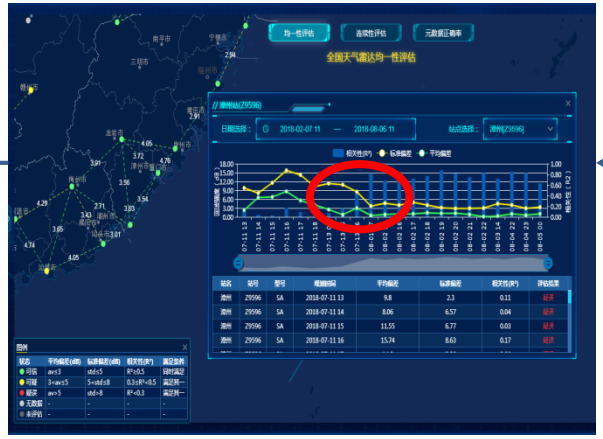
1. 雷达数据质量情况

2019 年 1 月全网运行的新一代天气雷达有 209 部，在上传至国家级的基数据中有 30 部雷达出现数据质量问题，占总站数的 14.4%，比上月减少 3.9%；累积出现 6748 频次的数据质量问题，约占总观测频次的 0.71%，比上月增加 0.06%。

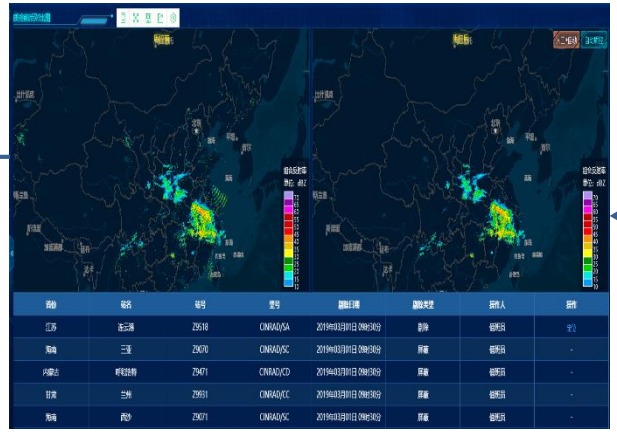
数据质量问题出现频次较高（≥20 次）的雷达有 14 部，占总站数的 6.7%，其中，宁德雷达（SA）、衡宁雷达（SA）、三亚雷达（SC）、阳江雷达（CD）、西安雷达（CB）出现电磁干扰现象的频次较多，分别为 468 次、992 次、1241 次、2871 次、440 次，出现非雷达观测回波较多的雷达有长治雷达（CC），为 51 次，出现回波较强的雷达有白城雷达（CC）、苏尼尔海雷达（CC），分别为 56 次、49 次。（详见附件）

数据质量问题中出现电磁干扰现象的雷达有 16 部，累积总频次为 6544 次，占本月全部数据质量问题的 96.98%；出现非雷达观测回波的雷达有 12 部，累积总频次为 99 次，

Data Evaluation



Diagnostic Errata

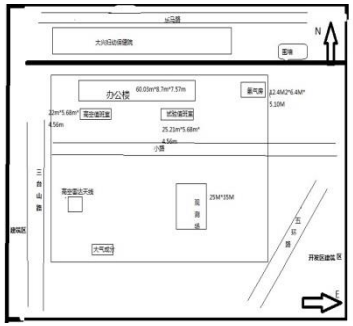


(4) OSCAR/Surface-----Metadata Maintain

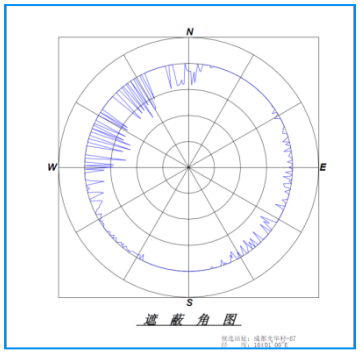
- Nominated a National Focal Point for OSCAR/Surface
- Maintain the metadata of 88 Sounding stations and 385 surface stations
- Update the metadata of relocated stations every year
- Correct any erroneous and/or missing metadata identified in OSCAR

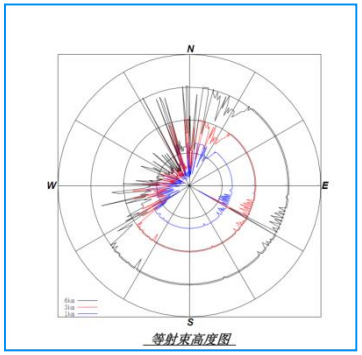
OSCAR/Surface-----Metadata Standard

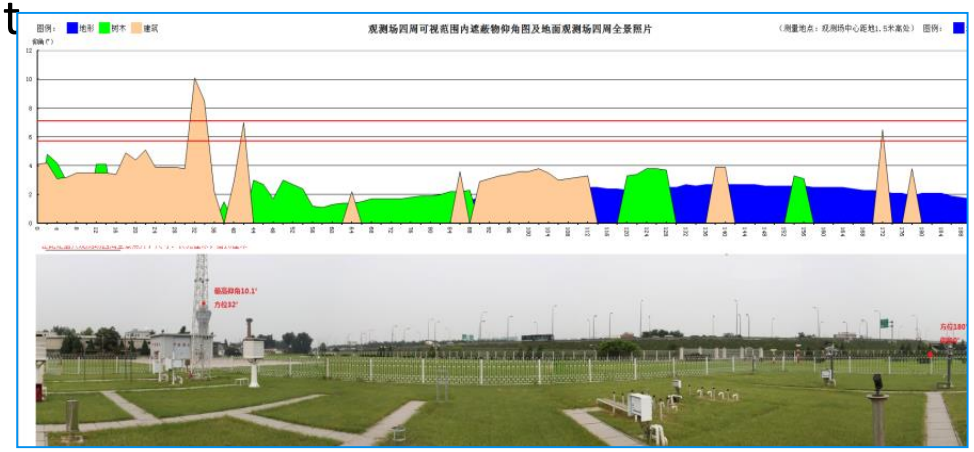
- **WIGOS metadata as primary template**
  - ✓10 categories
  - ✓65 elements



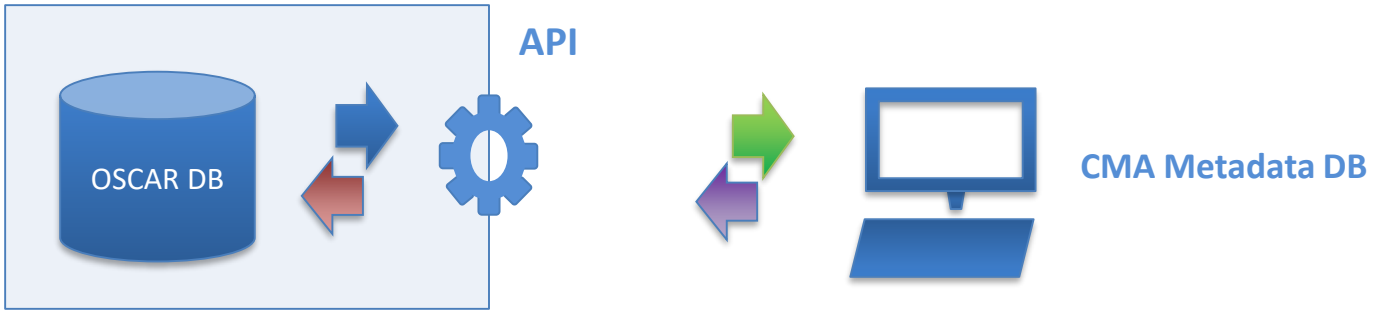
- **Add new metadata elements**
  - ✓Amount to 73 elements
    - +Station evolution
    - +On duty
    - +Obstacle type
    - +Interference source
    - +Observation environment assessment
    - +etc....

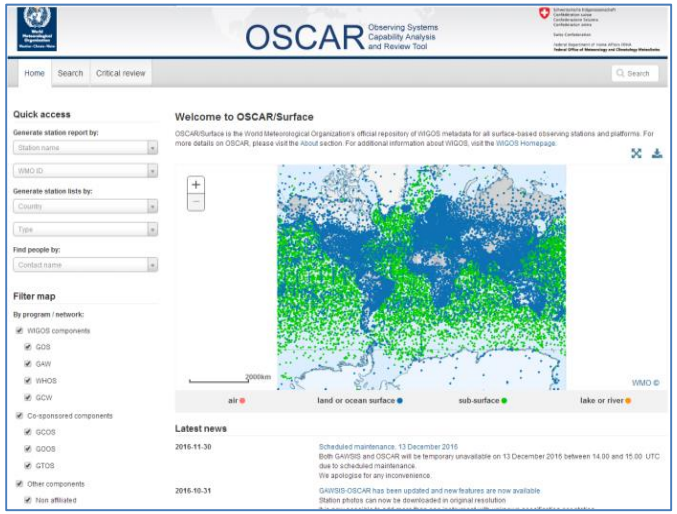




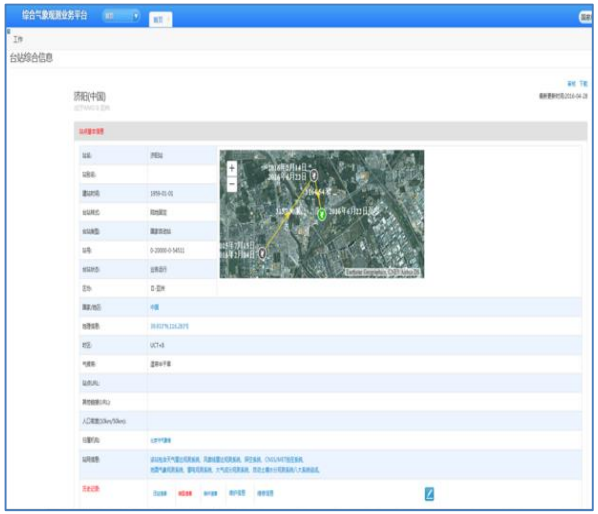


OSCAR/Surface----- Share Metadata





OSCAR

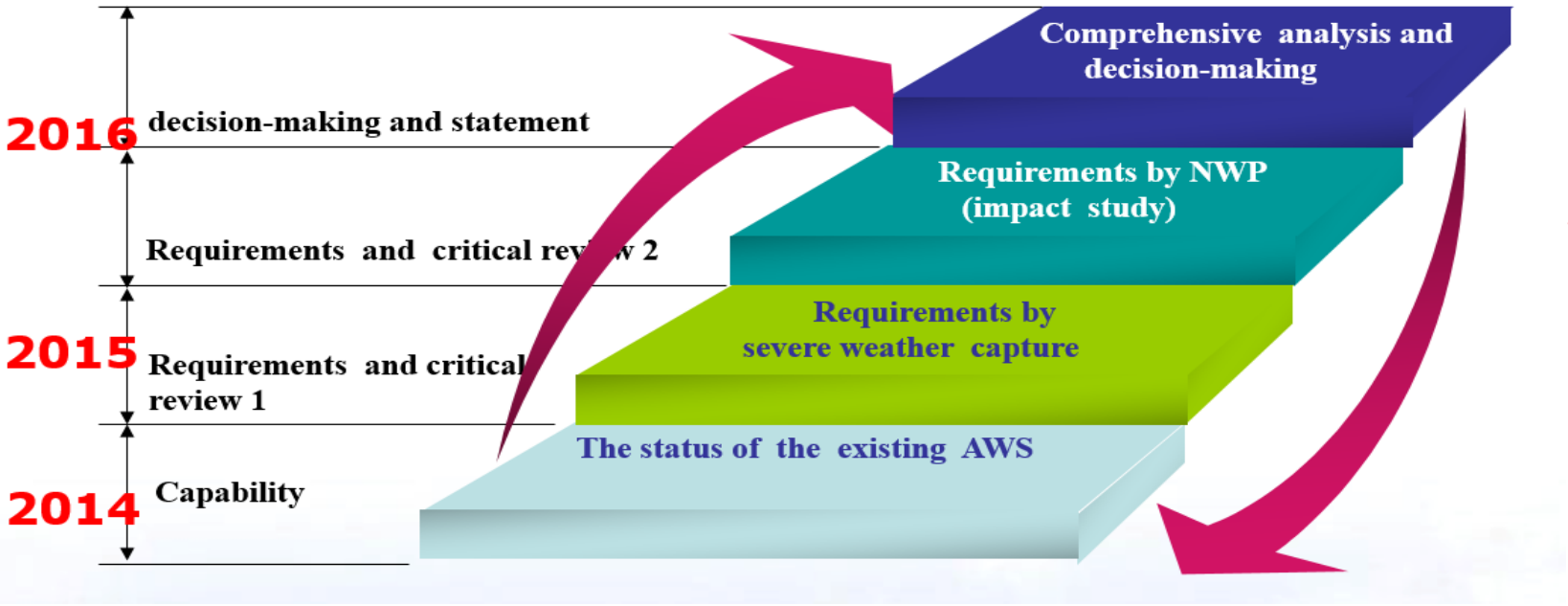


CMA system

The new system is under development

(5) Optimization of the Surface AWS network
CMA practice of RRR tool

The RRR cycle of the optimization AWS network

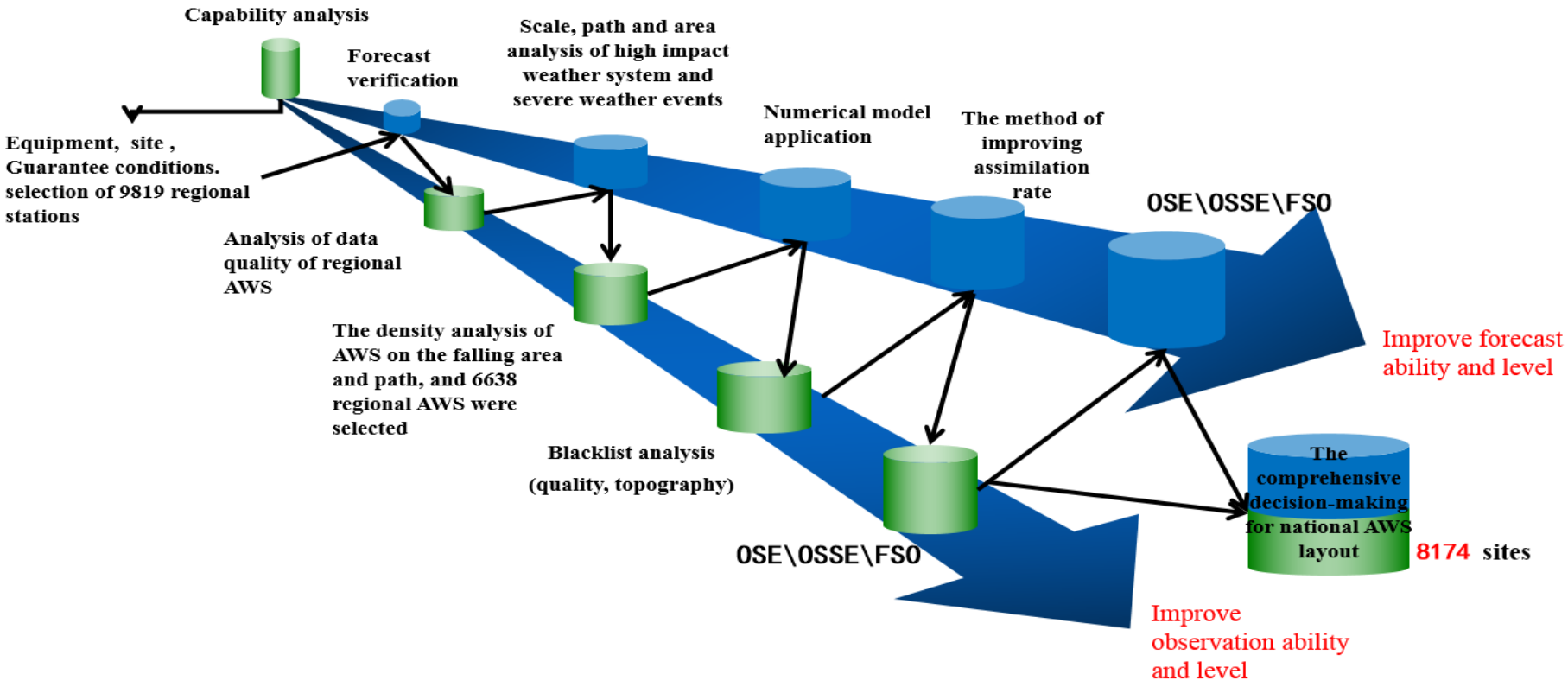


How many?

Where?

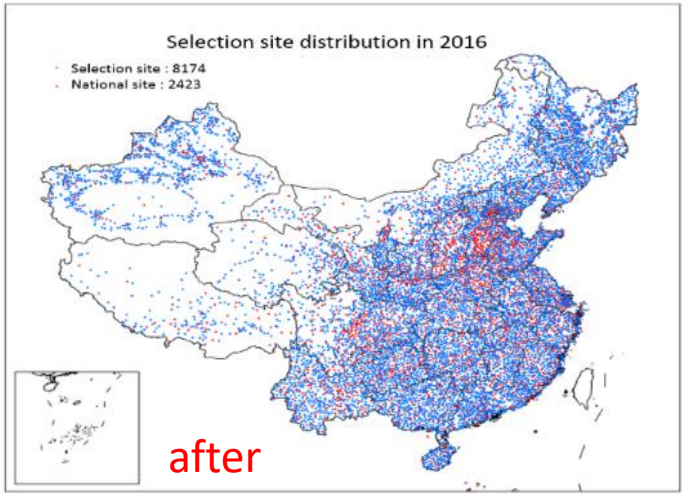
Which?

Mutual reciprocity and mutual benefit



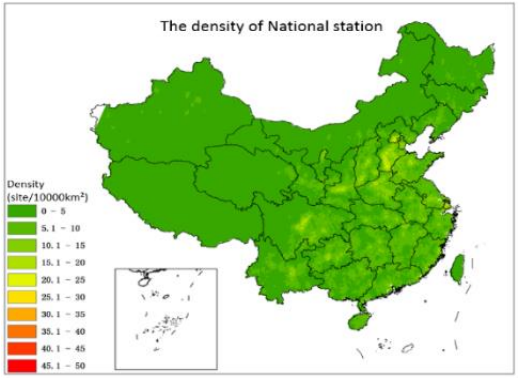
- RRR is a process with combining the science and engineering process of the system.
- Both the observation systems, forecast system and met. service systems benefit from the RRR process.

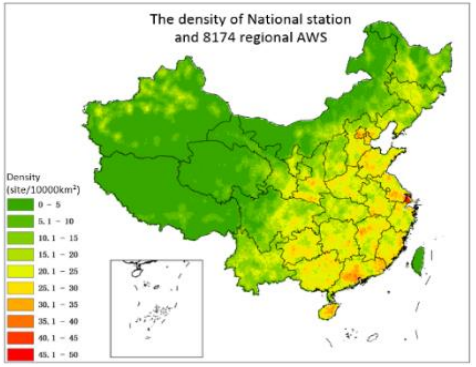
Comparisons of the layout before and after the optimization

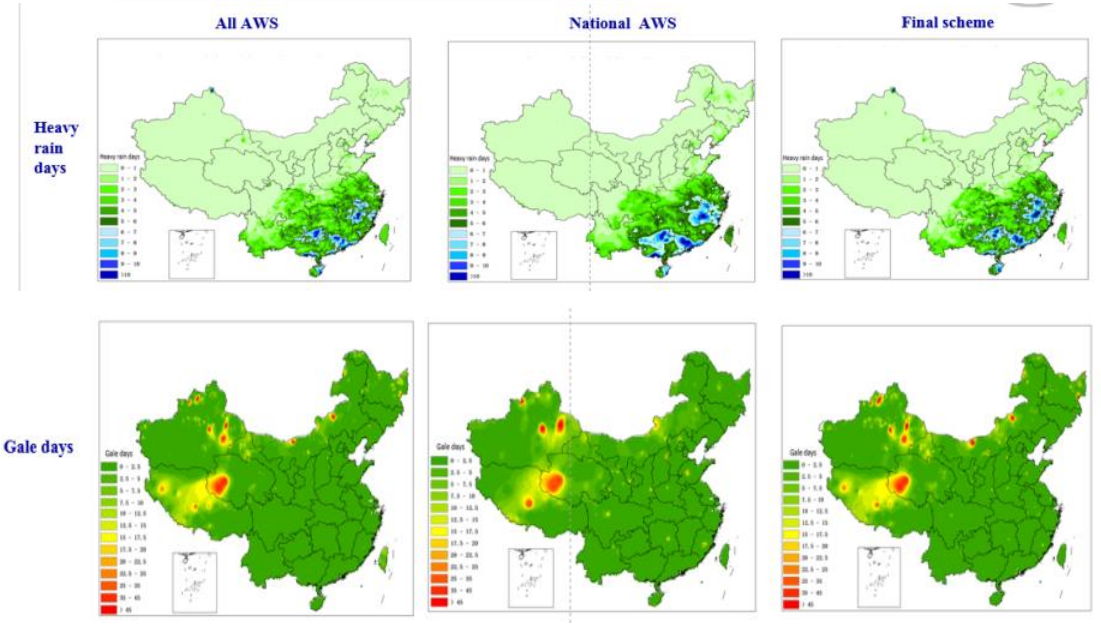


before

after







II. Next work planning

(1) Human resource training plan

- Based on the RTC-Nanjing (Beijing), RWC-Beijing(MOC/CMA) will joint other units, development training course and open a training course every year for all member of RA II.
- MOC/CMA gathers a large number of top technical expert, and plays an important role in various WMO working groups.
- Postdoctoral visiting scholar.
- Organize expert on-site technical training for one week every time.

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Q3.6.3-1 Have you ever attended a training course on OSCAR/Surface?

Presenter's comments

(2) provide technical support and service

- Based on the RIC-Beijing, RWC-Beijing(MOC/CMA) can help all member of RA II. to find the cost-effective instrument or observing system.
- To build RWC website and hot-line telephone.

  www.observation-cma.com

(3) to strengthen cooperation between members

- to strengthen bilateral cooperation;
- to joint implementation of the "One Belt And One Road" international development , to promote an action plan on redesign and improvement of the GBON.
  - AWS: unattended from station to information center
  - Sounding station: let us have a best try to make those silent station alive ! Together!

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Thank you
Merci
谢 谢
ありがとう

WMO OMM

World Meteorological Organization
Organisation météorologique mondiale