



# GSRN Lead Centre Introduction

**GUO Jianxia & Zhang Xuefen**  
Meteorological Observation Center, CMA  
[guo\\_jianxia@163.com](mailto:guo_jianxia@163.com)

*Bern, Switzerland      March 11, 2024*



# Outline

1. Background
2. Structure of GSRN LC
3. Responsibility and progress
4. Expect to learn from GRUAN



WMO OMM



# 1. Background

GCOS:

- 2015: GCOS proposed the idea of GSRN

The reference component of the tiered system for surface observations, similar to GRUAN for upper air

- 2020: INFCOM endorsed the decision of GSRN

Decisions:

- The implementation of GSRN and its task team (TT-GSRN)

- The establishment of a **lead centre**

Benefits to Members:

- GSRN aims at providing sustained surface reference observations for a subset of GCOS relevant ECVs

- Mar 2021: Call for offering to host a lead centre

INFCOM Decision: "It calls for the establishment of a **lead centre** sufficiently resourced and empowered to manage the rollout of such a global network and an oversight group, comprising a broad range of scientific and technical experts that will provide guidance on the development of the GSRN and ensure integration with relevant activities."

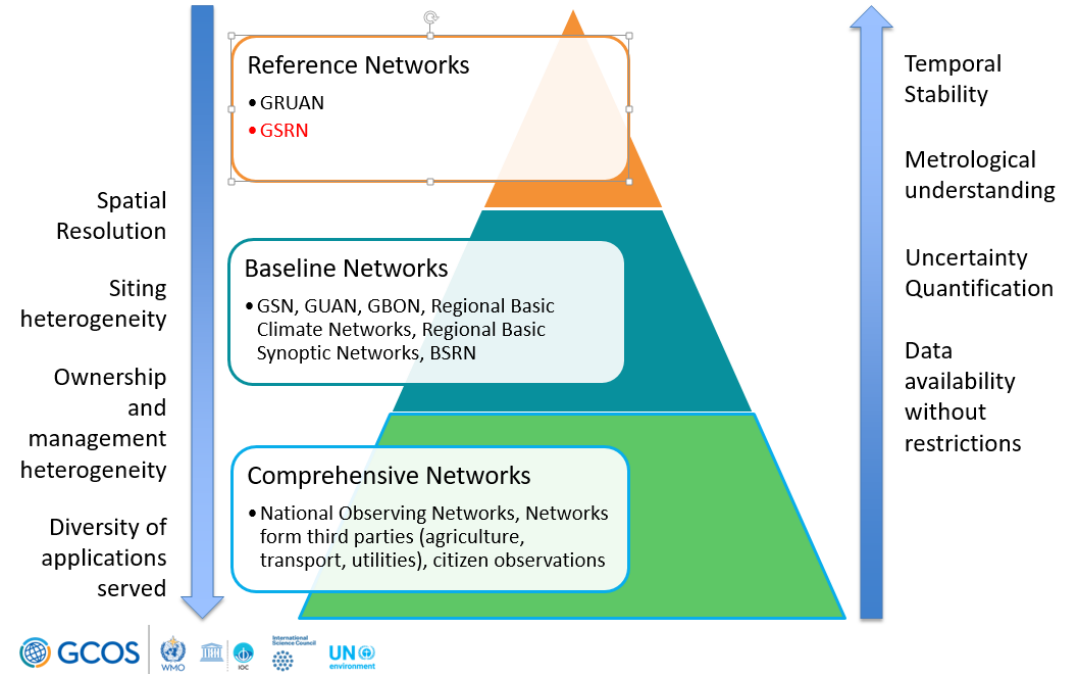


Diagram Courtesy of Caterina

# The Establishment of LC

## I. Found of LC

- **November 2021:** China Meteorological Administration was offered the role of GSRN Lead Centre.

## II. Preparation Phase

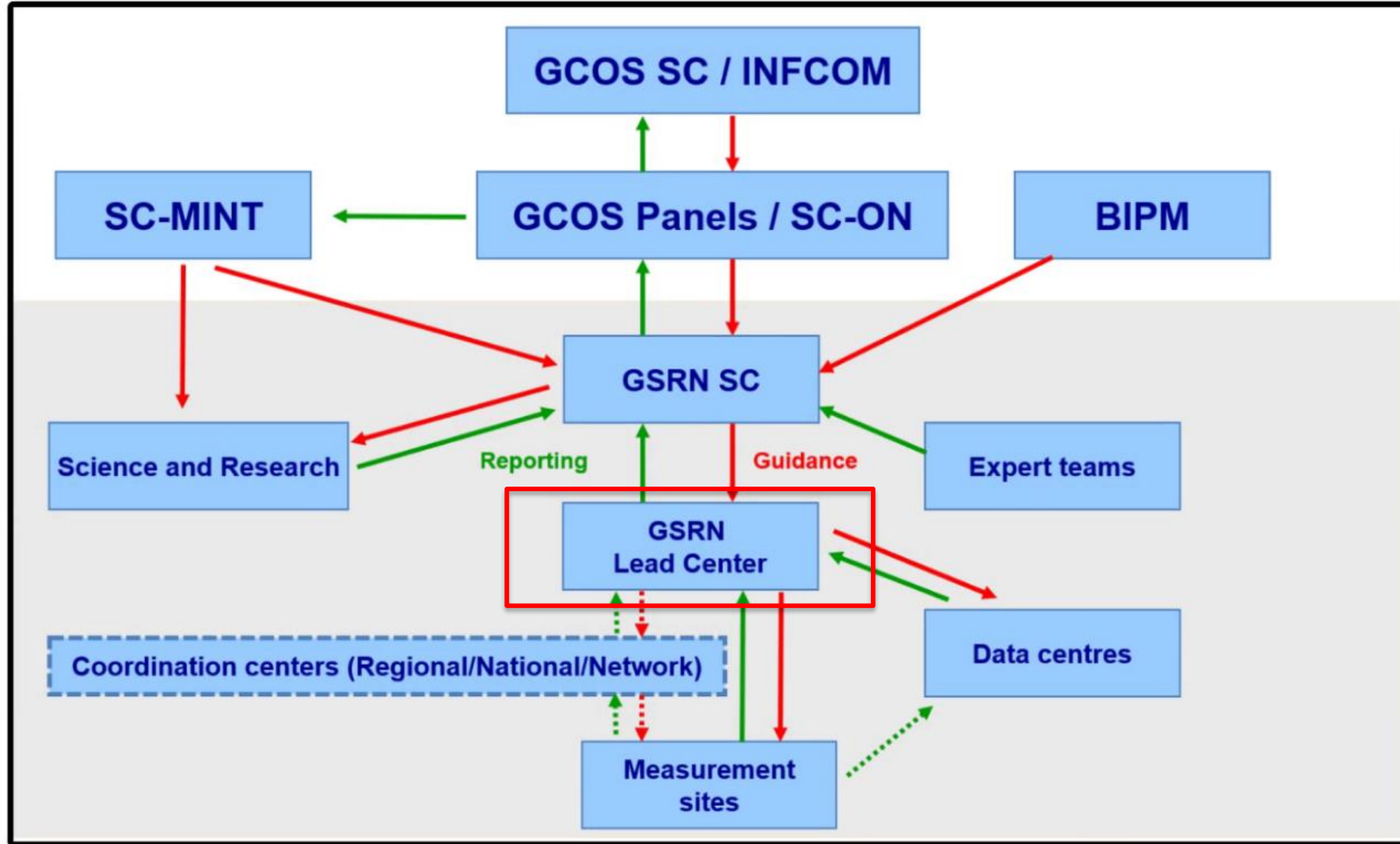
- **May 2022:** The Kick off meeting was successfully held.

## III. Implementation Phase

- **The end of 2022:** The work plan finalized.
- **2023:** Logo Design, Portal, System and the Product

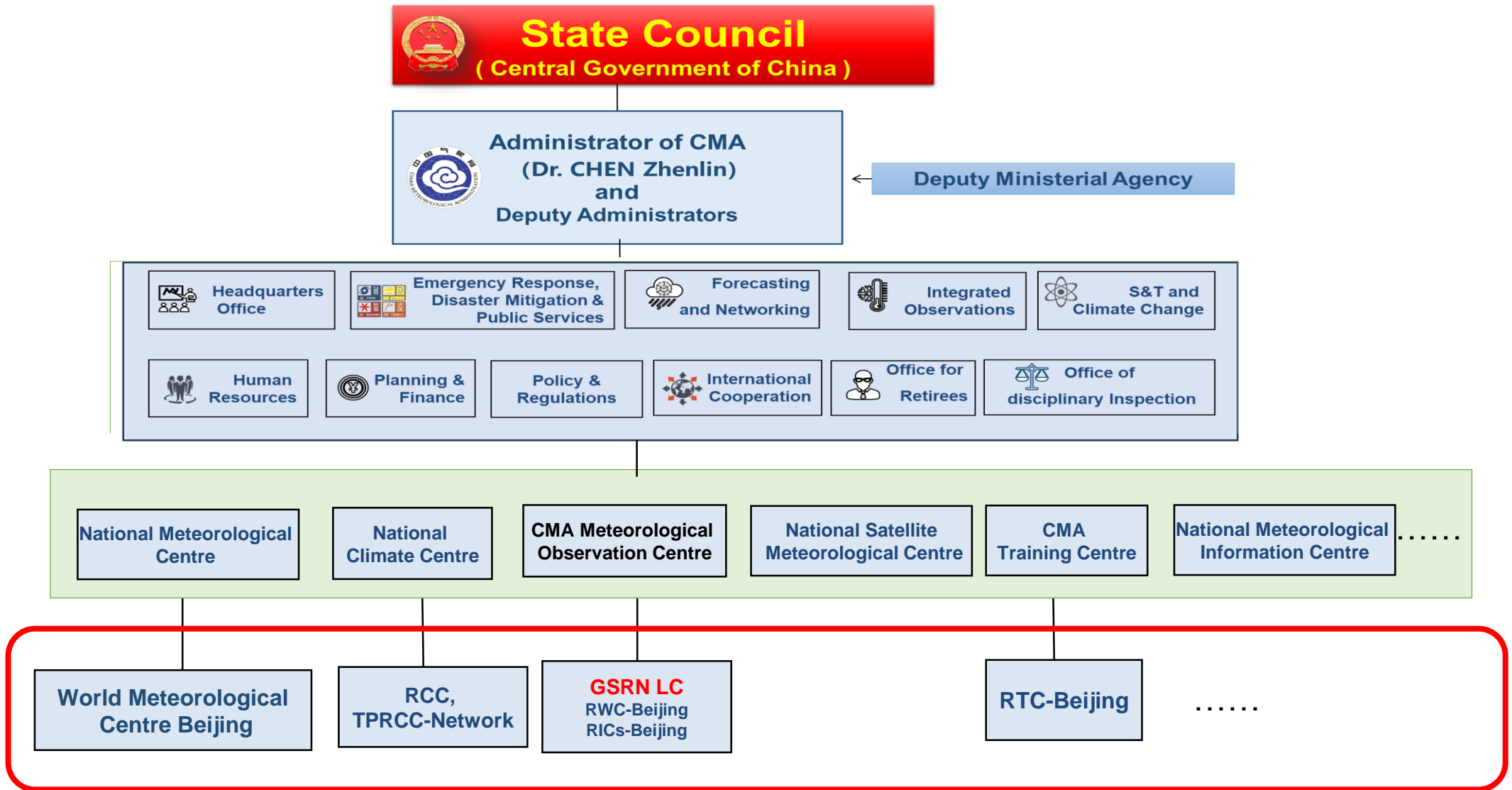


# 2. GSRN LC in the structure of GSRN





# The GSRN Lead Center in CMA



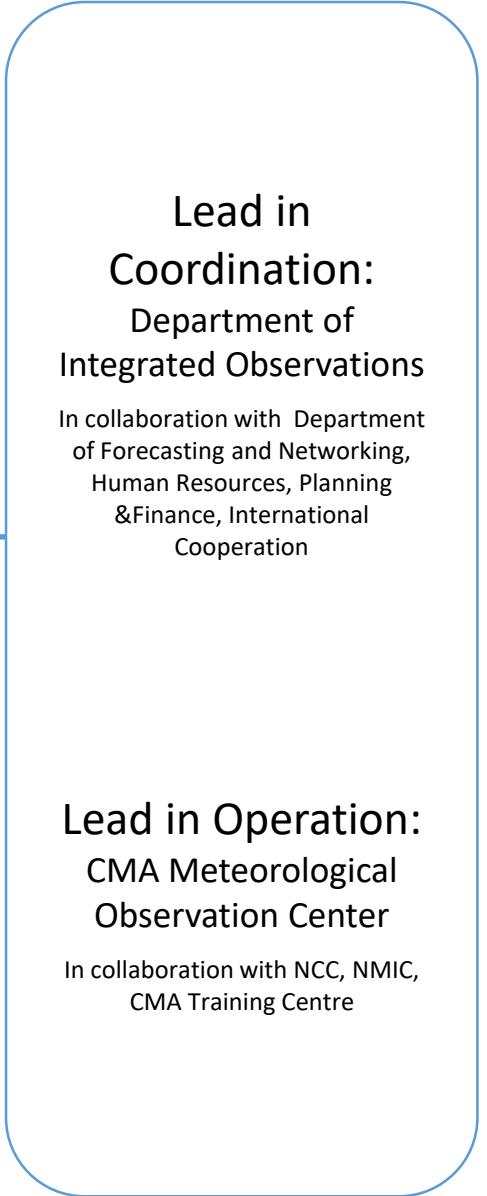
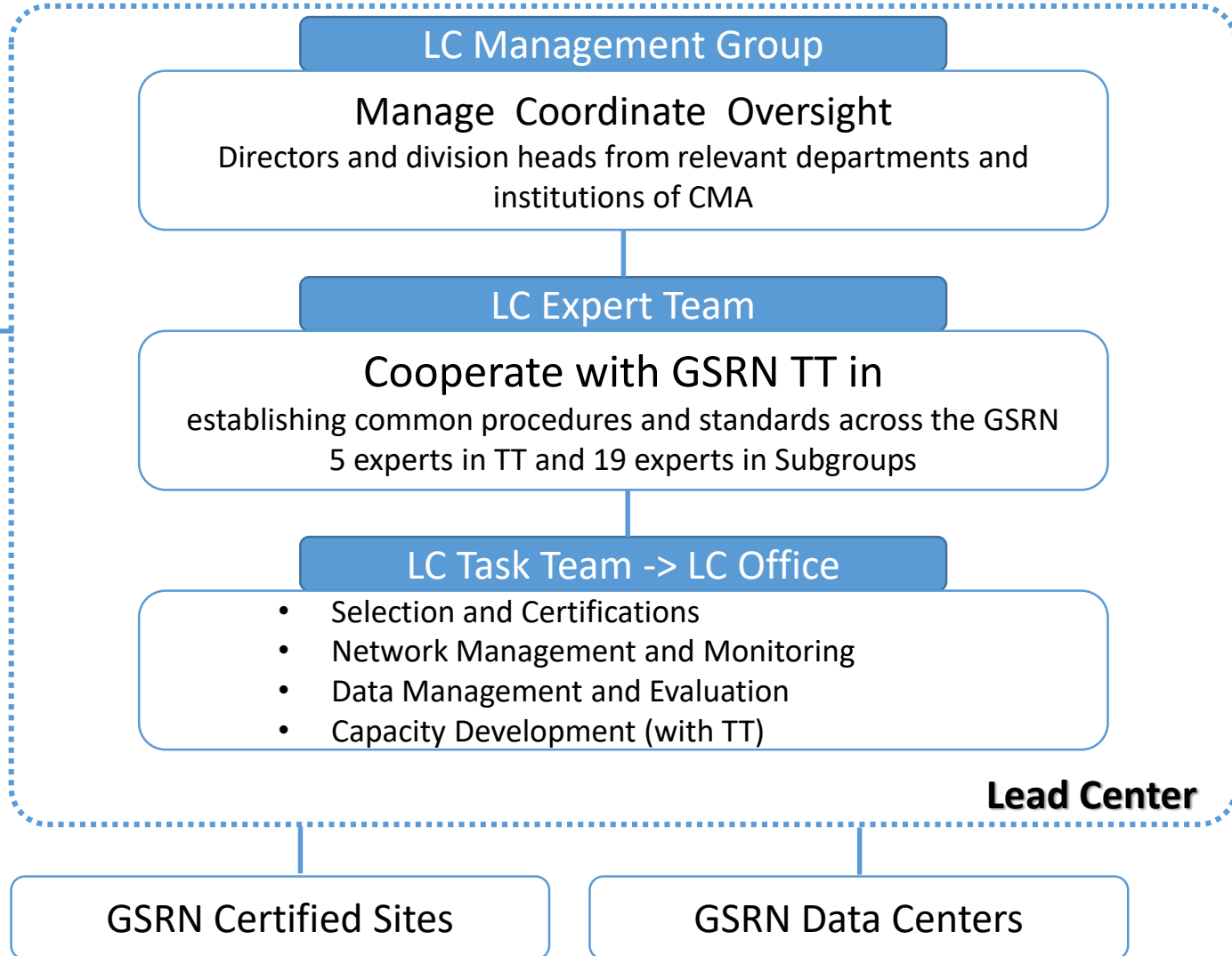
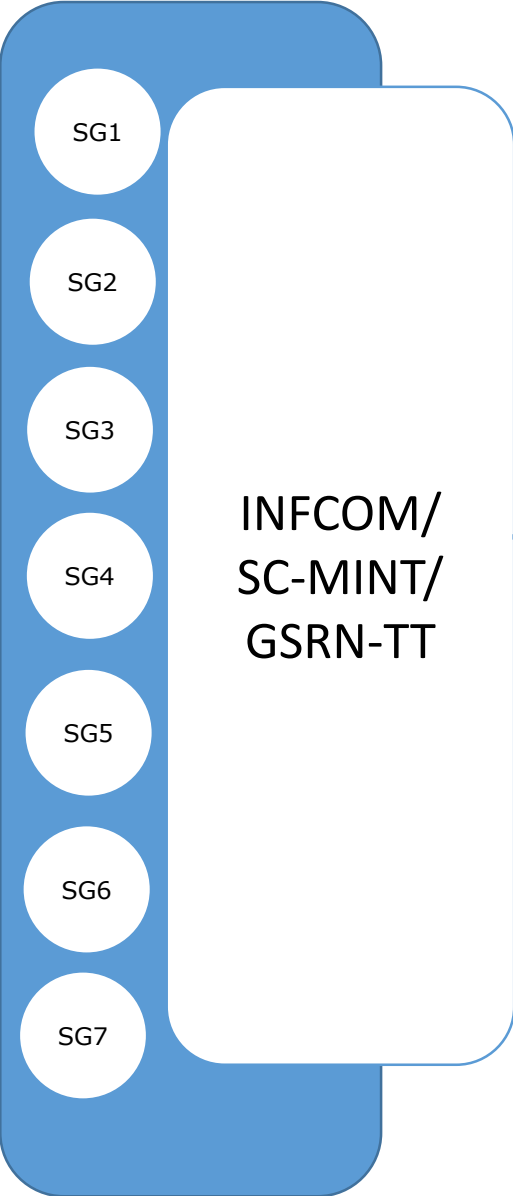


WMO



CMA

# Structure of LC



# Contributors of the LC in CMA

|    | Name                   |
|----|------------------------|
| 1  | Dr. WANG Jiankai       |
| 2  | Ms. ZHANG Nan          |
| 3  | Dr. LI Xiang           |
| 4  | Dr. GUO Jianxia        |
| 5  | Mr. ZHANG Ming         |
| 6  | Ms. GUO Wei            |
| 7  | Dr. QIN Shiguang       |
| 8  | Dr. ZHAO Xu            |
| 9  | Dr. REN yuyu(Ms.)      |
| 10 | Dr. WANG Pengling      |
| 11 | Ms. SHI Lijuan         |
| 12 | Ms. KANG Jiaqi         |
| 13 | Ms. WANG Jia           |
| 14 | Dr. LIU Yiming         |
| 15 | Dr. Dongdong Chen(Ms.) |
| 16 | Dr. CUI Xiai (Ms.)     |
| 17 | Ms. CAO Lijuan         |
| 18 | Ms. WANG Ying          |
| 19 | Mr. HU Xing            |







# 3. Responsibility and progress ToR of LC

## 1. Internal reporting, responsibilities, and guidance

- Report to the GSRN Steering Committee
- Oversight of the GSRN operations
- Regularly evaluate the operational status
- Provide administrative and technical support

## 2. Coordination of the network in collaboration with Members, GSRN-SC and GCOS Secretariat

- Coordinate national contributions to the network
- Establish common procedures and standards across the GSRN
- Coordinate with the data user community

## 3. Data management

- Establish systems to monitor station performance and perform QA/QC, including feedback to stations having potential problems

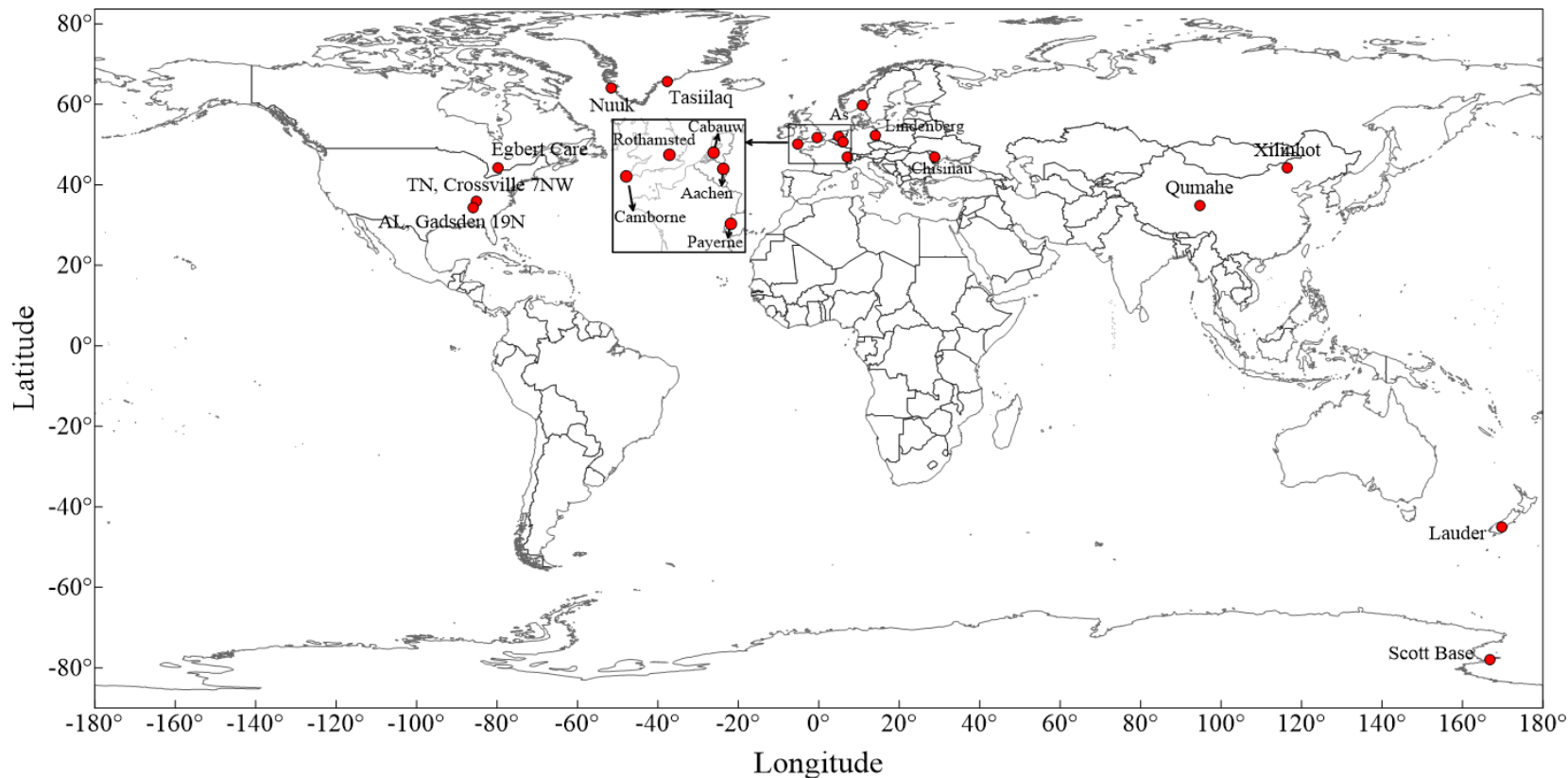
## 4. Training, education, development and research

# Timetable of Main activities

|                 |   |
|-----------------|---|
| May 2022        | Official Kick-off of GSRN Lead Centre   |
| Q2-Q3 2022      | Establish the Lead Centre Structure   |
| Before INFCOM-2 | Establish common procedures and standards across the GSRN (with TT)   |
| Post INFCOM-2   | Selection and certification of the GSRN pilot stations (with TT)  |
| February 2024   | Kick-off meeting with station contacts on the 5th of February (with TT)   |
| 2024            | Capacity Development: develop operational system, data exchange, software development, technical training, scientific experiment..... |
| Long-Term       | Ensure sustained reference quality observations, with full traceability and fully quantified uncertainty                              |



# GSRN (Pilot) – Map and List of Country



| GSRN Ref No. | Station Name       | Country             |
|--------------|--------------------|---------------------|
| 01           | Egbert CARE        | CANADA              |
| 02           | TN, Crossville 7NW | USA                 |
| 03           | AL, Gadsden 19N    | USA                 |
| 04           | Cabauw             | THE NETHERLANDS     |
| 05           | Chisinau           | Republic of Moldova |
| 06           | As                 | NORWAY              |
| 07           | Aachen             | Germany             |
| 08           | Lindenberg         | Germany             |
| 09           | Camborne           | UK                  |
| 10           | Rothamsted         | UK                  |
| 11           | Qumahe             | China               |
| 12           | Xilinhot           | China               |
| 13           | Payerne            | Switzerland         |
| 14           | Scott Base         | New Zealand         |
| 15           | Lauder             | New Zealand         |
| 16           | Nuuk               | Denmark             |
| 17           | Tasiilag           | Denmark             |





# GSRN(PILOT) Kick-off meeting with station contacts

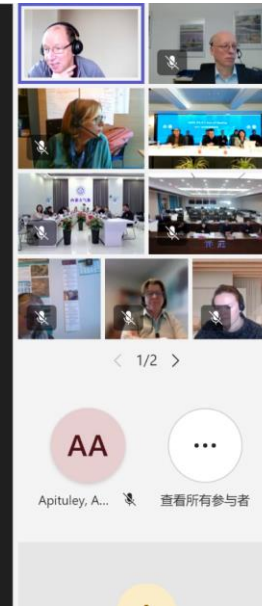


**GSRN(PILOT) Kick-off meeting with station contacts**  
5th February 2024 (On-line)

GLOBAL CLIMATE OBSERVING SYSTEM  
KEEPING WATCH OVER OUR CLIMATE

WMO IOC UN environment

Supported by the European Union  
Copernicus Europe's eyes on Earth



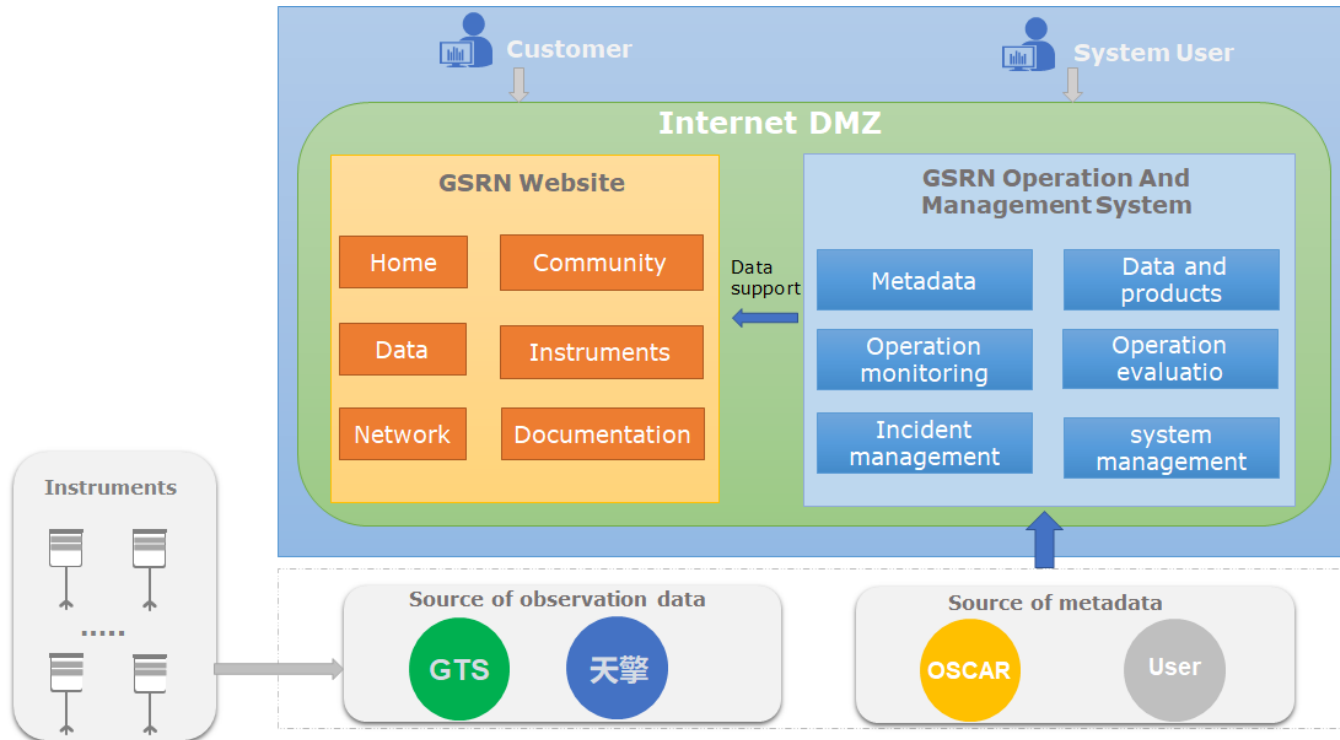




# Work in progress

1. Design the **operating system** framework and develop the main functions;
2. Design and develop the **metadata database**, and invite Xilin Hot site to test and check the functions;
3. Observation **data experimental transmission** with New Zealand;
4. Prepare the technical methods and processing flow of **observation data quality control**;
5. Develop **observation products** and carry out **uncertain research experiments**;
6. Prepare a **technical exchange meeting** and **training course** with the pilot stations.

# Design and develop the GSRN operational management system



## ◆ Primary Design on GSRN Operational Management System- **6 modules**.

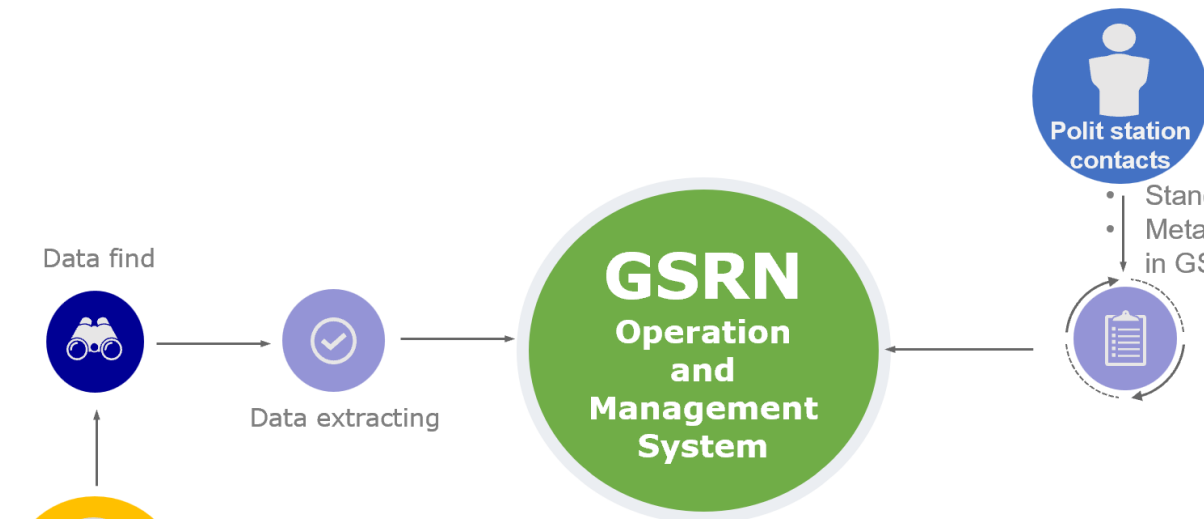
- Metadata Management
- Operational Monitoring
- Incident Management
- Data and Products
- Operational Evaluation
- System Management

## ◆ **Data source** includes GTS , WIS2.0 and OSCAR, Portal...

## ◆ **Browser/Server** via Internet



# Station level metadata acquisition, update and management



**GSRN Operation and Management System**

System > Stations

Station Name: All Country: All WMO Region: Please select Search Reset

| Station Name       | WIGOS Station Identifier(s) | GSRN station ID | Station type | Station Class      | Country / territory | WMO Region        | Longitude | Latitude | Actions         |
|--------------------|-----------------------------|-----------------|--------------|--------------------|---------------------|-------------------|-----------|----------|-----------------|
| XILIN HOT          | 0-20000-0-54102             | 13              | Land (fixed) | Climatological ... | China               | II - Asia         | 116.1167E | 43.9500N | [edit] [delete] |
| Qumaha             | 0-20000-0-56015             | 12              | --           |                    | China               | --                | 94.7281E  | 34.9319N | [edit] [delete] |
| Egbert Care        | TBD                         | 01              | --           |                    | Canada              | IV - North Ame... | 79.78W    | 44.23N   | [edit] [delete] |
| TN Crossville 7NW  | N/A                         | 02              | --           |                    | United States (the) | IV - North Ame... | 85.1345W  | 36.0130N | [edit] [delete] |
| AL Gadsdien 19N    | 0-20000-0-00004             | 03              | --           |                    | United States (the) | IV - North Ame... | 85.9621W  | 34.2851N | [edit] [delete] |
| Cabauw             | 0-20008-0-CES               | 04              | Land (fixed) | Climatological ... | Netherlands         | VI - Europe       | 4.9270E   | 51.9710N | [edit] [delete] |
| Aachen-Orsbach     | 0-20000-0-10505             | 07              | Land (fixed) | Agricultural me... | Germany             | VI - Europe       | 6.02439E  | 50.7983N | [edit] [delete] |
| Lindenberg         | 0-20000-0-10393             | 08              | --           |                    | Germany             | VI - Europe       | 14.1180E  | 52.2085N | [edit] [delete] |
| AS                 | 0-20000-0-01463             | 06              | Land (fixed) |                    | Norway              | VI - Europe       | 10.7819E  | 59.6605N | [edit] [delete] |
| Payerne            | 0-20000-0-06610             | 14              | Land (fixed) | Climatological ... | Switzerland         | VI - Europe       | 6.9425E   | 46.8116N | [edit] [delete] |
| Lauder Observatory | 0-20000-0-93817             | 16              | Land (fixed) | GBCN Surface...    | New Zealand         | V - South-Wes...  | 169.6843E | 45.0385S | [edit] [delete] |
| Scott Base         | 0-554-0-89665               | 15              | Land (fixed) | Climatological ... | New Zealand         | Antarctica        | 166.7562E | 77.8485S | [edit] [delete] |

Total 17 20/page < 1 > Go to 1

**GSRN Operation and Management System**

System > Stations > MyStationsDetails

Station Metadata Measurement Metadata go back

Station characteristics

|                     |   |                             |                                     |
|---------------------|---|-----------------------------|-------------------------------------|
| Name                | XILIN HOT                               | Station Alias               |                                     |
| Station type        | landFixed                               | WIGOS Station Identifier(s) | 0-20000-0-54102                     |
| GSRN station ID     | 13                                      | WMO Region                  | II - Asia                           |
| Country / territory | China                                   | Time Zone                   |                                     |
| Station URL         |   | Supervising organization    | China Meteorological Administration |
| station class       | --                                      |                             |                                     |
| Geospatial Location | Latitude: 43.9500N Longitude: 116.1167E | Station elevation           | 1124                                |
| address             |   |                             |                                     |

station status Contact

# Operational status monitoring

**GSRN Operation Management System**

System > Operation monitoring

Reverse data reports: please choose please choose Search

Click Here

CHN-Xilin Hot

Longitude: 43.9588  
Latitude: 116.1697  
Status: Available  
Time: 2023-09-19 11:00

| Country | Should reach | Actual arrival |
|---------|--------------|----------------|
| CHN     | 2            | 1              |
| CAN     | 1            | 0              |
| USA-1   | 2            | 0              |
| NLD     | 1            | 0              |
| DNK     | 1            | 0              |
| DEU     | 2            | 0              |
| NOR     | 1            | 0              |
| CHE     | 1            | 0              |
| Other   | 5            | 0              |

Tab number: 17

Legend: Available (green), Missing test (yellow), Dubious error (red), Not reached (grey)

Count: Available: 1, Missing test: 0, Dubious error: 0, Not reached: 14



Click the station

**GSRN Operation Management System**

System > sequence diagram

Station Name: whole Country: Please select Date: 2023-09-19 Time: 03

Status:  Whole  Available  Missing test  Dubious error  Not reached

Search Reset

| Station Name      | WIGOS Station Identifier(s) | Time | 0 - 9 min | 10 - 19 min | 20 - 29 min | 30 - 39 min | 40 - 49 min | 50 - 59 min |
|-------------------|-----------------------------|------|-----------|-------------|-------------|-------------|-------------|-------------|
| Xilin Hot         | 0-20000-0-54102             | 3    | Green     | Green       | Green       | Green       | Green       | Green       |
| Qumaha            | 0-20000-0-56015             | 3    | Blue      | Blue        | Blue        | Blue        | Blue        |             |
| Egbert Care       | TBD                         | 3    | Grey      | Grey        | Grey        | Grey        | Grey        |             |
| TN Crossville 7NW | 0-20000-0-00003             | 3    | Grey      | Grey        | Grey        | Grey        | Grey        |             |
| AL Gadsden 19N    | 0-20000-0-00004             | 3    | Grey      | Grey        | Grey        | Grey        | Grey        |             |
| Cabauw            | 0-20000-0-06348             | 3    | Grey      | Grey        | Grey        | Grey        | Grey        |             |
| Tranebjerg        | 0-208-0-06132               | 3    | Grey      | Grey        | Grey        | Grey        | Grey        |             |
| Aachen-Orsbach    | 0-20000-0-10505             | 3    | Grey      | Grey        | Grey        | Grey        | Grey        |             |
| Lindenberg        | 0-20000-0-10393             | 3    | Grey      | Grey        | Grey        | Grey        | Grey        |             |
| AS                | 0-20000-0-01463             | 3    | Grey      | Grey        | Grey        | Grey        | Grey        |             |

Total 16 10/page < 1 2 > Go to 1

Hosting and support of GSRN website is sponsored by Deutscher Wetterdienst. GSRN Lead Centre DWD 2023. Contact | Sitemap

**GSRN Operation Management System**

System > Operation monitoring > Status monitoring details

Observation data

| Team     | sta_name       | Min_Hot              | sta_identifier              | 0-20000-0-54102     | sta_size                    | Air (ft)        |      |
|----------|----------------|----------------------|-----------------------------|---------------------|-----------------------------|-----------------|------|
| 118.1887 | All            | 43.9588              | station_time                | 2023-09-19 03:20:59 | Day                         | 19              |      |
| 9        | Year           | 2023                 | Hour                        | 3                   | Min                         | 20              |      |
| 71889    | ID             | PRE                  | 0                           | WIL_S_Sensor_Leigh  | 10.5                        | RegionCode      |      |
| 307      | WIL_D_Avg_2m   | NetCode              | TEM_Min_OTime               | 301                 | V02175                      | 1               |      |
| 312      | WIL_D_S_Max    | PRS                  | WIL_S_INST                  | 1.6                 | WIL_S_Avg_2m                | 1               |      |
| 1803.5   | AB             | WIL_S_INST_Max_OTime | RHU_Min                     | 48                  | WIL_D_INST_Max              | 329             |      |
| 316      | TEM_Min_OTime  | WIL_S_Out_Max        | No observations and no data | WIL_S_INST          | 291                         | TEM_Min         | 16.4 |
| 2206     | COUNTRYCODE    | TEM_Min_Sensor_Leigh | 1.5                         | WIL_S_Avg_10m       | 291                         | WIL_S_Avg_10m   | 1.6  |
| 15.2     | TEM_Min        | RHU                  | 49                          | WIL_S_Max           | 2.1                         | WIL_D_Avg_10m   | 344  |
| 3.9      | WIL_S_Inst_Max | WIL_S_Avg_10m        | 1.9                         | WIL_D_Out_Max       | No observations and no data | WIL_S_Max_OTime | 306  |
| 307      | RHU_Min_OTime  | Station_ID           | 54102                       | TEM                 | 15.2                        |                 |      |

TEM

Legend: Maintenance (green), Fault (orange), Calibration (red), Replacement (blue), Other (grey)

Graph showing TEM status over time from 2023-09-18 03:20 to 2023-09-19 03:20.

Hosting and support of GSRN website is sponsored by Deutscher Wetterdienst. GSRN Lead Centre DWD 2023. Contact | Sitemap



# Data process, transmission routing and protocol

## Trans. routing & protocol

### Real-time Observation Data

#### Mandatory variable (MV)



Precipitation



Temperature

#### Associated quantities of influence (AQI) for MV



Relative humidity



Wind



Global & Reflected solar radiation

.....

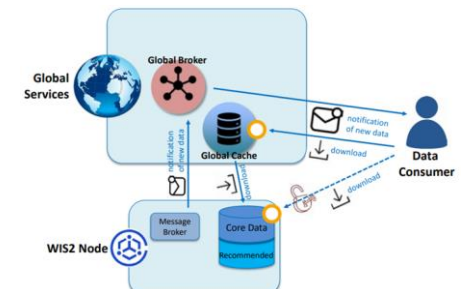
- Realtime raw data supporting BUFR format in WIS2.
- History raw data supporting CSV / BUFR

GTS  
(FTP)



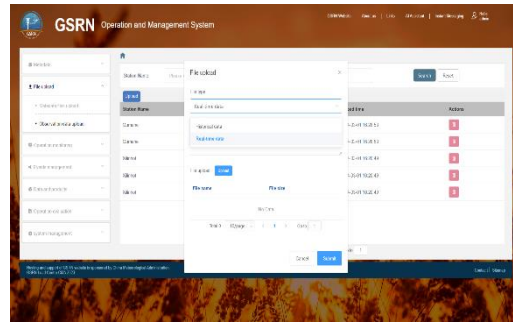
GTS

WIS2.0  
(http(s))



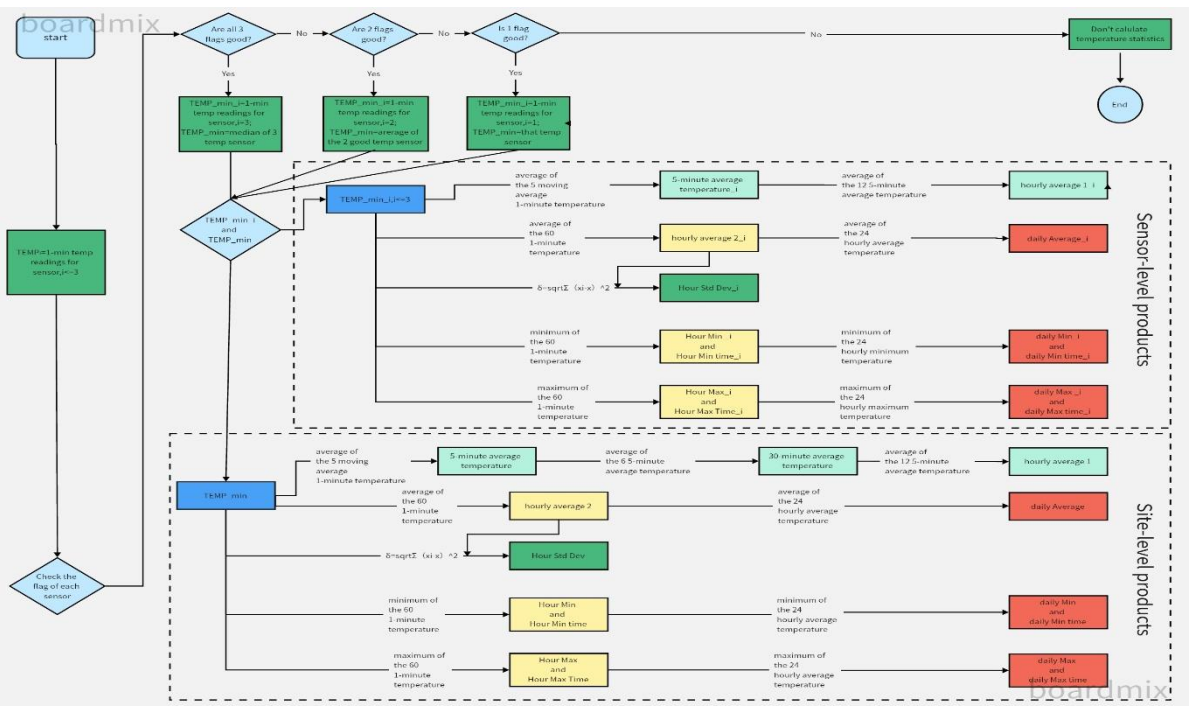
Brief data flow of WIS2.0

GSRN  
portal  
(http(s))

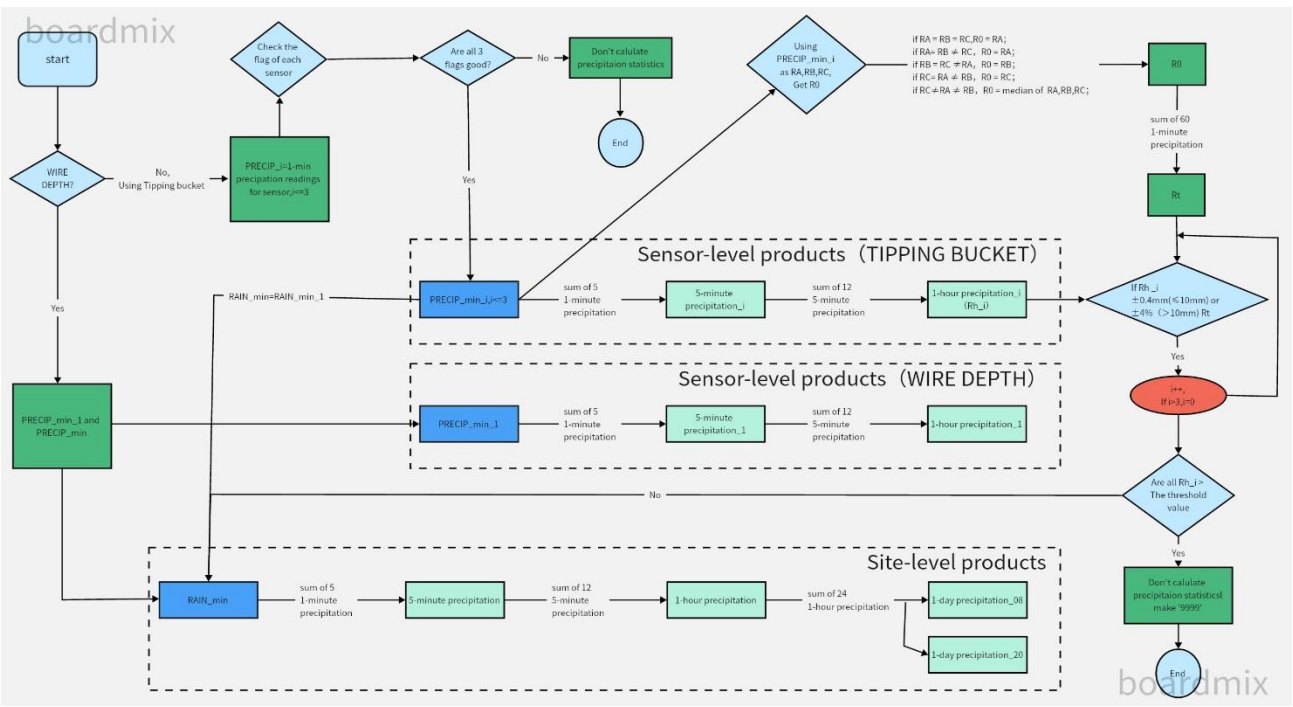


GSRN-LC

# Data products processing flow for air temperature and precipitation



Data products processing flow for minutely air temperature



Data products processing flow for minutely precipitation



# Display and analysis of data products

**GSRN Operation and Management System**

System > Temperature

Mark Site Location: All | please choose | Search

**XILIN HOT-CHN**

|                       |                     |
|-----------------------|---------------------|
| TEM:                  | -16.6°C             |
| Hour max temperature: | -14.7°C             |
| Hour min temperature: | -16.6°C             |
| 1min wind speed:      | 2m/s                |
| Longitude:            | 116.1167            |
| Latitude:             | 43.9500             |
| Time:                 | 2024-02-02 09:50:00 |

2024-02-02 | 1min

Hosting and support of GSRN website is sponsored by China Meteorological Administration. GSRN Lead Centre, CMA, 2023.

**GSRN**

锡林浩特 (54102) - Factor analysis

Time: 2023-09-04 05 - 2023-09-05 05 | Master station: 锡林浩特[54102]

Associated station: Please select

Element: TEM\_Max, RHU

Search

**Factor analysis**

Legend: TEM\_Max (red line), RHU (grey line)

| Time        | TEM_Max (°C) | RHU (%) |
|-------------|--------------|---------|
| 05:00 09-04 | 25           | 35      |
| 06:00 09-04 | 25           | 30      |
| 12:00 09-04 | 20           | 50      |
| 18:00 09-04 | 18           | 80      |
| 00:00 09-05 | 15           | 65      |
| 05:00 09-05 | 25           | 35      |

## 4. Expect to Learn from the GRUAN Lead Center

- GRUAN LC advanced management, operation mechanism;
- GRUAN advanced data processing, transmission technic;
- GRUAN advanced quality management experience;
- GRUAN advanced technical of data quality control, product development, uncertainty calculation etc.



Many thanks to Ruud, share the experience of GRUAN LC with us on March 23,2023, Give us a lot of inspiration



## Expect deeper cooperation with GRUAN LC in the future

- More frequent and in-depth technical exchanges and communication are expected with the implementation of GRUAN and GSRN in Lindenberg and Xilin hot. Field exchanges.
- Looking forward to the opportunity to conduct joint experiments and research.



**THANK YOU**

