Progress on GCOS-China
CMA IOS Development Plan
(2016-2020)

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1. Progress on GCOS-China

① Organized GCOS-China

- GCOS-China is the national-level coordinating body, it was established in 1997 for China’s participation in GCOS in order to develop national strategy, long-term plan, and implementation plan.

- 13 national departments

![Diagram of GCOS-China Council with its various components]

**GCOS-China Council**

- **Members of GCOS-China**
  - **Chairman:** the Administrator of CMA
  - **Vice-Chairmans:**
    - Ministry of Environmental Protection
    - State of Oceanic Administration
    - Chinese Academy of Sciences
  - **Members.**

- **Office of GCOS-China**
  - **Focal points from different agencies**

- **Expert groups of GCOS-China**
  - Group for Top-level design
  - Group for Atmosphere
  - Group for Ocean
  - Group for Land
  - Secretariat for experts
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② Established **CCOS Operations Framework**

- **Data Sharing Platform**
  (Data standardization, storage, sharing and service)

- **Data Processing**
  (Historic data, Long-term data series, Metadata, Raw data, Grid data, Real-time data)

- **Space-, surface-, Air-Observations**

  - Ocean
  - Atmosphere
  - Land
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③ Developed Plans

2002, issued "China Climate Observing System Program".

2007, The CCOS IP was issued jointly by seven departments to strengthen the cross-sector cooperation and facilitate the construction of CCOS.

2010, initiated the revision of the CCOS IP

2013, The CCOS IP (from 2013) was delivered and "The Priority Action Plan" were approved at the 7th session of GCOS-China.

2014, “National Plan on Climate Change (2014-2020)” was issued

2016, CMA IOS Development Plan (2016-2020) was delivered
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④ The CCOS IP includes:

• 162 actions
  – Top level / Cross-field Actions(19)
  – Field-specific Actions(143)
    • Atmosphere（48）
    • Ocean（45）
    • Land（50）
  – Focus on 6 areas
    • Identify applicable ECVs to the nation
    • Improve accuracy of variables and satellite remote sensing abilities
    • Optimize the observation network
    • Enhance Data collection, QC, and assimilation and sharing tech.
    • Unify Observation standards and specifications
    • Provide products verification and services
1. Progress on GCOS - China

⑤ Keep monitoring actions progress

- Unified observation standards and specifications
- Identified 16 key climate observation areas
- Optimized surface-based CCOS network
- Executed scientific experiments and research
- Improved satellite data assimilation & application
- Established CCOS data center
- Data processing and rescue (4 WMO & 700 CMA long-term stations.)
- Cooperation, data exchange and training
- Sustained investment (money & human resource)

Qinghai-Tibet Experiments

The 1st experiment, 1979
- Earth radiation and thermal equilibrium.
- Structure of atmospheric structure in plateau region.

JICA, 2004-2009
- Construction of integrated observation of plateau region.
- Water cycle and atmospheric structure, thermal equilibrium of near-surface layer.

The 2nd experiment, 1998
- Reaction between earth and atmosphere, structure of boundary layer.
- Characteristics of Water vapor transport in Qinghai-Tibet plateau.

The 3rd experiment, phase 2: 2018-2021
- Physical process between earth and atmosphere.
- Global and regional numerical model.

The 3rd experiment, phase 1: 2014-2017
- Integrated observation of boundary layer and troposphere
- Data ingesting and regional numerical model
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⑥ CMA met-ecosystem observation network redesign is ongoing

- Water, carbon and nitrogen flux observation
- Cryosphere and environmental changes
- Hydrological and water resource changes in major river basin
- Atmospheric composition on climate change
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Summary: CMA multi-sensors have embraced specific types of measurements or different geographical regions which can apply to most of the CMA application areas from ground up.

- Satellite
- Aircraft
- Balloon
- Radiosonde
- Radar
- Atmos. Baseline Station
- Climate Observatory
- Reference Climate Station
- Meteorological Station
- Test bed
2. Challenges

- Ecology is deteriorating globally which results disasters
- Diverse types of meteorological events cause disasters
- Large population with uneven distribution & Complex topography require redesign of obs. network
2. Challenges

− Obs. capability still needs to be improved ab initio, e.g. vertical structure of planetary boundary layer, soil moisture, Sat obs. Is still challenging.

− Data processing technology still needs to be enhanced

− Networks still can not be operated as “one” network adaptively & collaboratively
3. CMA IOS development Plan

Scope
- Typhoon
- Drought
- Flood
- Dust storm
- Fog and haze
- Snow
- ...

Vision

Technology
- Fire
- Vegetation
- Wetland
- Atmos. composition
- Severe convection weather
- ...

CMA IOS Architecture

It should support the applications of national, regional and global needs
3. CMA IOS development Plan

- CMA IOS Architecture should be:

1. with sensor tasking, instead of a passive data-push system.

2. metadata structure and resource management based on policy

3. links to analysis algorithms.
   - real-time products
   - data assimilation
   - storage, query & decision-support

4. different modes of operation such as routine base operations, targeted modes, and event-driven modes.
3. CMA IOS development Plan

Taking into account of China weather, climate, water features, limited resource and time frame:

① Optimize and redesign networks into “one”
② Envision future S & T to develop intelligent instruments and make them work adaptively & collaboratively
③ Emphasize on remote sensing, improve integrated applications
④ Reconstruct operations procedures by following ISO and WMO quality management framework
⑤ Well systems maintained
⑥ Continuously invest and R & D
3. CMA IOS development Plan

① Optimize and redesign networks into “one”

- **Integration**: space, methods, procedures & objects

  - **Space**: the space-based, air-borne and surface-based observations
  - **Object**: the physical, chemical and ecological processes. Besides T, P, W, H, the greenhouse gases, aerosols, air quality etc.
  - **Methods**: instruments & methods; standards of observations
  - **Procedures**: data collection, transmission, assimilation, application & management
3. CMA IOS development Plan

① Optimize and redesign networks into “one”

- WMO RRR, mutual-study among obs., forecast and services
  - Requirements Vs Capabilities for circulations

- Surface
- Belt
- Weather
- Radiosonde
- Meteorological
- Megacity experiment for PBL, chemical weather
- Qinghai-Tibet plateau experiment for Cryosphere
- Crowd-sourcing is also started

Legend
- Reference Climate Station 212
- Basic Meteorological Station 633
- Meteorological Station 1577
- Unmanned AWSs 8174
3. CMA IOS development Plan

② Envision future S & T to develop intelligent instrument and make them work collaboratively

Towards A Better IOS Network

ISO & WMO Quality Management Framework

Scope of Impact

Cross Alliance Partners

Within a IOS Activities

Among IOS Functions

Within a IOS Activities

Step 1: Integrate functions of the existing obs. sensors

Step 2: Improve Adaptation & collaboration among IOSs

Step 3: Network Optimization & Re-design

Relationships along the improvement of IOS Networks

Optimization Integration Collaboration Synchronization
3. CMA IOS development Plan

② Envision future S & T to develop intelligent instrument and make them work collaboratively
3. CMA IOS development Plan

③ Emphasize on remote sensing, improve integrated applications

– Issued *Guide to Satellite Remote Sensing Integrated Application System*

– Establish province-level remote sensing application centers, 9 are being constructed.

– Improve competence on application and service among different agencies, e.g. Weather radar v. 3.0 application system is now in operation.

• Project: 3D gridded field system based on multi-source data with quick updating capability

• Target sensing towards meteorological and geological disasters, e.g. dust, fire, drought, landslides and ice shelf break in the south pole.
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④ Reconstruct operations procedures by following ISO and WMO quality management framework


- Establish a standardized administration system
- Optimize operational procedures
- Enhance the ability of PDAC
- Quality Management
- Improve the competence of the management team

ISO Certification
3. CMA IOS development Plan

⑤ Well systems maintained

- 2-levels management
- 4-levels operations and maintenance
- Some by society companies through PPP
- Employees training

⑥ Continuously invest and R & D, projects as below

- Weather radar
- Flood prevention
- Met. Informatization
- Met. Satellites
- Met. marine
- Met. Innovation
THANK YOU!