Brief introduction to

National Satellite Meteorological Center, CMA

Jinsong Wang
Deputy Director-General
NSMC/CMA

The highest leadership is the DM chaired by the director general, and supported by S&T Advisory Committee. Important matter (e.g. strategy for future development, personnel, budget) is discussed and decided by the DM.

NSMC is made up of several organizational components which operate the satellites, provide data and information services, and conduct applied research.
Chinese Meteorological Satellite: FengYun Series

Polar Series
- First Generation
  - FY-1A Sept. 7, 1988
  - FY-1B Sept. 3, 1990
  - FY-1C May 10, 1999
  - FY-1D May 15, 2002
  - FY-3A May 27, 2008
- Second Generation
  - FY-2A June 10, 1997
  - FY-2B June 25, 2000
  - FY-2C Oct. 18, 2004
  - FY-2D Dec. 8, 2006
  - FY-2E Dec. 23, 2008

Geostationary Series
- First Generation
  - FY-1A Sept. 7, 1988
  - FY-1B Sept. 3, 1990
  - FY-1C May 10, 1999
  - FY-1D May 15, 2002
  - FY-3A May 27, 2008
- Second Generation
  - FY-2A June 10, 1997
  - FY-2B June 25, 2000
  - FY-2C Oct. 18, 2004
  - FY-2D Dec. 8, 2006
  - FY-2E Dec. 23, 2008
FengYun Polar Satellites: FY-1

<table>
<thead>
<tr>
<th>No.</th>
<th>Status</th>
<th>Launch</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY-1A</td>
<td>Exp. (dead)</td>
<td>Sept.7, 1988</td>
<td>6 months</td>
</tr>
<tr>
<td>FY-1B</td>
<td>Exp. (dead)</td>
<td>Sept.3, 1990</td>
<td>8 months</td>
</tr>
<tr>
<td>FY-1C</td>
<td>Op. (dead)</td>
<td>May 10, 1999</td>
<td>&gt;7 years</td>
</tr>
<tr>
<td>FY-1D</td>
<td>Op. (working)</td>
<td>May 15, 2002</td>
<td>&gt;7 years</td>
</tr>
</tbody>
</table>

Instruments:
- 10 chl. Visible and Infrared radiometer.
- Space Environment Monitor

Transmission:
- HRPT: 1.3308Mbps (DB)
- GDPT: 1.3308Mbps
2nd Polar Generation : FY-3

11 instruments
✓ Atmospheric sounding
✓ Microwave Imaging
✓ Ozone sounding
✓ Radiation budget for Earth system
☐ Spatial Resolution from Km to 250m
☐ Global data acquisition latency : 1.5 hours
FY-3 constellation

- FY-3 AM
- FY-3 PM
- FY-3 RM: Rainfall Measurement Satellite on-board Precipitation Radar

Core instrument: Ku/Ka Radar
Microwave Sounders: MWTS, MWHS, MWRI
## FY-3 Launch schedule

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FY-3B/PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY-3C/AM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY-3D/PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY-3E/AM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY-3F/RM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY-3G/PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY-3H/RM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY-3I/AM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FengYun GEO. Satellites: FY-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Pos.</th>
<th>Status</th>
<th>Launch</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY-2D</td>
<td>86.5E</td>
<td>Op. (working)</td>
<td>Dec.8, 2006</td>
</tr>
</tbody>
</table>

Platform: Spin stabilization
Payload: 5 chl. VISSR
Full Disc: every 30 min. at most

- FY-2E & FY-2D are working together to implement 15 min. interval obs.
- FY-2E takes over FC-2C in DEC., 2009
60 min interval  30 min interval  15 min interval
Next GEO Generation: FY-4

4 main instruments

- Interferometric Infrared Sounder
- Multiple Channel Scanning Imager
- Lightning Mapper
- Solar X-EUV imaging telescope (not available on 1st satellite)

Prototype structure of FY-4A

<table>
<thead>
<tr>
<th>Satellite</th>
<th>Working Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY-2F</td>
<td>2011-2013</td>
</tr>
<tr>
<td>FY-2G</td>
<td>2013-2017</td>
</tr>
<tr>
<td>FY-2H</td>
<td>2017-2019</td>
</tr>
<tr>
<td>FY-4A</td>
<td>2011-2019</td>
</tr>
<tr>
<td>FY-4B</td>
<td>2015-2022</td>
</tr>
</tbody>
</table>

24th CEOS Plenary, Rio de Janeiro
# FENGYUN GEO.

## Launch Schedule

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FY-2F</td>
<td></td>
<td></td>
<td></td>
<td>FY-2G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FY-2H</td>
<td></td>
<td></td>
<td></td>
<td>FY-4A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FY-4B</td>
<td></td>
<td></td>
<td></td>
<td>FY-4C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**24th CEOS Plenary, Rio de Janerio**
Road Map of FENGYUN Sats Development by Year 2020

| Mission | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| FY1     | A  | B  | C  | D  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FY2     |    |    | A  | B  | C  | D  | E  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FY3     | A  | B  | C  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| FY4     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

24th CEOS Plenary, Rio de Janeiro
Applications

Weather

Climate

Resource

Disaster

Environment
Natural disasters monitoring

Tropical Cyclone in Atlantic Ocean

Forest fire in Los. Angles

Dust Storm in Australia

Heavy Snow in China
Typhoon 3-D Structure
Products of Essential Climate Variables (ECVs) - defined by GCOS

- Global Cloud Detection
- Global Snow Cover
- Global Aerosol Distribution (monthly average)
- Sea Surface Temperature (5-day average)

Global Geophysical Parameters derived from FY-3A satellite data
Cloud Products

Cloud Amount

High Cloud Amount

Cloud Classification

Cloud Phase
Earth radiation budget:
The global energy balance is important for the Earth’s climate.

ERB and SIM onboard FY-3A were designed to collect information about sunlight reaching the Earth, sunlight reflected by the Earth and heat released by the Earth into space.
Global ozone total amount on July 18, 2008 from TOU/FY-3A

Evolution of ozone hole in antarctic from Aug.03,2008 to Jan. 19, 2009
The ice shelf with 34120 km square near the northeast of Greenland melted and broken within 1 month. Influenced by the warm dilution of the Northern North Atlantic Ocean.

July 16, 2008 to Aug. 17, 2008
Data Sharing

- Long-term historic satellite data since 1984, over 600TB
DVB-S & CMACast

- More than 500 Middle Scale Data Utilization Stations
- More than 3000 user terminals
- More than 300 DVB-S users
Long term satellite climate dataset has being developed in NSMC, which are based on more than 20 years’ satellite data, for examples:

- Precipitation Water Vapor (PMV)
- Outgoing Long wave Radiation (OLR)
- Cloud Mask (CLM)
- Land Surface Temperature (LST)
- Normalized Derived Vegetation Index (NDVI)
- Sea Surface Temperature (SST)
- Snow Cover (SNC)
- ……
Example: Satellite Climate Dataset

An Example: Snow Cover over China (1997-2008)
Data Calibration/Validation
CMA & CEOS

- CMA’s DunHuang Cal/Val site is one of the CEOS LandNet Reference Sites
- CMA recently participated the experiments in Tuz Gölü Lake organized by WGCV/IVOS
Summary

- CMA recognizes
  - the human being is facing more and more severe challenging such as environment deterioration, and climate change, and deeper understandings of the Earth system are urgently needed for correct decisions;
  - the spaceborne observations by satellites are one of our most important measures to comprehend the earth;
  - dedicated in developing continuous operational meteorological satellite series and improving the application capabilities.
CMA appreciates CEOS’ more and more important role in coordinating global earth observations, and its plenteous achievements in satellite data acquisition and distribution, calibration and validation, as well as outreach and education.

NSMC is willing to take part in CEOS activities as a member, to fulfill the obligations by the CEOS terms of reference, and together with other CEOS members to promote the earth observation from space for the benefit of the whole world.
Thank you!