Preliminary advances in Climate Risk Management in China
Meteorological Administration

Gao Ge

Guayaquil, Ecuador, Oct. 2011
Contents

• China Framework of Climate Service
• Experience in Climate/disaster risk management
• Climate information service
  – Program of adapting to climate change in China
• Plan for the future
Background

Major meteorological disasters in China

Along with development, the requirement for Climate services become more and more
Preliminary China Framework of Climate Service by CMA

- Government
- Public
- Sensitive sectors

- Communication Sharing Feedback Training
- Discussion and warning, Products

- C
- R
- M

- Climate abnormal Assessment
- Impact Assessment
- Climate zoning
- Climate verification before building

- D
- R
- M

- Disa. Risk Zoning
- Disa. Impact Assessment
- Risk Identification and pre-assessment
- Disa. Risk Transfer

- Basic database

- Prediction, Climate change Pre-assessment

- Monitor, diagnosis, detection

- Climate system model
In recent 5 years, through many pilot programs we accumulated experience and increased the knowledge to the Climate/Disaster Risk Management

- Disaster risk identification
- Disaster early warning
- Disaster Risk Assessment and Zoning
- Disaster Risk Transfer
- Climate demonstration before the Key projects construction
Disaster risk identification

- **China historical met. disaster database (1984-2009)**
  - Over 20 kinds meteorological disasters information covering many social and economic sectors on **county resolution** during 1984-2009 are collected by different meteorological services levels in China.

- **Meteorological disaster report system on real time in China**
  - Real time disaster database

- **The danger spots and the professional information of different sectors relating to the meteorological disaster are planning to investigate and collect in CMA.**

- Social and economic statistic information

- Geographic Information

**Problem:**

a. Disaster information is very coarse

b. Meteorological information doesn’t match the disaster because some spots have no meteorological observation
Early warning

- Various monitoring measures with high spatial and time resolution are used to find the disaster earlier.
  - Build auto-meteorological observation
  - Satellite
  - Radar
- Build public issued and broadcast rules of various meteorological disasters early warning and emergency draft at national and local levels.
## Warning grades of various meteorological disasters

<table>
<thead>
<tr>
<th>Grades</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typhoon</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Rainstorm</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Snow</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Cold spell</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Strong Wind in the sea</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Dust storm</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Low temperature</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Heat wave</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Drought</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Frost</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Freeze</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Fog</td>
<td></td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Haze</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>
Disaster Risk Assessment

Step1 cooperation with other sectors
- Disaster information
- Met. condition match to disaster
- Information of sectors
- Environment

Step2
- Causing factors & mechanism of met. disaster

Step3
- Threshold of Met. factor causing disaster for specific sector

Step4
- Numerical weather forecast and climate prediction model
- Downscale

Step5
- Current information and dangers sports

Step6
- Disaster Risk Assessment

Risk zoning

Trial
- Relationship;
Advantages of this Framework

• Disaster Risk Assessment
  – Clear target of service
    • the threshold are different for the specific sector and spots to the specific disaster, scientific and objective
  – Useful information for disaster prevention
  – Easy understand for user

• Traditional forecast and prediction
  – Focus on basic meteorological elements
  – The grades of the index don’t really reflect the disaster
  – User don’t know how to use the information and meaning
• Pilot program on risk assessment of Rain-storm and flood are carry out in 2011

Four provincial meteorological services are chosen to study the risk assessment for torrential flood on basin scale, urban waterlogging, drown assessment of flood respectively.

Aims to:
- Learn to know how to collect information and danger spots investigation, improve the database.
- How to determine the threshold of meteorological condition causing flood disaster
- Forecast technique related to the Threshold
- Draft to the flood risk assessment techniques
- Operational application
Threshold of causing disaster Criteria: the water level caused by accumulated basin area precipitation over the warning level, disaster would be happen.

A Index reflects water level of early day (mm)

Example for the Threshold analysis

Accumulated basin precipitation (mm) for a basin in Anhui Province (Anhui MA,2011)
Daily hazard risk forecast of Geological disaster

The threshold get through the cooperation with Ministry of Land and Resources of the People’s Public China, and issued the product to public by TV.
First-frost date prediction for agriculture for 2009

Anomalies Prediction (Days)

Observed anomalies (Days)

Cooperation with Ministry of Agriculture
To find a transfer and dispersion way of agricultural meteorological disaster which is suitable to China.

- Provide climate disaster risk service to company and government for reasonable design of insurance policies and system, insurance rate, losses verification and compensation.

### Risk coefficients of different rice insurance areas

<table>
<thead>
<tr>
<th>Grade of risk region</th>
<th>Regional coeff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 grade</td>
<td>1.6</td>
</tr>
<tr>
<td>2 grade</td>
<td>1.3</td>
</tr>
<tr>
<td>3 grade</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Integrated risk of per unit area yield of rice in Zhejiang Province
Commercialize meteorological index insurance

- Co-operation with insurance company, data analysis and threshold set has been carried out in pilots.

Example, insurance product of Tobacco meteorological index

Longest frost day during February and March
Climate demonstration before the Key projects construction

- Hydraulic engineering or Dam construction
- Railway and roadway
- Solar and wind energy plant
- Bridge construction
- Ecosystem protecting protection
- ....

- Form a series technique guide report for popularize and apply
- Form management rules by meteorological sector which must obey during the period of project plan for companies.
Climate information service

- Major climate change adaptation project
- China – UK – Swiss collaboration
- Collaborative project – bringing together Chinese and international expertise
- Climate change as cross-sectoral issue
- Reducing risk by building resilience
- Focus on adaptation options and planning
- Focus on vulnerable groups e.g. poor communities, women & children
- Knowledge-sharing with other countries
Climate projection in China

Brochure

Scenarios website
<table>
<thead>
<tr>
<th>Dataset</th>
<th>Variables</th>
<th>Spatial Resolution</th>
<th>Temporal Resolution</th>
<th>Emission Scenarios</th>
<th>Time Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gridded Observation dataset</td>
<td>Temperature, precipitation</td>
<td>0.5° × 0.5°</td>
<td>daily</td>
<td></td>
<td>1961-2007</td>
</tr>
<tr>
<td>GCMs</td>
<td>Temperature, precipitation</td>
<td>1° × 1°</td>
<td>monthly</td>
<td>A1B, A2, B1</td>
<td>1901-2100</td>
</tr>
<tr>
<td>ME</td>
<td>Temperature, precipitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REA</td>
<td>Temperature, precipitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FvGCM-RegCM</td>
<td>Temperature, precipitation</td>
<td>0.25° × 0.25°</td>
<td>daily</td>
<td>A2</td>
<td>1961-1990; 2071-2100</td>
</tr>
<tr>
<td>MIROC-RegCM</td>
<td>Temperature, precipitation, Relative humid, wind speed</td>
<td>0.25° × 0.25°</td>
<td>daily</td>
<td>A1B</td>
<td>1951-2100</td>
</tr>
<tr>
<td>RCMs</td>
<td>Temperature, precipitation</td>
<td>0.5° × 0.5°</td>
<td>daily</td>
<td>A2, B2</td>
<td>1961-1990; 2071-2100</td>
</tr>
<tr>
<td>HadAM3P-PRECIS</td>
<td>Temperature, precipitation</td>
<td>0.5° × 0.5°</td>
<td>daily</td>
<td>A1B</td>
<td>1961-2100</td>
</tr>
<tr>
<td>HadCM3Q0-PRECIS</td>
<td>Temperature, precipitation</td>
<td>0.5° × 0.5°</td>
<td>daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>……to be update</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Who are the Users? Why are they using?

- National Climate Center publish Climate Projection dataset for China Version 1.0 and Version 2.0 in October 2008 and November 2009.
- Dataset has been effectively applied in many organizations.

Relative usage of Climate Projection Dataset for China (Version 1.0 and Version 2.0)
## Preparation of the User Guidance

### Outline -- Questionnaire Feedback: 7/24  Reasonable/Unreasonable: 6/1

<table>
<thead>
<tr>
<th>Outline</th>
<th>Contents</th>
<th>Reasonable</th>
<th>Unreasonable</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>summary</td>
<td>Purposes of the &quot;China Climate Data&quot;, its project support, data overview, data providers, and composition purposes and contents of the user guidance</td>
<td>6</td>
<td>1</td>
<td>included target users in this part</td>
</tr>
<tr>
<td>1. Data Introduction</td>
<td>Observed grid climate data, GCM and RCM primary estimates, including data's temporal series, temporal resolution, spatial resolution, emission scenarios, climate variables, and data and information generation methods</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Production</td>
<td>Introduce products derived from the existing dataset. Products' spatial scale; products' temporal resolution; Products' format; how to get access to the products, etc.</td>
<td>6</td>
<td>1</td>
<td>included the method to obtain products and update, maintenance information</td>
</tr>
<tr>
<td>3. Uncertainty</td>
<td>Explain uncertainties caused by climate variability, GCM, emission scenarios, etc.</td>
<td>5</td>
<td>2</td>
<td>give more information about uncertainty</td>
</tr>
<tr>
<td>4. Evaluation and key result</td>
<td>Comparisons between observed grid data and CRU grid data, GCM and RCM data and observed results, etc.; China climate change trend derived from global model and regional models</td>
<td>7</td>
<td></td>
<td>add introduction about CRU dataset</td>
</tr>
<tr>
<td>5. Data Usage Notes</td>
<td>Data Authorization, data inapplicable fields, etc.</td>
<td>5</td>
<td>2</td>
<td>include how to select scenarios to be used in assessment here</td>
</tr>
<tr>
<td>6. Worked Example</td>
<td>Analysis of extreme events, water resources, agriculture, flood and drought based on the dataset itself</td>
<td>6</td>
<td>1</td>
<td>contact with data provider and some previous users</td>
</tr>
<tr>
<td>7. Case Study</td>
<td>Application in in fields of agriculture, water resources, ecosystems, animal husbandry, forestry, and human health</td>
<td>6</td>
<td>1</td>
<td>give information according case studies questionnaires</td>
</tr>
<tr>
<td>8. Glossary</td>
<td>Terminologies in the Guidance</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Case Studies

Previous Case Studies

- 农业（全国）
- Agriculture national scale
- 水资源（流域）
- Water resource (Catchment scale)
- 生态系统—植被
- Ecosystem –vegetation
- 生态系统—珍稀濒危物种的分布
- Ecosystem –Rare and endangered species
- 草地畜牧业
- Grassland husbandry
- 人体健康—血吸虫病分布与传播
- Human Health

ACCC
Adapting to Climate Change in China
中国适应气候变化项目
Plan for the future

• Improve the disaster database to meet the vulnerability and hazard research
• Build climate factors causing disaster and thresholds system
• Make zoning maps of major climate disaster in China
• Develop climate disaster risk assessment operation
• Make rules related to the climate risk management
• Cooperate with other departments
• Share experience and training for improve service capacity
Thanks!