International cooperation for advanced climate information and prediction services

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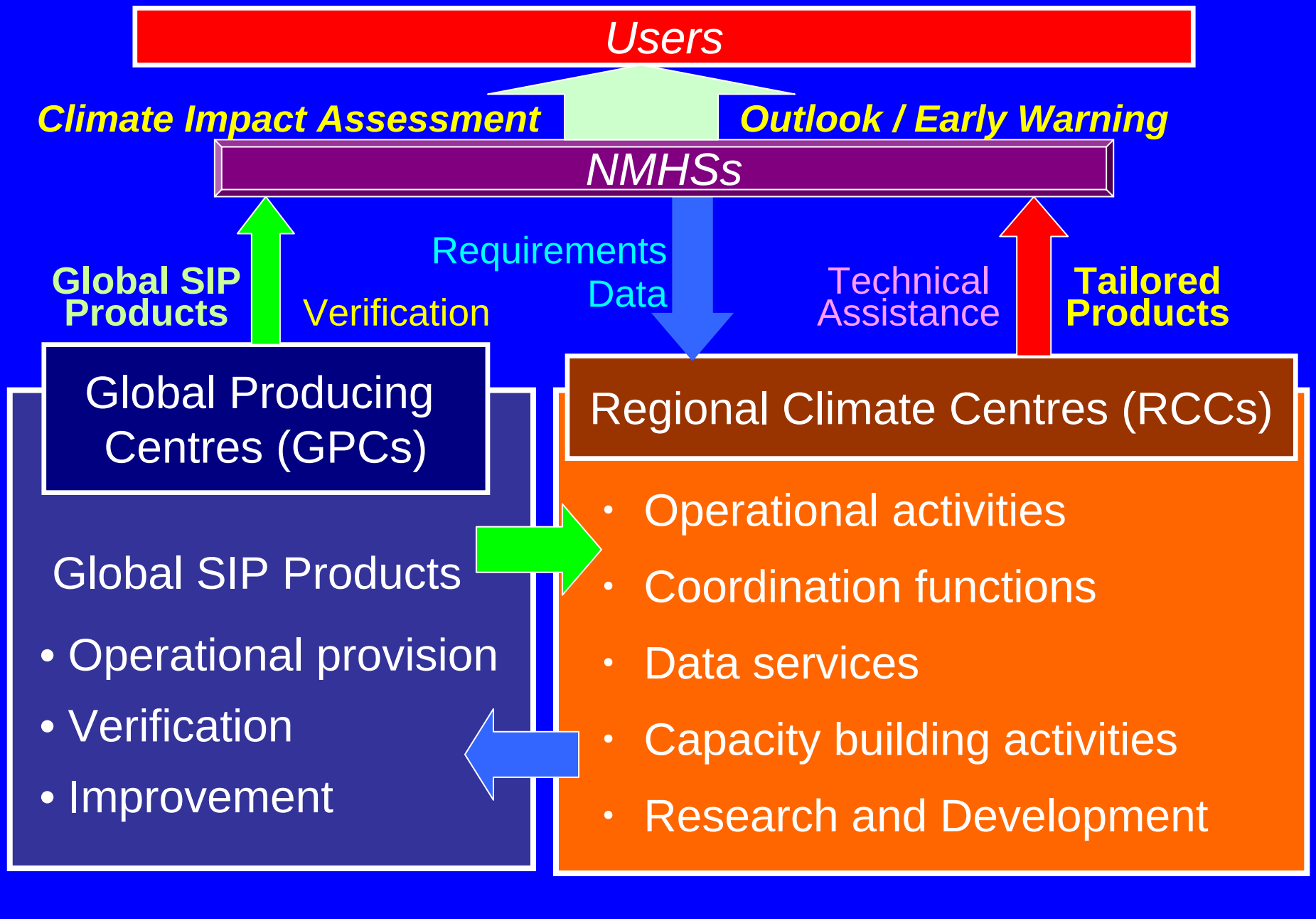
WMO Framework for Advanced Climate Service



What's Global Producing Center (GPC) ?

- **Operate Seasonal to Inter- annual prediction (SIP) system routinely and provide the products for NMHSs and RCCs on the website or disseminate them via GTS or Internet.**

- **Provide global analysis GPV**
- **Provide global prediction GPV including Sea Surface Temperatures**
- **Provide verification products including hindcasts**

Theme1. Development of multi-model ensemble techniques

Theme2. Operational use of 1-tiered ocean-atmosphere coupled model

Theme3. Evaluation of intra-seasonal variability for the application

What's the Regional Climate Center (RCC) ?

- The Regional Climate Center is responsible for providing necessary supports to the NHMSs in the region in order to strengthen their climate information and prediction services.

- Main functions of RCC

1. Operational function :
Provide climate information and prediction products operationally

2. Coordination function :
Support making consensus prediction & coordination with end-users

3. Database service function :
Maintain and provide climate database

4. Capacity-building function :
Train NHMS staff and end-users how to use seasonal outlooks

5. Research and development function :
Development of techniques for seasonal prediction and its application

Options for RCC structure

- Single, multi-functional RCC for the whole region
- Distributed System (distributed functions and/or areas of responsibility among several RCCs within the region)
- Multiple RCCs (multi-functional centers and single functional centers in the region)
- Virtual System (several nodes linked and identified as one RCC)

Some services may be provided by Universities or other scientific organizations outside WMO.

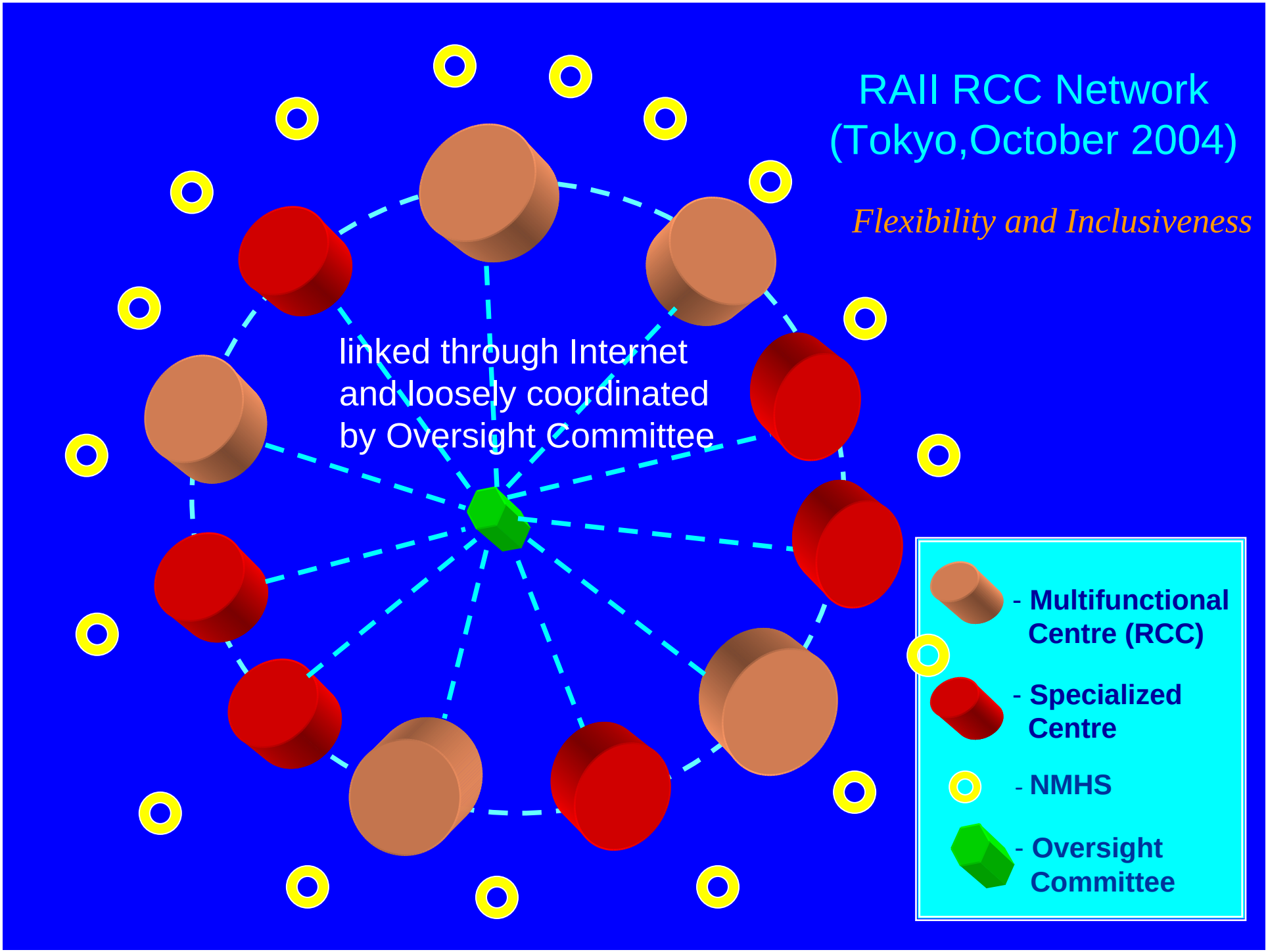
Noting that requirements will vary from region to region and even in the same region from sub-region to sub-region.

RCC-related activity in RA-II (Asia)

- In RA-II, it was decided to take steps to implement a *network of multiple multi-functional centres and/or specialized centres* as the structure Regional Climate Centre in RA-II
- Candidates of participating institutions in RCC network in RA-II
  - TCC/JMA (Tokyo Climate Center/ Japan Meteorological Agency)
  - BCC/CMA (Beijing Climate Center/ China Meteorological Administration)
  - KMA (Korea Meteorological Administration) or APCC (APEC Climate Centre) as a specialized centre for Multi-Model Ensemble technique
  - NCC/IMD (National Climate Centre/ India Meteorological Department) with EMRC (Environmental Monitoring and Research Centre), Climate Change Research and Analysis Group (CRAG)
  - NCC/IRIMO (National Center for Climatology/ Islamic Republic of Iran Meteorological Organization)
  - Center for Meteorology and Climatology, Viet Nam
  - Distribute RCC-Moscow = Hydrometeorological Research Centre of Russia; Main Geophysical Observatory; Institute for Global Climate and Ecology; All-Russian Research Institute of Hydrometeorological Information (World Data Centre)

RAII RCC Network (Tokyo,October 2004)

Flexibility and Inclusiveness



RCC-related activity in RA-V (Oceania)

- In RA-V, no discussions are reported about the implementation of Regional Climate Centre(s)
- However, there are some distinguished climate-related activities in RA-V, such as;
  - PI-CPP (Pacific Islands – Climate Prediction Project) supported by AusAID & BoM/Australia
  - Island Climate Update by NIWA (National Climate Centre of New Zealand)
  - Pacific ENSO Update by PEAC (Pacific ENSO Application Centre) supported by NOAA/CPO and Univ. Hawaii
  - Regional Climate Forecast by ASMC (ASEAN Specialized Meteorological Centre) at Singapore

A Goal of the Regional Climate Center (RCC)

Mitigation of hazards due to climatic variability

Climate Database

- Long-term accumulation of climate data
- Long-term accumulation of hazards due to climate variability

Climate Monitoring

- Real-time collection of observational data
- Detection of extreme climate by comparing with normals

Climate Analysis

- Analysis of relationship between global and regional anomalies
- Climate impact assessment by comparing with the past hazards

Climate Prediction

- Prediction of global anomalies by (Coupled) Global Climate Models
- Prediction of local anomalies by downscaling the global anomalies

Prediction of the impacts of extreme climate

= probability of exceeding the user-specific thresholds

When high probability is predicted

Issuance of **a Climate Watch** by the NHMS

Tokyo Climate Center (TCC)

Establishment : April 2002

Mission :

To assist Climate Services of NMHSs in the Asia-Pacific region

with the aim of mitigating climate-related disasters and contributing to the sustainable development in the region

TCC will serve as one of the multi-functional RCCs in the region

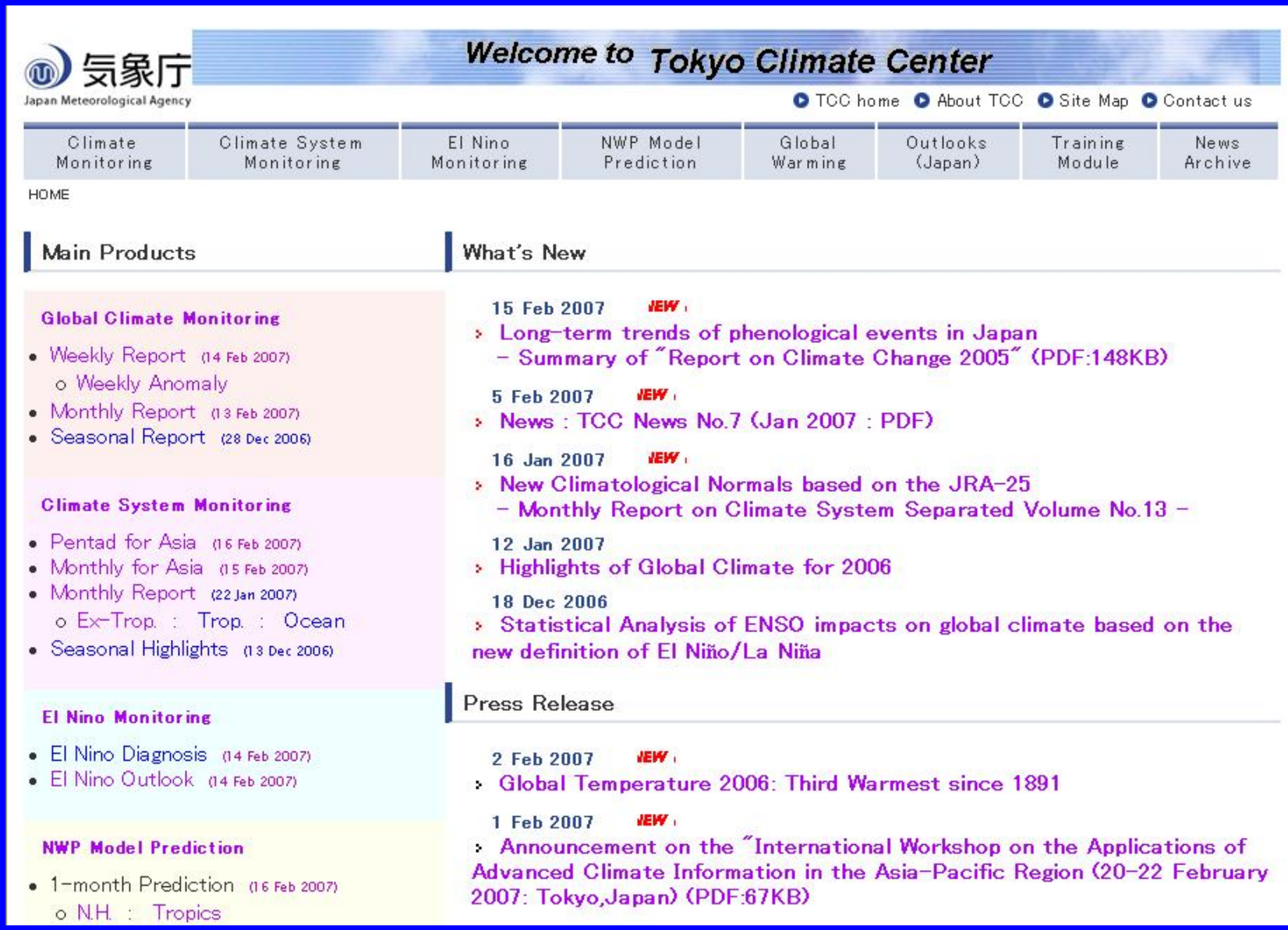
Data and Products available from TCC's Web Site

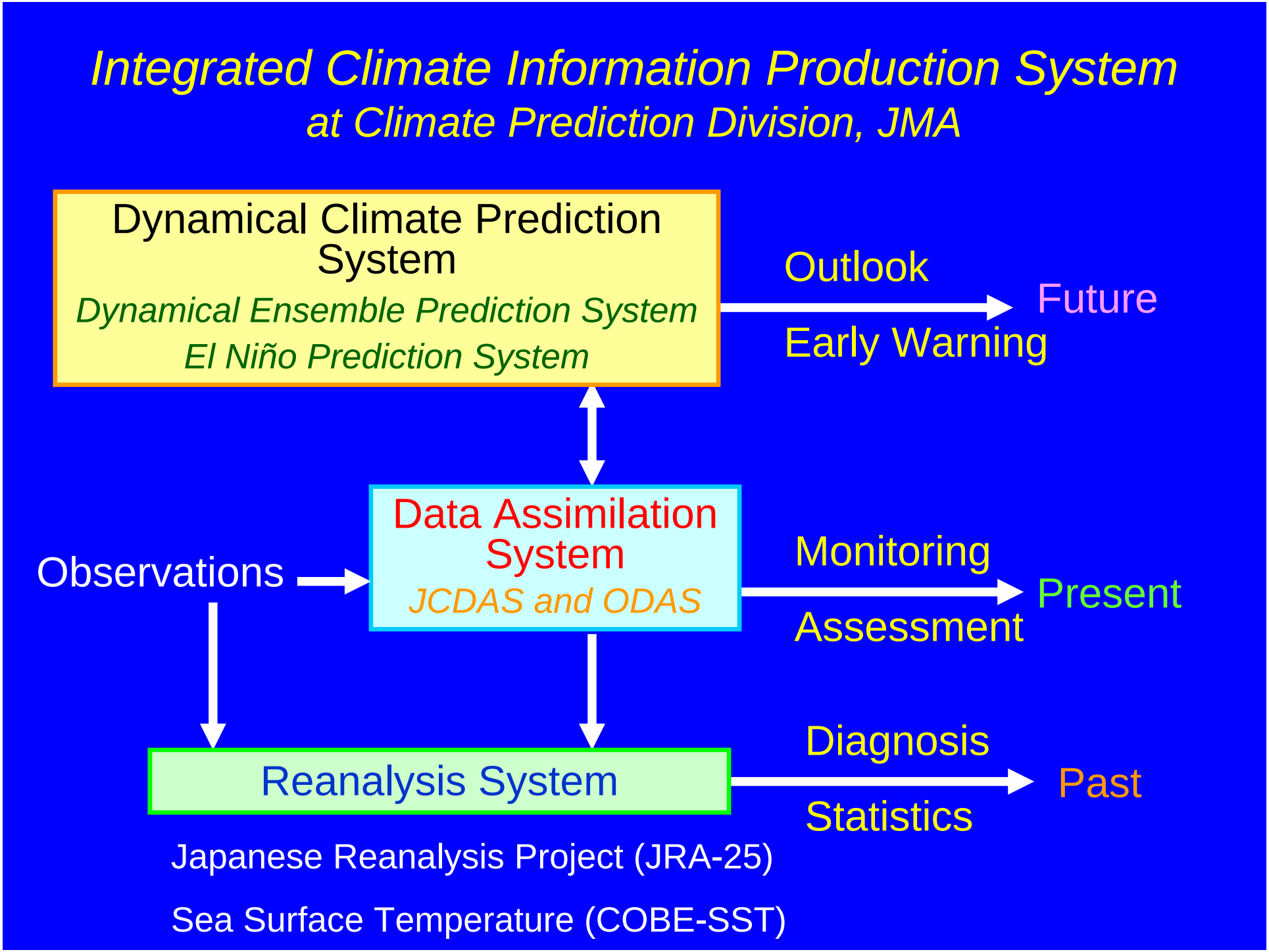
1. Global Climate and Extreme Climate Events
2. Monitoring Report on the Global Climate System
3. Current Diagnostic Report and Outlook for ENSO
4. One-month, Three-month and Summer/Winter season Ensemble Prediction Outputs
5. Global Warming Monitoring / Projection
6. Training Modules

Please visit "Tokyo Climate Center Website"

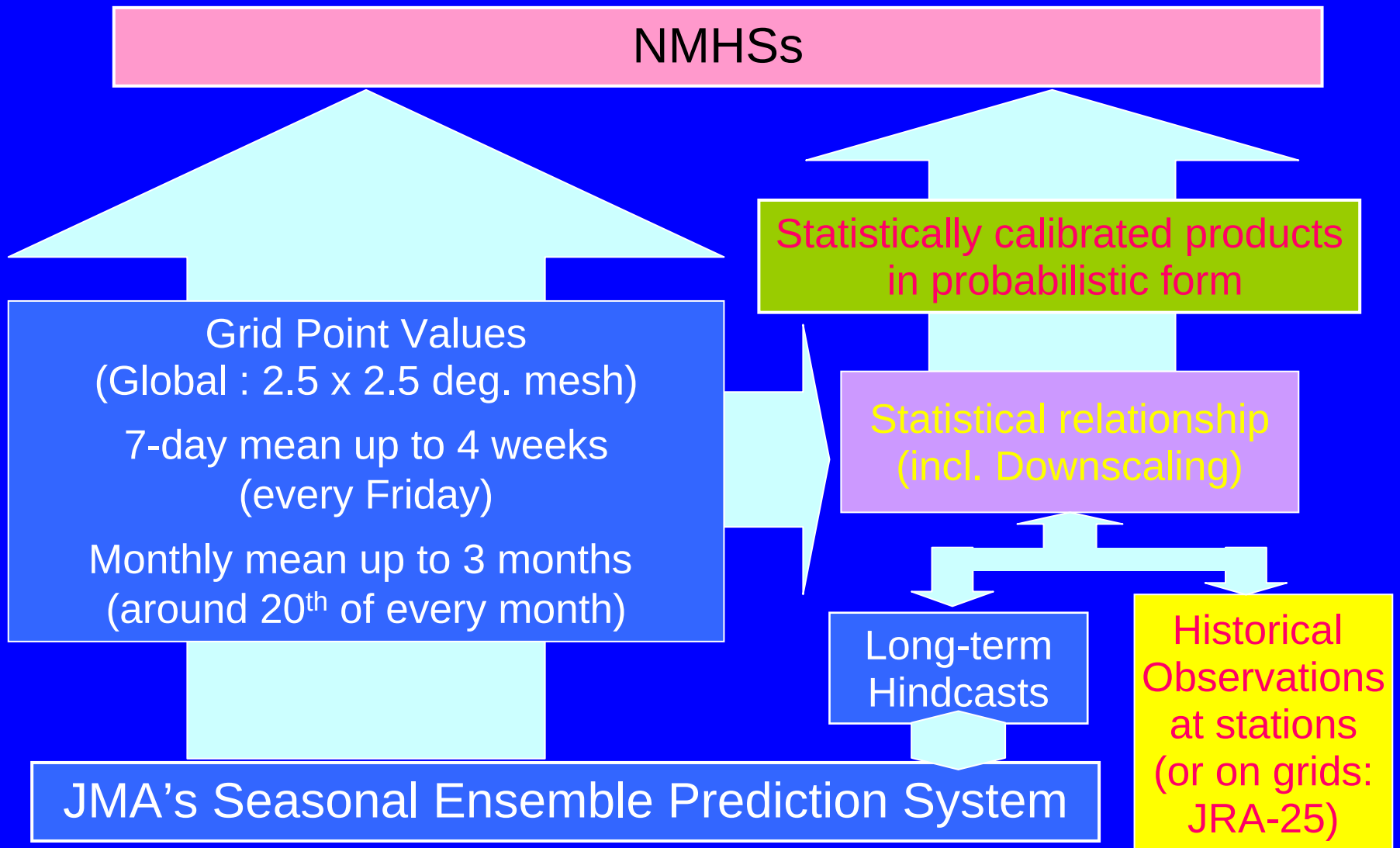
http://cpd2.kishou.go.jp/tcc for NMHS users

http://okdk.kishou.go.jp for public users




Integrated Climate Information Production System
at Climate Prediction Division, JMA
Dynamical Climate Prediction System
Dynamical Ensemble Prediction System
El Niño Prediction System
Outlook
Early Warning
Future
Data Assimilation System
JCDAS and ODAS
Observations
Monitoring
Assessment
Present
Reanalysis System
Diagnosis
Statistics
Past
Japanese Reanalysis Project (JRA-25)
Sea Surface Temperature (COBE-SST)

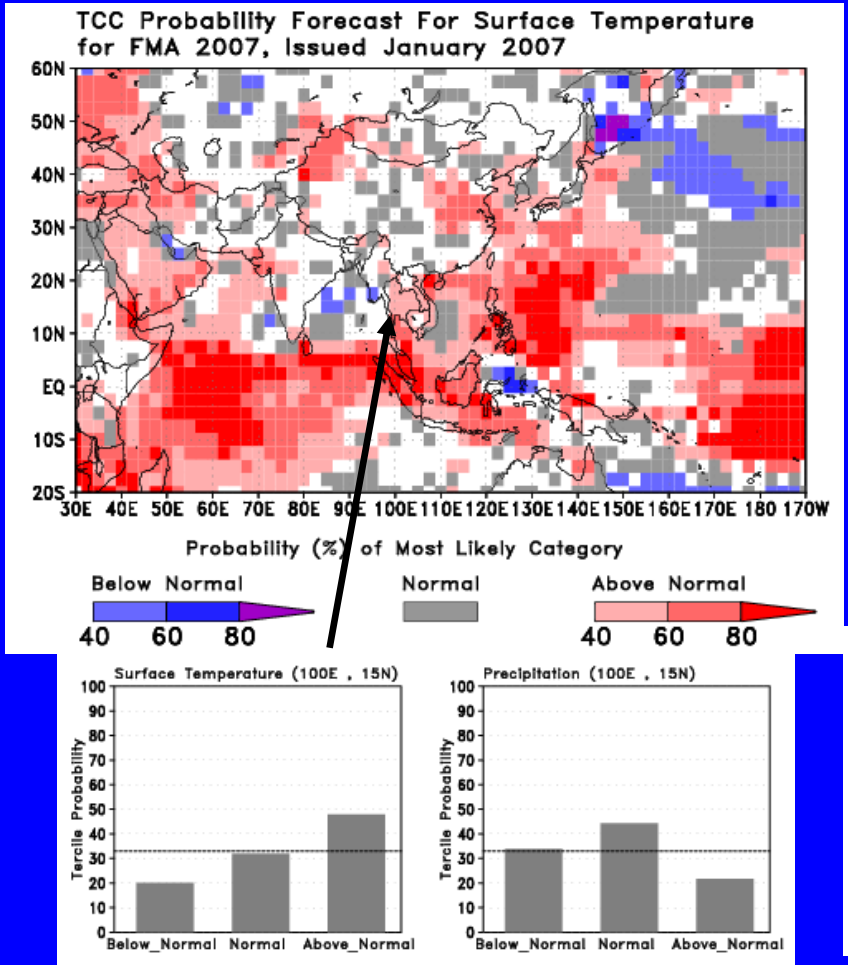
Operational Seasonal Prediction Products available from TCC



Examples of calibrated probabilistic products

Seasonal mean temperature

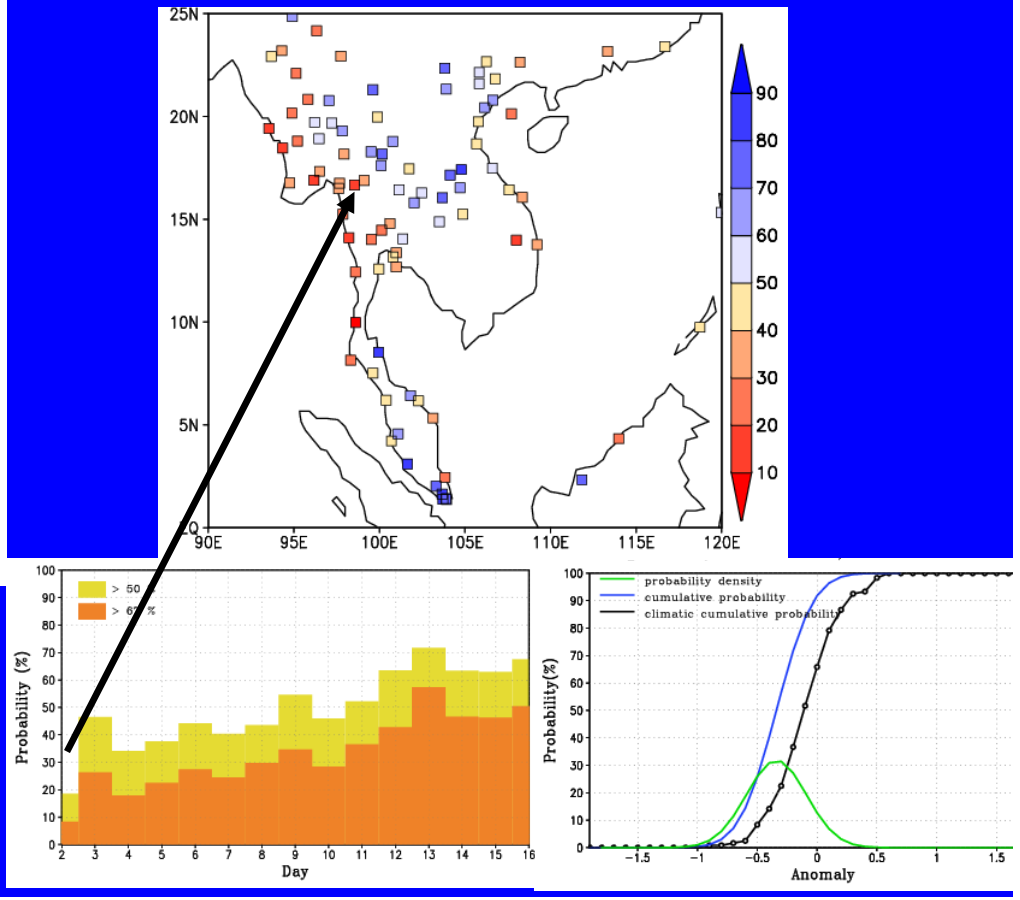
3-equal category probability
on 2.5 deg. grids
http://okdk.kishou.go.jp/products/model/probfcst/4mE/index.html



14-day precipitation

2-equal category probability
at climate observation stations
(under development)

Probability (%) of exceeds the median of 1992-2001 Initial date: 1997/6/10



Future Plans of TCC

1. Operational function
   - Upgrade of extended-range / long-range ensemble prediction system (March 2007, middle of 2007, respectively)
   - Change of TCC web server and renewal in TCC website including RA-II RCC homepage (second quarter of 2007)
   - Experimental provision of downscaled probabilistic one-month prediction product through the TCC website (second quarter of 2007)
   - Start issuing 'Summary Report on Climate System' (April 2007) and 'Annual Report on Climate System' (March 2008)

2. Coordination function
   - Organizing the third WCRP International Conference on Reanalysis (January 2008)
   - Cooperative development of tailored climate products with TMD and MMD

Future Plans of TCC (cont.)

3. Data service function
   - Monthly surface climate database service in operation (second half of 2007)
   - Data service for the global climate change monitoring in operation (autumn 2007)

4. Training and capacity building function
   - JICA group training course in Meteorology (Sep-Dec 2007)

5. Research and development function
   - Upgrade of Ocean Data Assimilation System (ODAS) and El Niño prediction system (March 2008)
   - Global warming projection vol.7 (March 2008)
   - Development of the web-based analysis and diagnosis tools of extreme climate events (early 2008)