# Development and Application of Global Drainage Basin Database （GDBD）

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# Motivation and Overview of GDBD

➢ In the 21st century, human well-being will be locally and globally affected by various water-related issues.

- freshwater scarcity and pollution, floods, disturbance of biogeochemical cycles, conflicts in international river basins and so on….

➢ For understanding and addressing these issues, baseline data is prerequisite.

➢ So we have developed Global Drainage Basin Database (GDBD).

- Consists of 6 GIS data
  - Basin boundary data
  - Stream network data
  - Discharge station data
  - Natural lake data
  - Dam lake data
  - Flow direction data
- Gives us
  - hydrological flows of land surface
  - appropriate spatial unit
    - for **analysis, assessment and management**
  - Geographic, topographic, and social information

Dam lake data

Circumference、Area ... of information
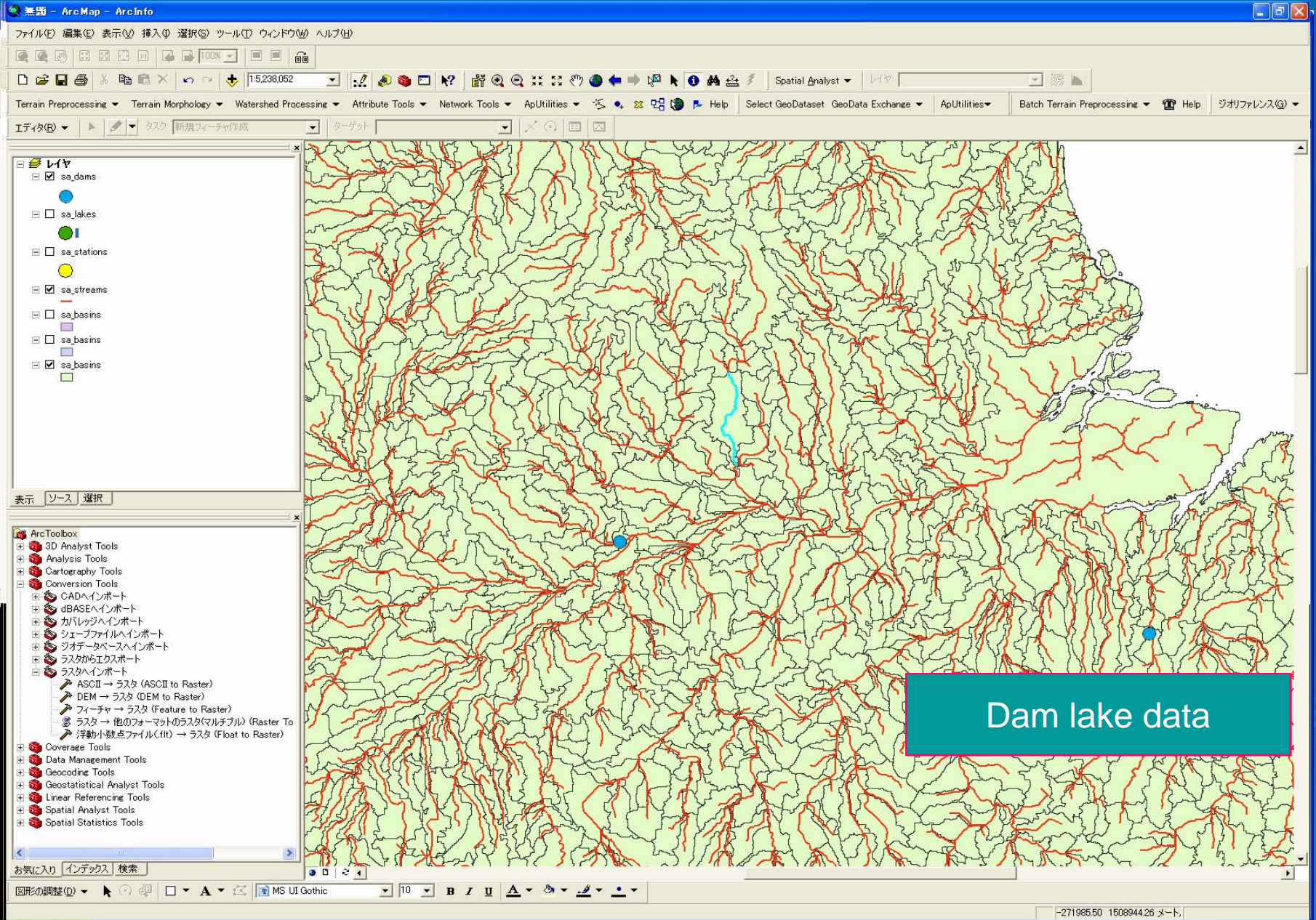
Shape_Length    666000.102545
Shape_Area      7718000285.601...3

# Features of GDBD ①
# -Data format-

➤ **ArcGIS Geodatabase** format
- ArcGIS ＋ MS Access
  - Suitable for development of database based on GIS data
  - We can browse and edit database
    - Not only by ArcGIS but also by MS Access
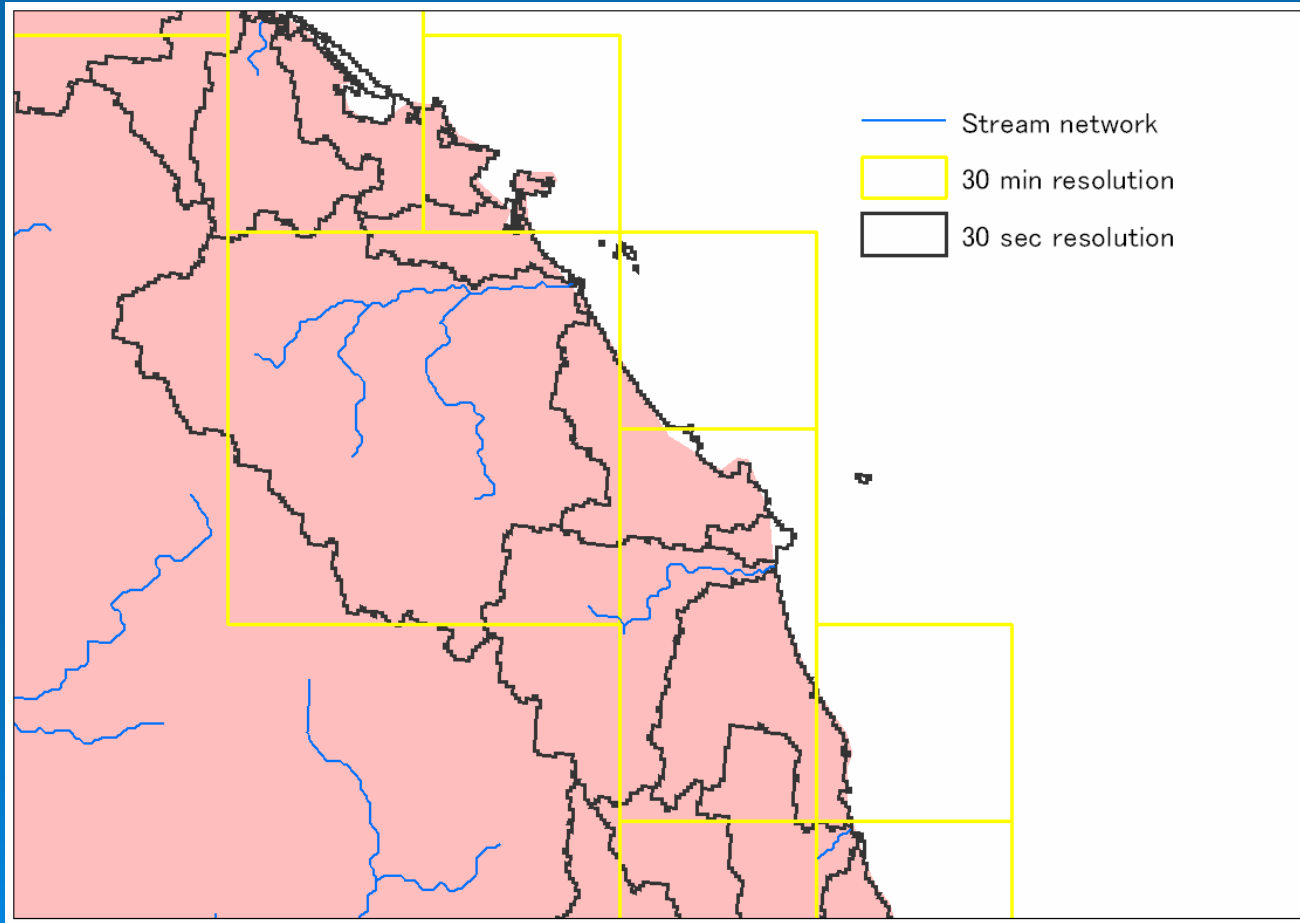  - Useful for those not familiar with GIS

# Features of GDBD ②
## -Data resolution-

> High-resolution data (30 seconds ≒ 1km)



Comparison between 30 min and 30 sec basin boundary

# Application of GDBD
## -Development of Water Supply/Demand Calculation Model-

| Climate Data<br>（GSWP2：Temperature、Precipitation） | Population Data<br>Crop Water Requirement Data | AQUASTAT<br>Shiklomanov |
|---|---|---|

**Runoff Calculation Module**

**Water Demand Calculation Module**

Runoff

Water Consumption

**River Discharge Calculation Module**

**River Discharge**

Basin boundary | Stream Network | Natural Lake | Dam Lake | Discharge Station

**GDBD**
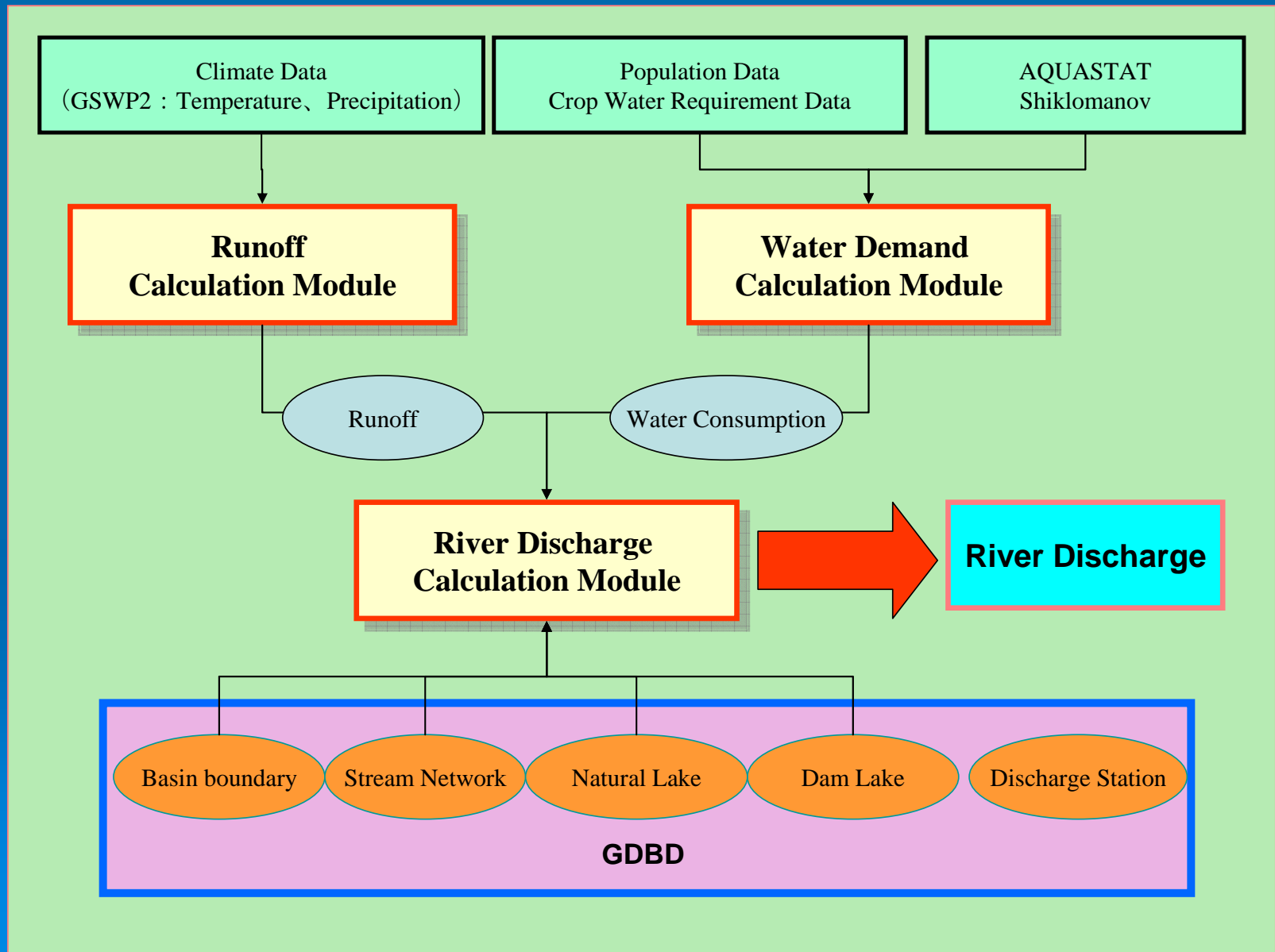
# Result -Global-
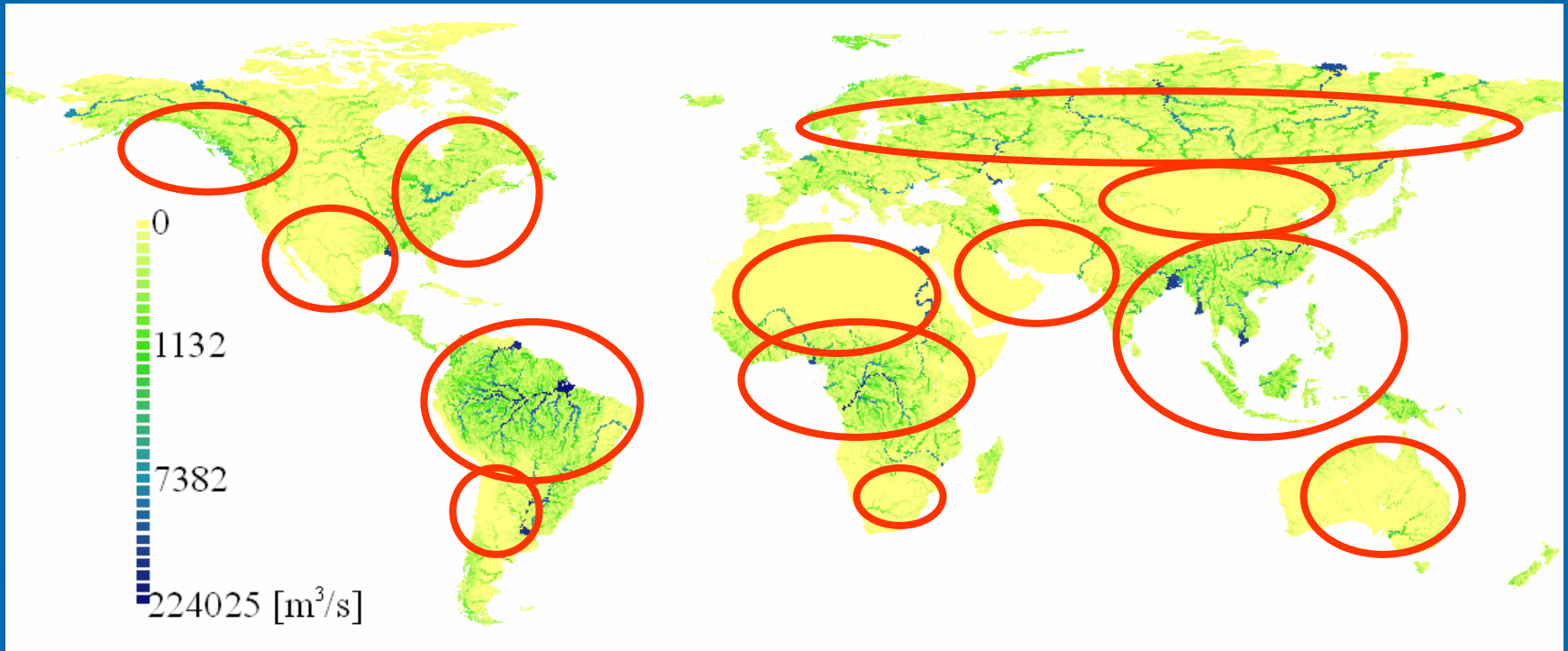


Annual river discharge [$m^3/s$]

> Abundant in hi-latitude and equatorial region
> Scarce in mid-latitude region

There is spatial variability of water resource

# Result -Regional-



Annual river discharge [m³/s] （Indochina Peninsula）

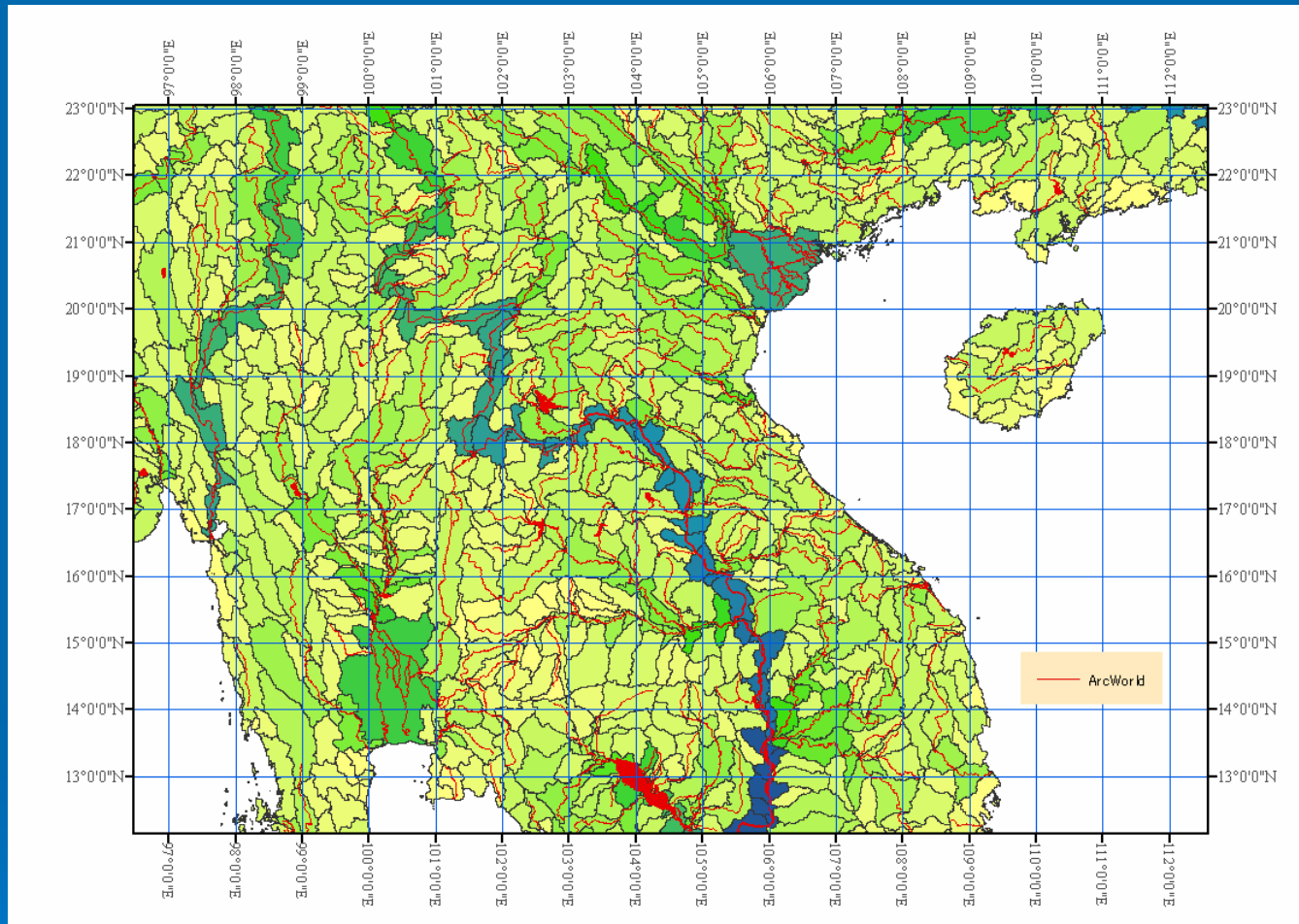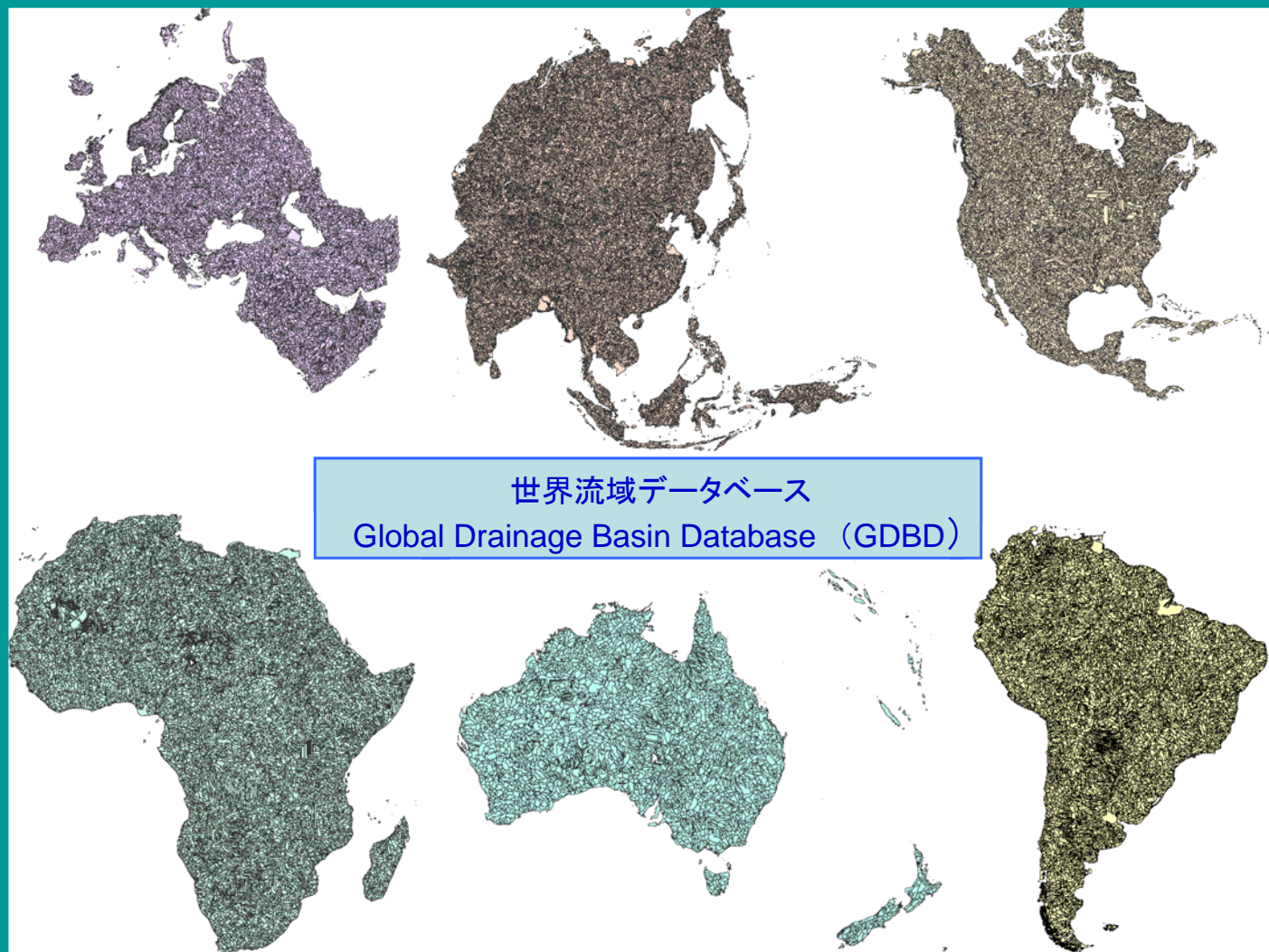➢ We can see spatial variability of water resource at small scale by using high-resolution basin boundary data of GDBD

# Summary and future plans

- We have developed Global Drainage Basin Database (GDBD)
  - Basin boundary, Stream network, River discharge station, Natural lake, Dam lake, Flow direction
  - a broad range of information
- We have developed water supply/demand calculation model based on GDBD.
  - We can see spatial variability of water resource by this model

- We will apply GDBD and the model based on GDBD to not only global but also regional water-related problem.

世界流域データベース
Global Drainage Basin Database （GDBD）

Available soon from
http://www-cger.nies.go.jp/cger-j/db/dbhome.html

# Thank you for your attention