# Global water resources modeling and assessment

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NIES

- Researcher (5-yr term; Apr, 2006-)
- PhD (Eng; Univ of Tokyo; Mar, 2006)
    - Hydrology and water resources Eng., (Civil Eng.)
    - Modeling and assessment of global water resources

Contents

1. My research interest: Modeling and assessment of global water resources

2. Achievements in this FY: Simulate global water resources situation in the 21C
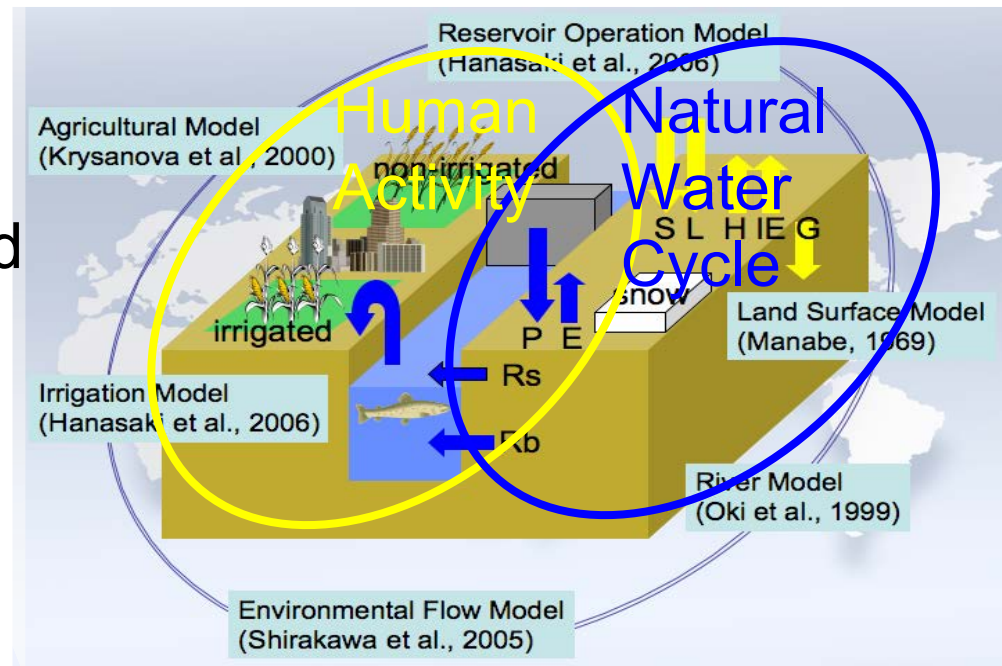
3. Research plan in the next FY

Global water resources model

Rivers in Asia on TRIP in 1°x1° mesh

1°×1°

Total: 15,000 grids
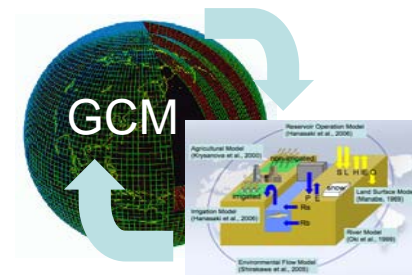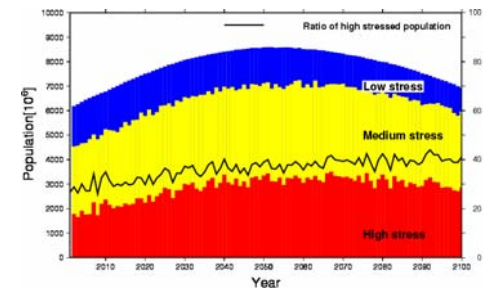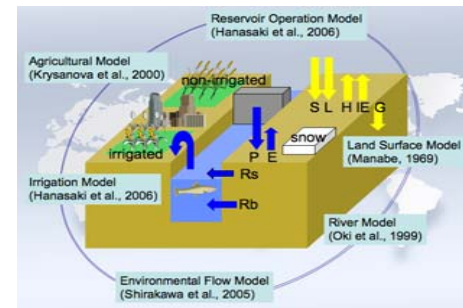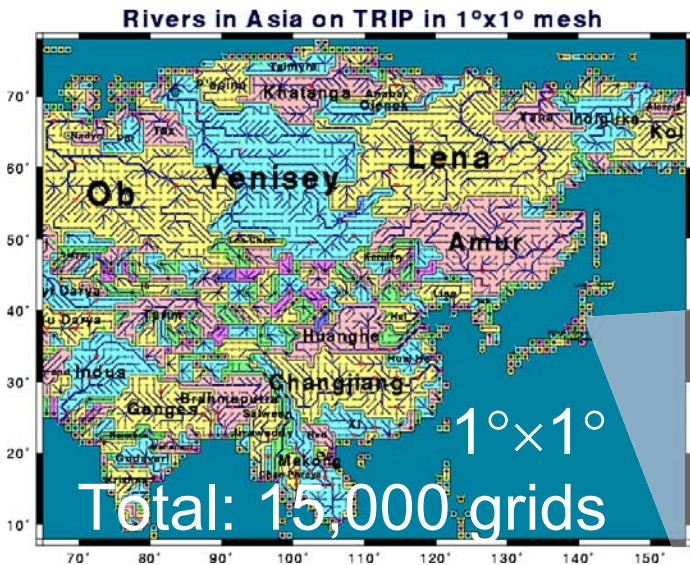
- Grid-based model
- For each grid, meteorological data and geographical data is prepared

- Estimate water resources and water demand for each grid at daily-basis.

- Most advanced integrated global hydrological model

Reservoir Operation Model (Hanasaki et al., 2006)

Agricultural Model (Krysanova et al., 2000)

Human Activity

Natural Water Cycle

non-irrigated

S L H IE G

irrigated

snow

P E

Rs

Land Surface Model (Manabe, 1969)

Irrigation Model (Hanasaki et al., 2006)

Rb

River Model (Oki et al., 1999)

Environmental Flow Model (Shirakawa et al., 2005)

What my model can do?
Water resources assessment

Thailand

Annual water resources	Annual water use
210 km³/yr	87 km³/yr
(FAO, 2004)	(FAO, 2004)

Annual water resources
210 km^3/yr
(FAO, 2004)

Annual water use
87 km^3/yr
(FAO, 2004)

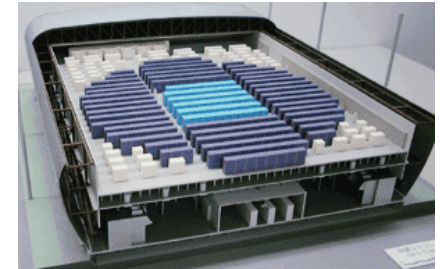Annual-basis

Daily-basis

[contemporary]

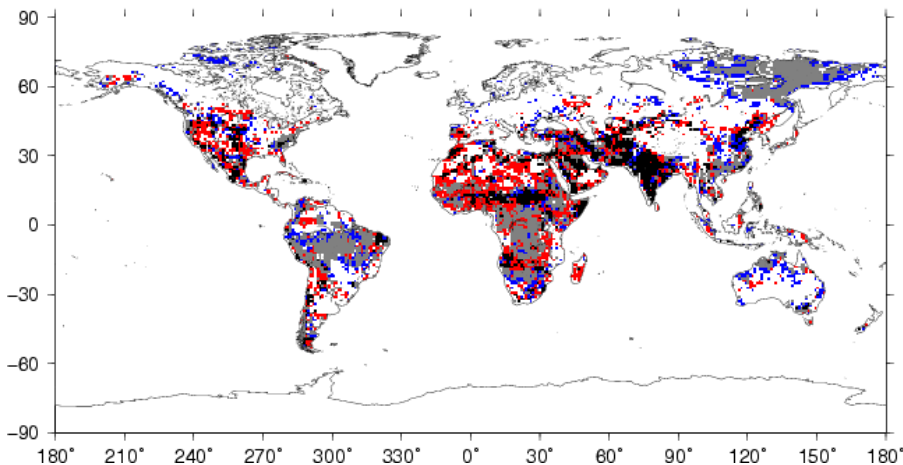[my results]
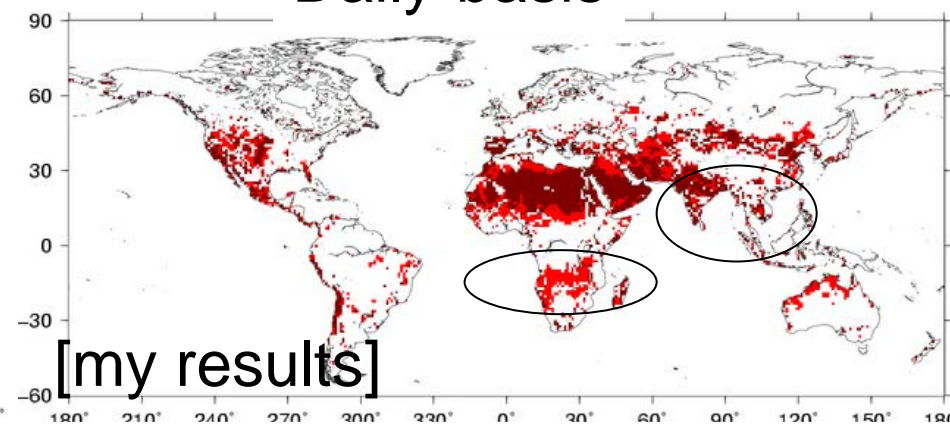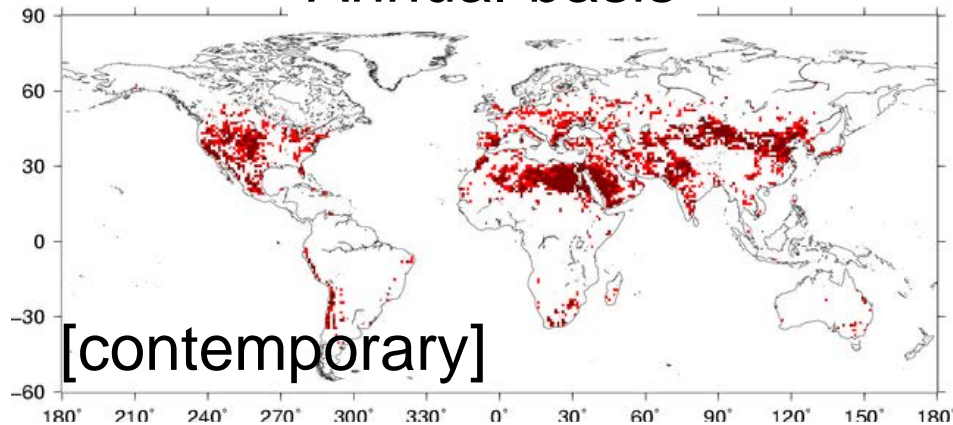
High Stress   Medium Stress   Low Stress

Achievements in this FY

- Climate change impact assessment
  - Change in water availability and water use: sub-annual variation
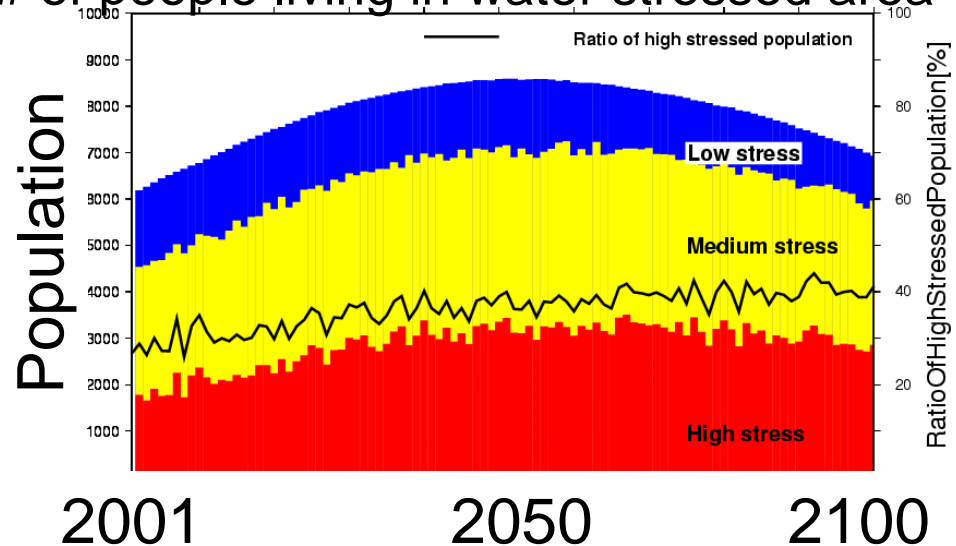 - Climate scenario MIROC3.2, SRES-A1B

The Earth Simulator

Water stressed area (2050)

2050

# of people living in water stressed area

Population

Ratio of high stressed population

Low stress

Medium stress

High stress

RatioOfHighStressedPopulation[%]

2001   2050   2100

Research Plan in the next FY

- Couple my model with GCM
  - GCM team is interested in modeling human activity
  - Sophisticate land surface process
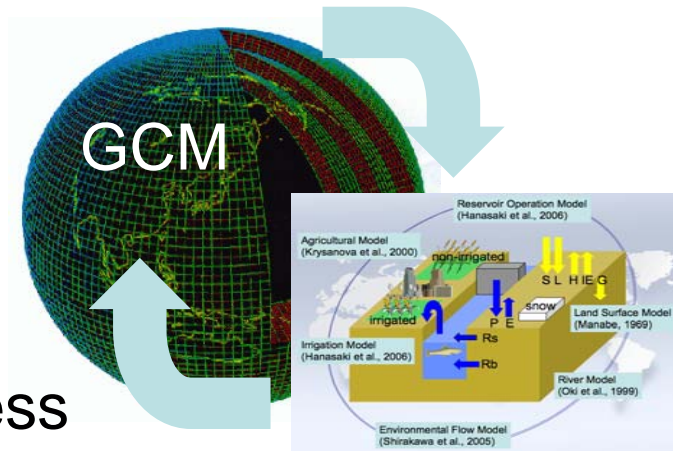
- Make it ready to distribute source code/manual/tutorial
  - "Regionalization"
  - Feedback from regional specialists
    - Thailand (The Chao Phraya River Basin)

Summary

- My research interest: Global water resources modeling and assessment
  - Grid-based, integrated model
  - Assess sub-annual variation in water resources and water use
- Achievement in this FY
  - Climate change impact assessment
  - # of population under water stressed area
- Research plan in the next FY
  - Work together with GCM developers and regional specialists