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International Symposium on Future Asia, Kyoto

World Climate Research Programme (WCRP) and related activities

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Mission & Objectives

World Climate Research Programme supports climate-related decision making and planning adaptation to climate change by coordinating research required to improve

(1) climate predictions and

(2) our understanding of human influence on climate

"for use in an increasing range of practical applications of direct relevance, benefit and value to society"

(WCRP Strategic Framework 2005-2015).

Core projects and relevant activity progresses

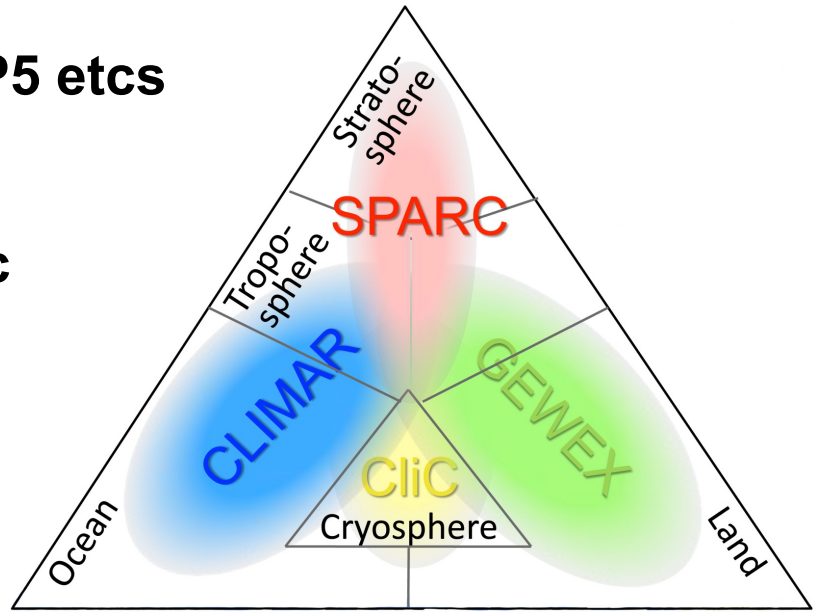
- **Seasonal prediction: ENSO etc**
- **Contributions to IPCC AR5: WGCM CMIP5 etcs**
- **Atmospheric data sets: GEWEX;**

  GPCP, Regional Hydrology data sets etc
- **Ocean data sets: CLIVAR; ARGO,**

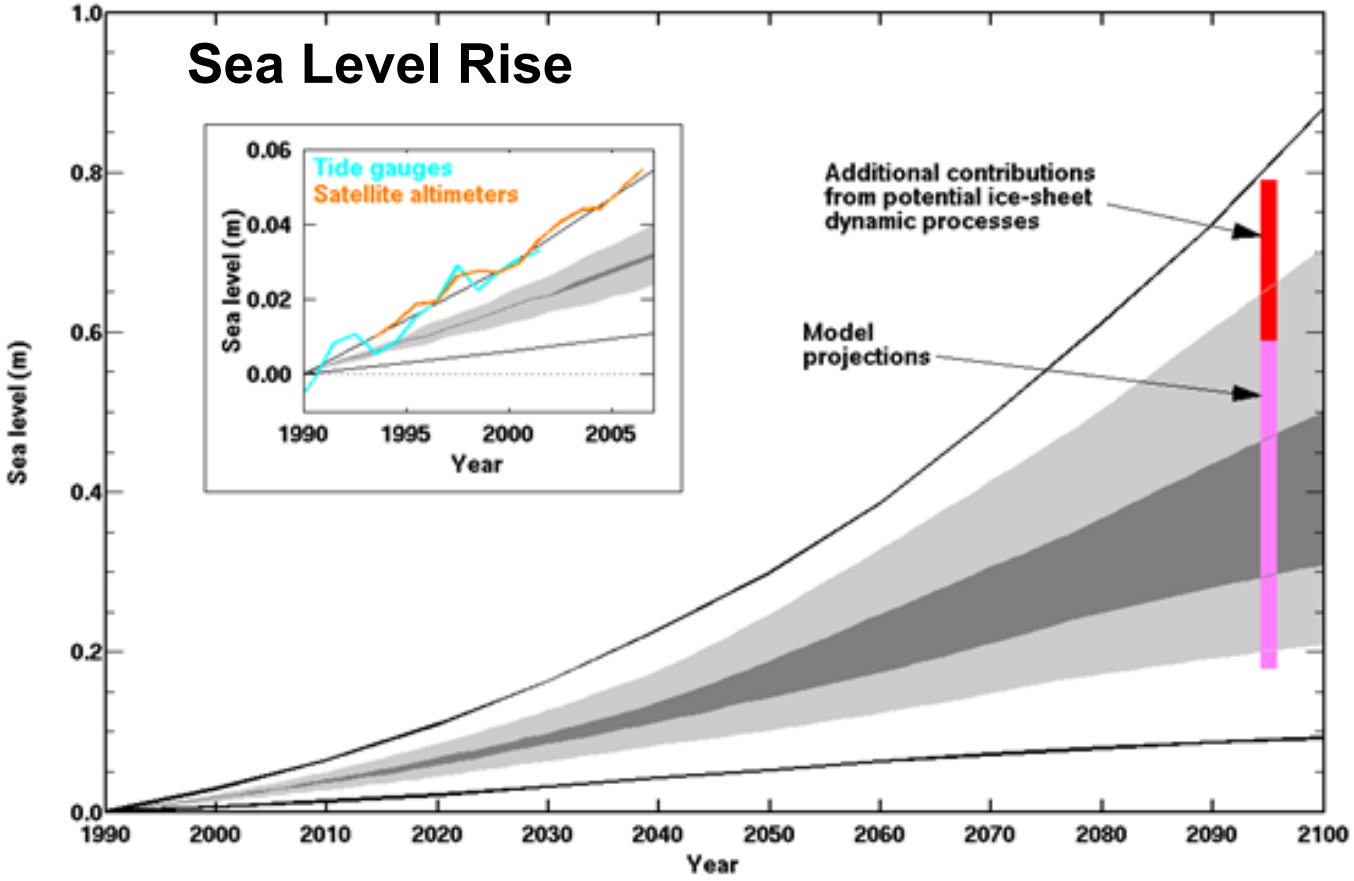
  Ocean synthesis evaluation etc
- **Physical/chemical data sets: SPARC;**

  Chemistry-Climate Model Validation

  (CCMVal), Ozone hole phenomenon etc
- **Change in cryosphere and sea level: CliC, CLIVAR etcd**



CMIP modeling study for climate change
Contribution to IPCC (AR5 drafting stage)



Church et al., 2001

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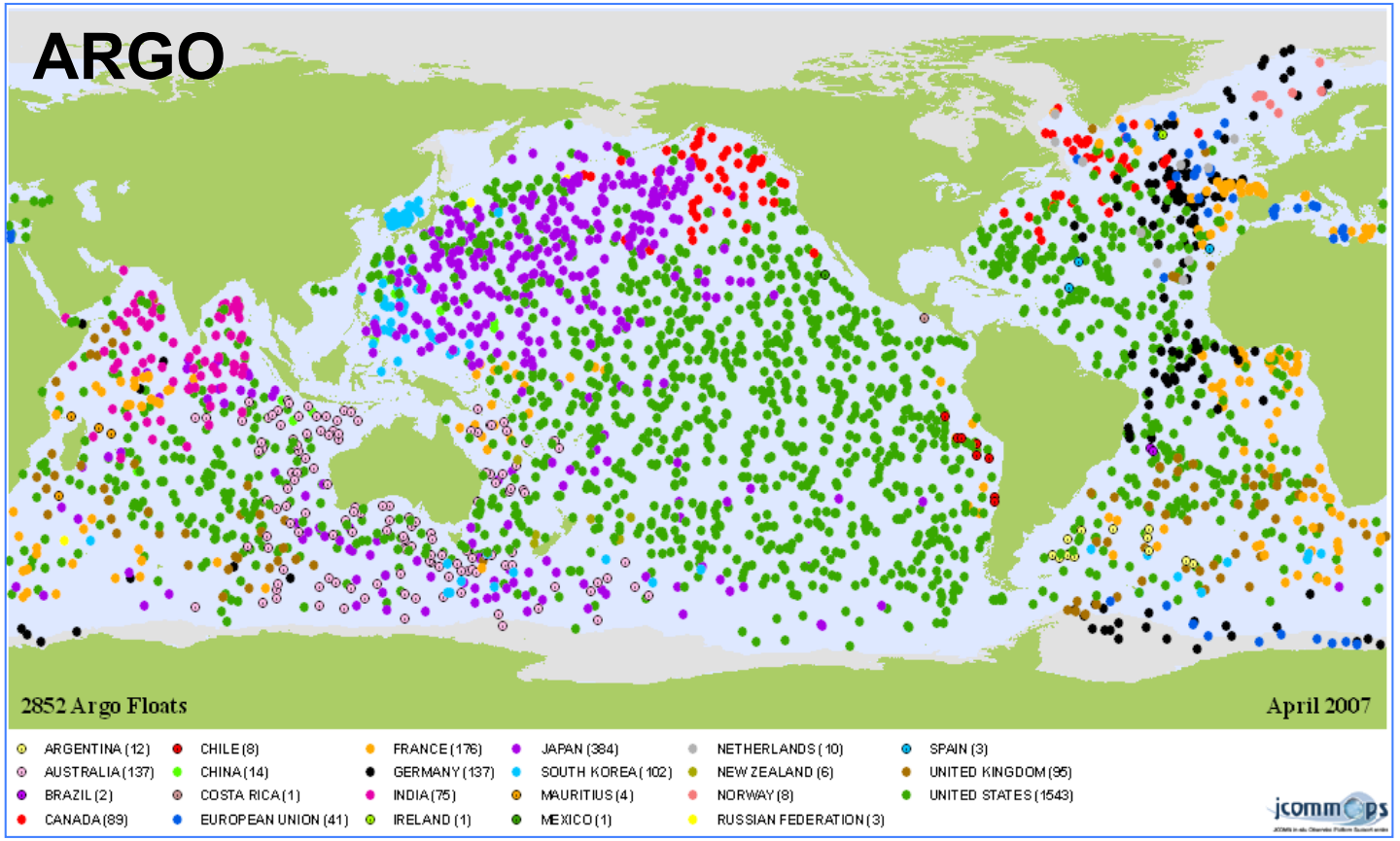
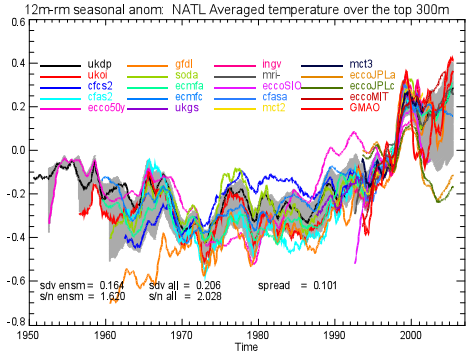
The ocean observing system



CLIVAR GSOP: Ocean Synthesis Evaluation Workshops

N. Atlantic Temp (0-300 m)



WCRP enabling initialized predictions

WCRP Working Group on Regional Climate (2-way Communication: Science-User)

- coordination of WCRP research on regional climate information & services
- communication between WCRP, GFCS and Future Earth, point of contact to regional climate information/service entities
- prioritization of WCRP regional climate research and prediction
- advice for impact assessment, decision making and climate services, especially on water, health, food and disaster risk reduction
- oversee regional climate research initiatives such as CORDEX
- visibility of WCRP regional science and communication of advances to climate service institutions (through web, reports, workshops, etc.)
- liaison with other programmes, communication of science priorities to funding agencies, NGOs and development agencies

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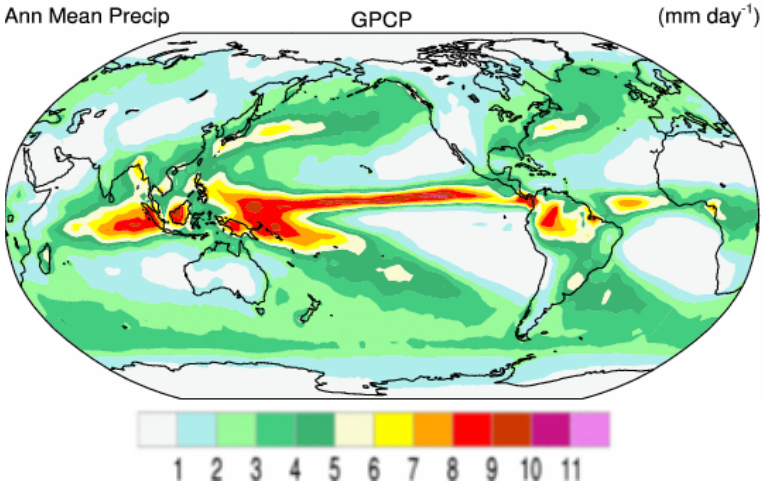
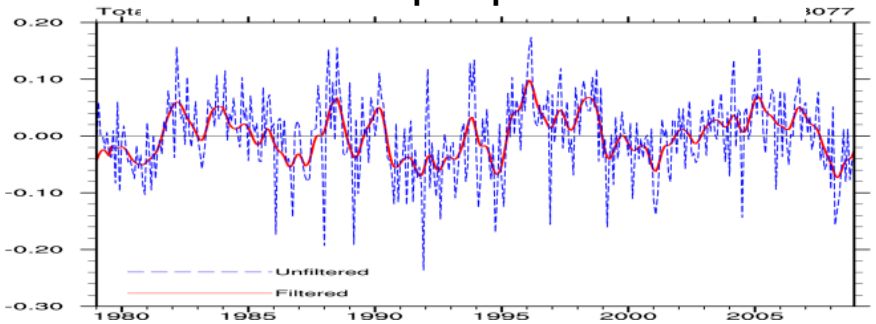
Atmospheric data sets

GEWEX Global Precipitation Climatology Project



GPCP Global precipitation 1979-2008



Regional Hydrology Data Sets

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Global environmental change research: a long, successful history

four Global Environmental Change Programmes

WCRP World Climate Research Programme

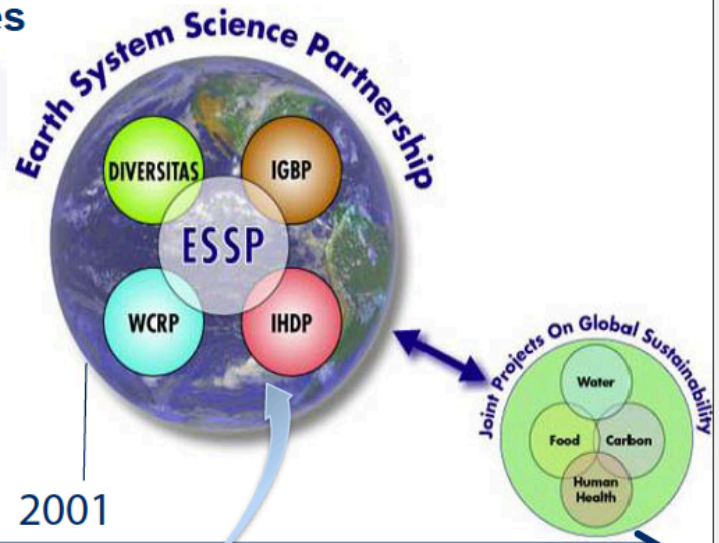
DIVERSITAS an international programme of biodiversity science

1980 1986 1991 1996 2001

GLOBAL CHANGE IGBP International Geosphere-Biosphere Programme

IHDP International Human Dimensions Programme on Global Environmental Change

all co-sponsored by ICSU



and their partnership

GEC programmes and development agencies

Future Directions: Actionable Science

Defined as: data, analysis, and forecasts that are sufficiently predictive, accepted and understandable to support decision-making, including capital investment decision-making.

- ICSU Review and Visioning, acknowledge WCRP past contributions and identify future challenges and opportunities
- OceanObs ’09, World Climate Conf-3 '09: Global Framework for Climate Services (GFCS)
- WCRP Open Science Conference (24-28 October 2011 Denver, Colorado, USA): 1907 from 86 countries; 541 Early Career Scientists & Students; 332 from Developing Countries
- Need for more flexibility/agility to respond to expanding users needs, that includes information:
  - At regional scale
  - For key sectors of global economy
  - For adaptation, mitigation and risk management

ESSP DIVERSITAS IGBP IHDP WCRP

WCRP World Climate Research Programme

WMO IOC ICSU

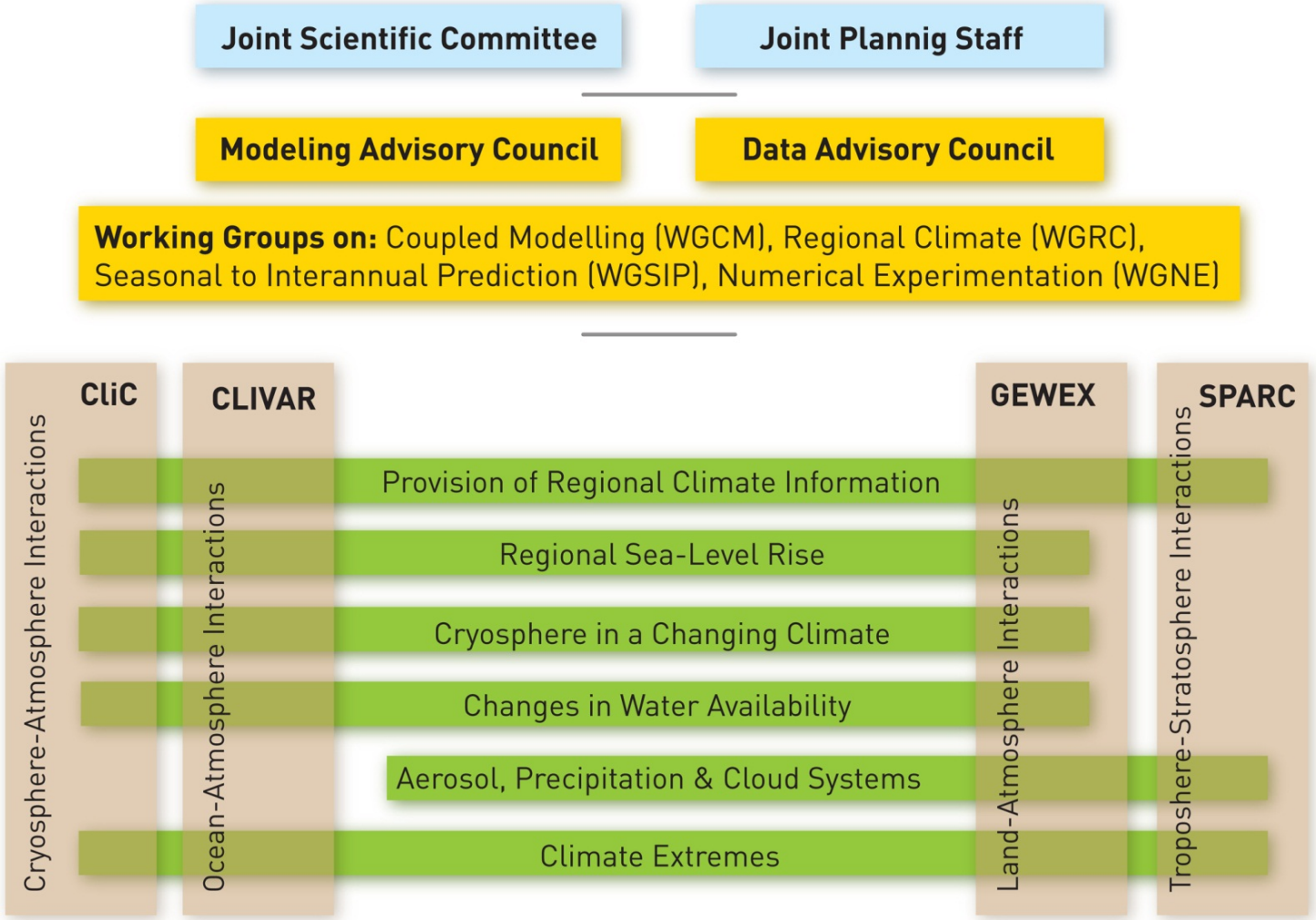
Emerging structure Post-2013

The WCRP will be based on four fundamental *interactions* of the Earth/climate system

WCRP Overarching/ Unifying themes:

Observation and Analysis, Process understanding, Modeling development, projections and prediction, Climate Information and Application

Grand Challenges: 5-10 years horizon

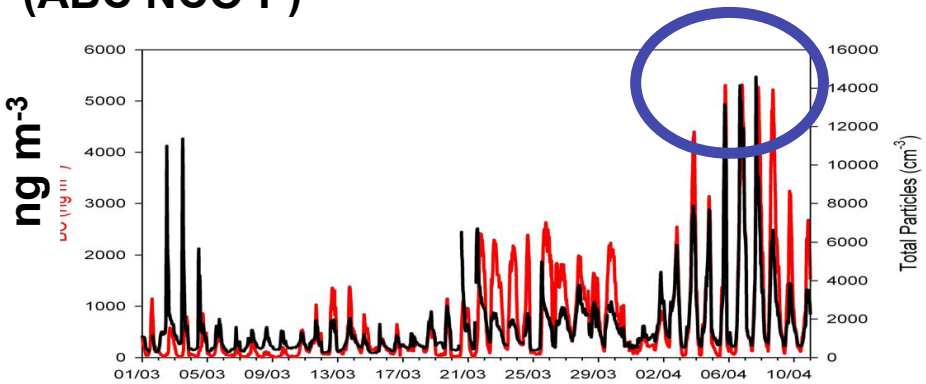


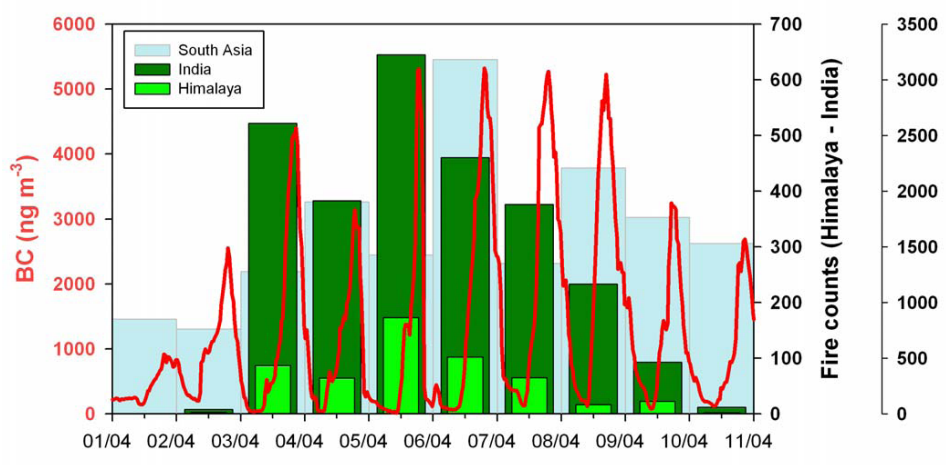
UNEP/Atmospheric Brown Cloud Project (ABC)

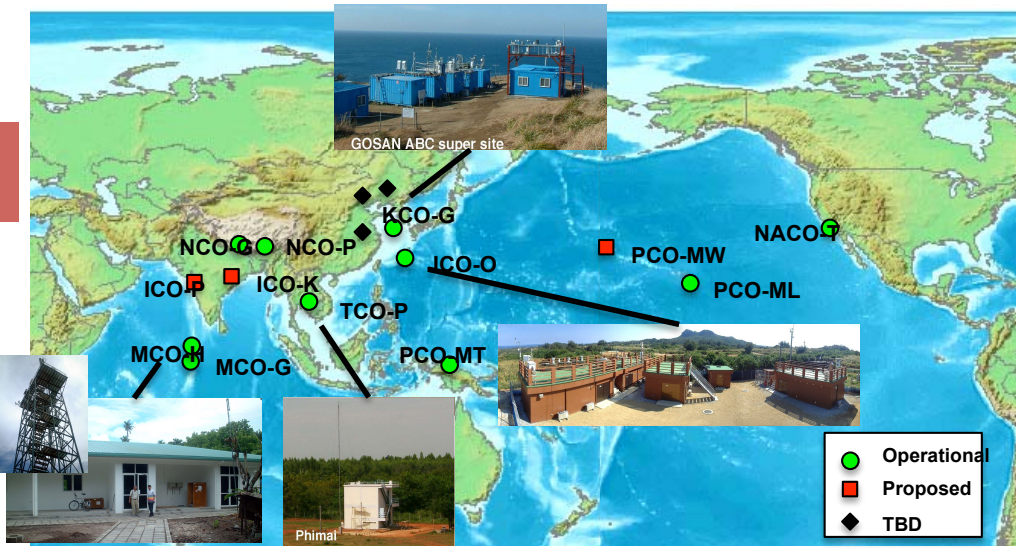
- Air quality measurements
- Link with IGBP/IGAC etc

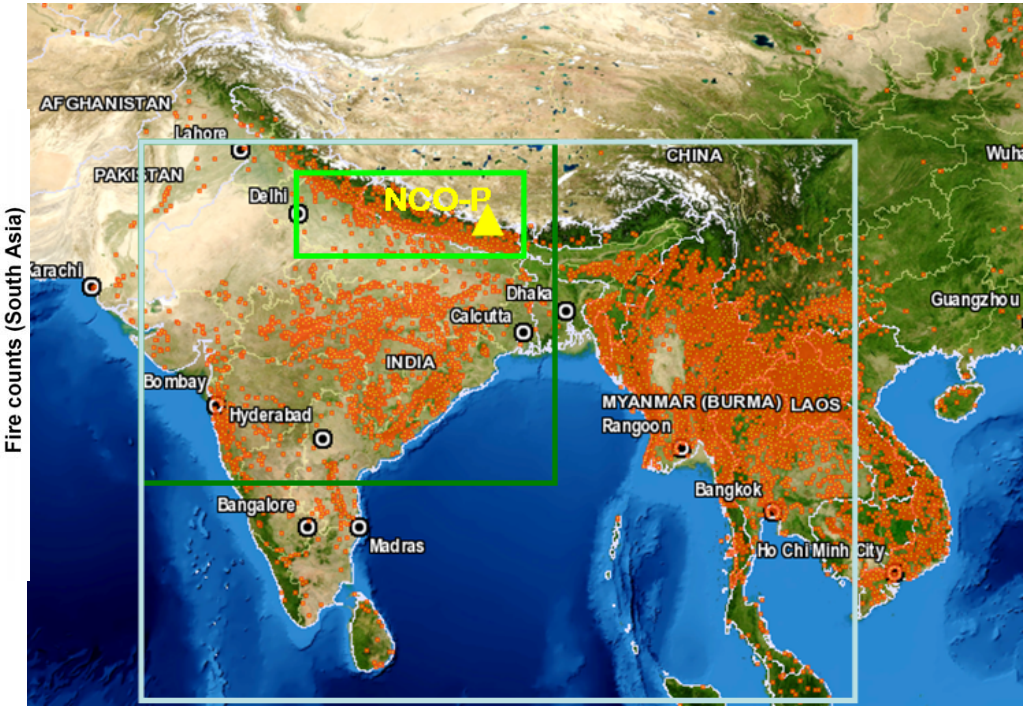
ACUTE POLLUTION EPISODE OF APRIL 2010

Ev-K2-CNR high altitude observatories (ABC NCO-P)



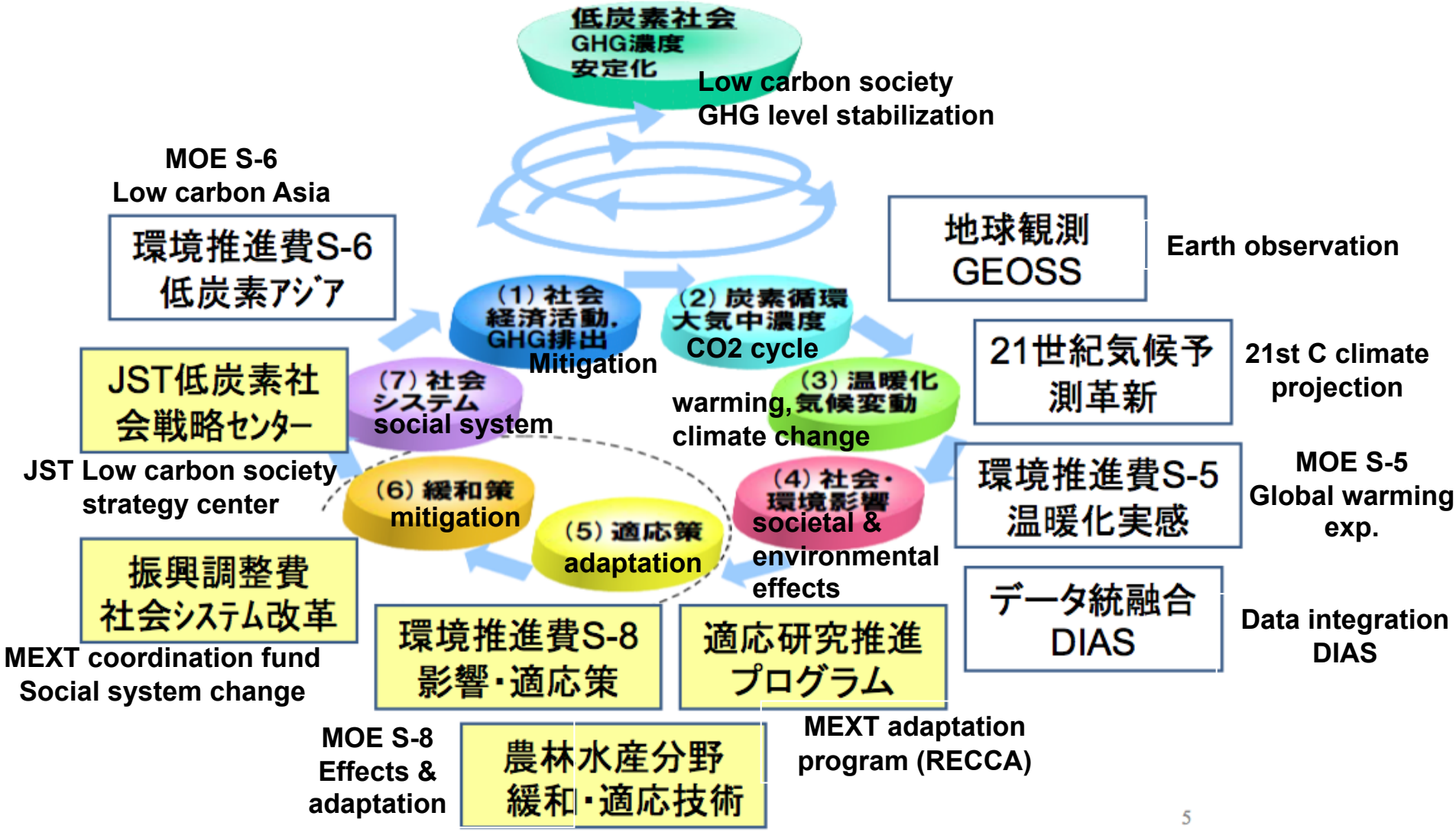






Sandro Fuzzi (UNEP/ABC-Asia ST'12)

Japan national research strategy for climate projection, adaptation and mitigation



Ministry of Agriculture, Forestry and Fisheries
mitigation & adaptation technolgocy

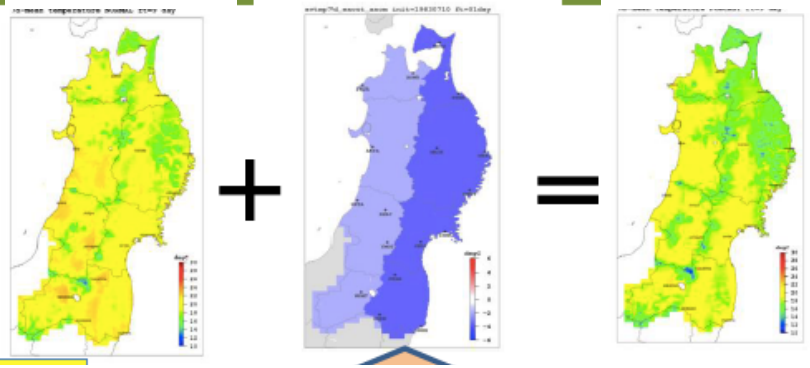
Seasonal weather change: Example 2

Dialogues between JMA and National Agriculture and Food Research Organization (NARO) for climate risk management

NARO mean temp (1km)

JMA temp anomaly prediction

NARO-JMA temperature prediction



dialogue

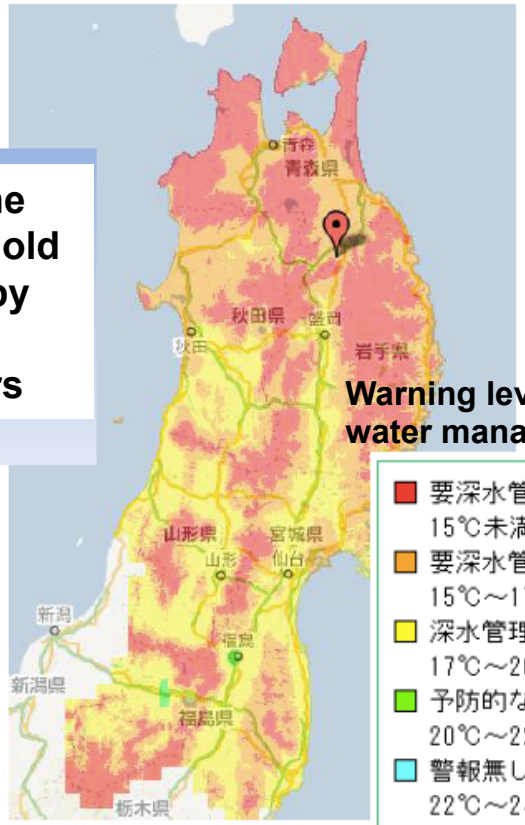
Result

	東北農研		気象庁
空間スケール	空間的に詳細な気温予測が必要	→	平年偏差は空間スケールが大きいので、1kmメッシュの平年値に地域内一様の平年偏差を重ねることで対応できる。精度も確認
確率表現	利用者が使いやすいように、まず予測の中央値を使う。追加的に確率予測も付加	←	予測誤差があるので確率的な予測しかできない
予測精度	深水管理の指標である気温（17℃以下など）の予測の精度を知りたい	→	指標の気温予測の精度評価

NARO early warming for cold weather crop damage 報

Determination of the temperature threshold for crop damages by cold weather; information to users

反応で改良



Warning levels for water management

- 要深水管理 15℃未満
- 要深水管理 15℃～17℃未満
- 深水管理推奨 17℃～20℃未満
- 予防的な深水管理 20℃～22℃未満
- 警報無し 22℃～24℃未満
- 警報無し 24℃以上

Ⅲ International contribution to Asia-Pacific region

(needs and measures)

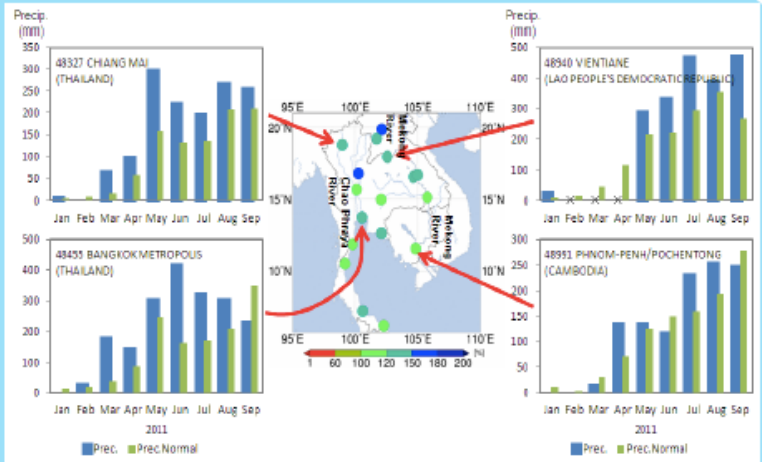
Support system for climate risk management for Asia-Pacific region

- **Data use**
- **International presence through Asia-Pacific Climate Center**
- **MRI global warming prediction results for international applications**
- **Collaboration with Disaster prevention organizations**

Activity of Asia-Pacific Climate Center
Promotion of GFCS through activities in Asian region
- **Provide climate information (seasonal prediction, extreme weather etc)**
- **Support tools for climate risk management**
- **Technology transfer of climate information use**

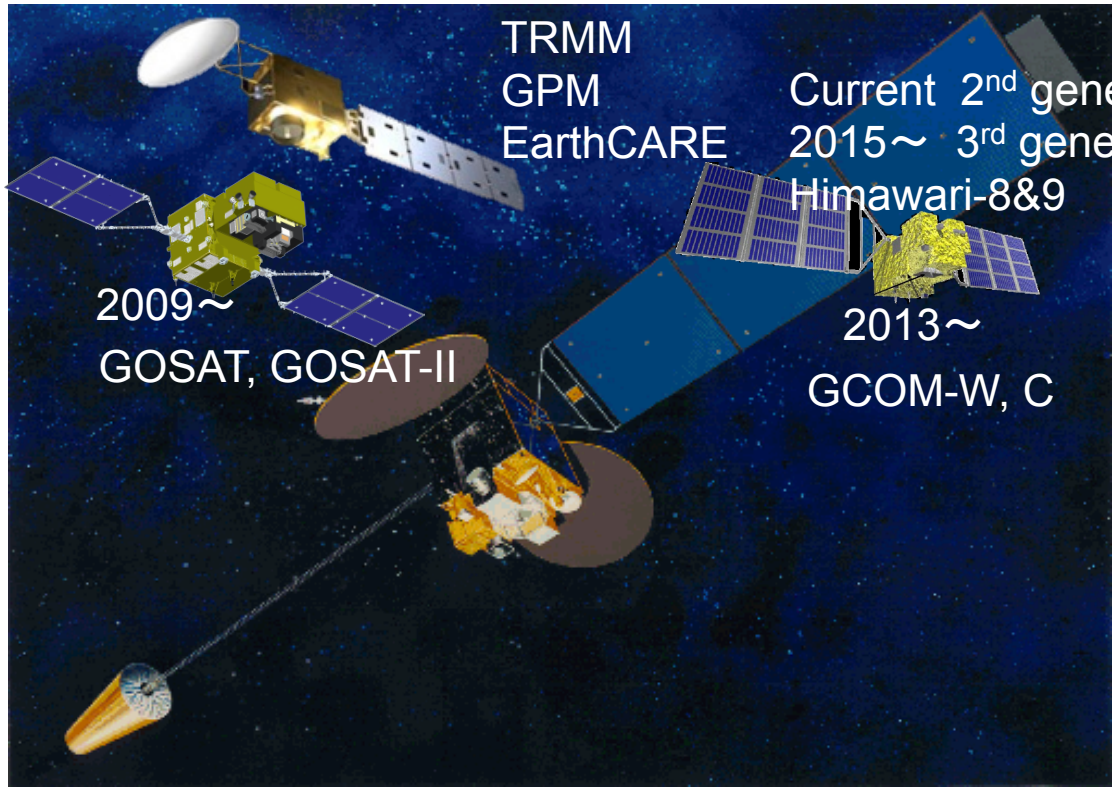
(examples)
Large scale flood events in Thailand and Indonesia in 2011

（活動事例）
- 平成23年夏、タイなどインドシナ半島での大規模な洪水について、実況の降水経過などの資料を作成し、当該国と共有（世界気象機関（WMO）のホームページにもニュースとして掲載）
- 加えて、当該国には、上記資料を作成した気候解析ツールの具体的利用方法も提供し、気候情報の活用を支援



Thailand flood in 2011
4 monthly (June-Sept) mean precipitation mean in the normal period and observed monthly mean precipitation change

Satellite observation: Contribution from Japan



Full disk scan every 10min
Rapid scan every 2.5 min

AHI specs, JMA/HIMAWARI-8/9

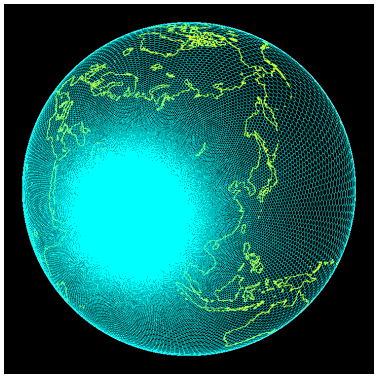
Band	Central Wavelength [μm]	Spatial Resolution
1	0.43 - 0.48	1Km
2	0.50 - 0.52	1Km
3	0.63 - 0.66	0.5Km
4	0.85 - 0.87	1Km
5	1.60 - 1.62	2Km
6	2.25 - 2.27	2Km
7	3.74 - 3.96	2Km
8	6.06 - 6.43	2Km
9	6.89 - 7.01	2Km
10	7.26 - 7.43	2Km
11	8.44 - 8.76	2Km
12	9.54 - 9.72	2Km
13	10.3 - 10.6	2Km
14	11.1- 11.3	2Km
15	12.2 - 12.5	2Km
16	13.2 - 13.4	2Km

MEXT key national projects

- Program for creating the climate change risk information
- Research Program on Climate Change Adaptation (RECCA)
  - Advanced Data downscaling method
  - Data assimilation technology
  - SImulation technology for climate change adaptation
- Green Network of Excellence (GRENE)
  - Biodiversity, Carbon Cycle, Water, City, Agriculture, and Health
- Data Integration and Analysis System (DIAS) /GEOSS
- JMA GFCS activities

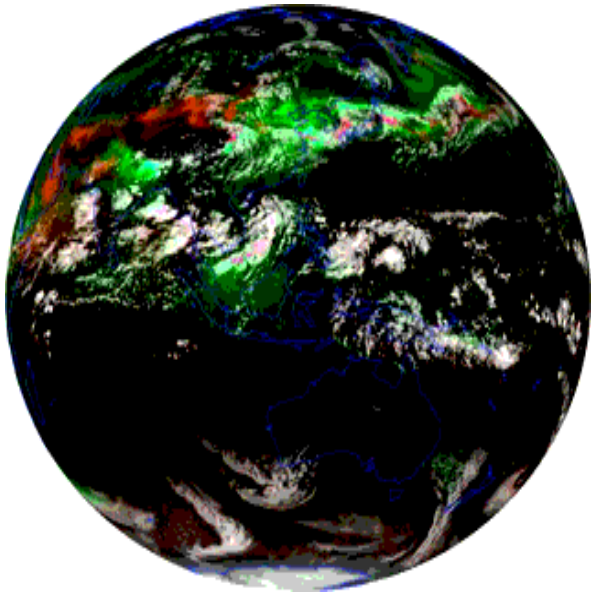
MEXT/RECCA/SALSA Project

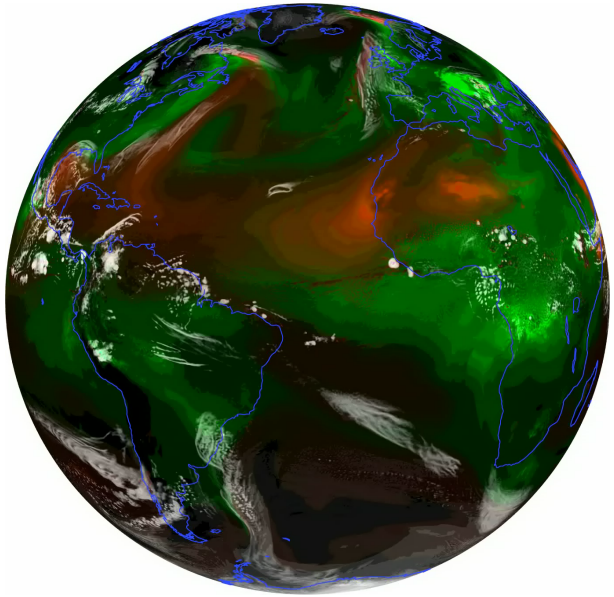
Development of next generation atmospheric material transportation models

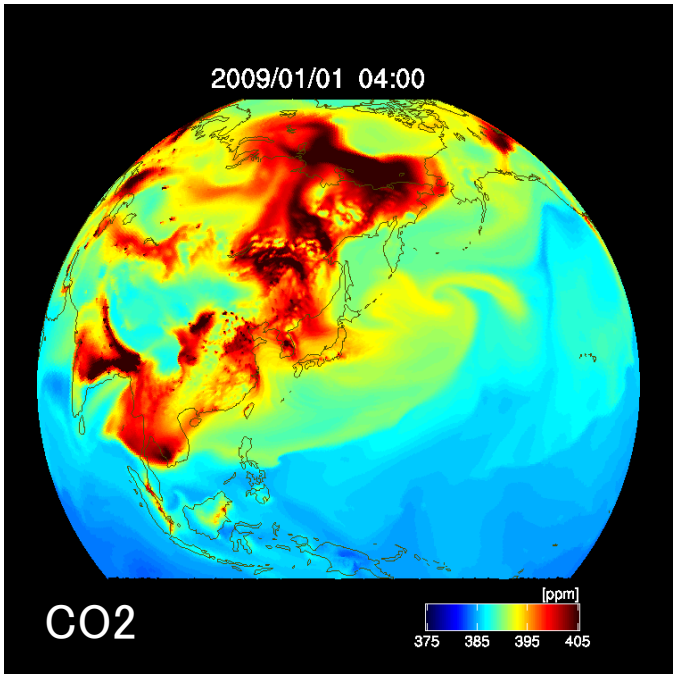


Stretched-NICAM grid

Use of Nonhydrostatic Icosahedron Atmospheric Model (NICAM) with aerosol, long- and short-lived gas models







7km simulation on the Earth Simulator
white: cloud, red: mineral dust, green: fine aerosols

- **In collaboration with Riken group (Prof. M. Sato and Dr. H. Tomita)**
- **10pF HPC - Kei**

Conclusions

- **Good progress in the World Climate Researches**
- **Global Framework for Climate Services (GFCS)**
- **WCRP Future Directions: Actionable Science**
- **WCRP Grand challenges**
- **Strong activities in Asia (Japan for example) for climate risk studies and applications**