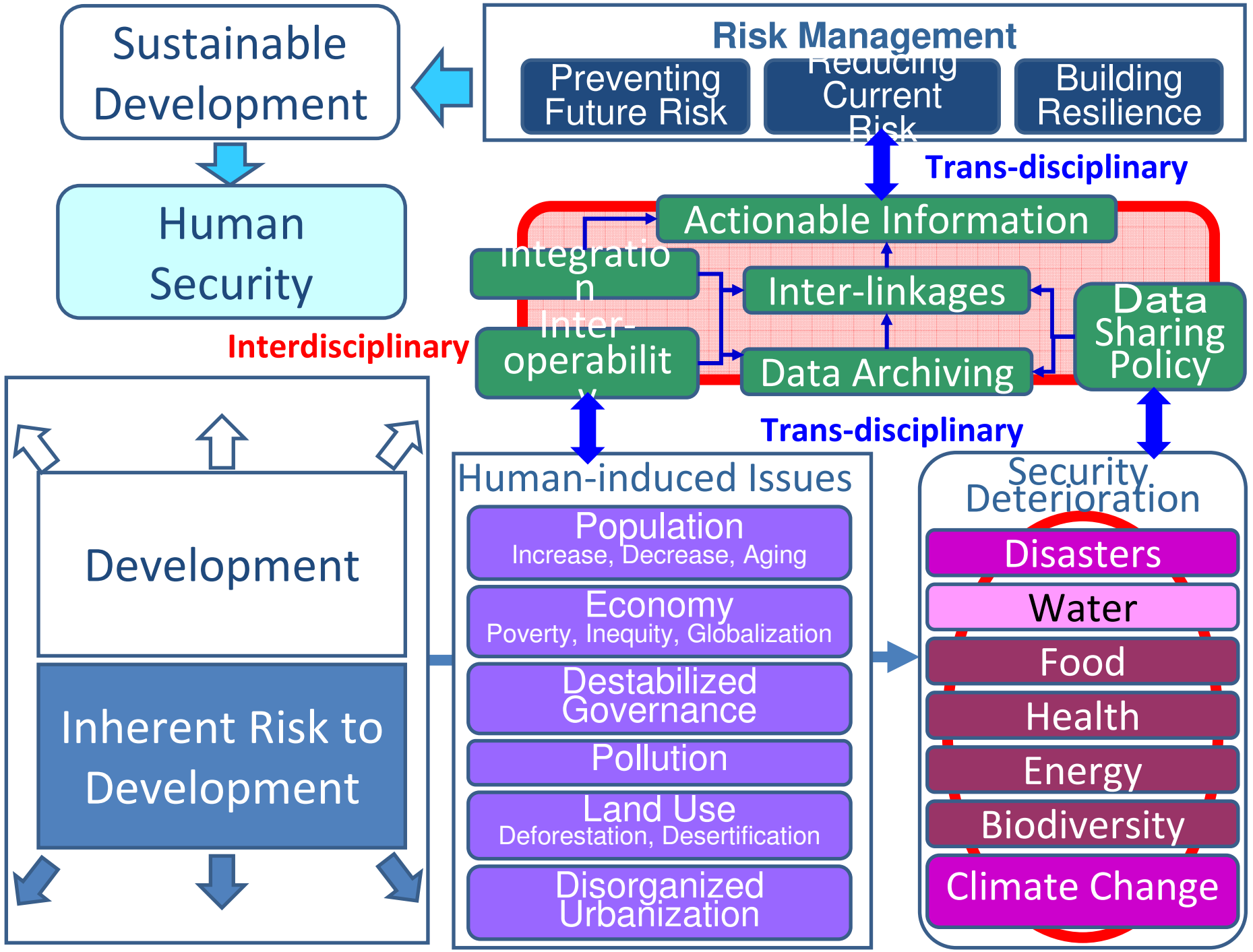
GROUP ON EARTH OBSERVATIONS

The AWCI Training Workshop on
Assessment of Climate Change Impact on a Watershed Hydrology
including Hydrological Modeling in Cold Region Basins
Islamabad, 15-17 September 2014

Science and Technology Supporting Sustainable Development

Toshio Koike
The University of Tokyo


Sustainable Development
Human Security
Risk Management
Preventing Future Risk
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Building Resilience
Trans-disciplinary
Actionable Information
Integration
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Data Archiving
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Inherent Risk to Development
Human-induced Issues
Population
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Destabilized Governance
Pollution
Land Use
Deforestation, Desertification
Disorganized Urbanization
Security Deterioration
Disasters
Water
Food
Health
Energy
Biodiversity
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GROUP ON EARTH OBSERVATIONS

GEO, the Group on Earth Observations

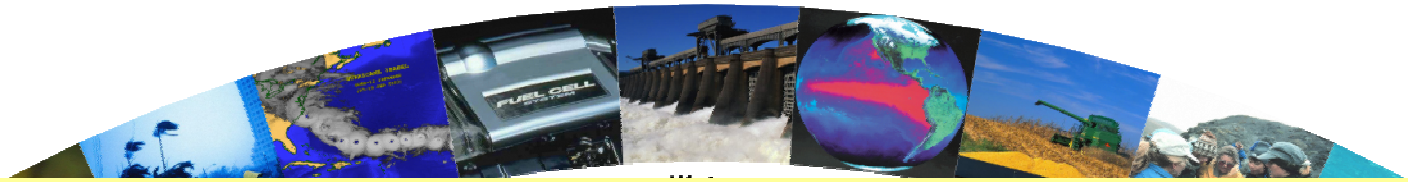
An Intergovernmental Body
with 92+EC Members & 67 Participating Organizations

- ***Earth Observation Summit I (July 2003: Washington DC)***
- ***EO Summit II (April 2004: Tokyo)***
- ***EO Summit III (February 2005: Brussels)***
- ***EO Summit IV (November 2007: Cape Town)***
- ***EO Summit V (November 2010: Beijing)***
- ***EO Summit VI (January 2014: Geneva)***

GROUP ON EARTH OBSERVATIONS

GEOSS

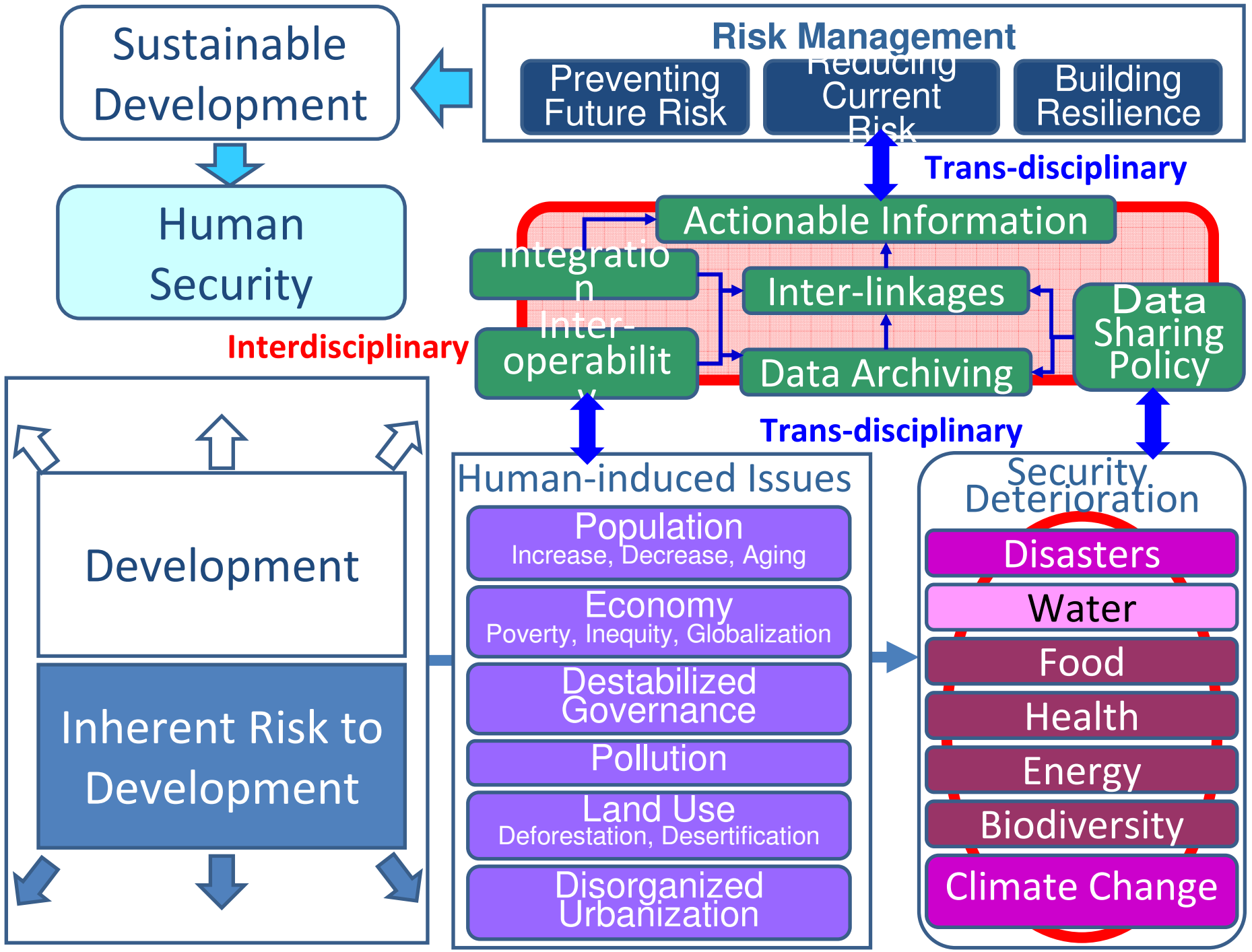
Global Earth Observation System of Systems



Vision for GEOSS

The vision for GEOSS is to realize a future wherein decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations and information.

A Global, Coordinated, Comprehensive and Sustained System of Observing Systems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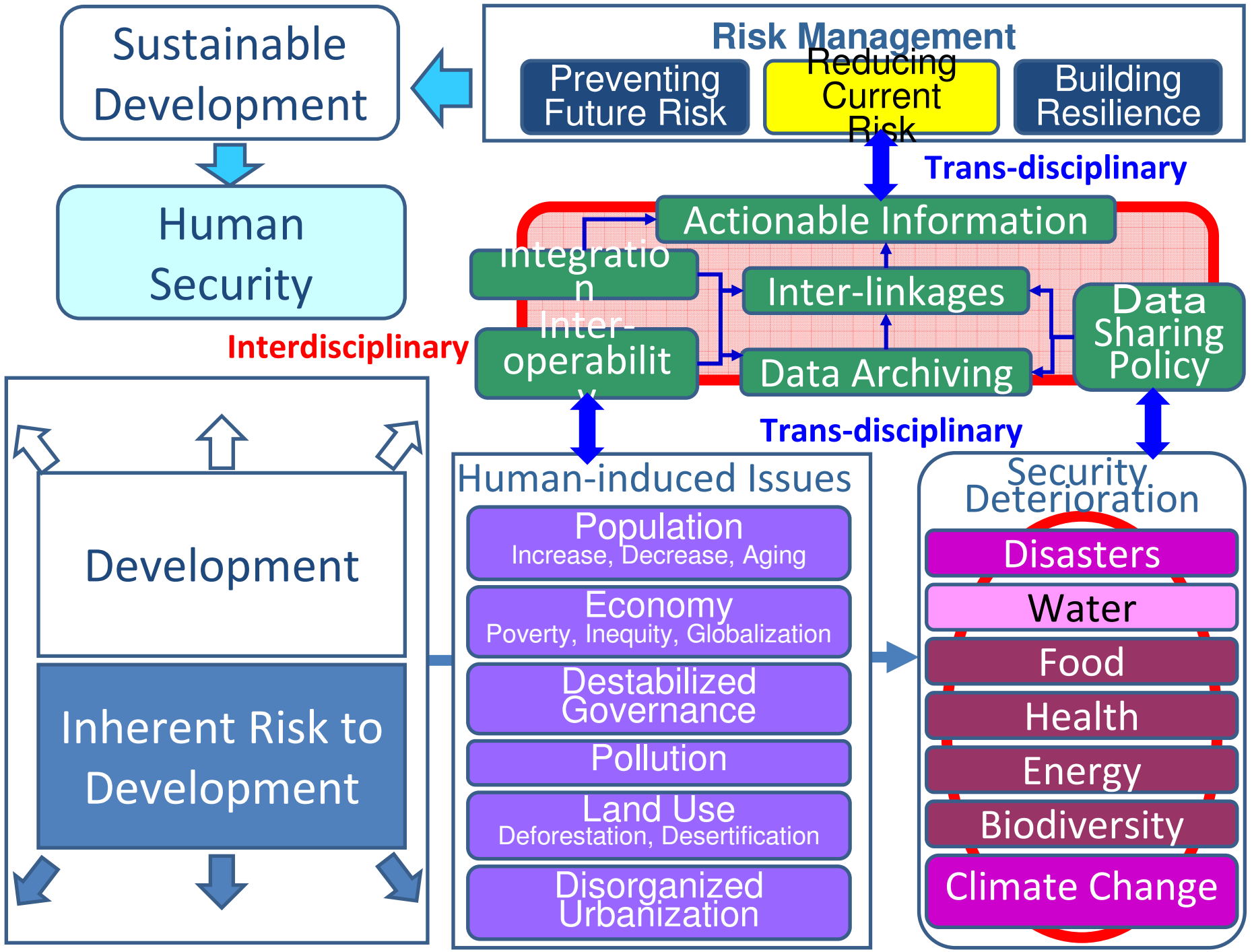
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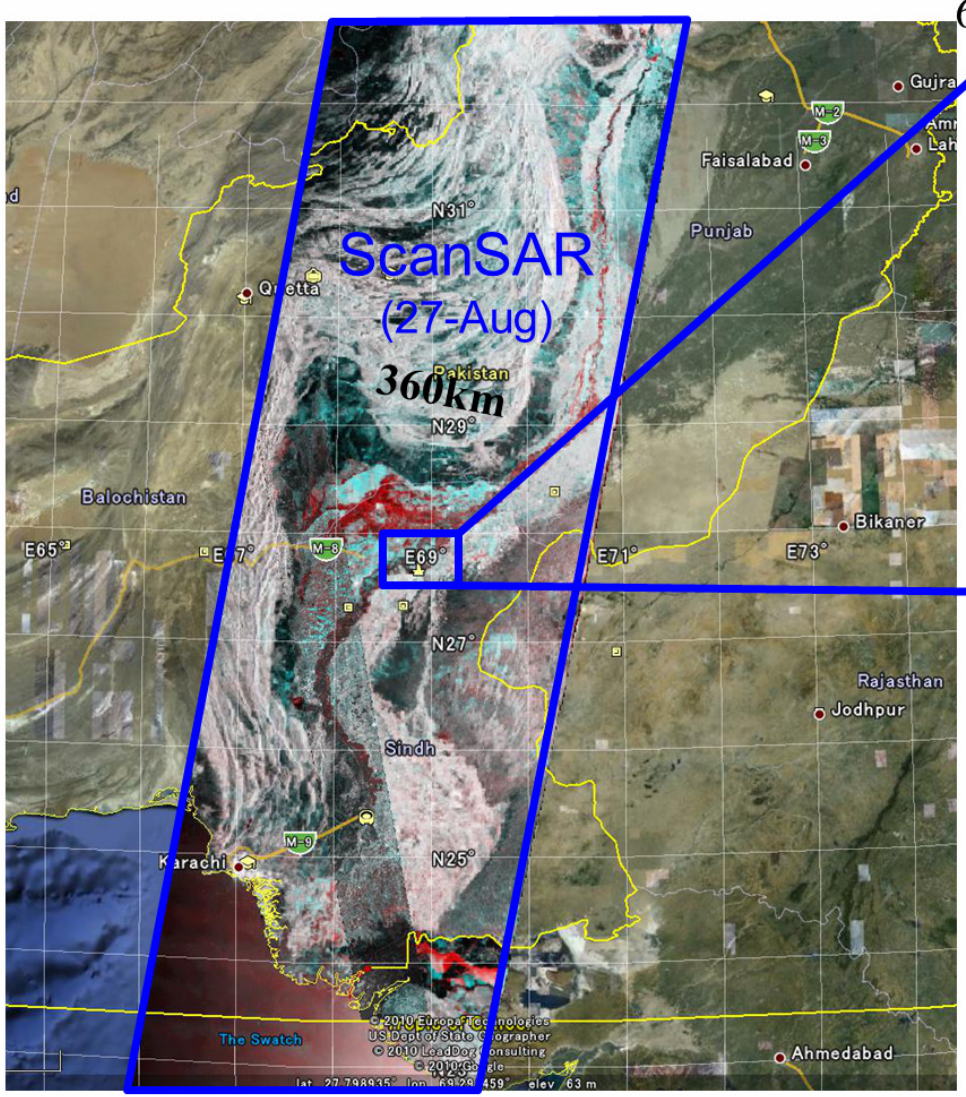
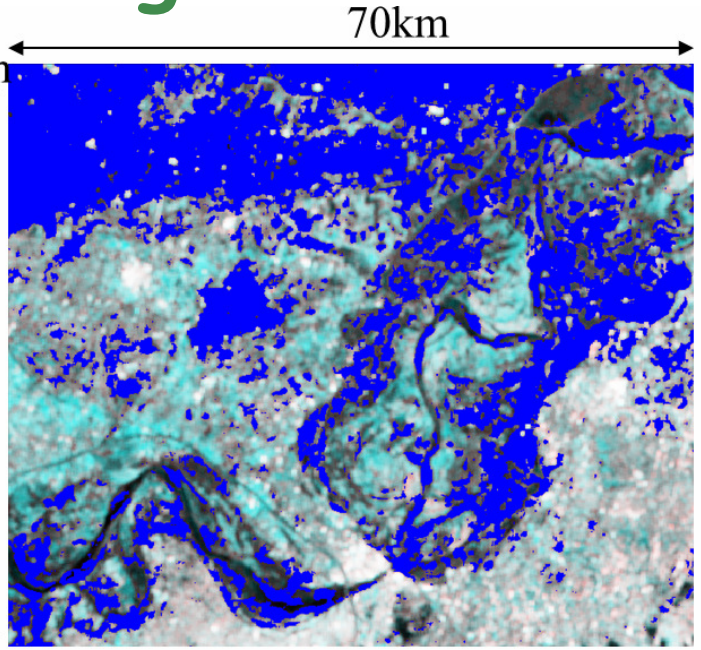
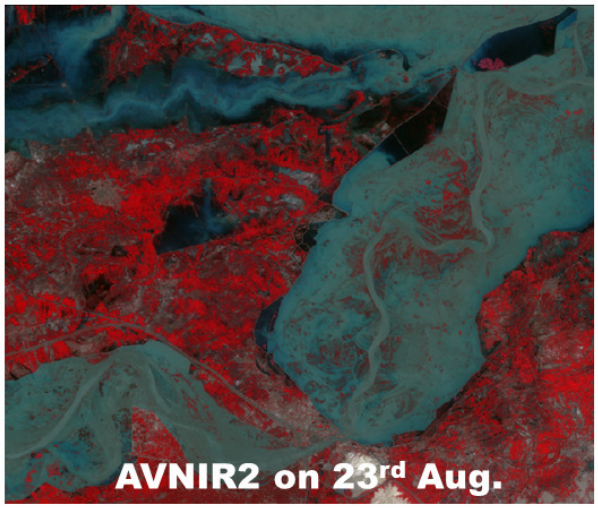
Daichi-1(2006-2011)

Near Real-time Monitoring of Flood

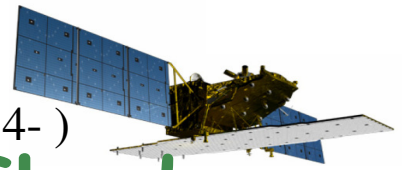




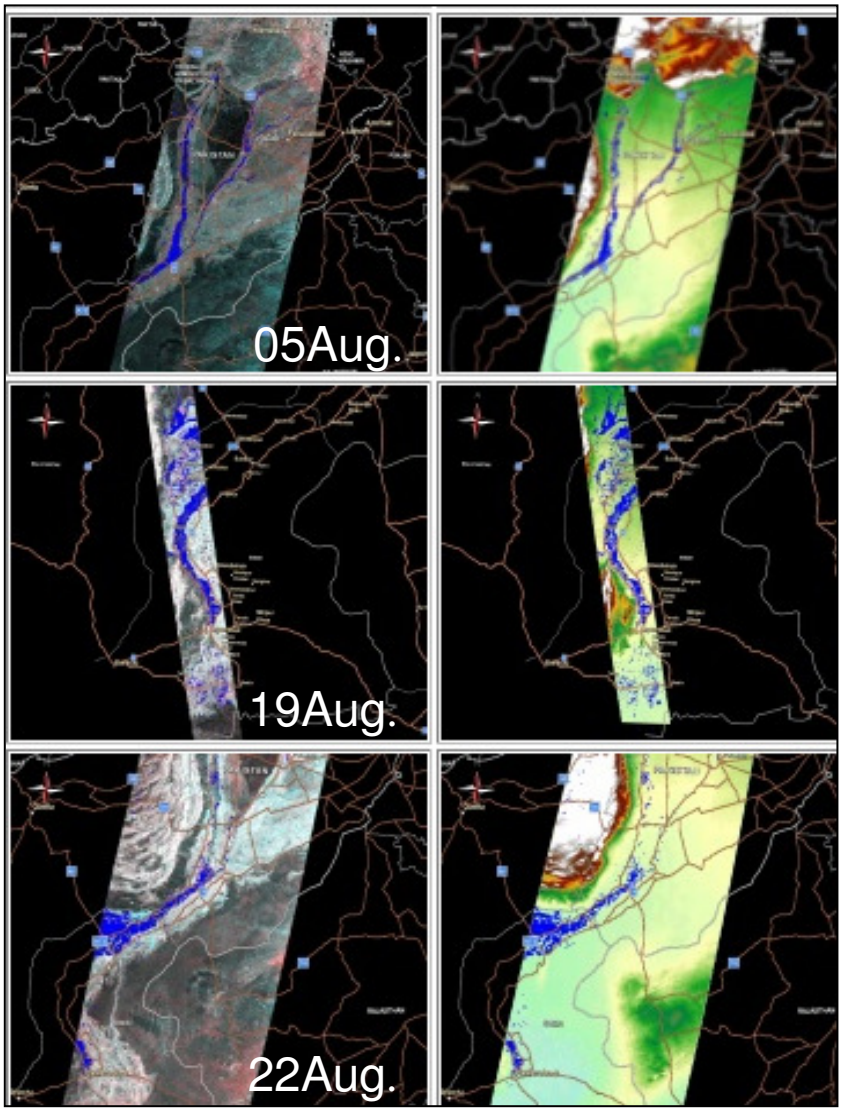


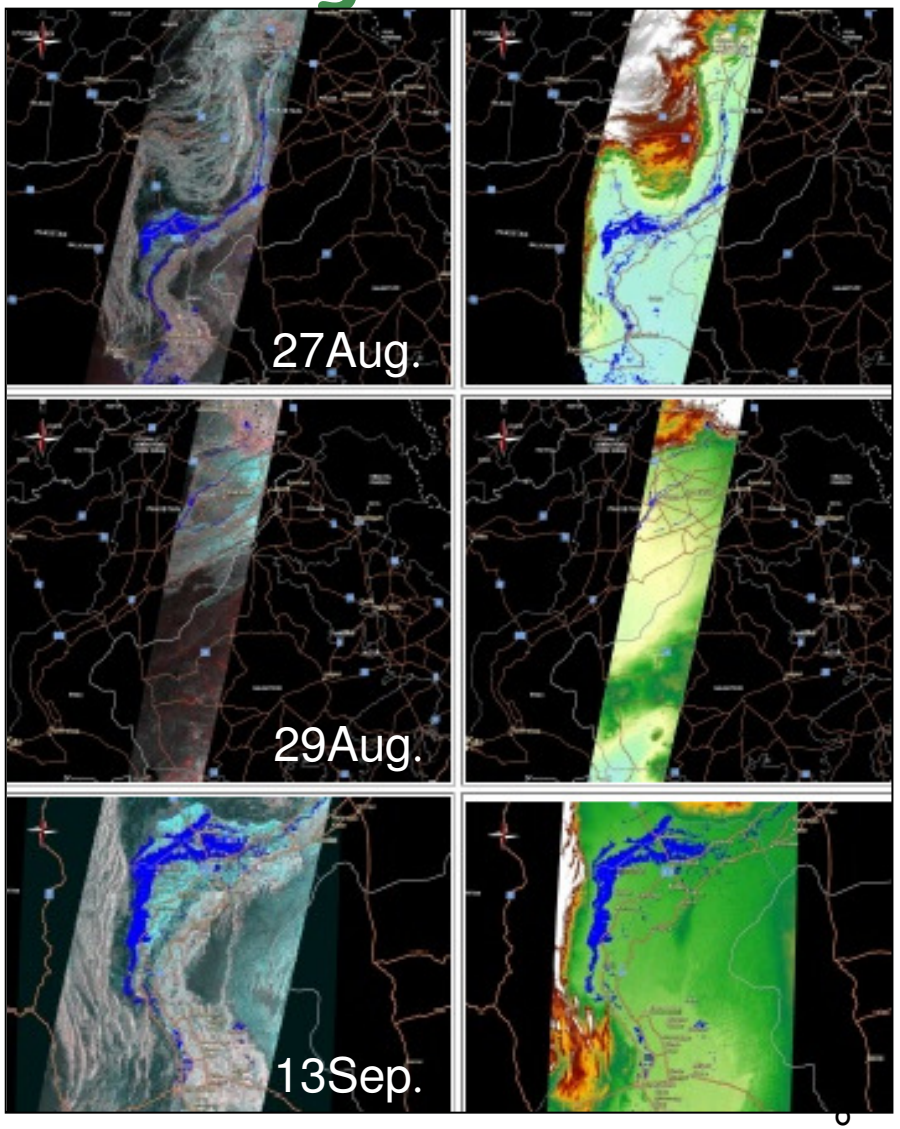
Daichi-1(2006-2011)

Daichi-2 (2014-)



Near Real-time Monitoring of Flood

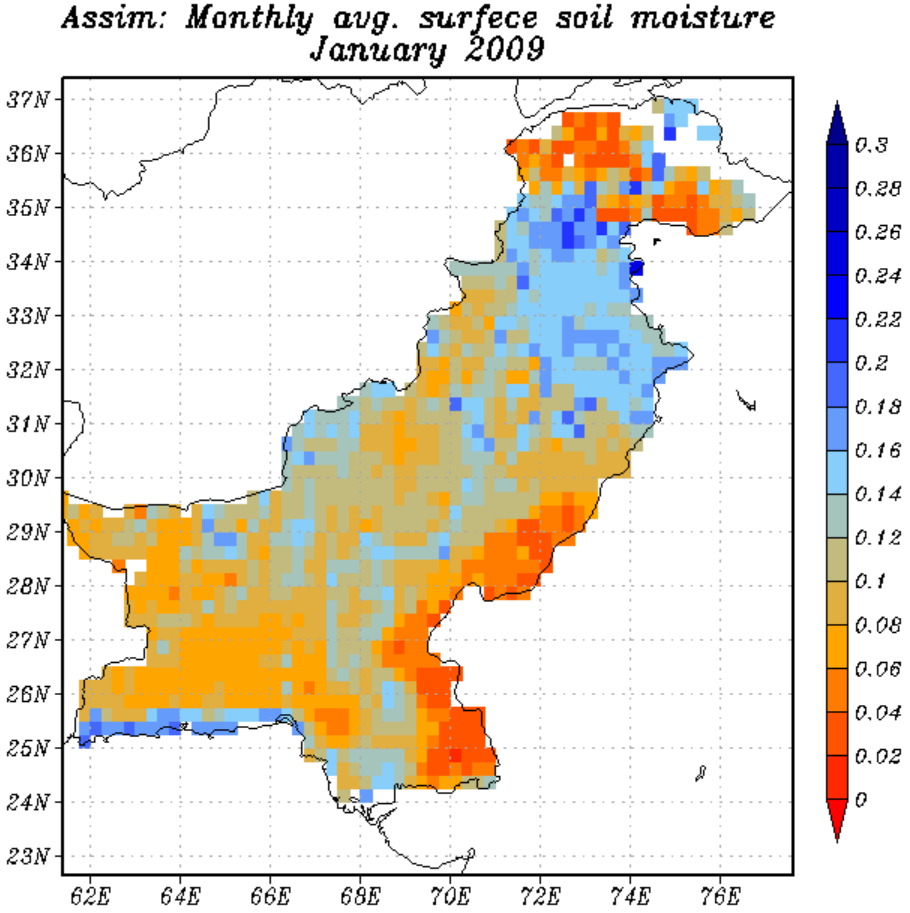


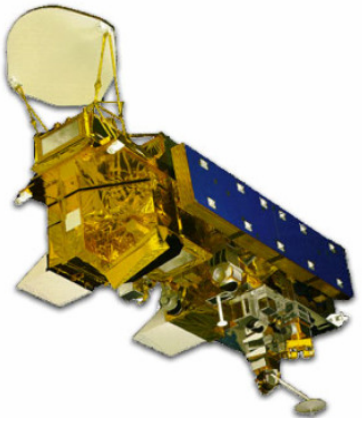


GEOSS/AWCI Website: http://monsoon.t.u-

Shizuku/AMSR-2
(2013-)

Surface Soil Moisture



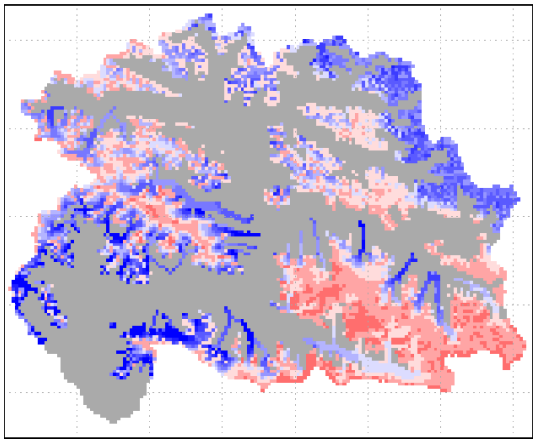


Aqua/AMSR-E
(2002-2012)

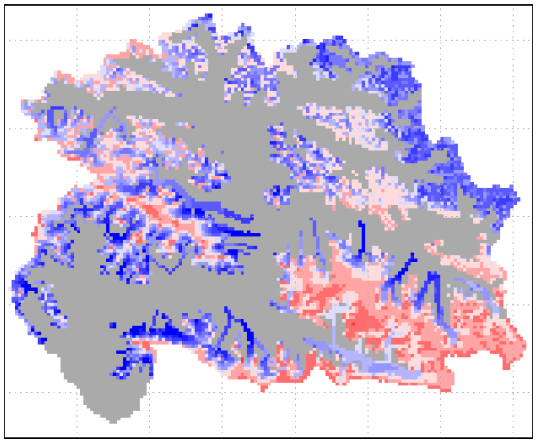
Hunza: Mass Balance and Discharge

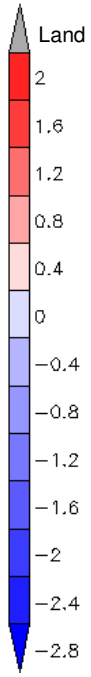
Net Mass Balance (m w. eq.)

Oct 2001- Sep 2002

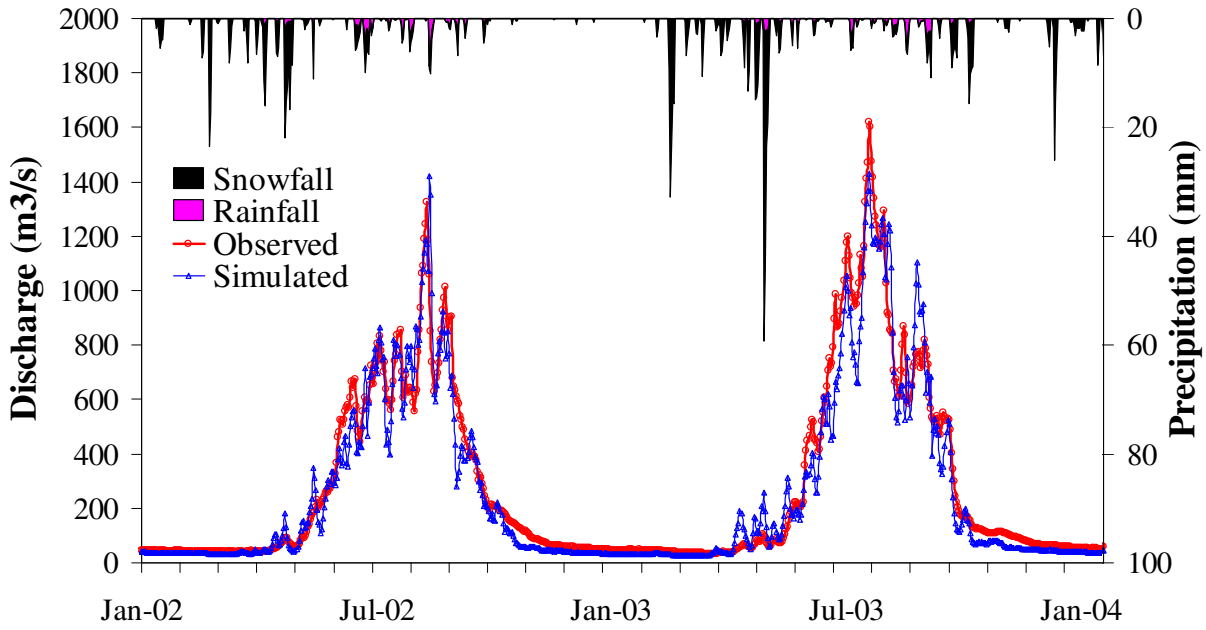


Oct 2002- Sep 2003



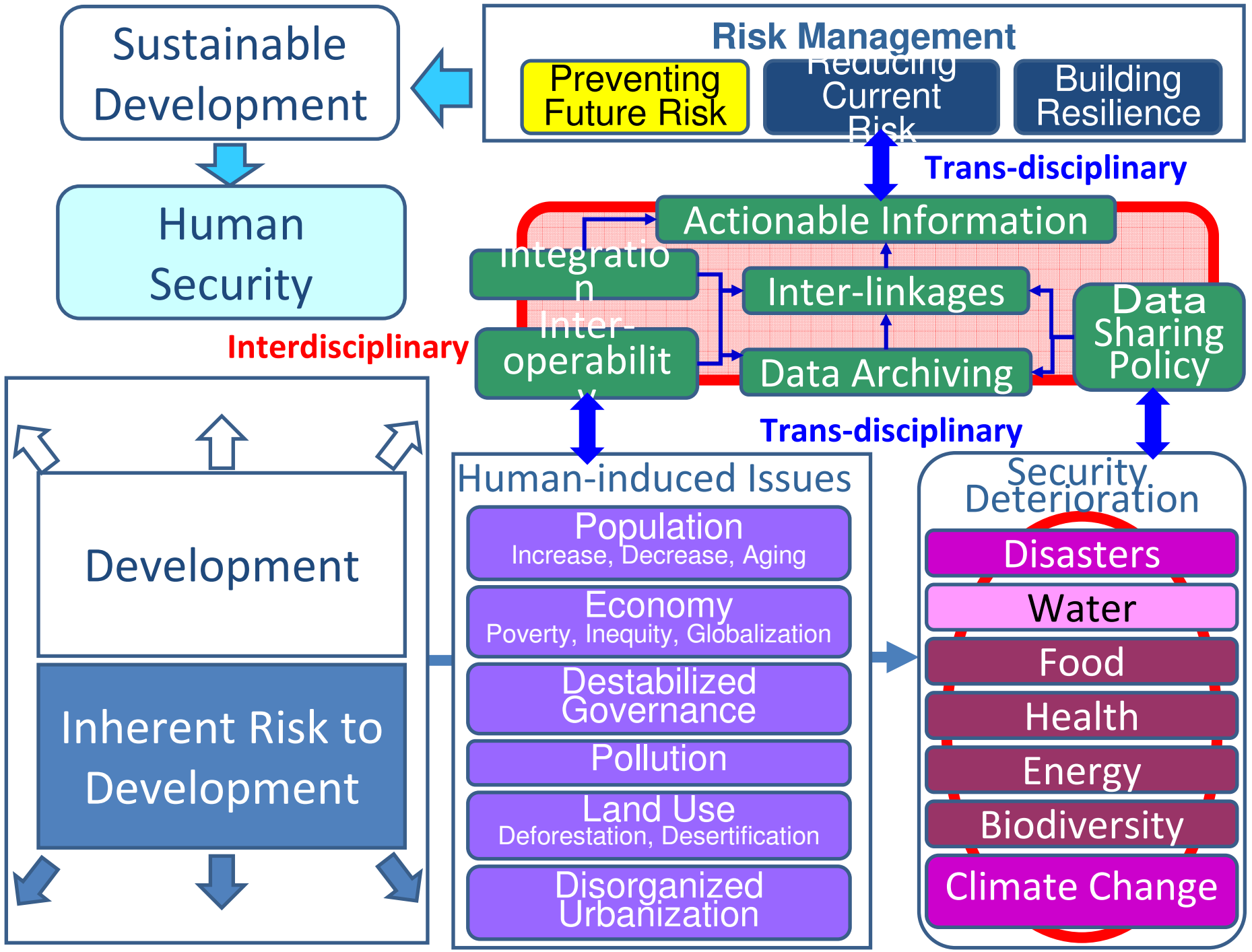


Discharge at Basin Outlet



	Contribution to Discharge			Statistics		
Year	Rainfall	Snow melt	Glacier melt	NSE	MBE	R^2
2002	12%	35%	53%	0.92	+4.56%	0.97
2003	10%	40%	50%	0.94	+3.65%	0.97

Offered by Dr. Maheswor Shrestha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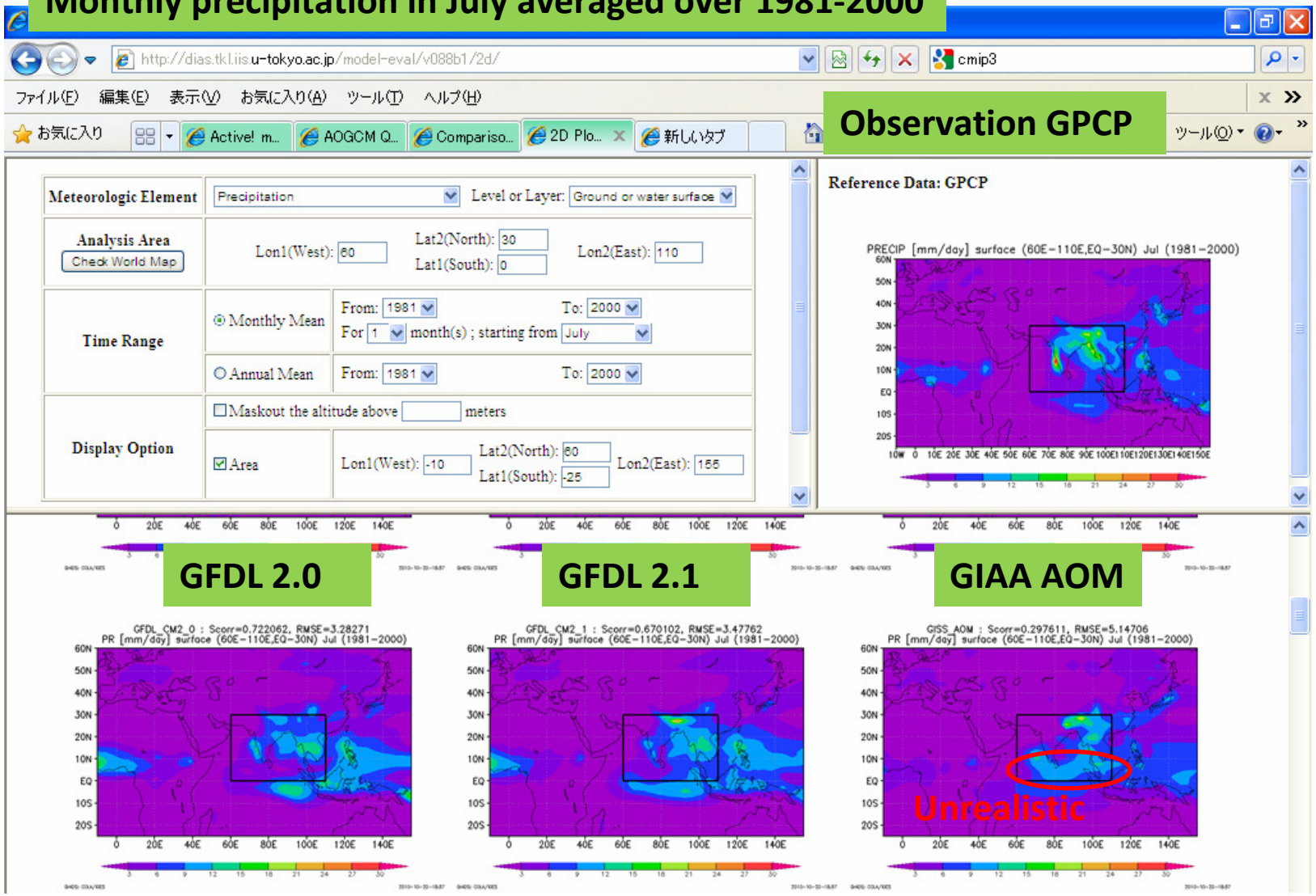
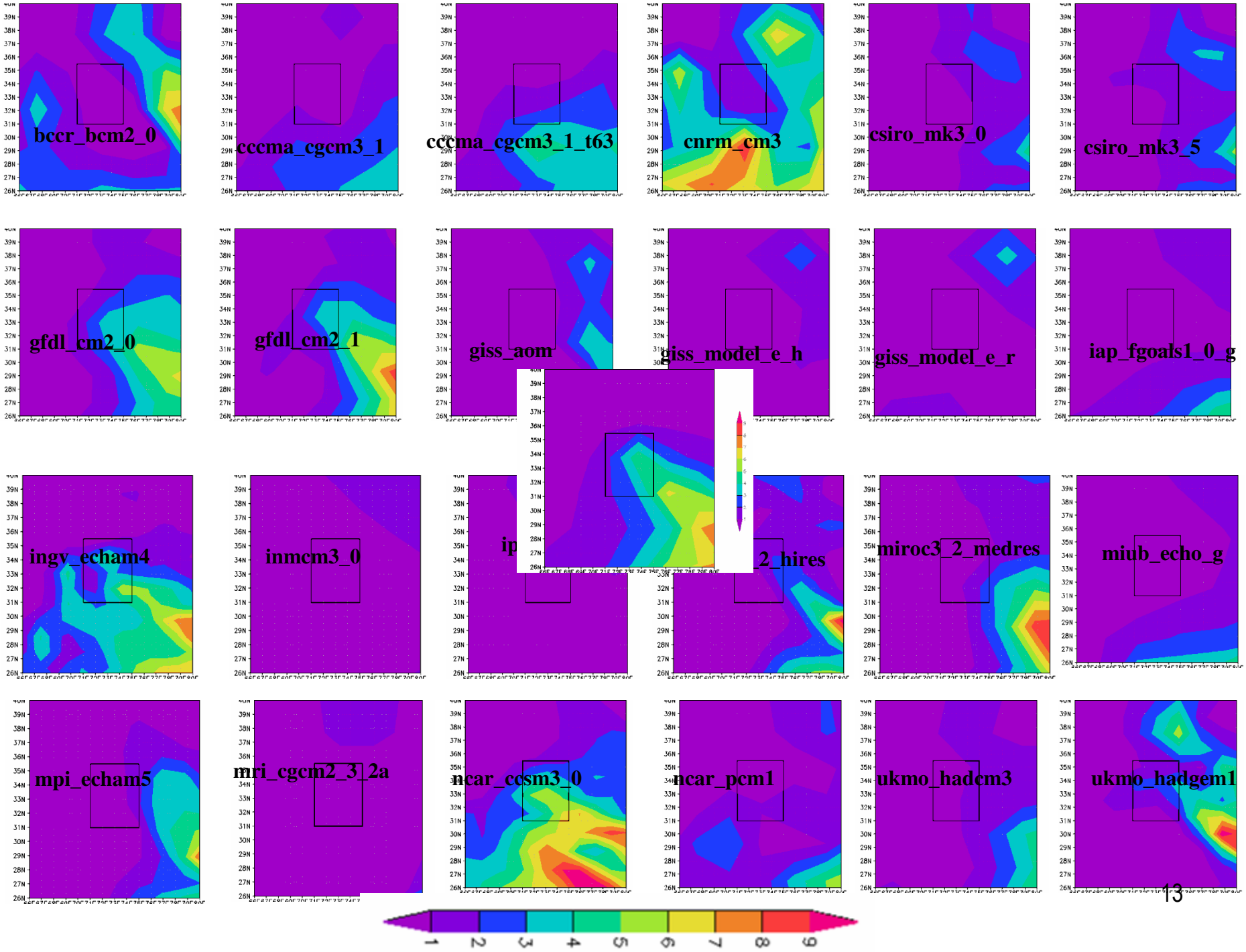
1. Selection of CMIP3 models based on reproducibility in the 20th century

In order to evaluate the variability of the Asian summer monsoon in the global warming as simulated by the CMIP3 models, it is necessary to pick up best models to reproduce the seasonal evolution of the Asian summer monsoon in the 20th century.

Monthly precipitation in July averaged over 1981-2000

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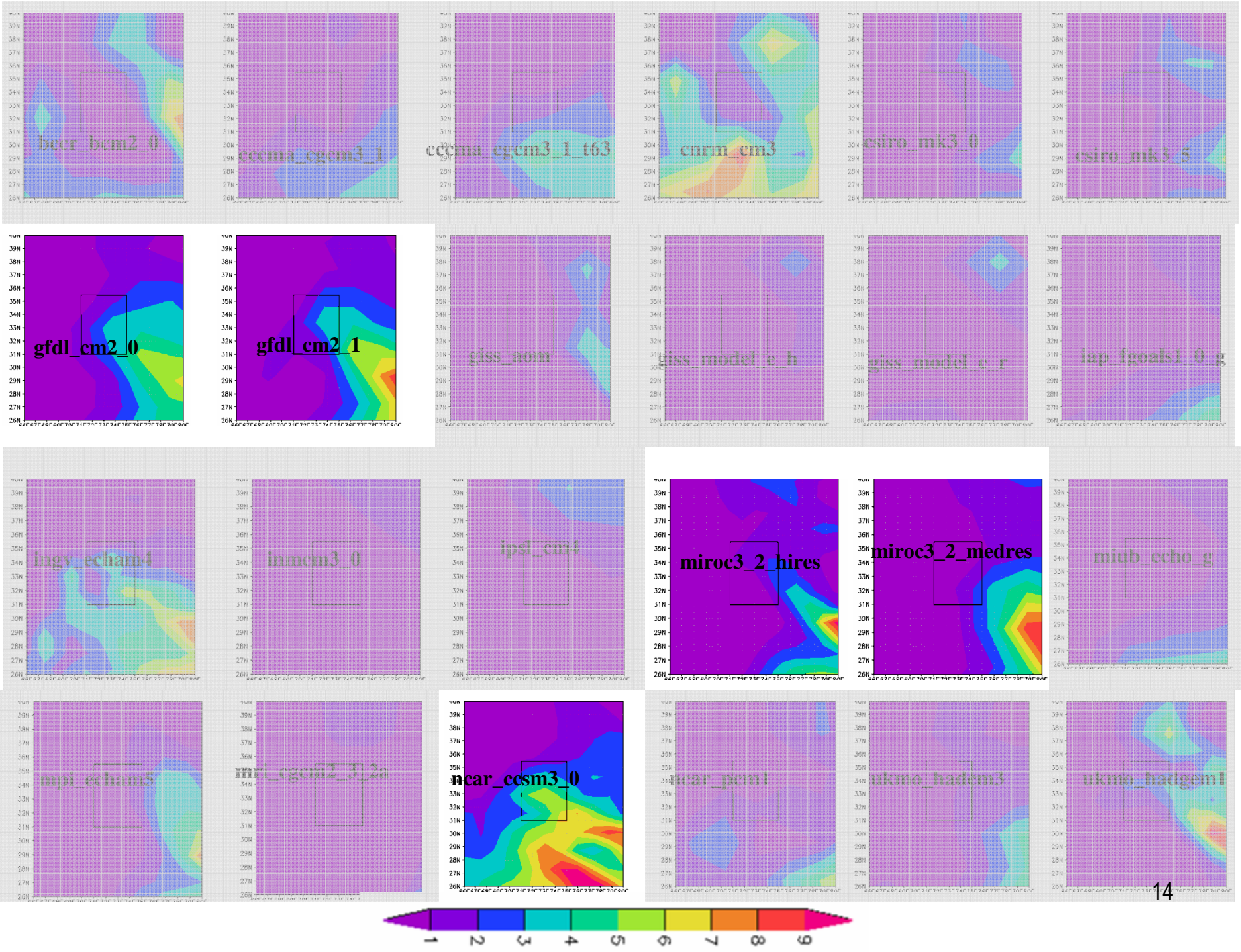
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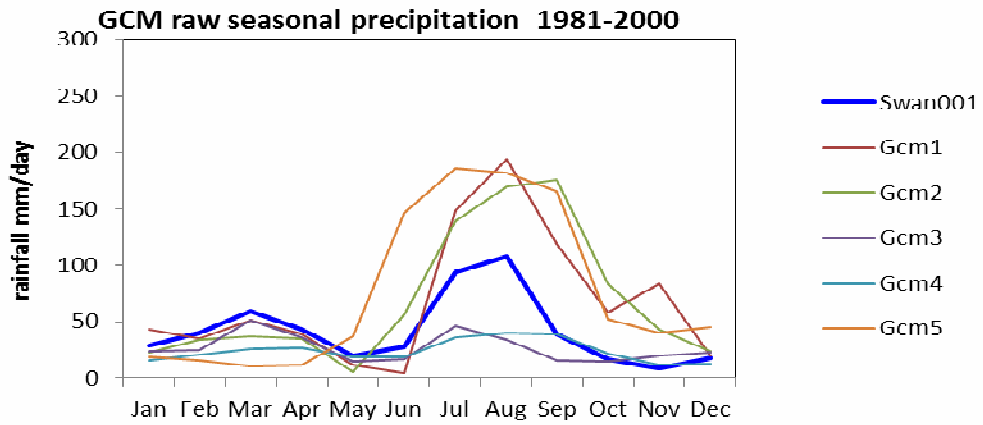
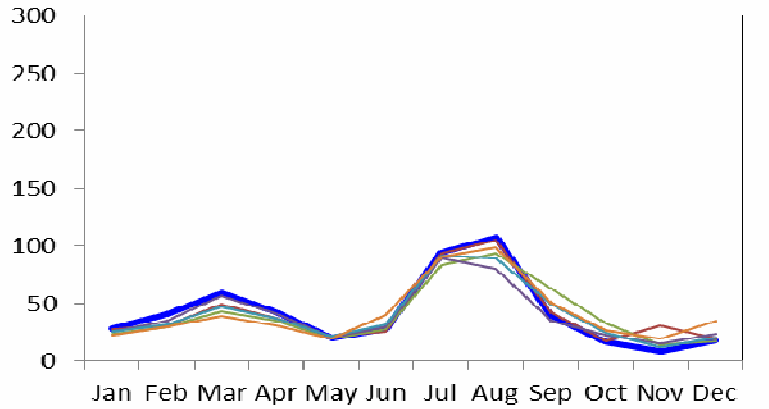
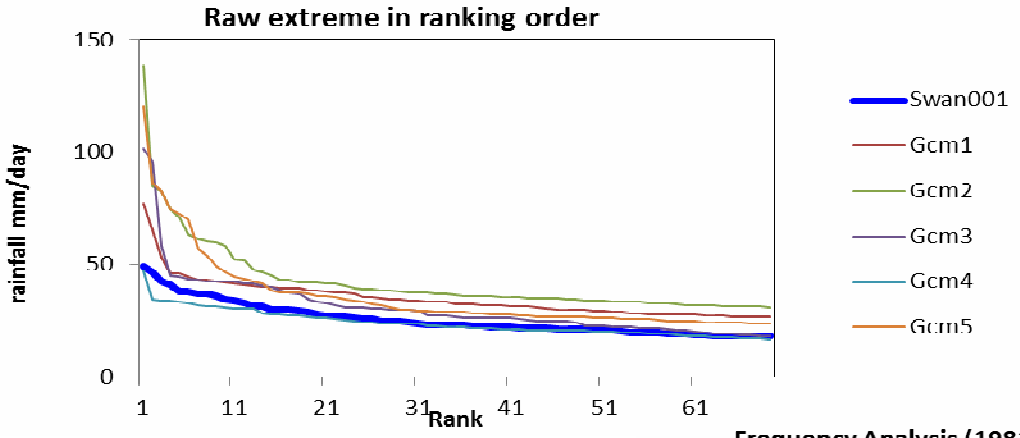
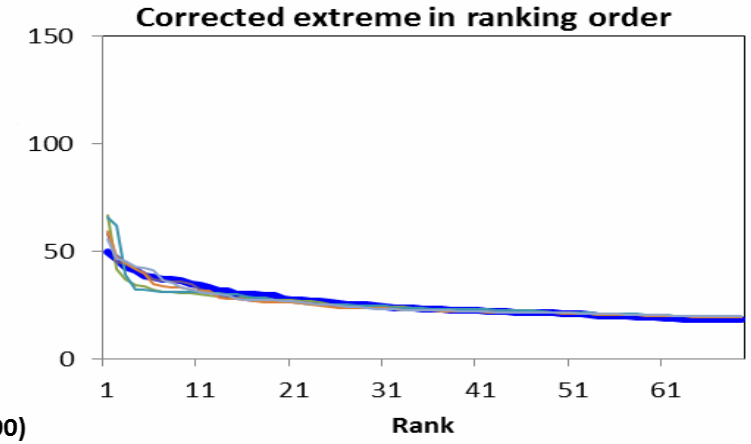
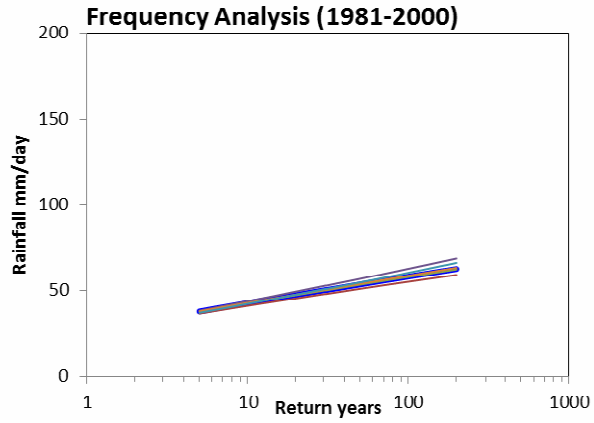
Bias correction

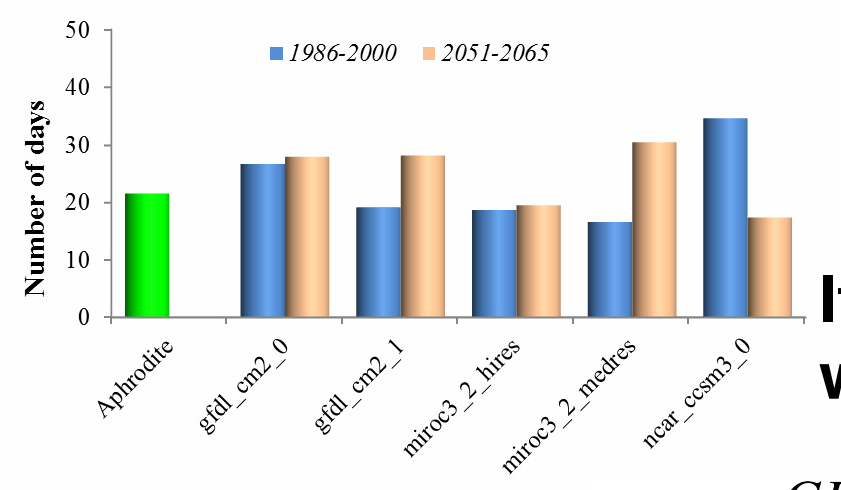










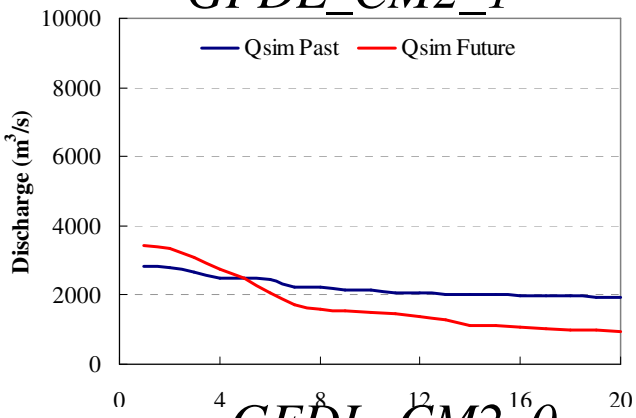


Average maximum continuous dry spell

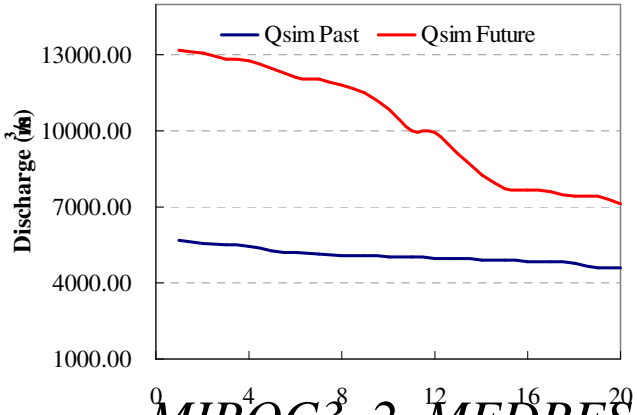
It is likely that droughts and floods will be more severe in future.

Change in the top 20 floods

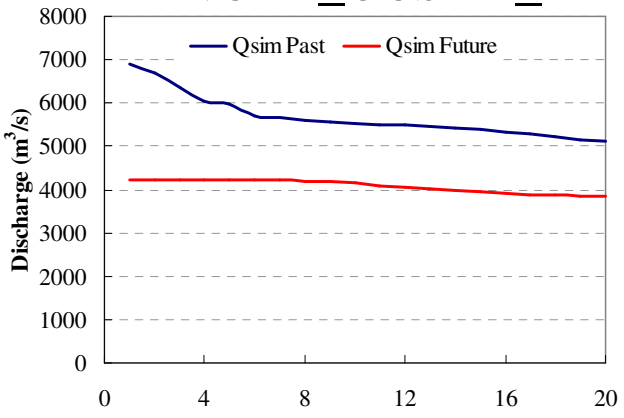
GFDL_CM2_1



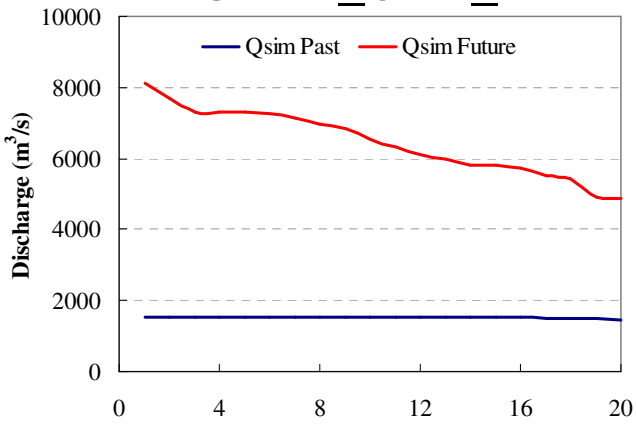
MIROC3_2_HIRES



NCAR_CCSM3_0



GFDL_CM2_0



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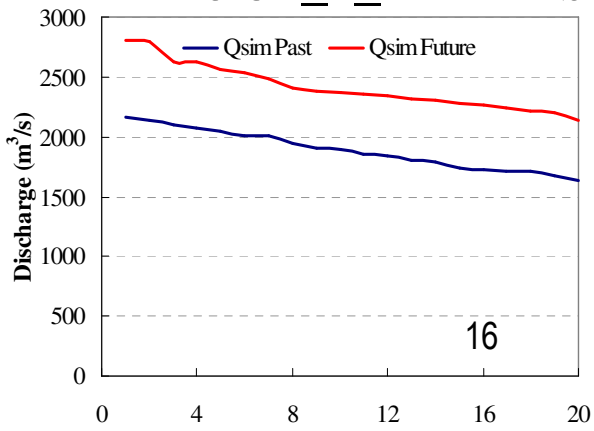
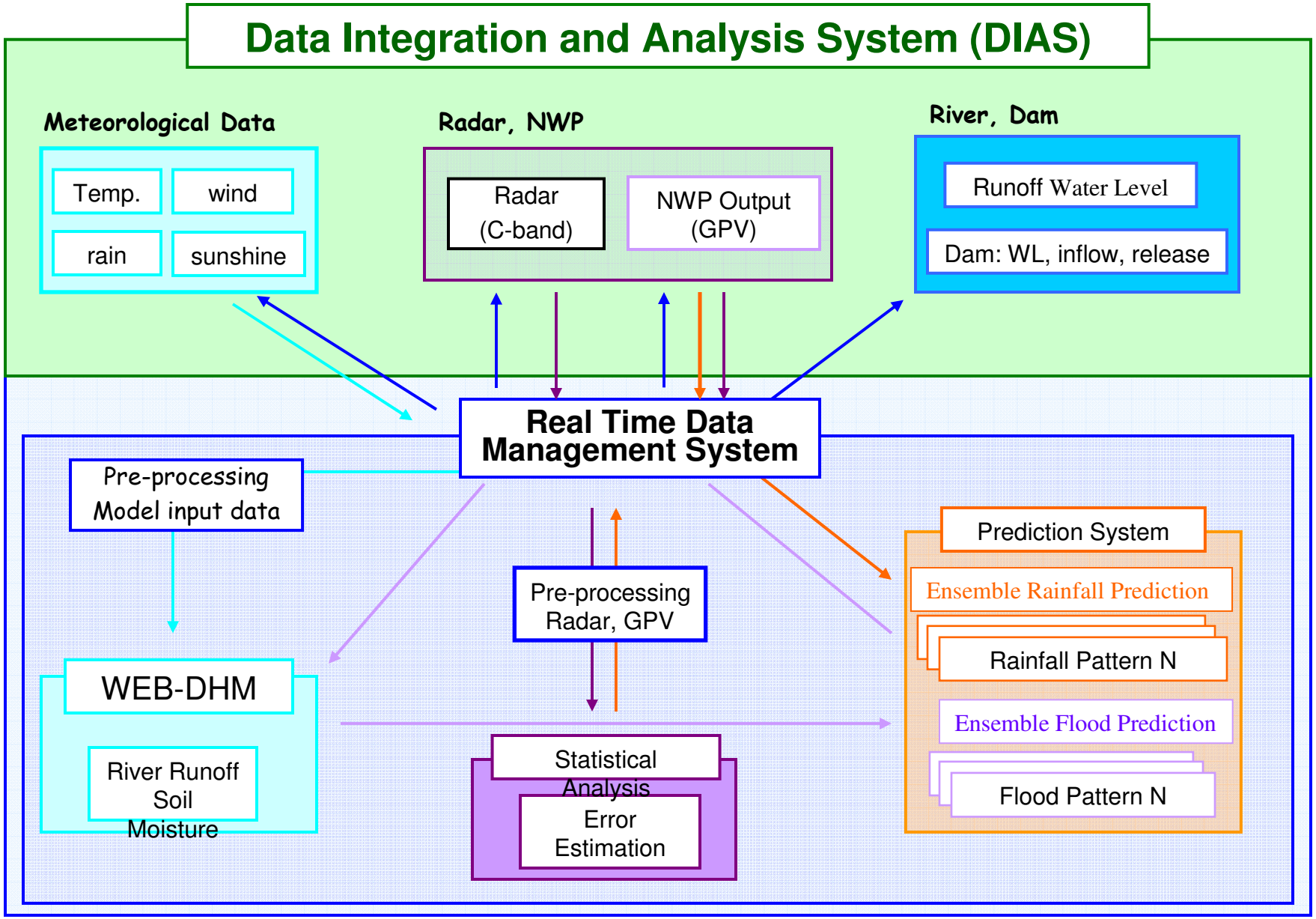


Offered by Dr. Dr. Asif M. Bhatti & Dr. Mohamed Rasmy

DIAS Ensemble Flood Prediction



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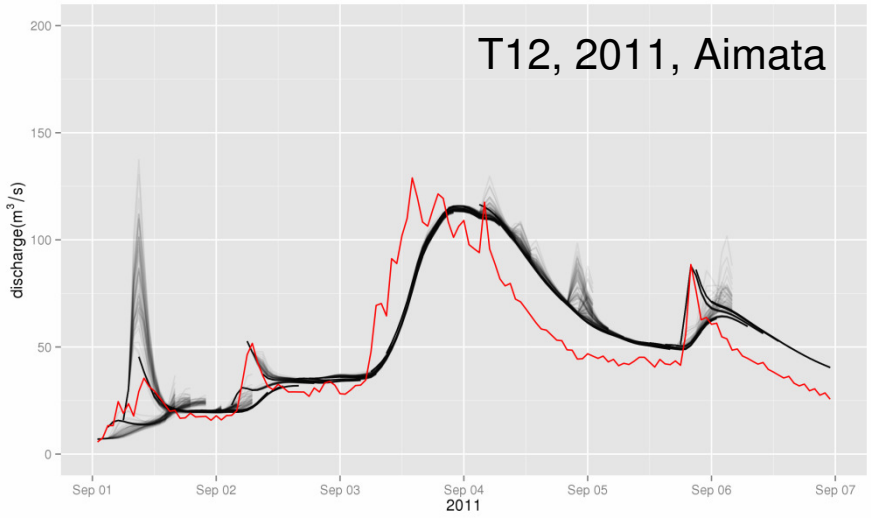

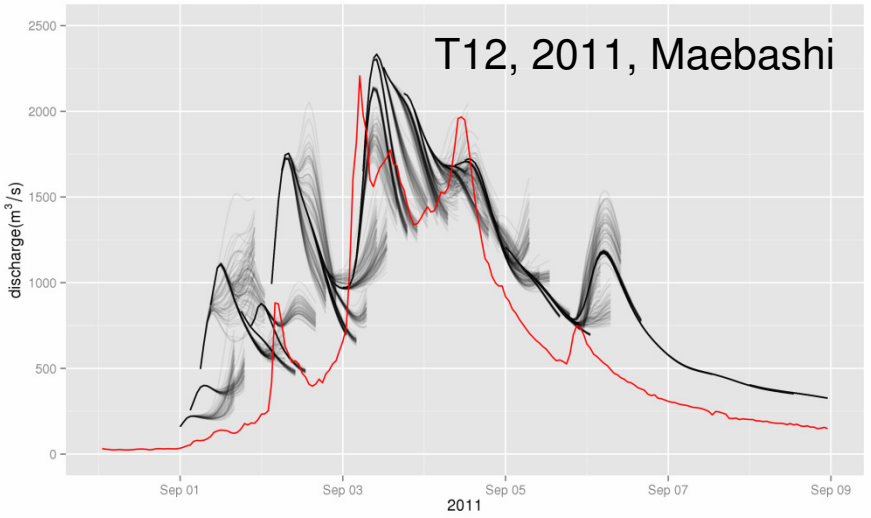

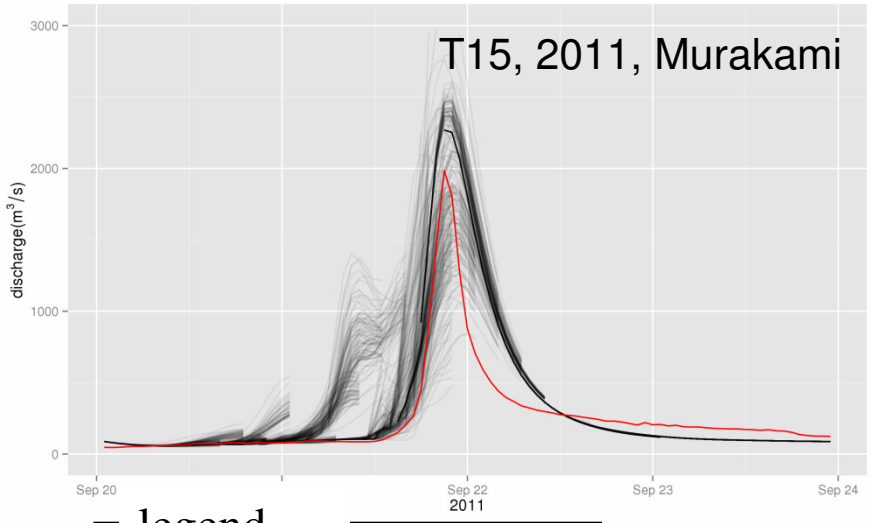

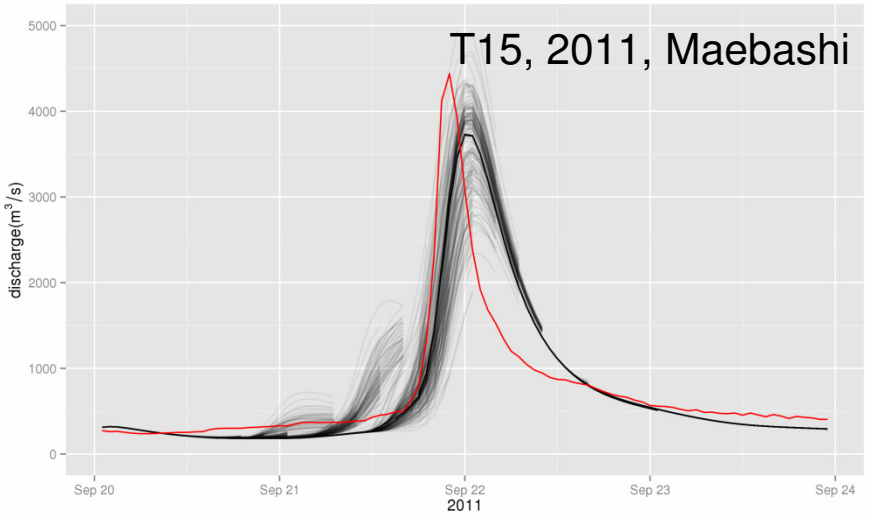

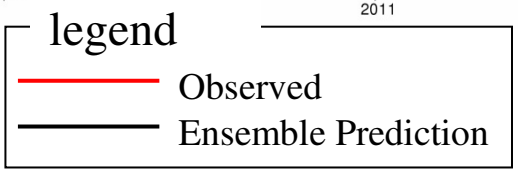

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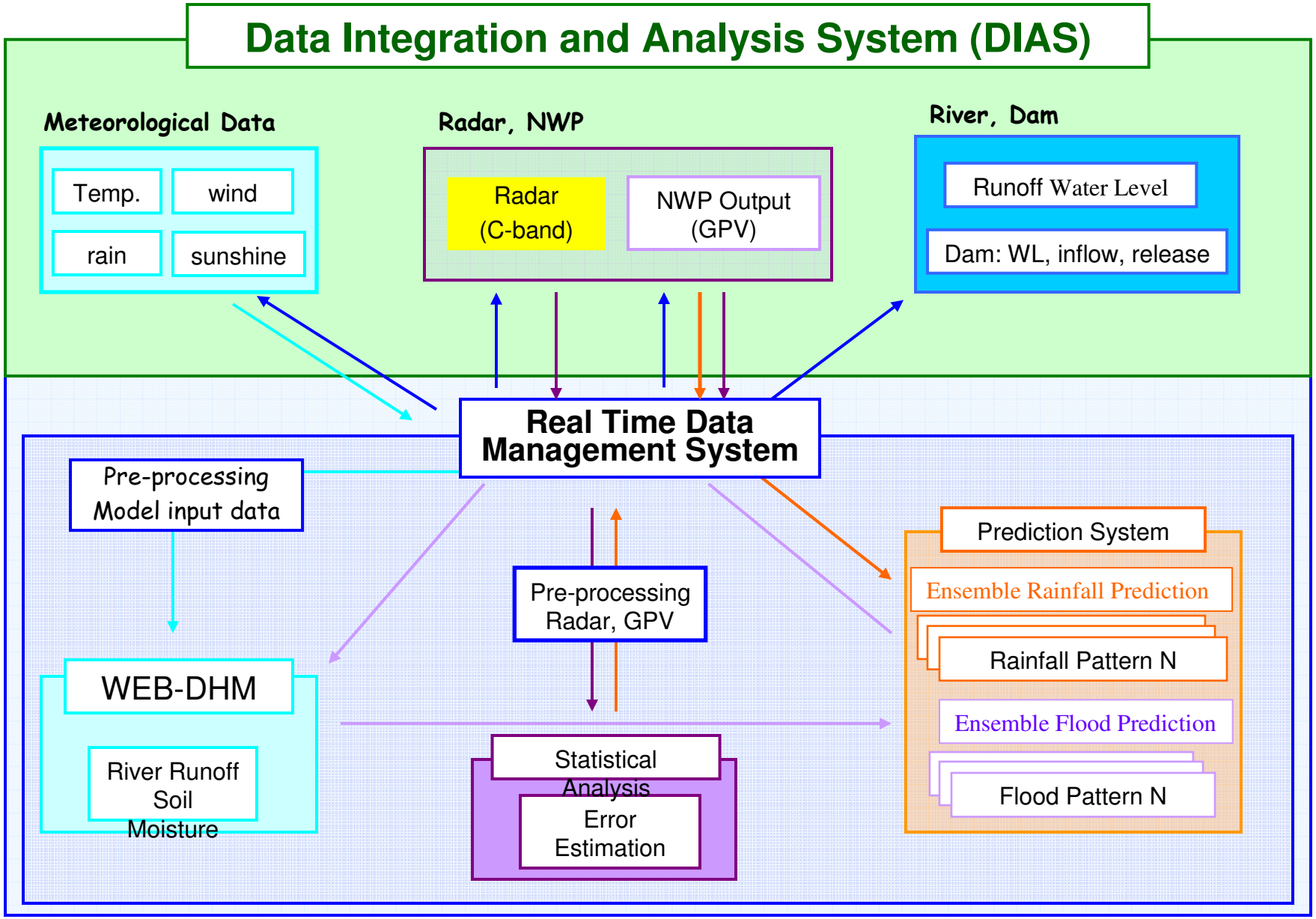
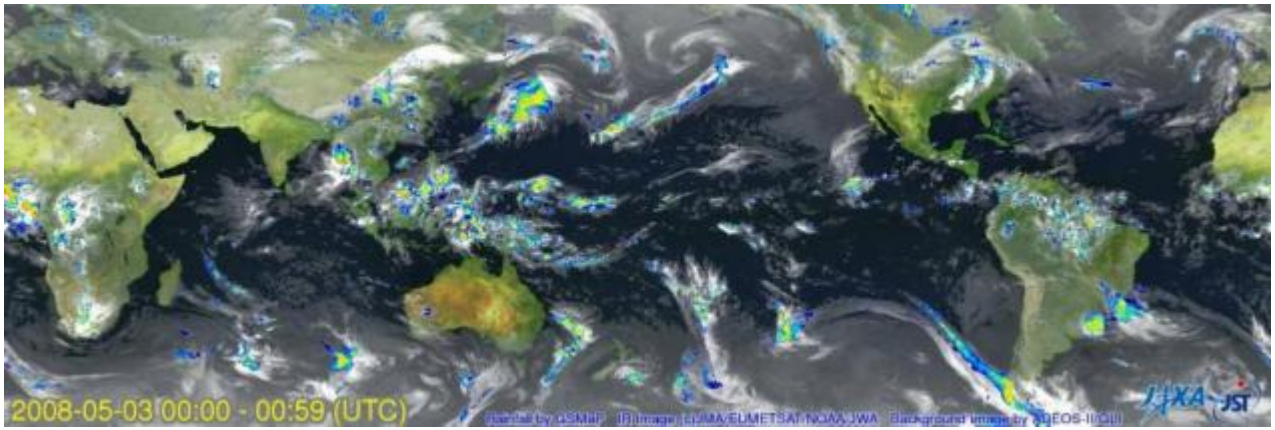


GSMaP Overview

NTT DATA

GSMaP (Global Satellite Mapping of Precipitation)



- "High precision and high resolution global precipitation map" by using multiple (more than nine) satellite-borne microwave radiometers
- Microwave radiometers observe the intensities of microwaves radiated by raindrops or scattered by snow ice.
- GSMaP additionaly uses rain cloud movement to enhance temporal resolution by using infrared imager aboard geo-stationary meteorological satellites.
- JAXA offers hourly global rainfall maps in near real time (about four hours after observation).

GSMaP Real-time Calibration

NTT DATA

New challenge from "Monthly" to "Daily/Hourly"

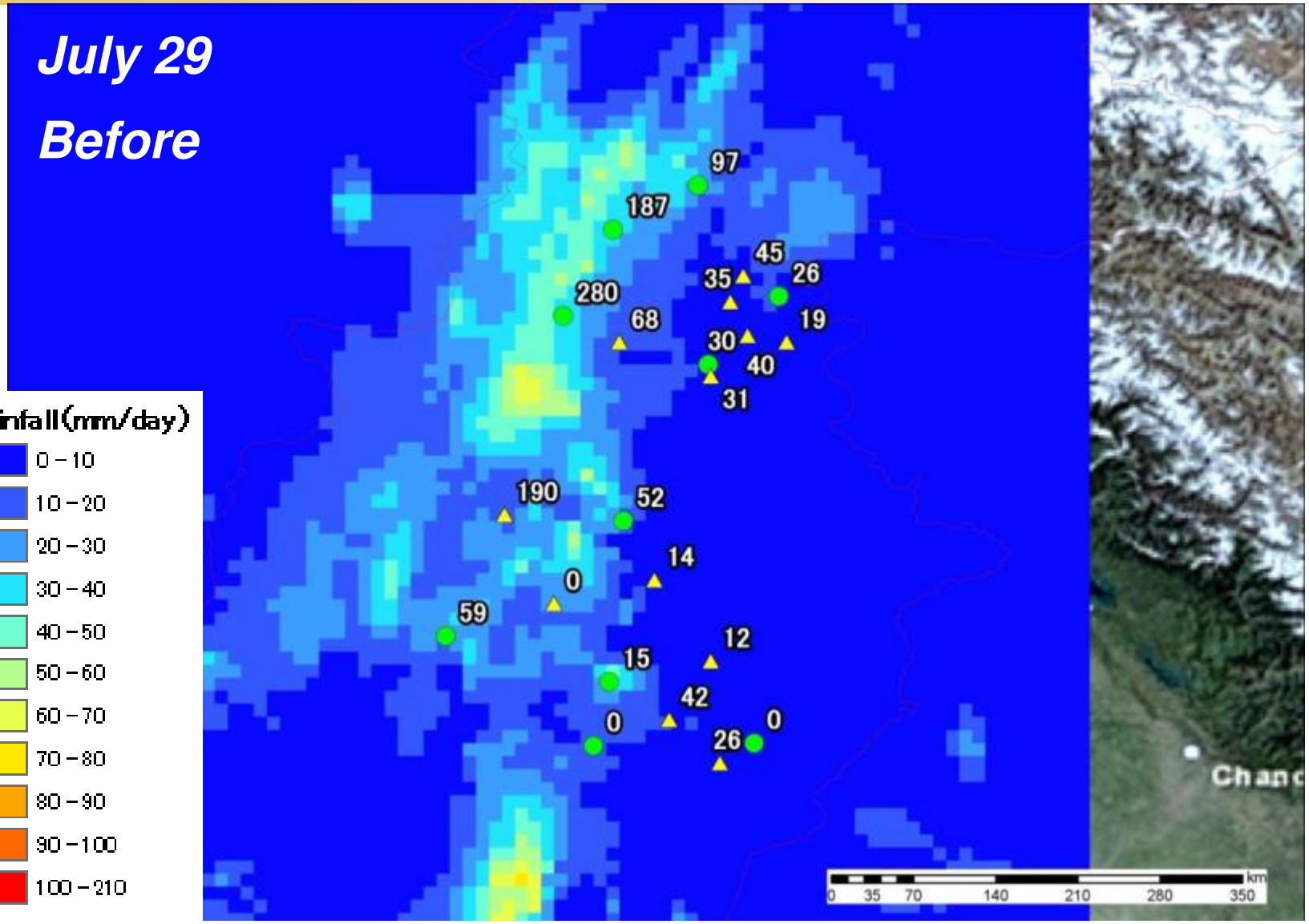
- *JAXA has launched a study on real-time correction from Nov, 2013.*
- *1st technical workshop with PMD, SUPARCO and UNESCO in Jakarta in Nov, 2013.*
- *2nd technical workshop with PMD and SUPARCO in Tokyo in Jan, 2014.*
- *3rd technical workshop with PMD and SUPARCO in Islamabad in March, 2014.*

Techniques for the new challenge

Target	*Purpose*	*Method*
Rainfall amount accuracy	*To improve hourly/daily rainfall by combining GSMaP and ground observation data*	*Offset & Scale correction*
Geo-location accuracy	*To improve geometric (XY) error by comparing with ground-observed rainfall pattern*	*Shift correction*
Topographic effect	*To improve local topographic effect by using elevagtion data*	*Elevation weight*

Applying to flood event in July 2010

NTT DATA



Applying to flood event in July 2010

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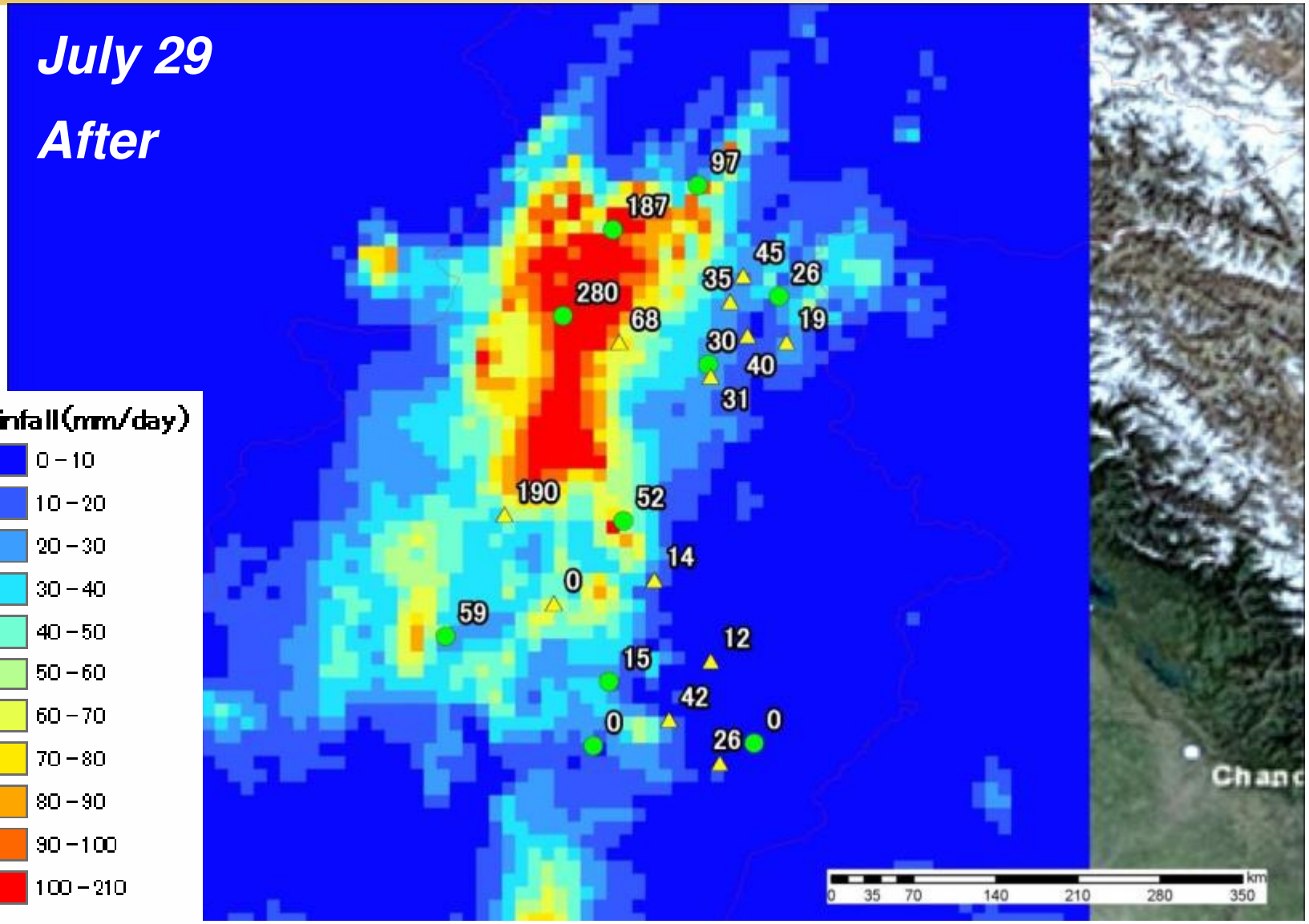

Applying to flood event in July 2010

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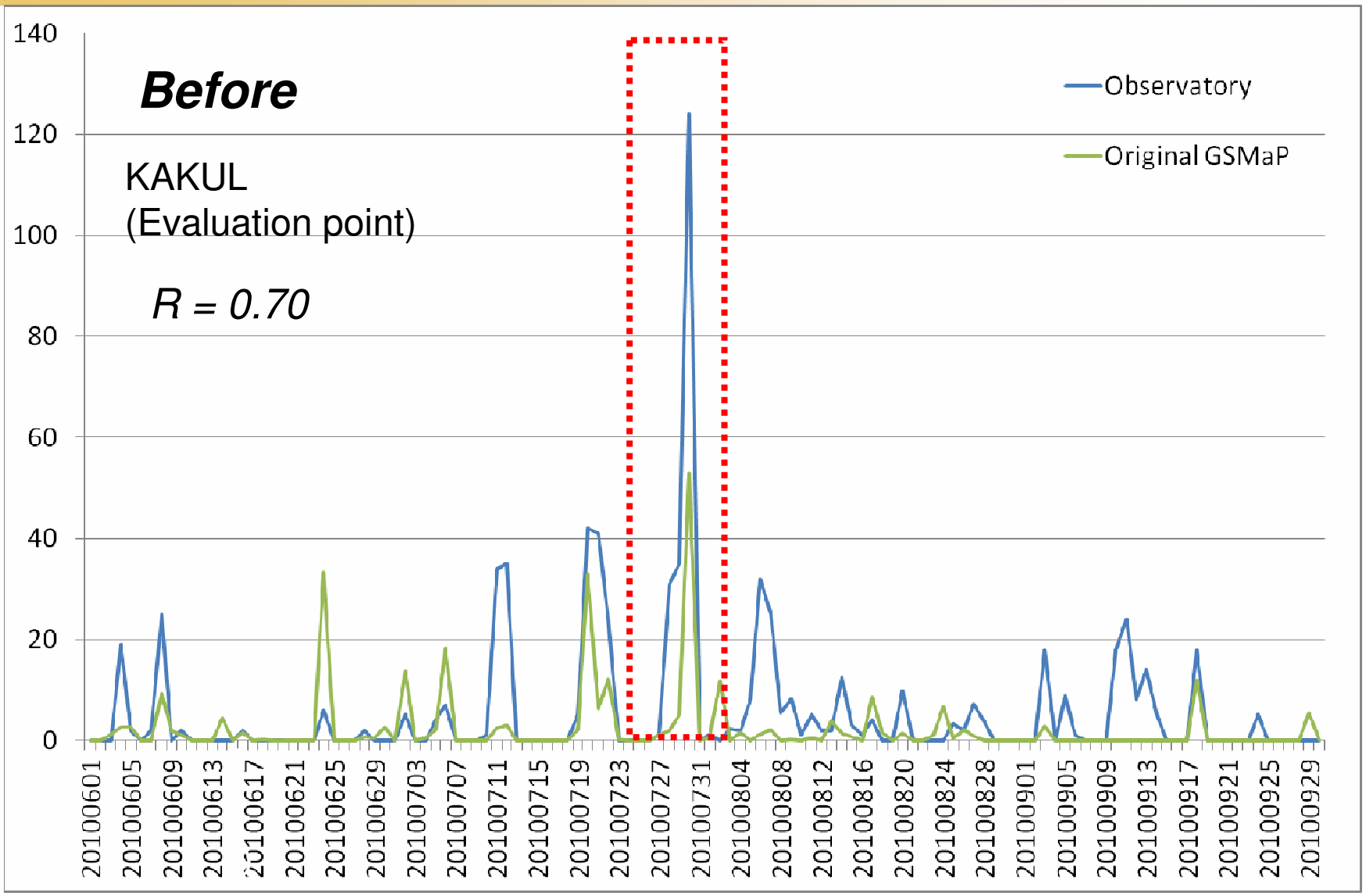
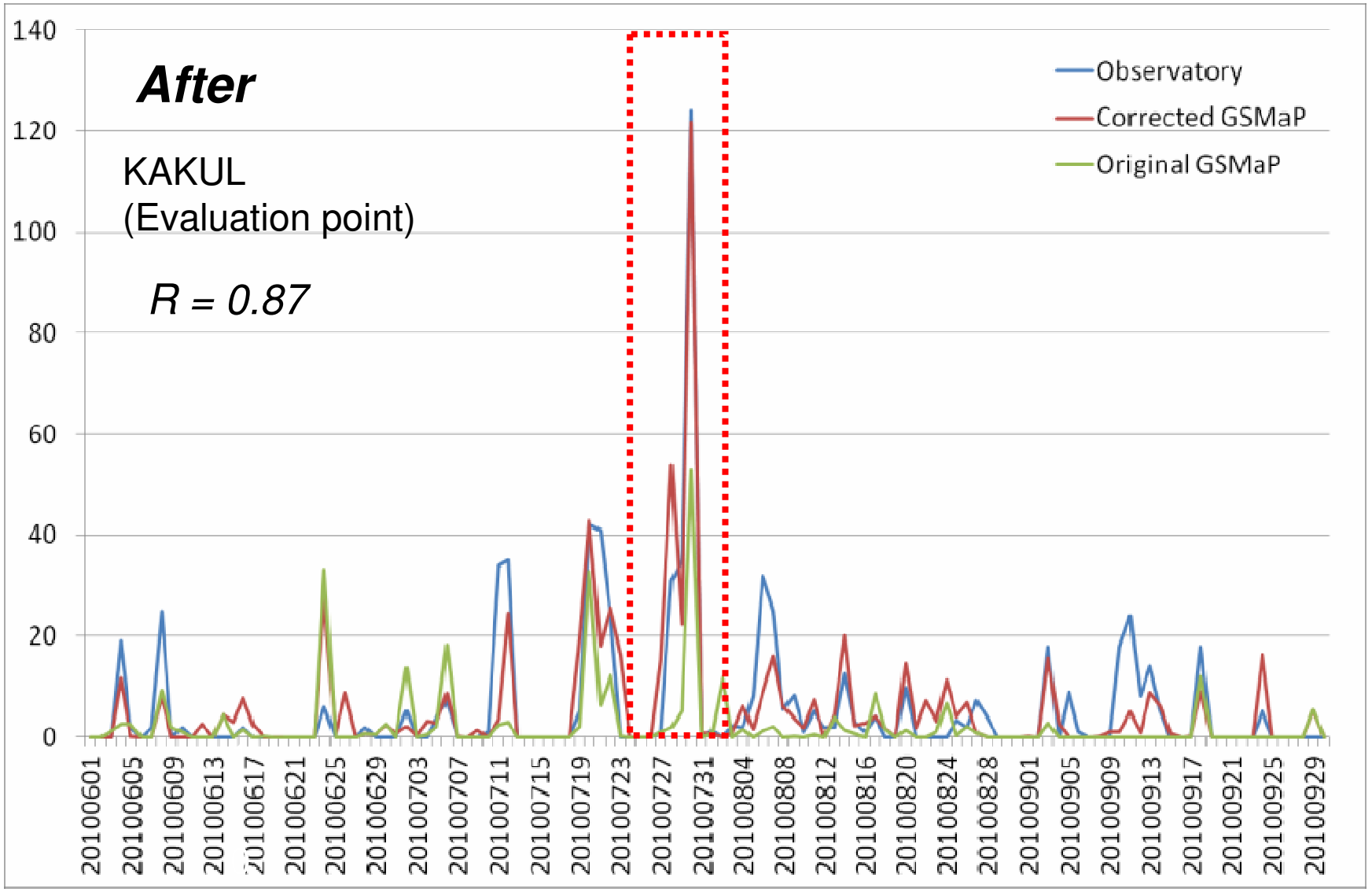
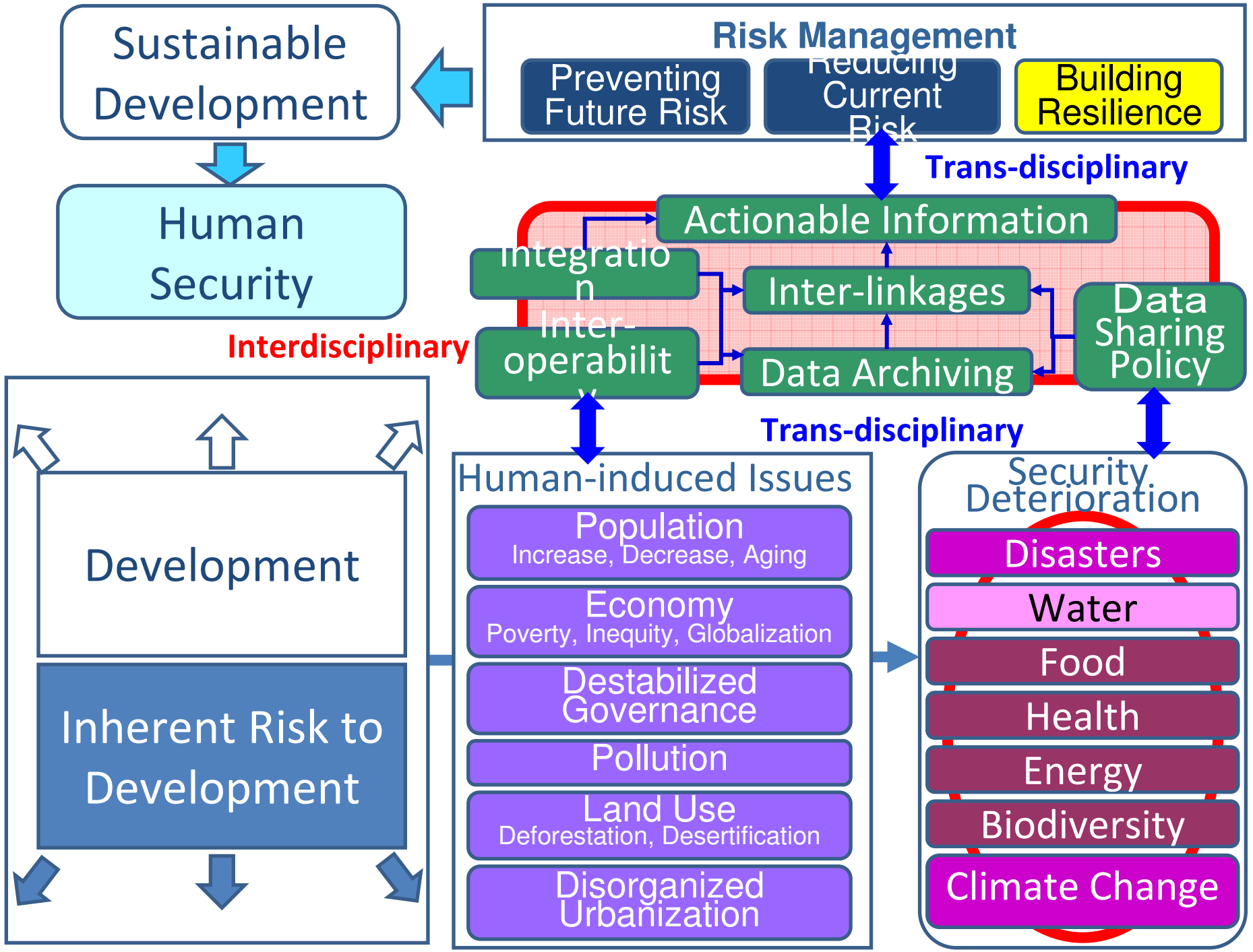


Applying to flood event in July 2010

NTT DATA

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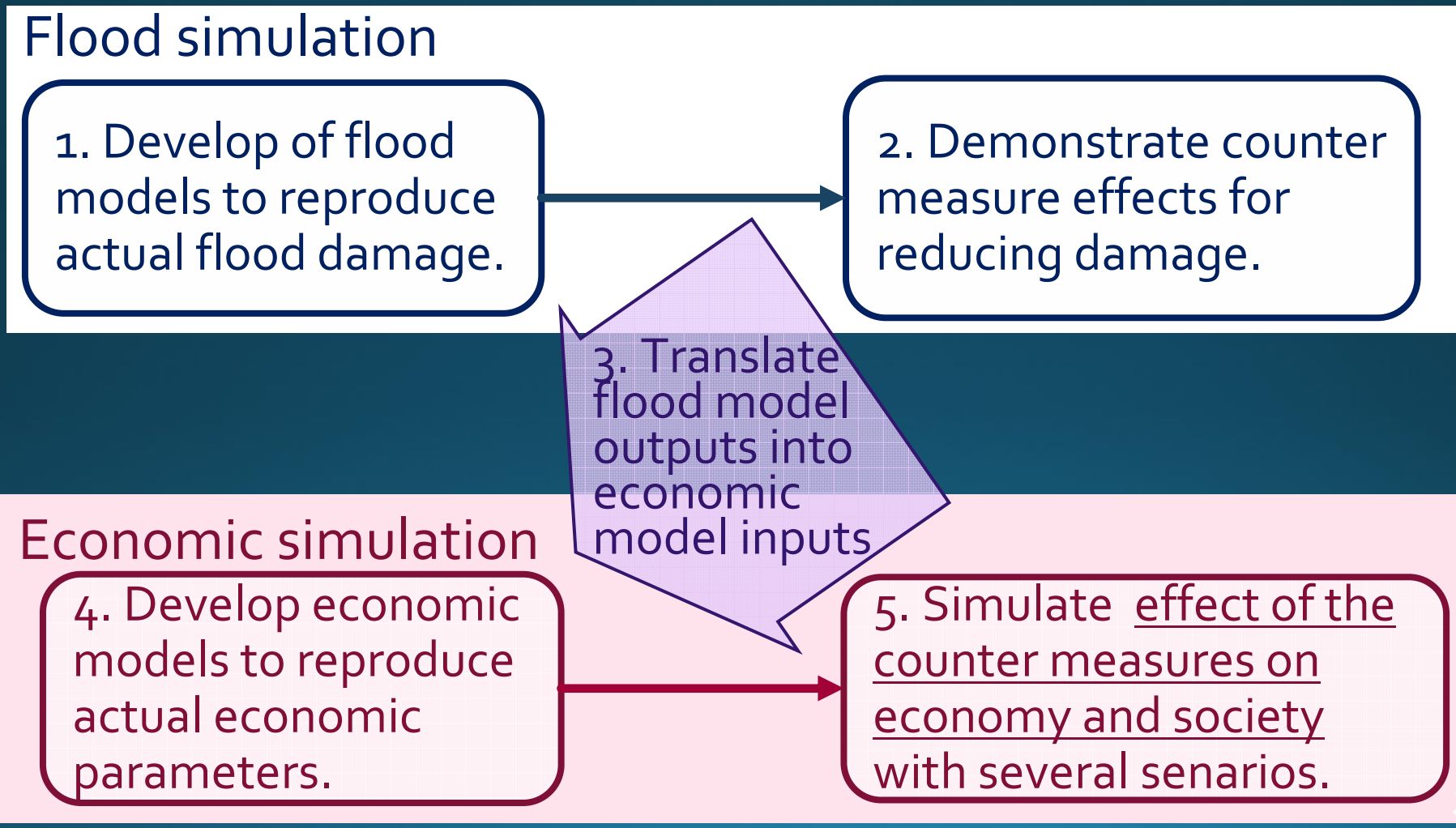
Inherent Risk to Development
Human-induced Issues
Population
Increase, Decrease, Aging
Economy
Poverty, Inequity, Globalization
Destabilized Governance
Pollution
Land Use
Deforestation, Desertification
Disorganized Urbanization
Security Deterioration
Disasters
Water
Food
Health
Energy
Biodiversity
Climate Change

Disaster Prevention Investment

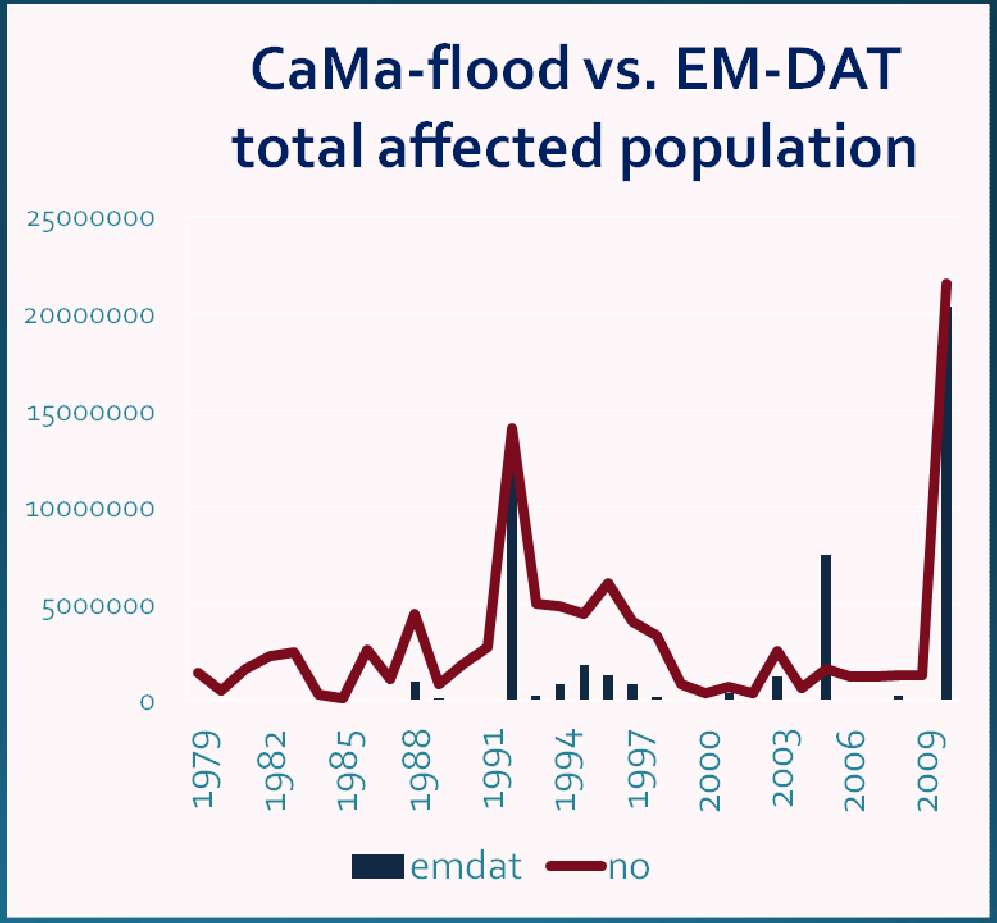


Result of Confirmation

: CaMa-flood has reproducibility against EM-DAT on affected population

Assuming that the place flooded deeper than 5.0m is affected,

CaMa-flood has some reproducibility compared to EM-DAT

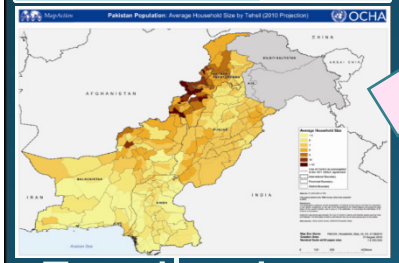


Example of parameter calculation ~ ψ: Physical damage rate ~

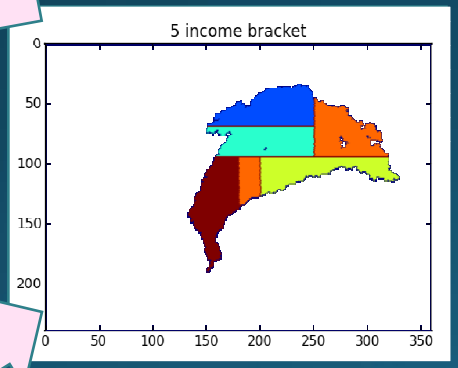
What percentage of Physical Asset were damaged for each 5 income brackets??

Family size data

Income Bracket	Family Size
1st ,poorest	8.78
2nd , poor	7.97
3rd , middle	7.32
4th , rich	6.45
5th , richest	5.36



Family size distribution

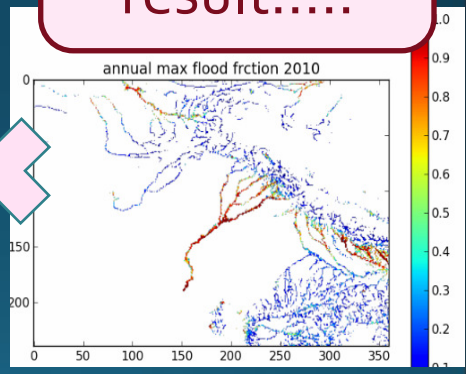


Income bracket map

Income Bracket	Physical asset
1st ,poorest	84$
2nd , poor	151$
3rd , middle	181$
4th , rich	197$
5th , richest	313$

Physical assets amount for 5 brackets

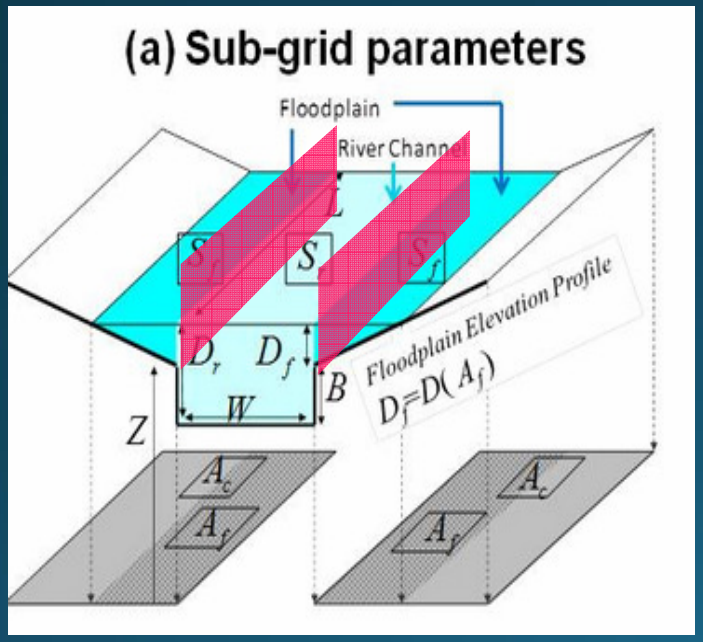
CaMa-flood result!!!!!

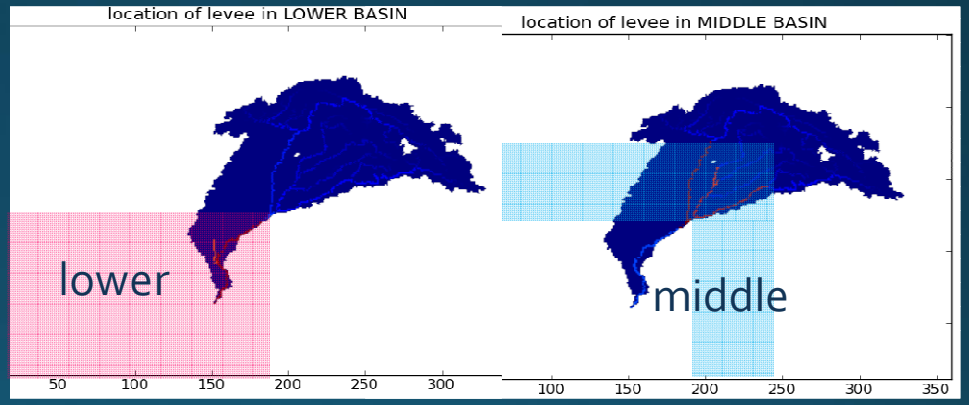


Percentage of inundated area

Building levees as disaster prevention and calculating the effect on damage reduction

Building **LEVEES** as **Disaster Prevention** in CaMa-flood and measuring the effect of the levees on the **damage reduction**



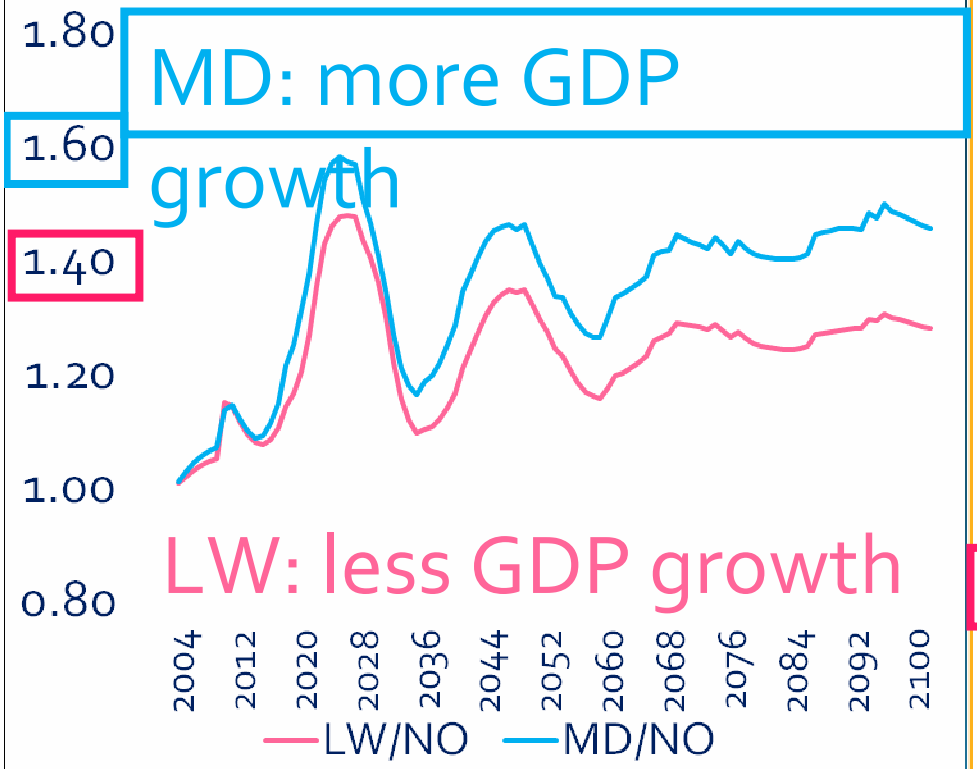


Building levee in **mainstream** of LOWER(LW) and MIDDLE(MD) basin

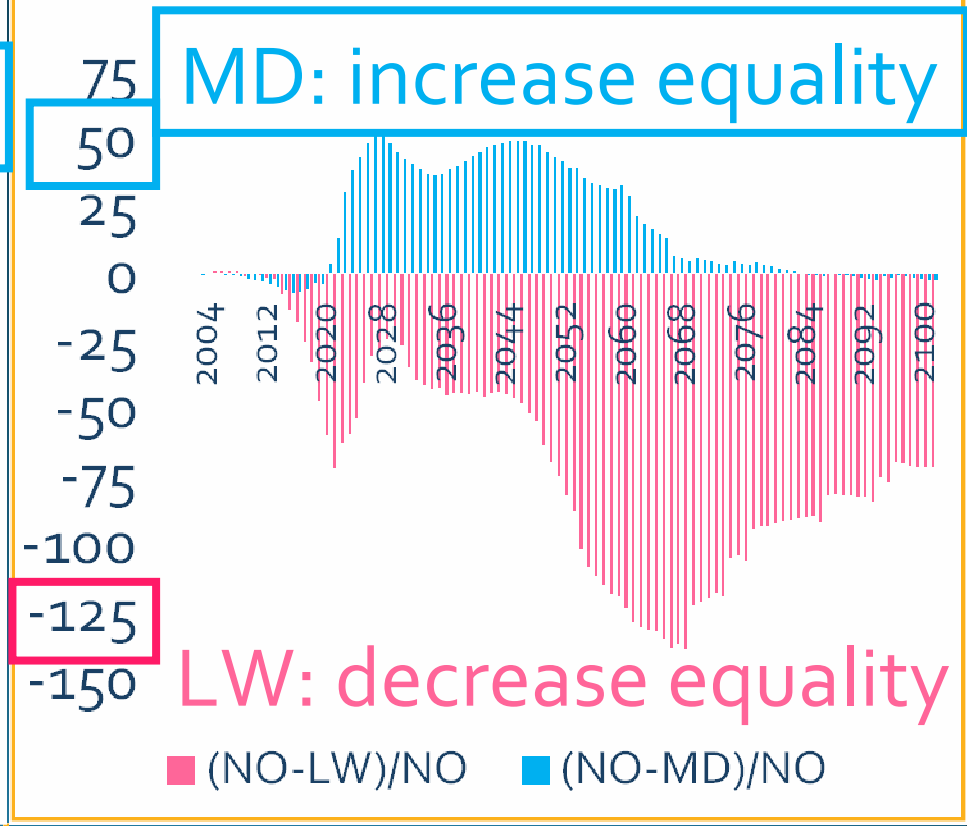
D. Yamazasi, 2012, Physically-based Modelling of Large-scale Floodingin Continental-scale Rivers of the World

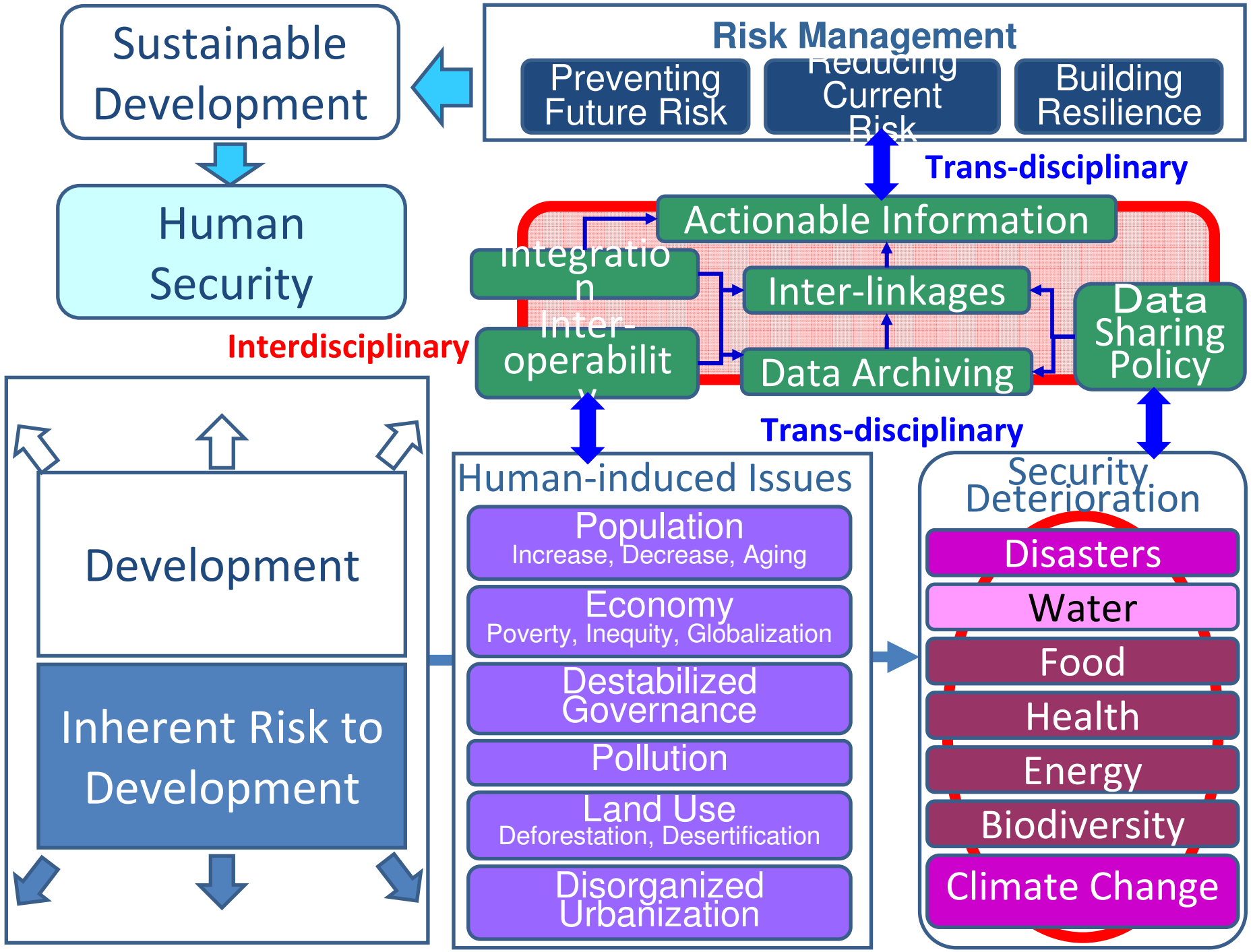
Results are different between LW levee and MD levee

GDP comparison
Low levee/No levee
Middle levee/No levee



Gini coefficient reduction (%)
LW and MD levee against
NO levee




Sustainable Development
Human Security
Risk Management
Preventing Future Risk
Reducing Current Risk
Building Resilience
Trans-disciplinary
Actionable Information
Integration
Inter-operability
Inter-linkages
Data Archiving
Data Sharing Policy
Interdisciplinary
Trans-disciplinary
Development
Inherent Risk to Development
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Disorganized Urbanization
Security Deterioration
Disasters
Water
Food
Health
Energy
Biodiversity
Climate Change

GROUP ON EARTH OBSERVATIONS

The AWCI Training Workshop on
Assessment of Climate Change Impact on a Watershed Hydrology
including Hydrological Modeling in Cold Region Basins
Islamabad, 15-17 September 2014

Asian Water Cycle Initiative

Thank you for your attention.

Toshio Koike
The University of Tokyo

GEOSS Asian Water Cycle Initiative (AWCI)

2005 Nov.	1st Symp. in Tokyo
2006 Sept.	TTM in Bangkok
2007 Jan.	2nd Simp. in Tokyo
2007 Sept.	1st ICG in Bali
2007 Dec.	3rd Simp. in Beppu
2008 Apr.	2nd ICG in Tokyo
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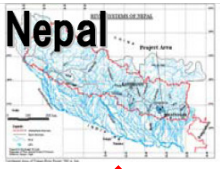
2009 Feb.	4th ICG in Kyoto
2009 Dec.	5th ICG in Tokyo
2010 Mar.	6th ICG in Bali
2010 Oct.	7th ICG in Tokyo
2011 Mar.	1st CCAAT in Tokyo
2011 Oct.	8th ICG in Tokyo
2012 Sept.	9th ICG in Tokyo
2013 Jun.	2nd CCAAT in Tokyo
2013 Nov.	Asia-Africa Water Cycle Symposium
2014 May	10th ICG in Tokyo

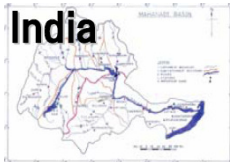
Coordination Design
Data Sharing Policy
Implementation Plan

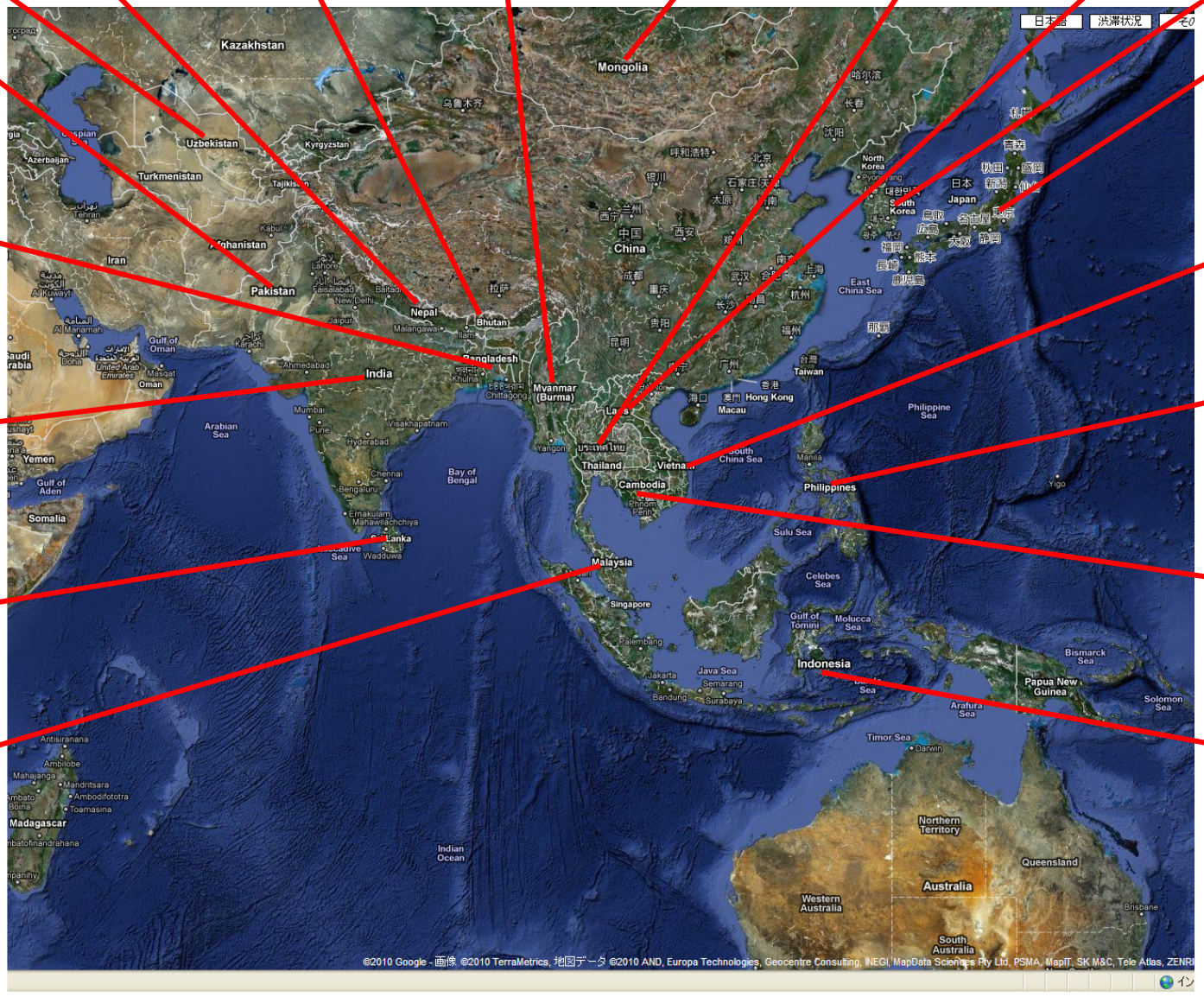
18 Demonstration River Basins

Symp.: Symposium TTM: Task Team Meeting ICG International Coordination Group
CCAAT: Climate Change Assessment and Adaptation Training

Demonstration River Basins







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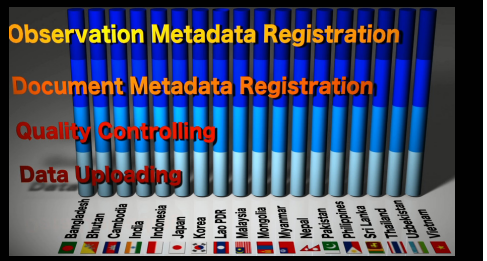
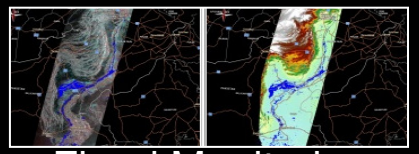
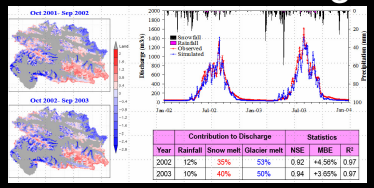


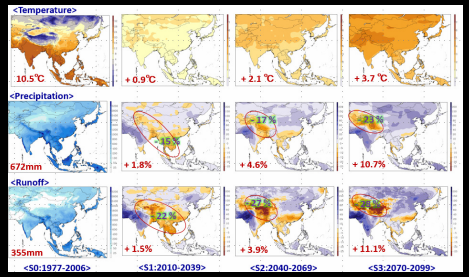
Data Archive



Flood Monitoring



Snow & Glacier Melt



Climate Change Impact Assessment in Asia

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