Monsoon Asia Integrated Regional Study (MAIRS)

JSC Meeting, Beijing, 19 July 2012



Significance of Monsoon Asia

- World's highest mountains
- Heat source of Tibetan Plateau
- Seasonal monsoon affects water and food resources
- Range of natural hazards (TC to GLOF)
- Anthropogenic aerosols
- 3.6 billion people
- Rapid urbanisation
- Vulnerable coastal development



Integrated Studies

- Integrated across
 - Disciplines
 - Sectors
 - Boundaries
 - Activities

Collaboration and capacity building across region

History of MAIRS

- Commenced in 2006 under auspices of START
- Chair SSC: Congbin Fu
- IPO supported by CAS at IAP, Beijing
- Link to ESSP
- Review in 2010
- Commenced phase 2 in 2011

Organisation of MAIRS

- Chair of SSC
 - Michael Manton
- Vice Chairs of SSC
 - Tetsuzo Yasunari & Pavel Kabat
- Director of IPO
 - Ailikun

MAIRS Themes

- Multiple stresses in high mountain zones
- Vulnerable systems in dryland zones
- Rapid transformation in coastal zones
- Rapid development of urban zones
- Modelling and observations

Key Questions for Themes

What are the major drivers for change and variability?

What are the vulnerabilities of communities and ecosystems?

What are the options for responding to those vulnerabilities?

Mountain Theme Workshops

- June 2011, Beijing, China
 - Identified case studies in India, China, Nepal, Bangladesh eg CAS international project on climate change in Koshi Basin
- June 2012, Pokhara, Nepal
 - Joint with International Centre for Integrated
 Mountain Development (ICIMOD)
 - Drafted strategic plan
 - Rio+20 call for development of mountain zones

Drought Impact on Rangeland Herders in Inner Mongolia

- Study by Xiaoyi Wang, CRESS

- Pastoral village of 80 households
- 10,000 livestock
- Decade-long drought & rising temperature affected pasture & water availability
- Herders' incomes significantly reduced
- But there are social factors



Social Factors interacting with Drought Impacts



Xiaoyi Wang, CRESS

New Dryland Projects

- CDKN project on "Climate Compatible Development in Dryland Systems of Mongolia and Surrounding Asian Systems", D. Ojima, K. Gavin and Chuluun, 2012-2014
- MOST international project "Disaster and risk management in Mongolian Plateau", Heqing HUANG, 2012-2015
- APN CAPaBLE: Capacity Building to Study and Address Climate Change-induced Extremes in Northern Asia (MAIRS-NEESPI joint activity)

Impact of Warming on Precipitation



Comparison of precipitation intensity in Taiwan for the two coolest years (blue) and two warmest years (red) over the period 1961-2005

Find similar result for GPCP data

Response is larger than expected from Clausius-Clapeyron

S. Liu et al. (2009)

Modelling Studies

- Regional Modelling Inter-comparison Project (RMIP)
- Land surface (ecosystem) modelling intercomparison (ADMIP)
- Regional urban climate modelling project (JST-MOST)

- Link with CORDEX across monsoon Asia

RMIP Simulation Design



Integration Domain: (45-165E, 0-45N) Resolution: 60KM (for whole area, downscaling to 30KM in some key areas) Participating Countries: China, Japan, Korea, Australia, US Regional Models: 6 models in RMIP II, and 9 models in RMIP III Simulation Periods: 1978-2000 for control, 2038-2070 for projection, A 2-year spin-up time is applied to both control and projection runs

Shuyu Wang, Nanjing University

Changes of Interannual T2m [A1B(2040-2069)-20C(1980-1999 averaged)]



RMIP Activities

- Regional projections for 2040-2070 with uncertainties
- Data sharing
- Development of integrated assessment tool for urban policy and planning (UrbanCLIM – Yinpeng Li)
- High-resolution precipitation events
- High-resolution urban simulations
- Link with CORDEX

Asian Dryland Model Intercomparison Project (ADMIP)

- Led by Jun Asanuma and Dennis Ojima
- Support from APN, MAIRS and MEXT-JSPS
- Few observations and relatively poor performance of LSM in Asian drylands
- Data from sites at Tongyu, China (CEOP), Kherlen Bayan Ulaan, Mongolia (CEOP, AsiaFlux)
- 7 LSMs and 7 TEMs from Japan, China, Korea, USA, Australia





Kazuaki Yorozu, Kyoto University

Conclusions

- MAIRS has focus on key global change issues for monsoon Asia
- Developed links between research groups across region
- Established links across disciplines
- Established links between regional and global research
- Aims to provide regional connection for Future Earth Program