

Session #20: Observational and Modeling Initiatives for the Asian monsoon field campaign
(AsiaPEX and AMY-II)

9 Jul. 2024: GEVEX/Open Science Conference
@ Keio Plaza Hotel, Sapporo, Japan



Core-to-Core
Program



AsiaPEX

Asian Precipitation Experiment, (2019-2030)

GEVEX

Strategy of integrated observation and modeling
initiatives: Asian Monsoon Year (AMY)-II

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Shinjiro Kanae, and Jun Matsumoto

What is AsiaPEX under WCRP

International Science Council World Meteorological Organization International Oceanographic Committee

ISC

WMO

IOC

sponsorship

WCRP

1980-

World Climate Research Programme

GEWEX

Global Energy and Water Exchanges

GHP

GEWEX Hydroclimatology Panel

RHPs

Regional Hydroclimatological Projects



WCRP Core Projects

- ▶ GEWEX is one of WCRP Core Projects

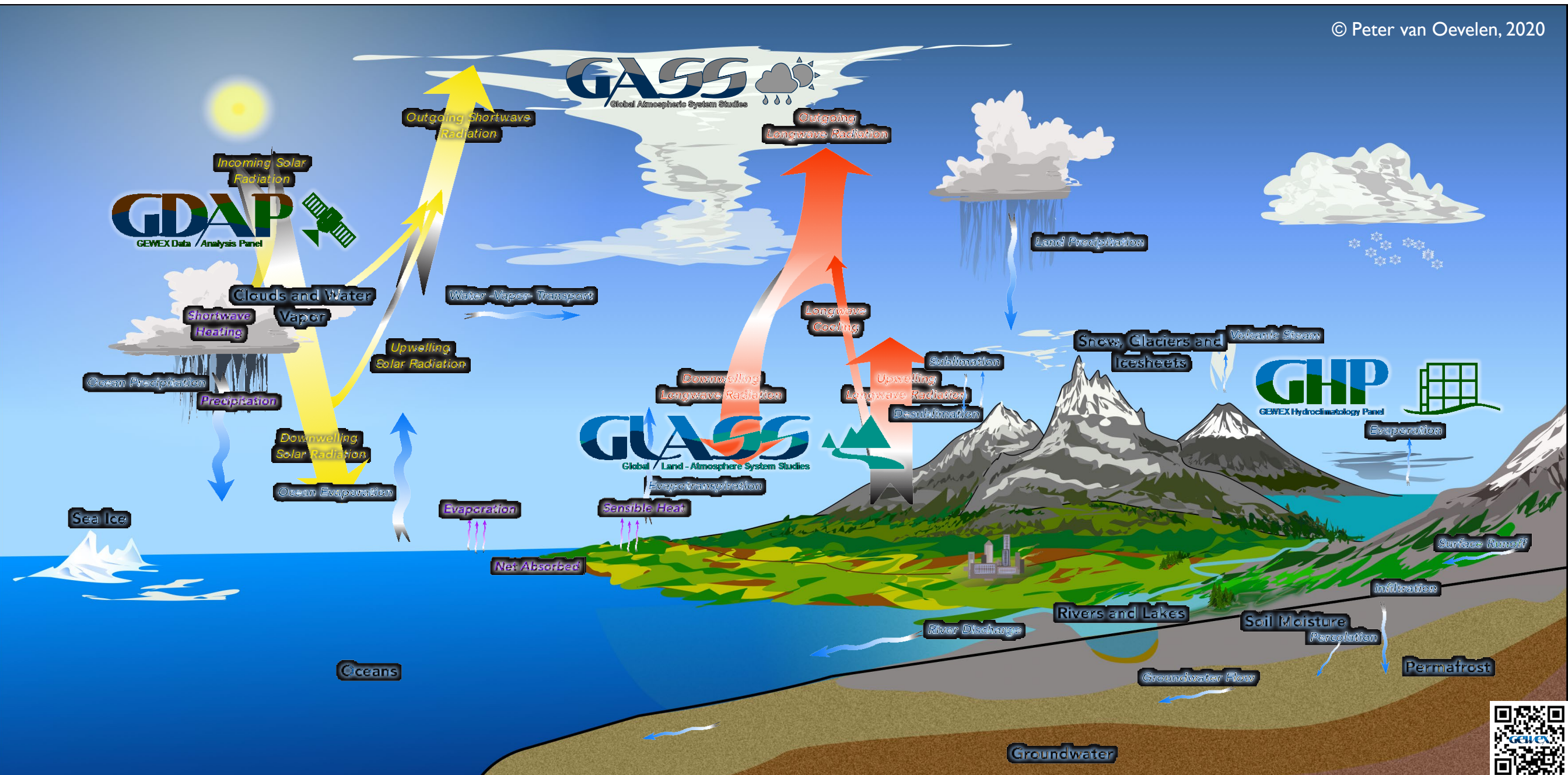
Core Projects

- Atmospheric Processes And their Role in Climate (APARC)
- Climate and Cryosphere (CliC)
- Climate and Ocean Variability, Predictability and Change (CLIVAR)
- Earth System Modelling and Observations (ESMO)
 - ▶ including the Coupled Model Intercomparison Project (CMIP)
- Global Energy and Water Exchanges (GEWEX)
- Regional Information for Society (RIfS)
 - ▶ including the Coordinated Regional Climate Downscaling Experiment (CORDEX)



GHP under GEWEX

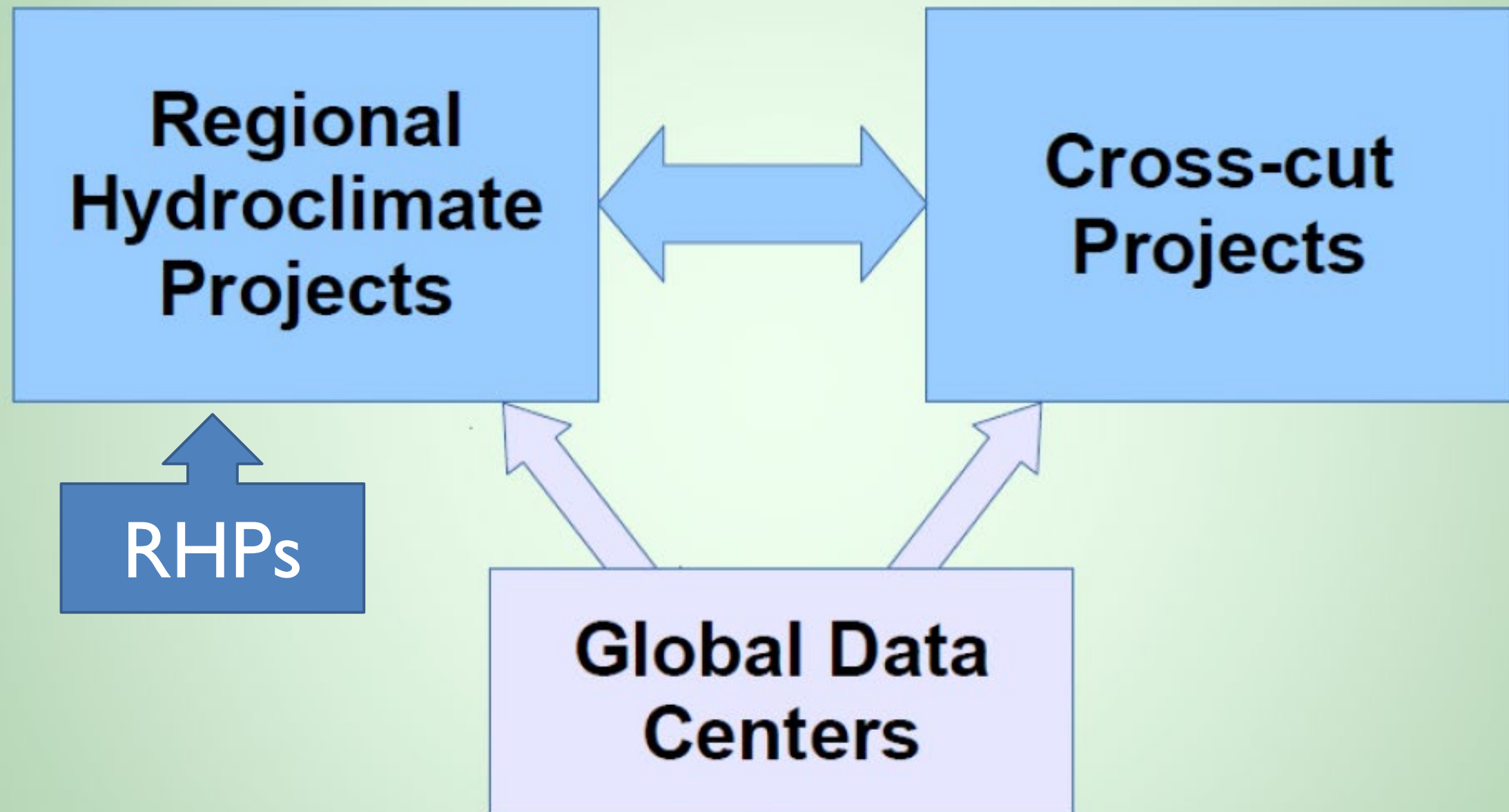
© Peter van Oevelen, 2020



AsiaPEX as an RHP

GHP Structure

GHP: GEWEX Hydroclimatology Panel



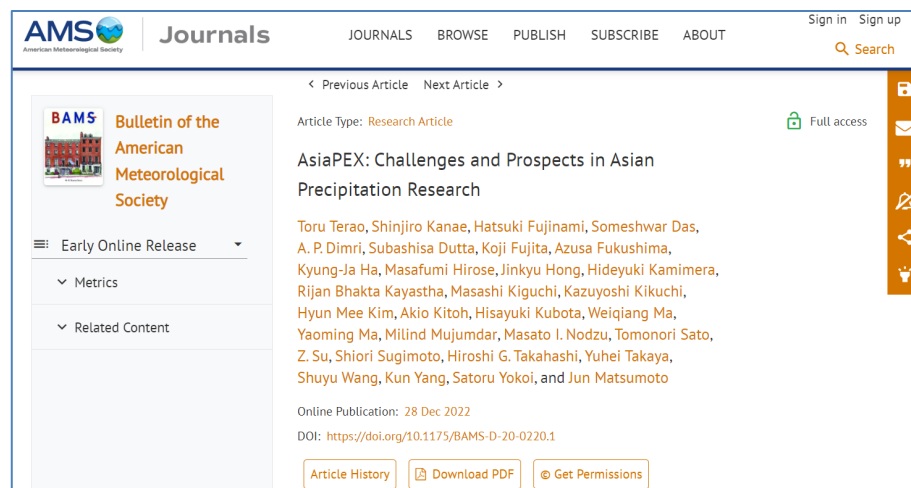
AsiaPEX Kick-off Conference

- ▶ Date: 28-30 August 2019
- ▶ Venue: Hokkaido University, Sapporo, Japan
- ▶ Participants: 72 from 10 countries
 - ▶ Philippines, Vietnam, Indonesia, Bangladesh, Mongolia, Nepal, USA, India, China, Japan
- ▶ 7 Sessions, 61 Presentations including 16 posters



Science Plan was Accepted

- ▶ Initial version: 11 Oct. 2019
 - ▶ Submitted and reviewed under COVID pandemic.
- ▶ Ver. 1.999 is submitted: 18 Sep. 2023
 - ▶ Published BAMS Review Paper -> Revised Plan



1 Asian Precipitation Experiment (AsiaPEX)[←]
2 Science Plan[←]
3 AsiaPEX Science Plan Drafting Team[←]
4 31 August 2023[←]
5
6 1. Introduction[←]
7
8 Asian terrestrial precipitation, a prominent component of the global water and energy cycles, is an
9 important driver of general atmospheric circulation (Chang et al. 2017, 2018) and supports more
10 than 4 billion people who have developed diverse lives and cultures (Terao et al. 2023). It is one
11 of the core targets of GEWEX, which is tackling global and regional water and energy cycles
12 affecting the people's life under the changing climate. Under the tropical and monsoon Asian
13 climate, Asian precipitation is characterized by considerably diversified spatiotemporal patterns
14 from arid to the wettest weather. It ranges across a wide spectrum of climates, including
15 perpetually hot and humid tropics, monsoon climate with seasonal contrasts, and the cold and harsh
16 climates of high mountains with even glaciers. Such diversity creates many challenges for

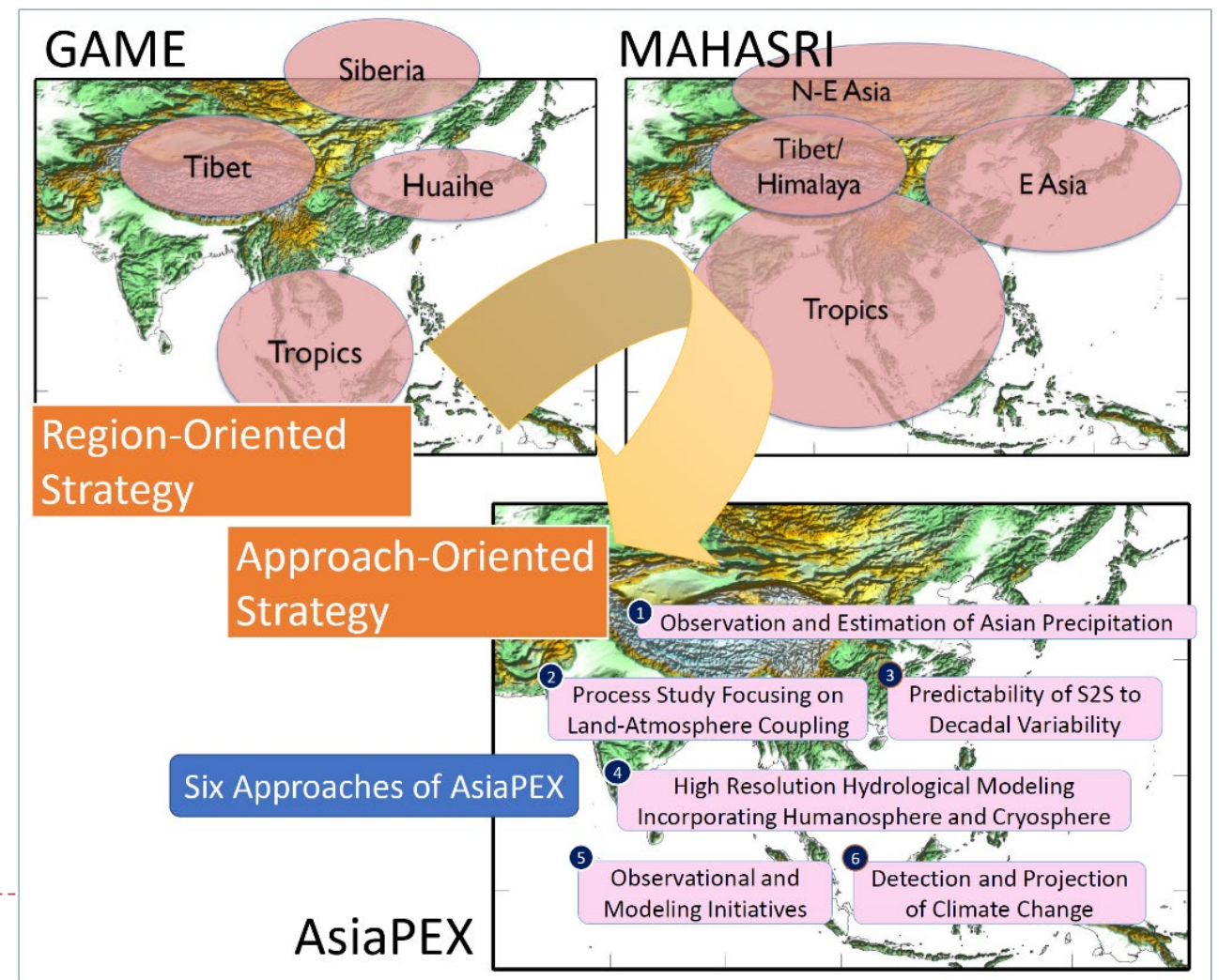
- ▶ Ver. 2 is accepted!: 30 Dec. 2023
 - ▶ With a condition of mandatory revision.
- ▶ Now AsiaPEX is an RHP!

History and Mission of AsiaPEX

Objectives of the AsiaPEX

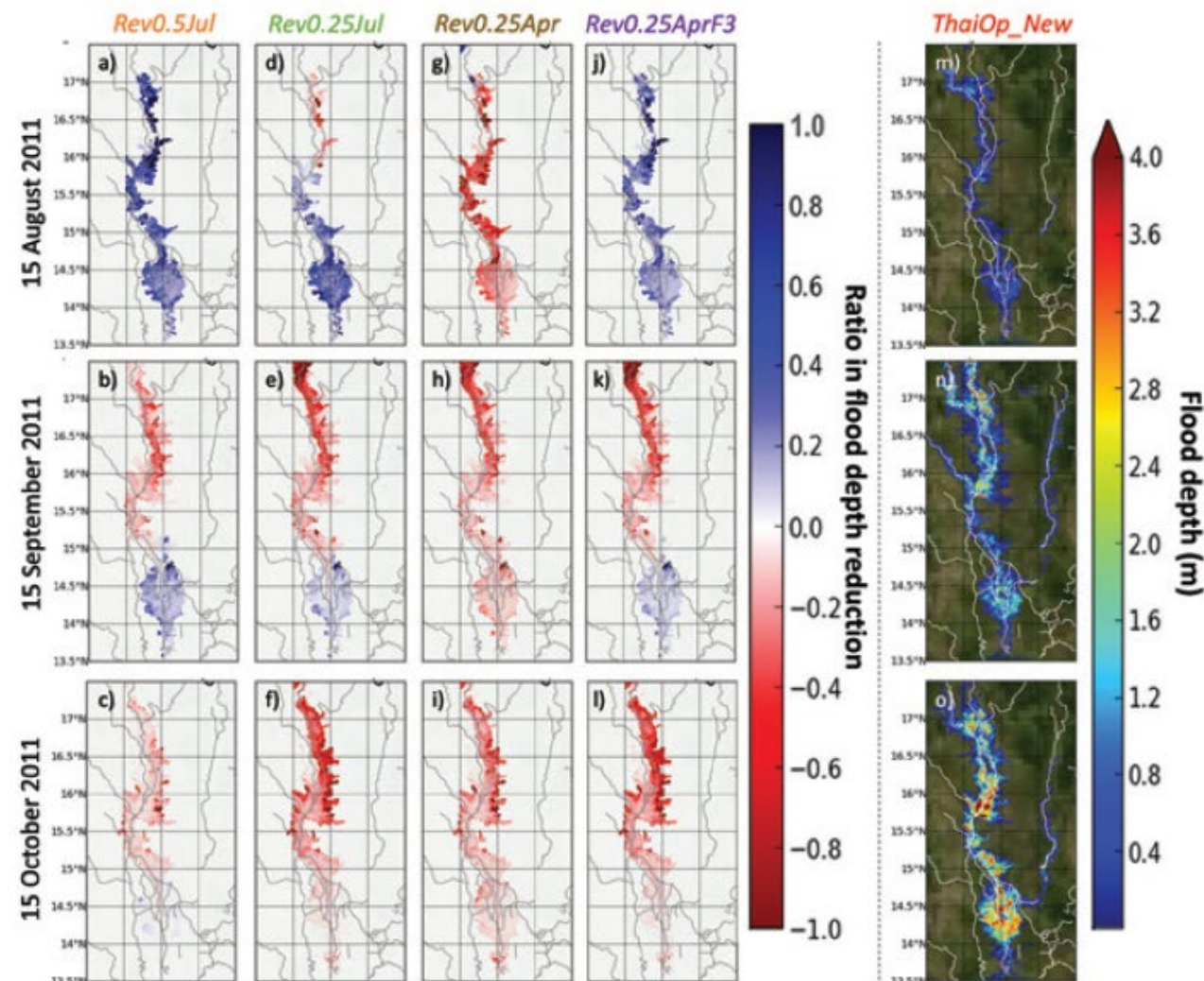
► General Objective

- Understanding of Asian Land Precipitation over Diverse Hydroclimatological Conditions: For Better Prediction, Disaster Reduction and Sustainable Development



Outcomes / impacts of MAHASRI (2)

- ▶ Flood Monitoring / Prediction System
 - ▶ Chao Praya River Basin in Thailand
 - ▶ Mega Flood in 2011



Earlier target storage date → higher reduction in flood depth in the earlier months; lower reduction in the worst flood months

Later target storage date → higher reduction in the later months (flood months)

Diverse monsoon season

Monsoon onset / withdrawal of Philippine and their interannual variability

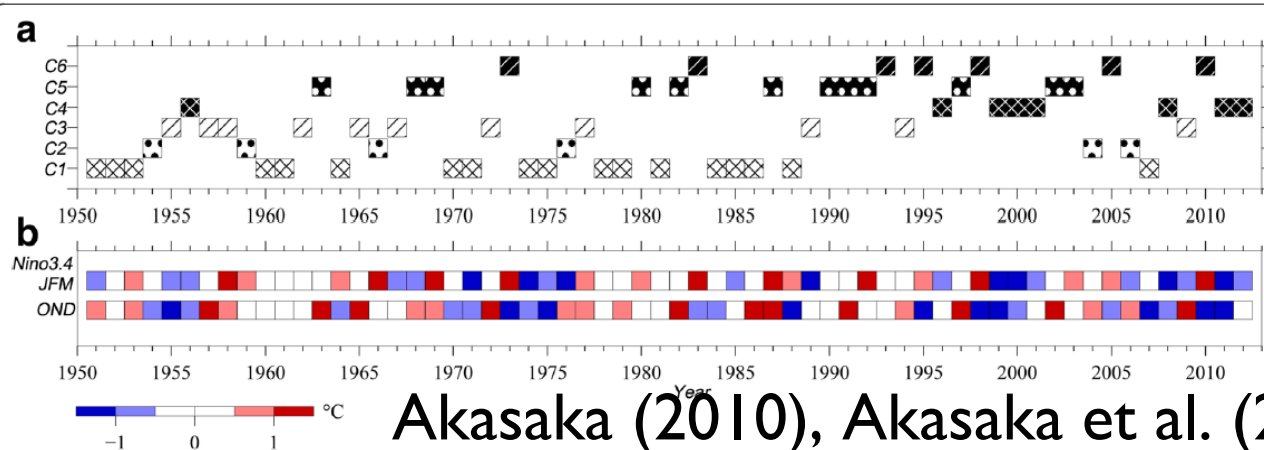
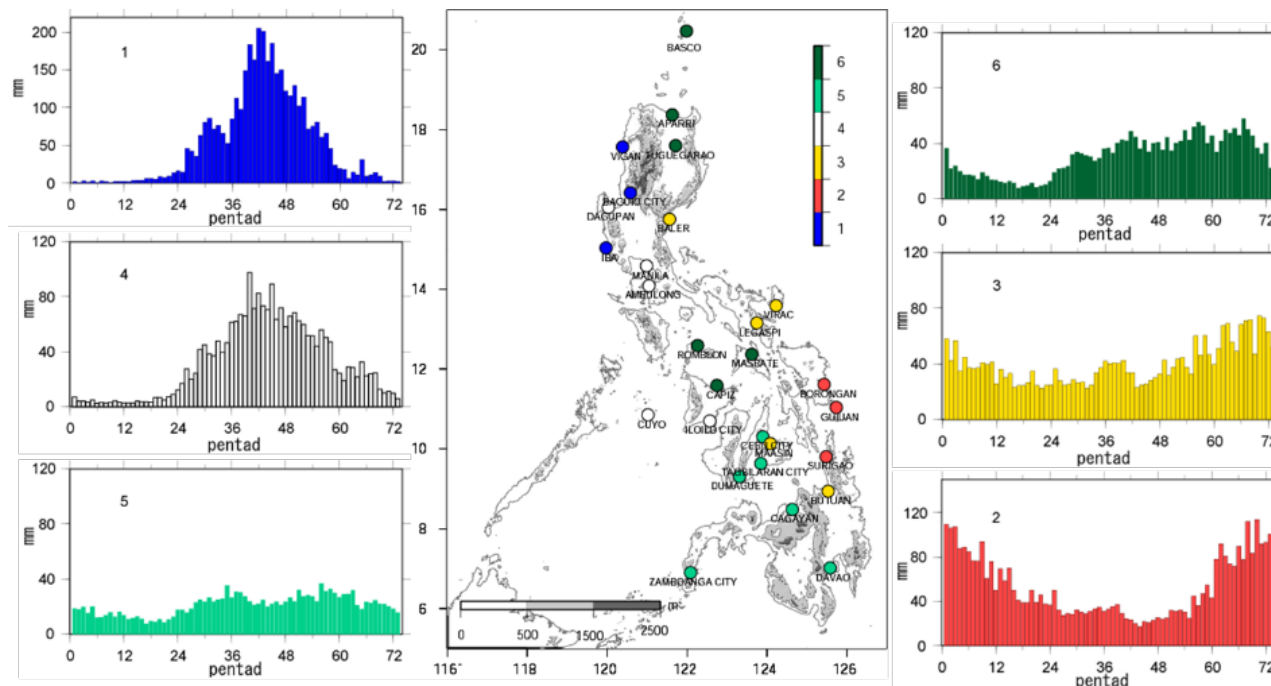
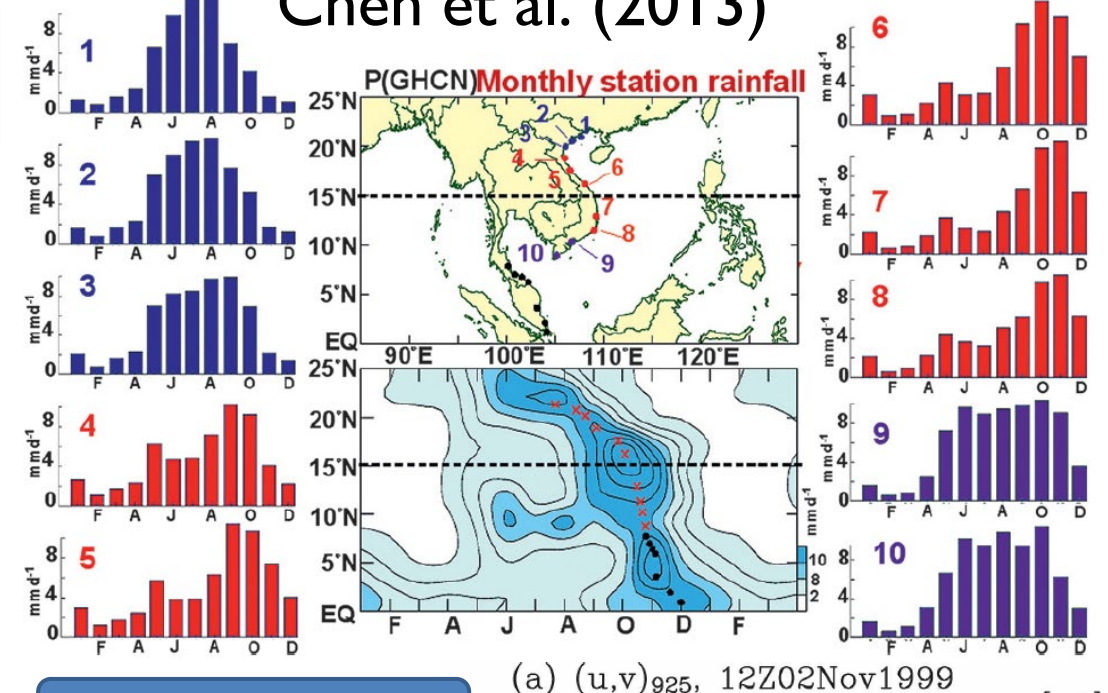


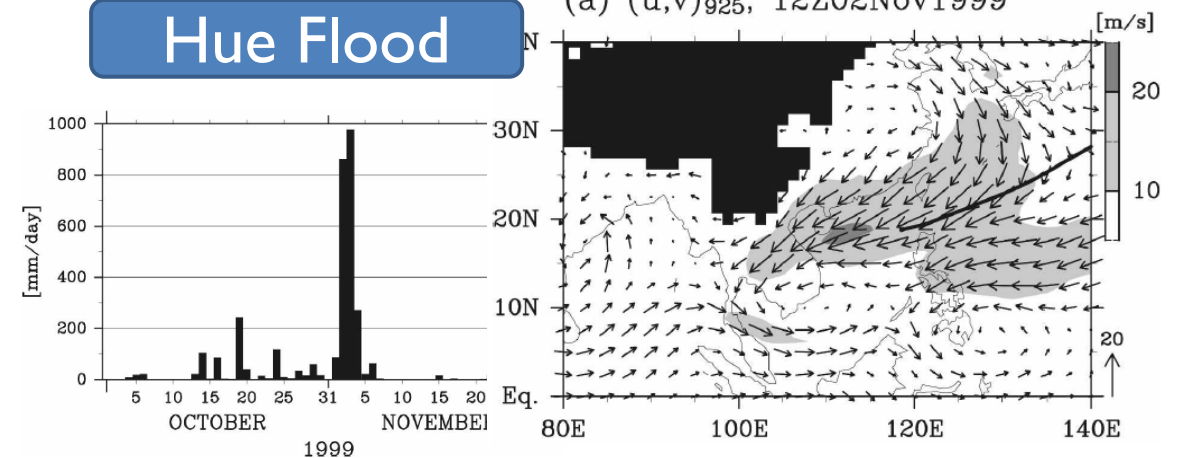
Fig. 5 Long-term variability in the seasonal march pattern of the summer rainy season. **a** A diagram of each cluster for the period of 1951–2012. **b** ONI (the 3-month mean SST anomalies averaged in Niño 3.4) for January–March (JFM) and for October–December (OND)

Akasaka (2010), Akasaka et al. (2018)

Chen et al. (2013)



Hue Flood



Yokoi and Matsumoto (2008)

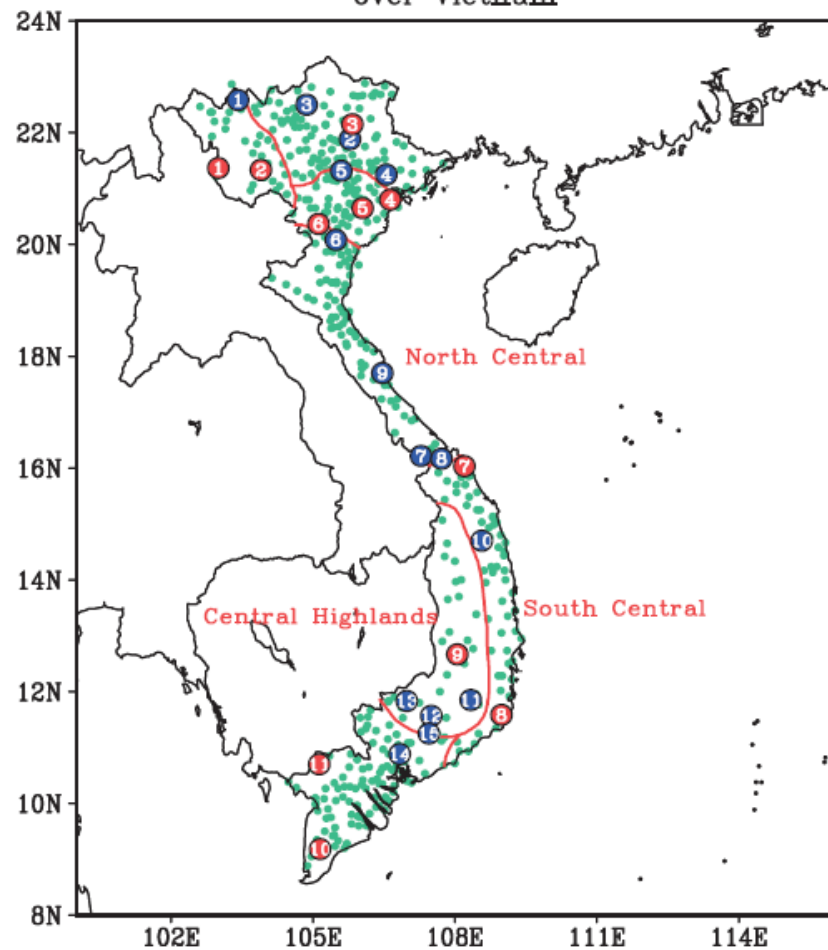
Autumn / winter monsoon in Vietnam

Grid-rain / Long-term Extreme Trend

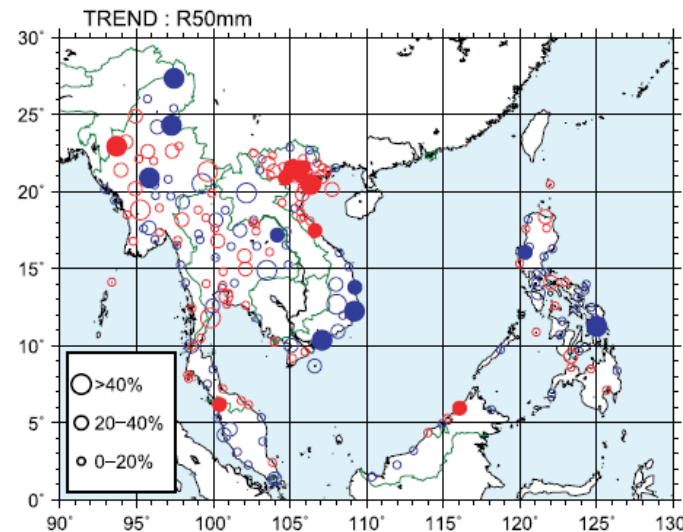
VnGP: Gridded rainfall
data over Vietnam

481 gauges, daily, 0.25 deg
resolution, 1980-2010

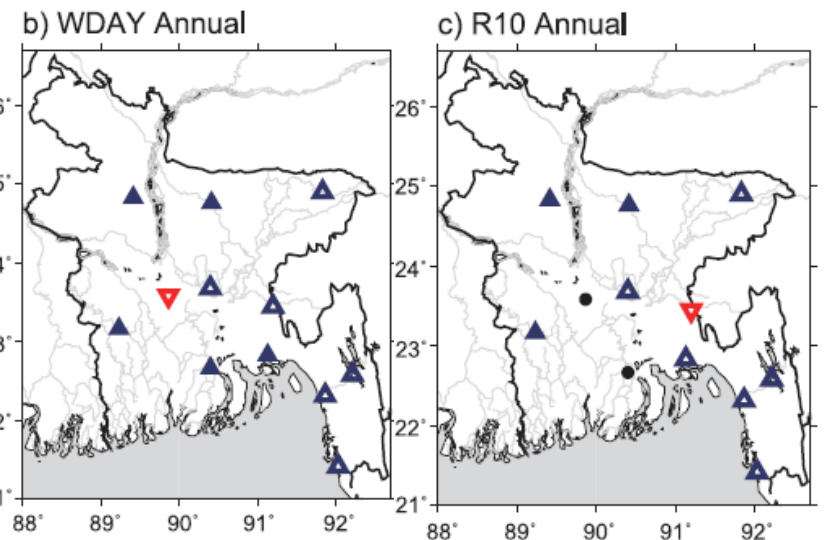
Locations of rainfall stations
over Vietnam



Nguyen-Xuan et al. (2016)



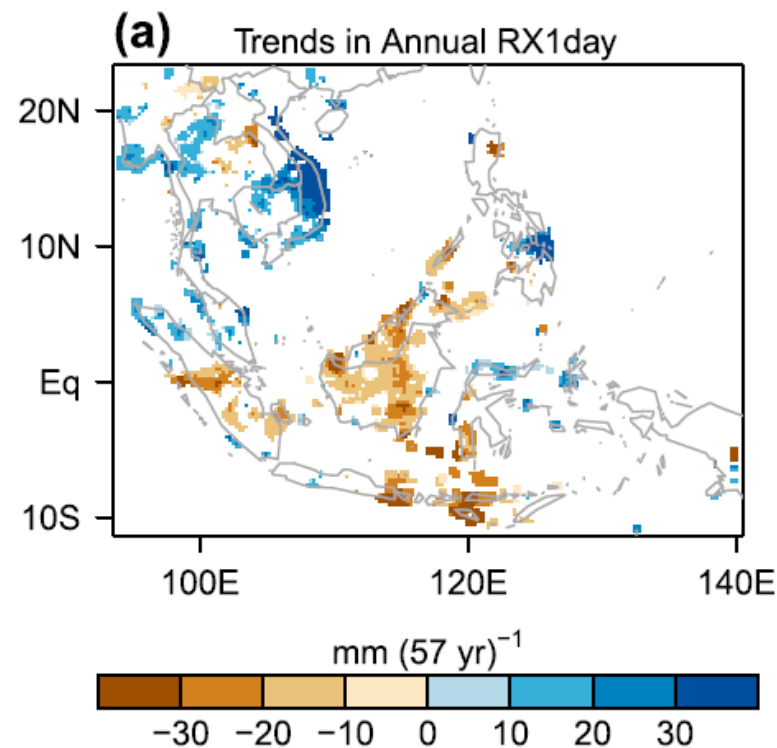
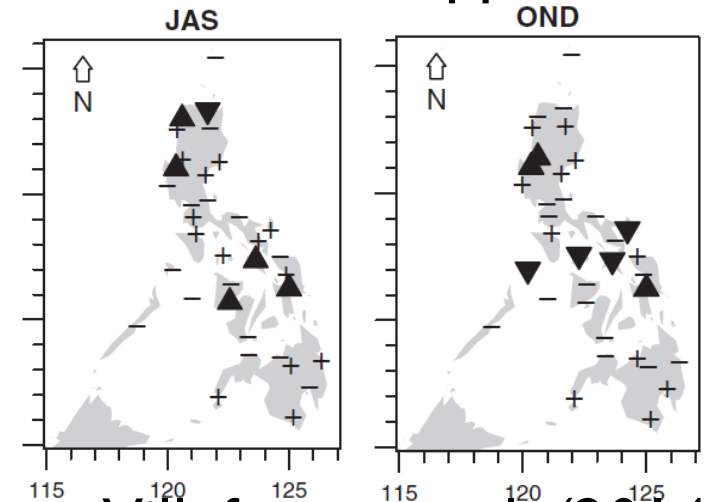
Endo et al. (2009)



Endo et al. (2015)

Long-term Extreme
Trends

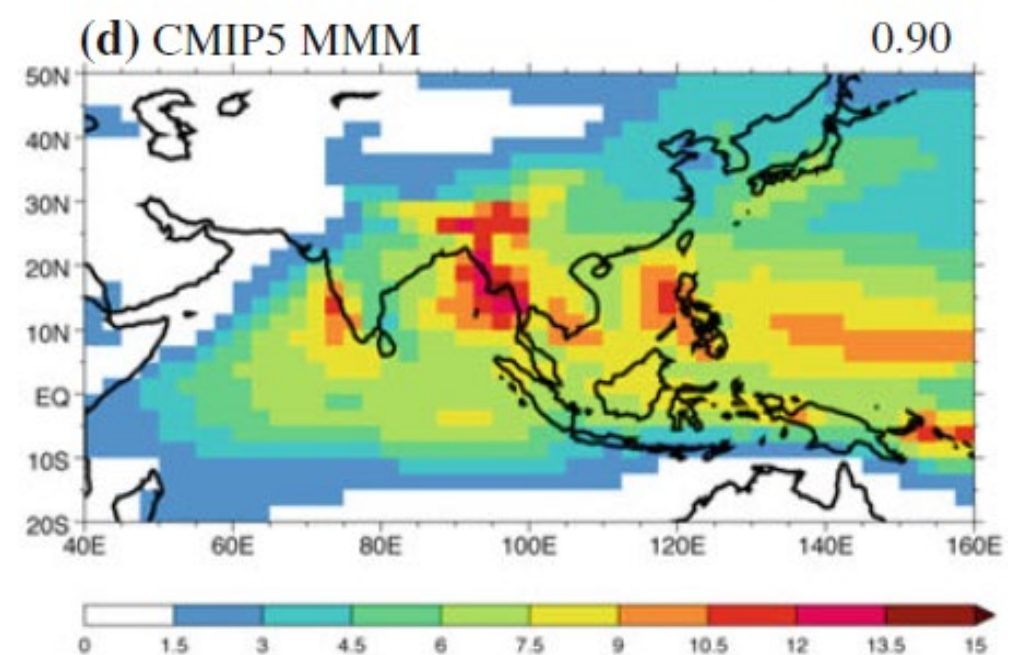
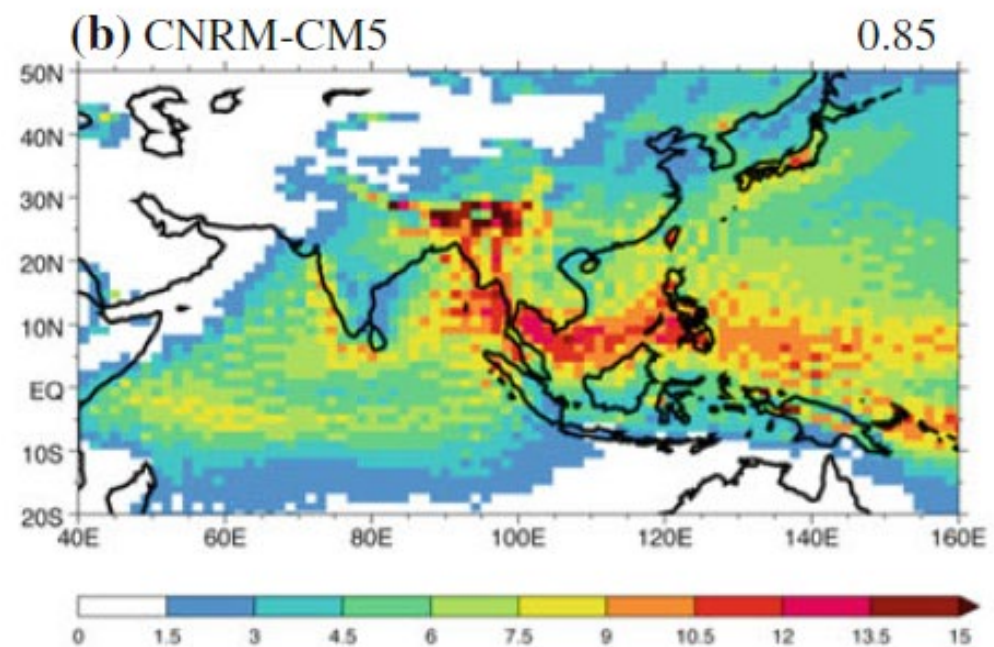
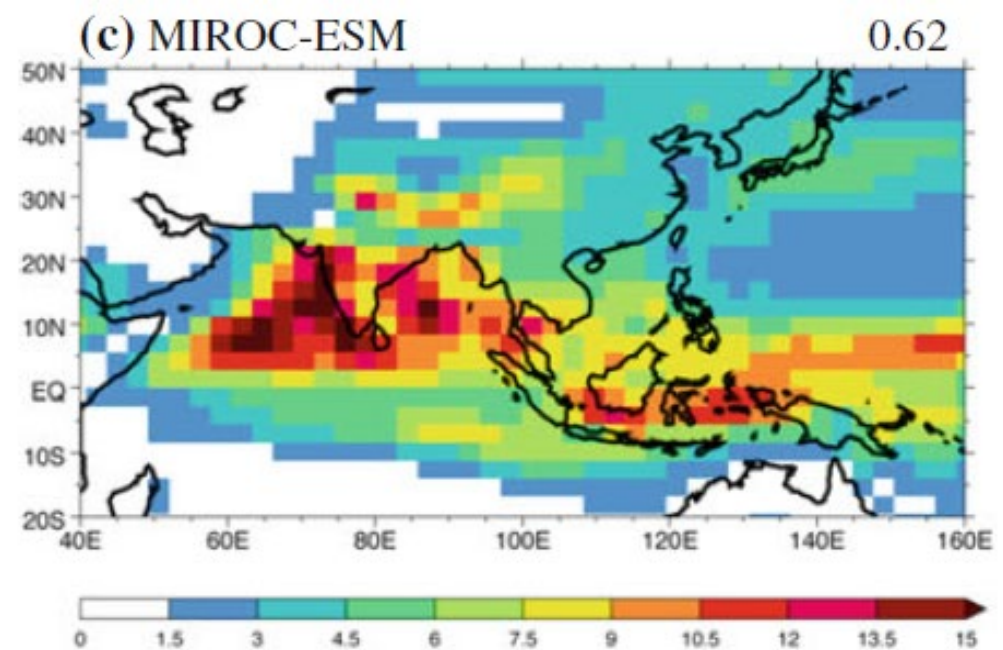
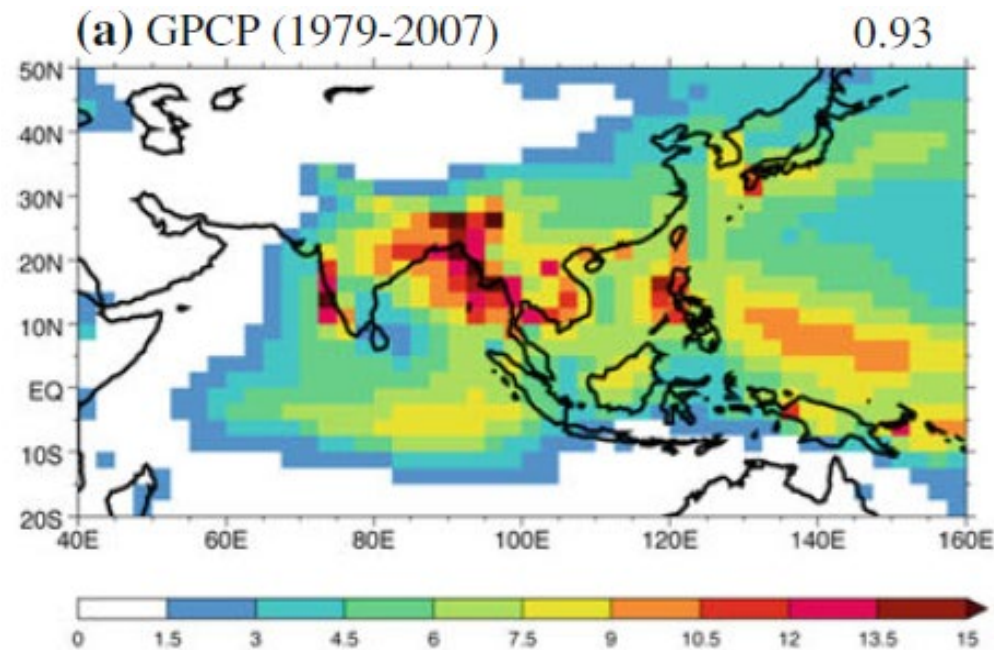
RX5d / Philippines



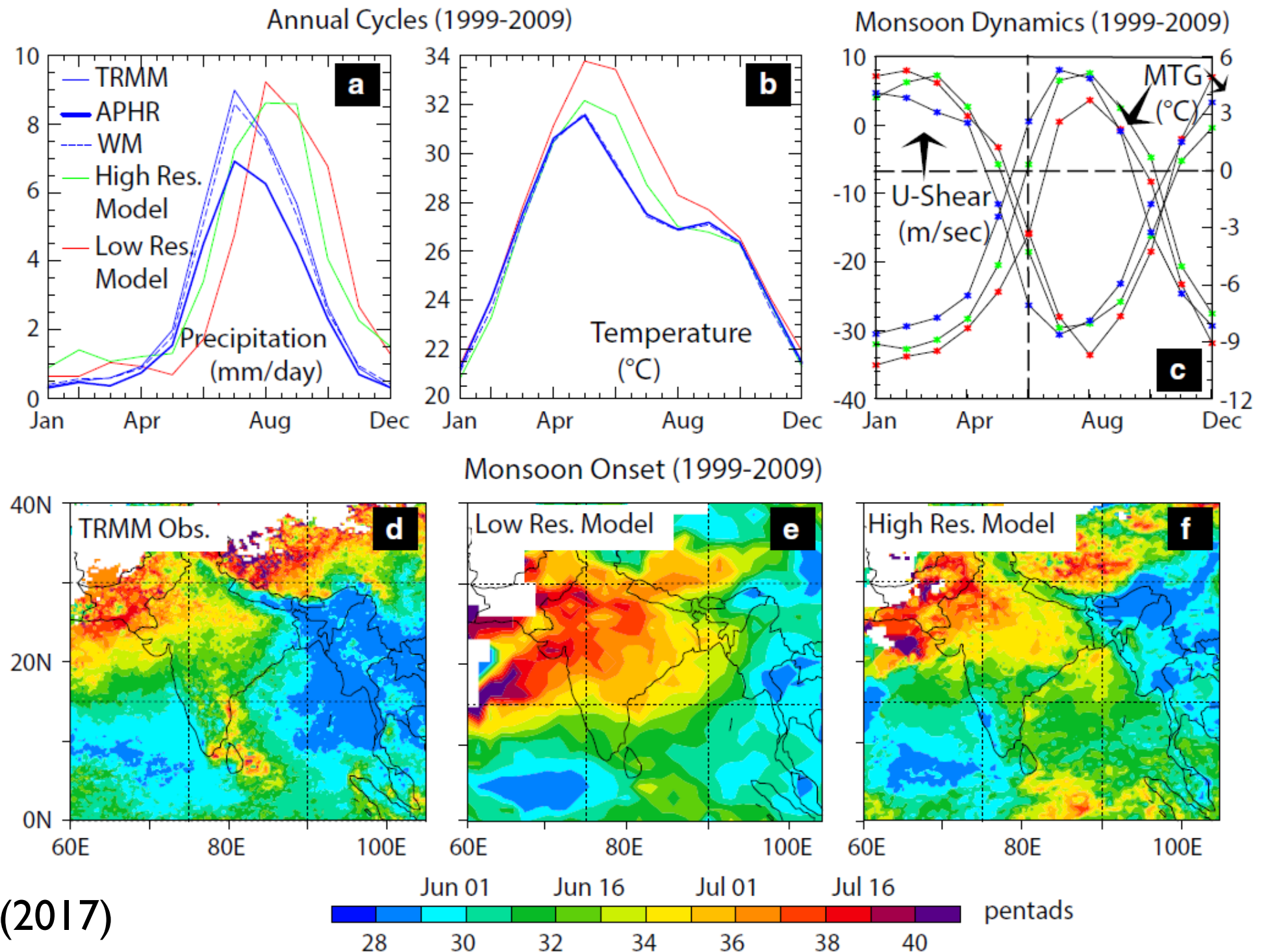
Villefuerte and Matsumoto (2015) Villefuerte et al. (2014)

Annual Precipitation in Climate Models

► Sperber et al. (2013)



Seasonal march in climate models



Asufoq et al. (2017)

Approaches of AsiaPEX

Approach-Oriented Research Strategy

- ▶ Discussion on Science Plan of AsiaPEX
 - ▶ Project initiation and kick off Conference in Sapporo
 - ▶ Significance of six approaches are confirmed in the Conference

1 Observation and Estimation of Asian Precipitation

2 Process Study of LULCC
Atmosphere Coupling

3 Predictability of S2S to
Decadal Variability

4 High Resol. Hydrol. Modeling / Human to Glacier

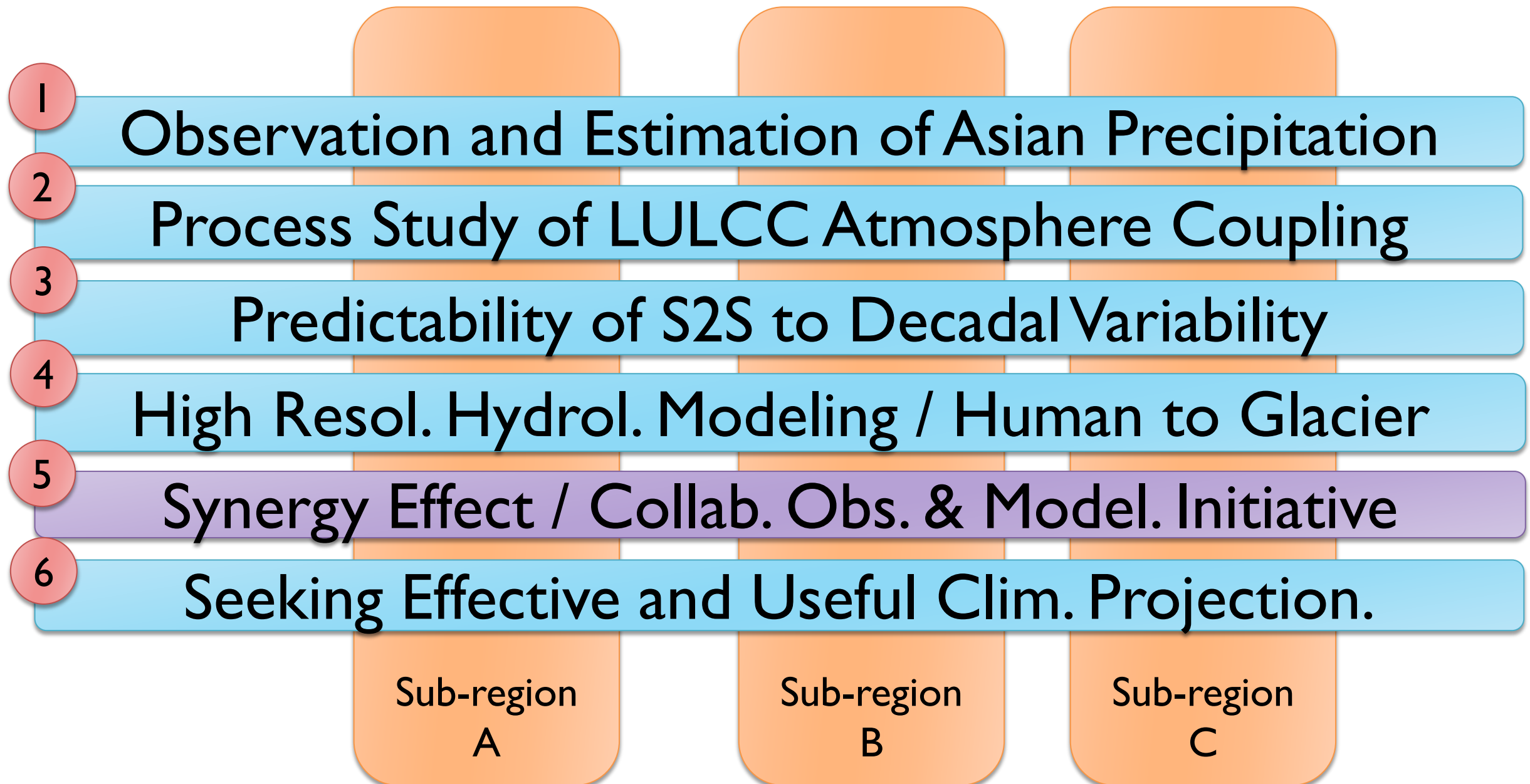
5 Synergy Effect / Collab.
Obs. & Model. Initiative

6 Seeking Effective and
Useful Clim. Projection.



Approach Oriented Research Plan

► Approaches × Sub-regions



AsiaPEX as an umbrella

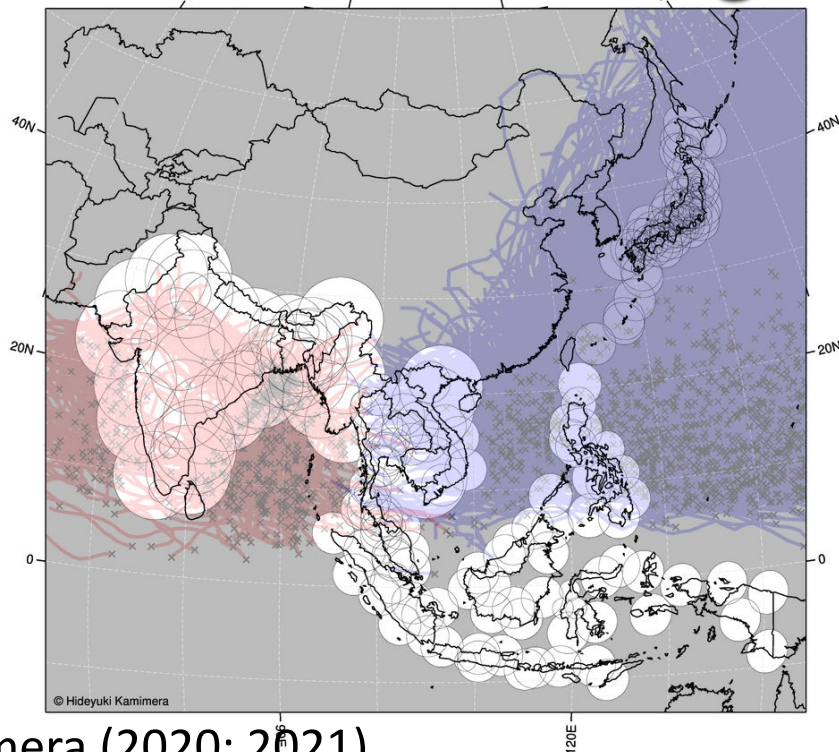
- ▶ Coordination of individual research activities
 - ▶ Project design / funding source / interaction with GEWEX



BRAIN: Borderless Radar Information Networking over South and Southeast Asia

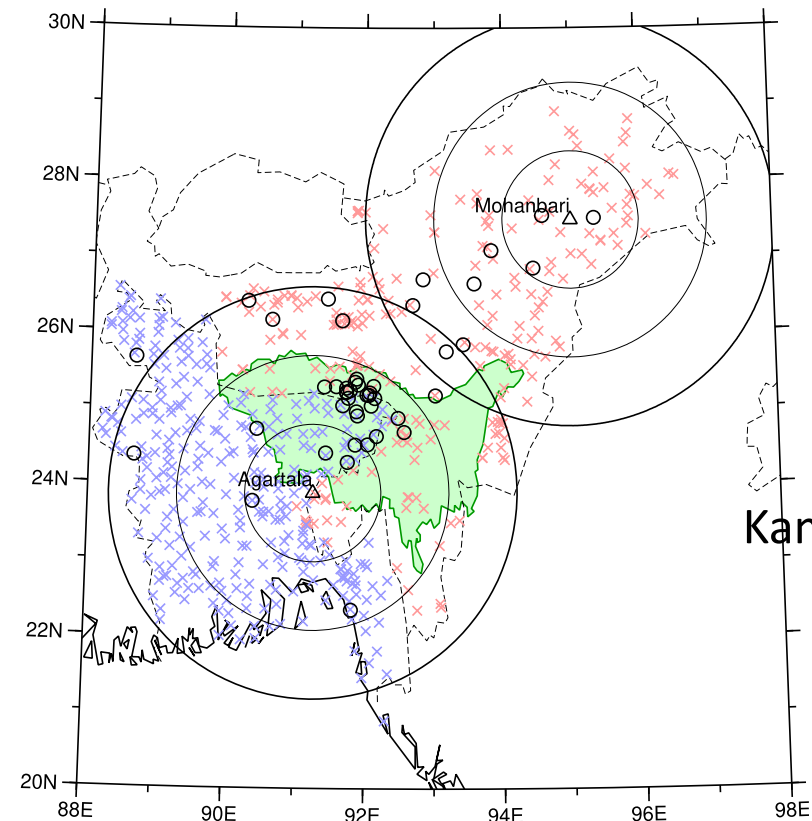
Approach I

Information networking



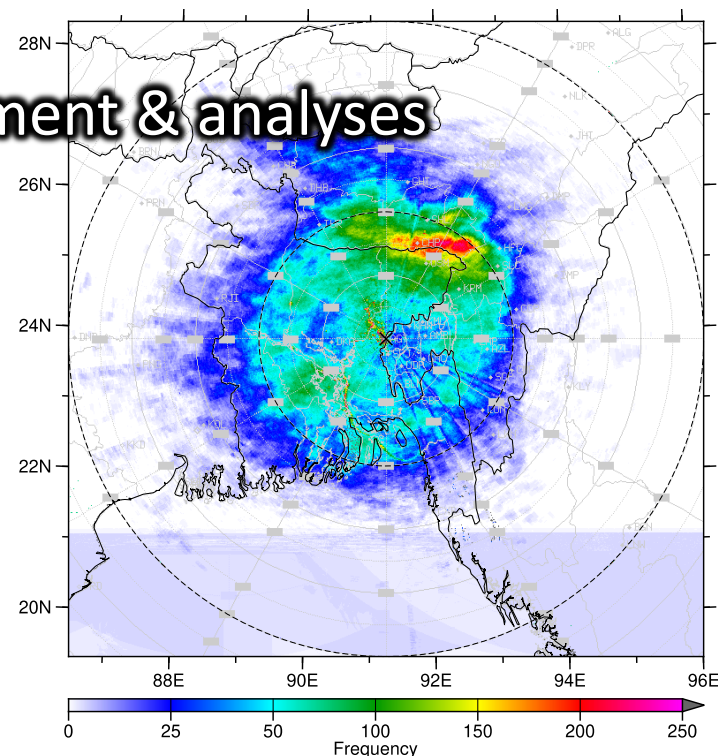
Kamimera (2020; 2021)

Radar-based QPE/QPF

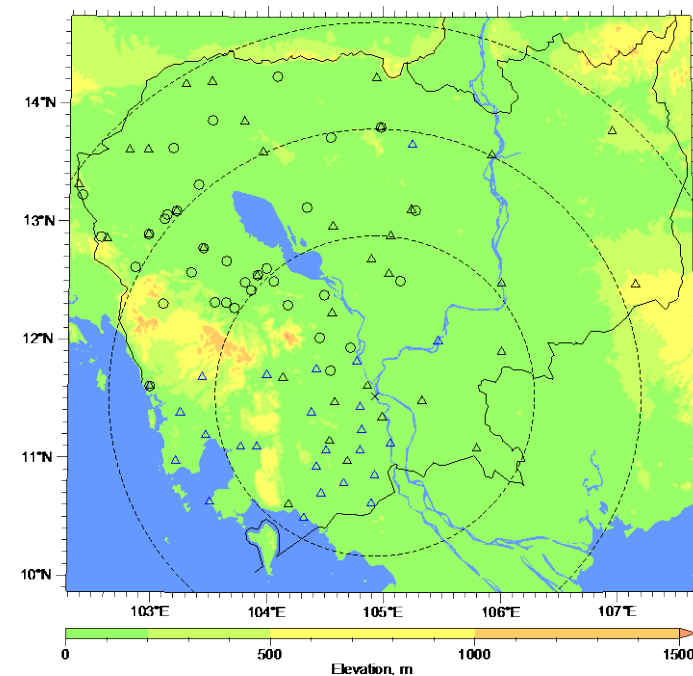


Kamimera and Yamane
(accepted)

Data management & analyses



Kamimera and Yamane (accepted)



Kamimera et al. (2023)



Lee et al. (2024)

- ▶ Digitization of daily precipitation data in Seoul, Korea for 130 years from 1778 to 1907.

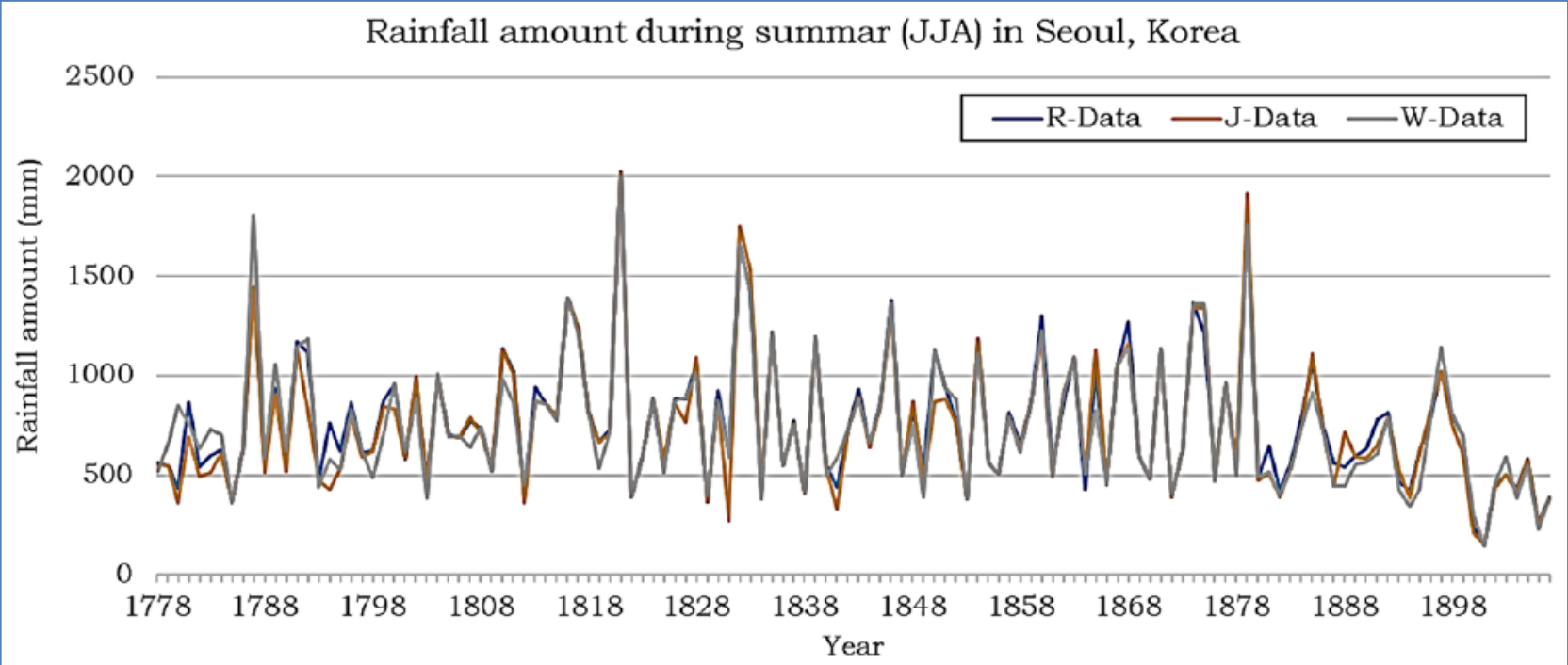


Wada (1917)

第二表
更正雨量 (韓)

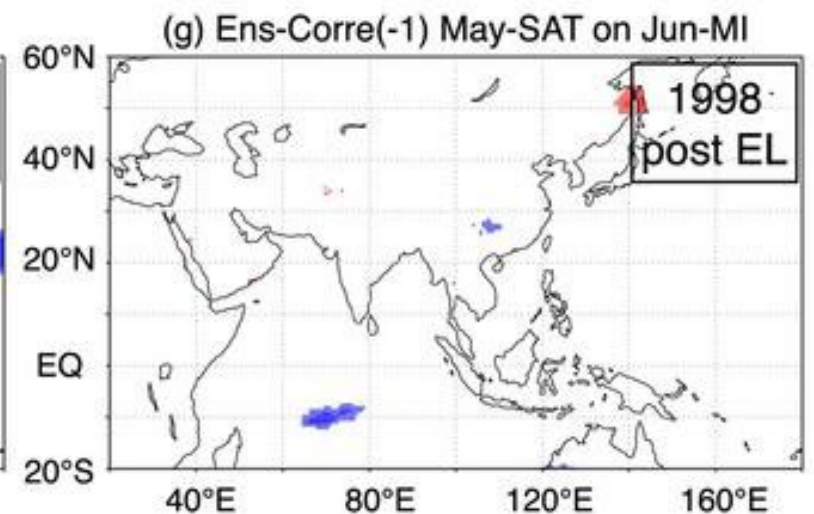
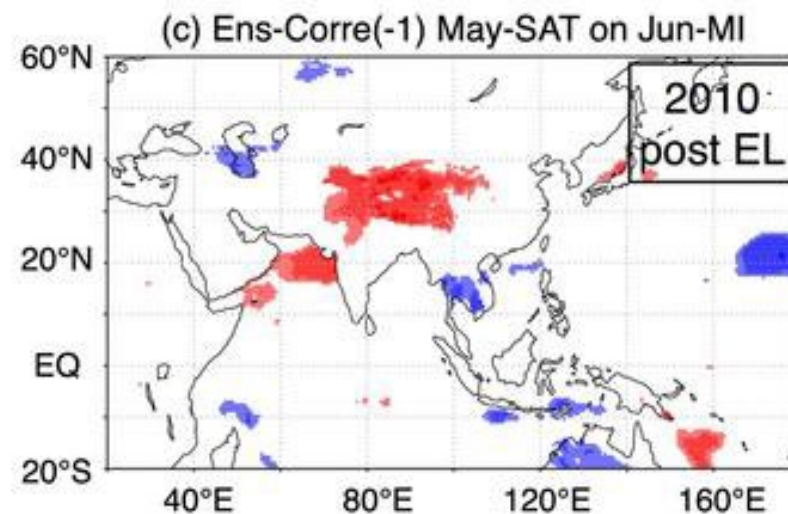
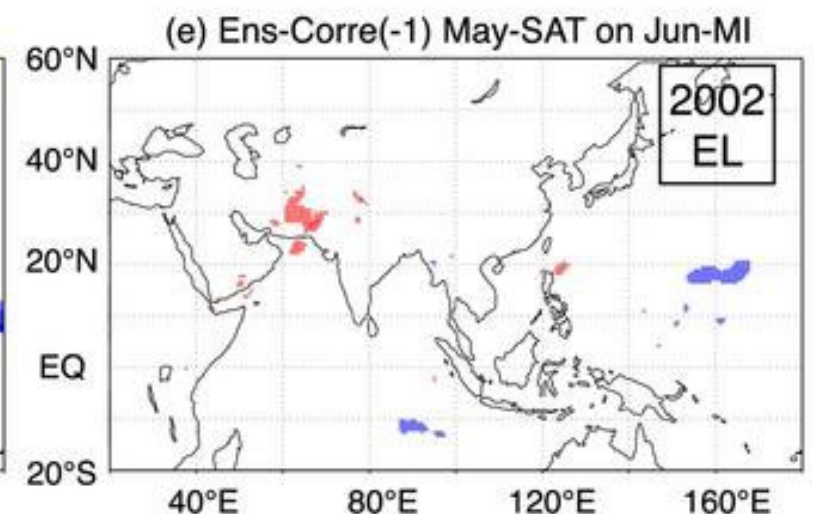
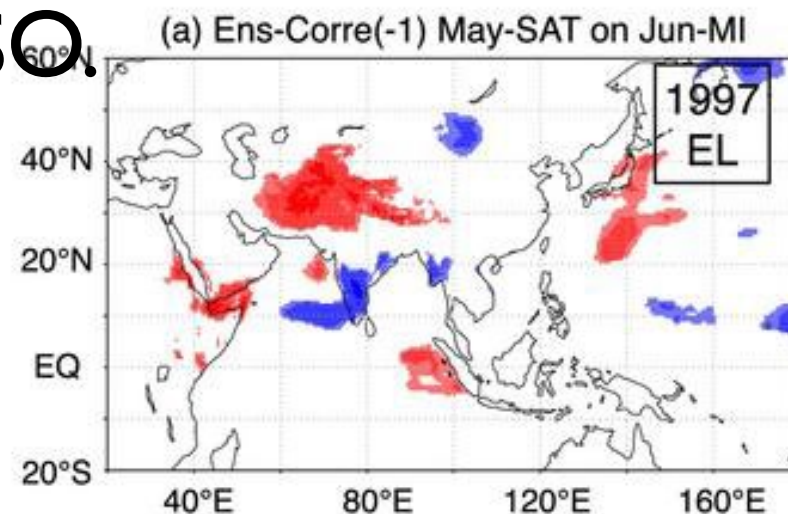
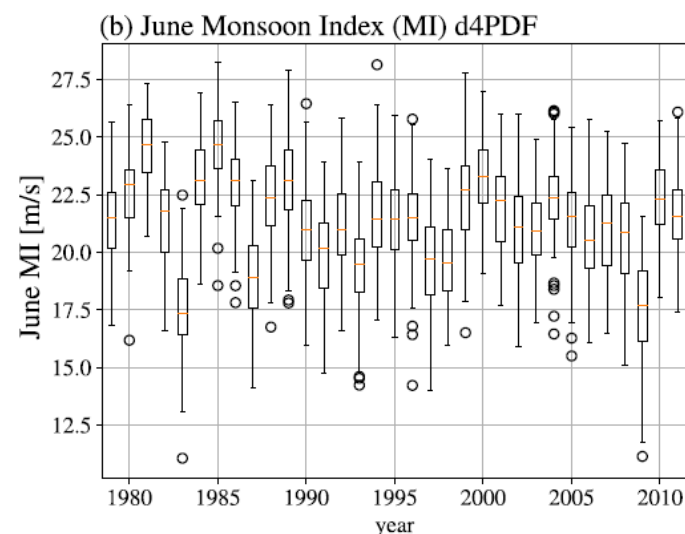
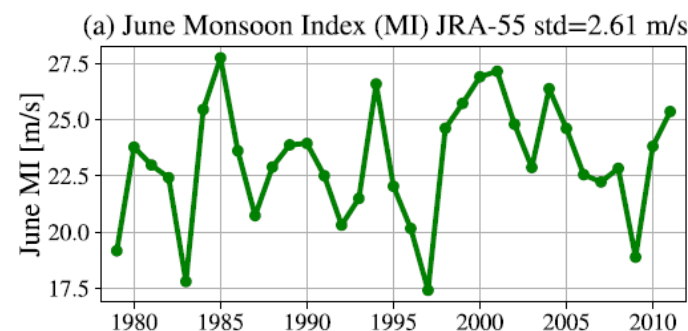
年	一月	二月	三月	四月	五月	六月	七月	八月	九月	十月	十一月	十二月	合計
1770	—	—	—	—	—	90	851	199	276	48	24	0	—
1771	72	0	361	22	67	290	128	53	60	26	51	0	1130
1772	72	0	115	?	50	9	—	228	—	20	41	0	—
1773	0	0	230	76	3	172	284	257	195	114	24	32	1387
1774	72	0	8	218	20	31	147	202	90	33	17	32	870
1775	72	0	25	241	90	172	154	—	33	4	41	154	—
1776	43	0	90	98	95	18	431	46	63	26	0	134	1044
1777	0	0	57	8	64	20	205	185	117	4	207	0	867
1778	0	86	0	22	84	119	293	170	156	26	7	0	963
1779	0	7	394	104	53	365	161	218	90	108	85	32	1617
1780	14	13	74	104	53	223	427	312	282	59	71	0	1632
1781	0	46	180	50	70	286	321	250	225	0	24	6	1458
1782	0	26	156	11	76	46	464	206	144	48	27	192	1396
1783	29	0	33	95	90	134	106	614	87	103	10	0	1301
1784	0	198	66	143	118	174	400	218	630	101	139	26	2213
1785	0	0	33	59	92	81	277	46	117	103	31	26	865
1786	0	0	33	45	120	84	403	226	48	9	3	58	1029
1787	0	0	189	98	22	451	382	715	426	15	54	0	2852
1788	288	50	107	48	123	110	352	100	354	55	24	0	1800

最近百四十年間ノ京城雨量



Takahashi et al. (2024)

- ▶ Surface air temperatures over the Tibetan Plateau impacts on Asian monsoon severity independently from the phase of ENSO.



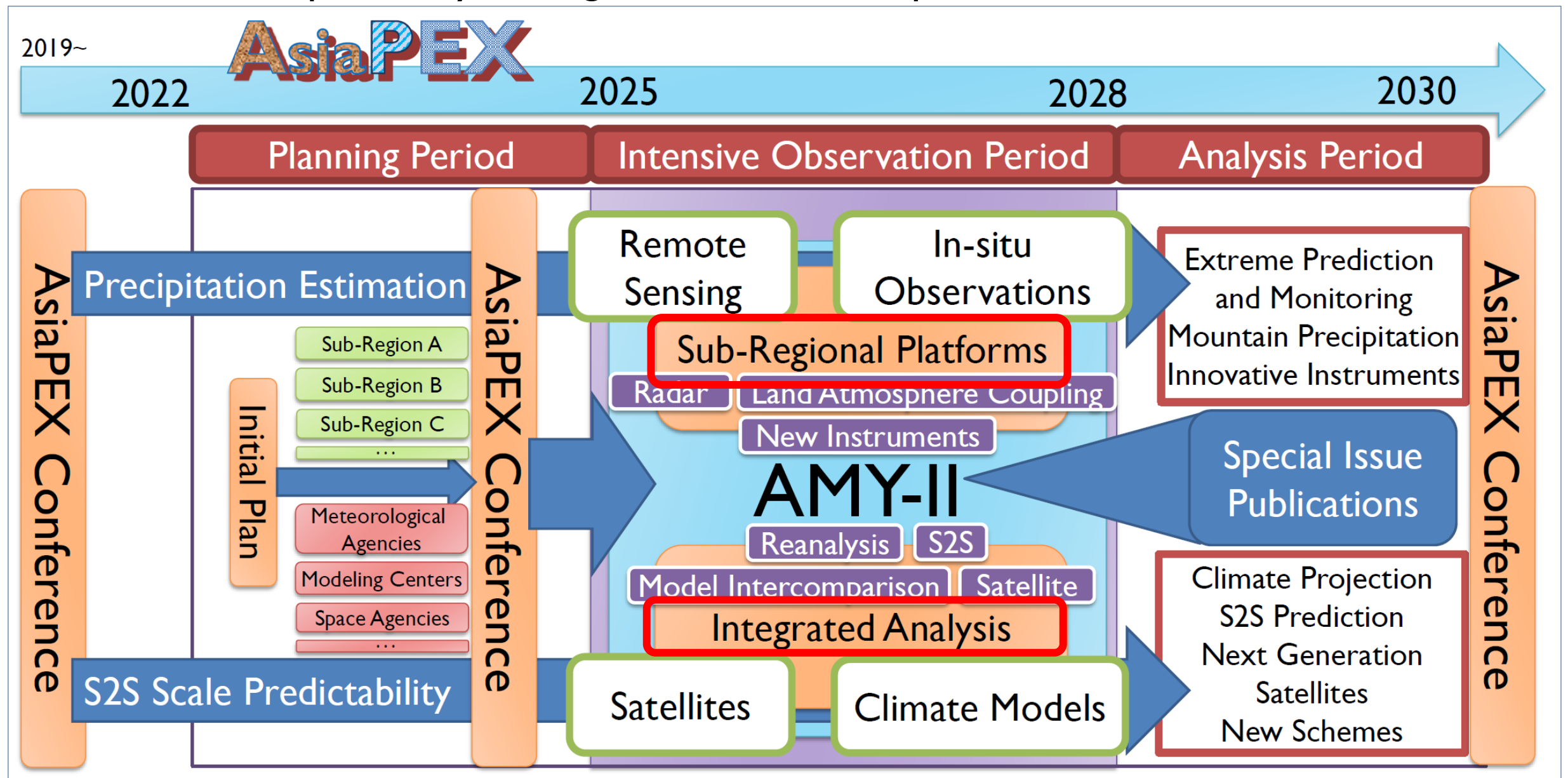


Future Plan

Field Campaign: Asian Monsoon Year-II

Two Strategic Approaches:

- 1) the subregional process-oriented coordinated observation platforms at scales of tens to hundreds of kilometers with collaborative observations and
- 2) integrated analysis using global modeling, reanalysis, and remote sensing dataset that can be underpinned by subregional observation platforms.



Five Challenges in 2024

- ▶ Revision of Science Plan
- ▶ Organizing Panels, Project Steering Group
 - ▶ Panels for 6 Approaches
 - ▶ Decide Co-Chairs for each Panel
 - ▶ Working Groups for Funding, Data, Capacity Building ...?
 - ▶ Projects for Sub-regional Activities
 - ▶ Project Steering Group, Science Steering Group
- ▶ Preparation for Applying Big Funds
 - ▶ JSPS, APC, RIHN
- ▶ Preparation for 2nd AsiaPEX Conference: Feb. 2026?
- ▶ Asian Monsoon Years-II (name?): Dec. 2026-Nov. 2028?



LOGO?

JSPS/SOLA Special Issues

- ▶ JSPS/SOLA Special Issues will be called for very soon.
 - ▶ Call for papers will be from the beginning of 2025.
 - ▶ Papers related with GEWEX activities are welcome.



Asian Precipitation
Experiment

Sessions and Workshops

9TH GLOBAL ENERGY AND WATER
EXCHANGES
OPEN SCIENCE CONFERENCE
JUL 7 - 12, 2024 | SAPPORO, JAPAN

GEWEX



JSPS

ICEDS



KAGAWA
UNIVERSITY

Core-to-Core Program



Sessions and Workshops

Program
at a glance

July 08 (Mon) Workshop on AsiaPEX in Southeast Asia and Mongolia: Part I

12:30-13:20 @ Sohjuan, 4F, Keio Plaza Hotel

July 09 (Tue) GEWEX/OSC AsiaPEX Session+Workshop

Main Event

Observational and Modeling Initiatives for the Asian Monsoon Field Campaign (AsiaPEX and AMY-II)

Session 1 13:30-15:00 @ Eminence Hall-B, Keio Plaza Hotel

Posters 15:30-17:00 @ Plaza Hall & Cherry, Keio Plaza Hotel

Session 2 17:00-18:30 @ Eminence Hall-B, Keio Plaza Hotel

Workshop 18:30-19:00 @ Eminence Hall-B, Keio Plaza Hotel

AsiaPEX Summer Starlight Party @ NU AiR THE ROOF TOP of SAPPORO, ->MAP[1]



July 11 (Thu) Core-to-Core AsiaPEX Reception **Invited Only**

19:00-21:00 @ Room 6C, TKP Sapporo White Building Conference Center, ->MAP[2]

July 12 (Fri) Workshop on AsiaPEX in Southeast Asia and Mongolia: Part II

14:30-15:20 @ Room 4A, TKP Sapporo White Building Conference Center, ->MAP[2]

↓
July 13 (Sat) Workshop on Storm Modeling over NE Indian Subcontinent

14:30-18:00 @ Room 2B, TKP Sapporo White Building Conference Center, ->MAP[2]

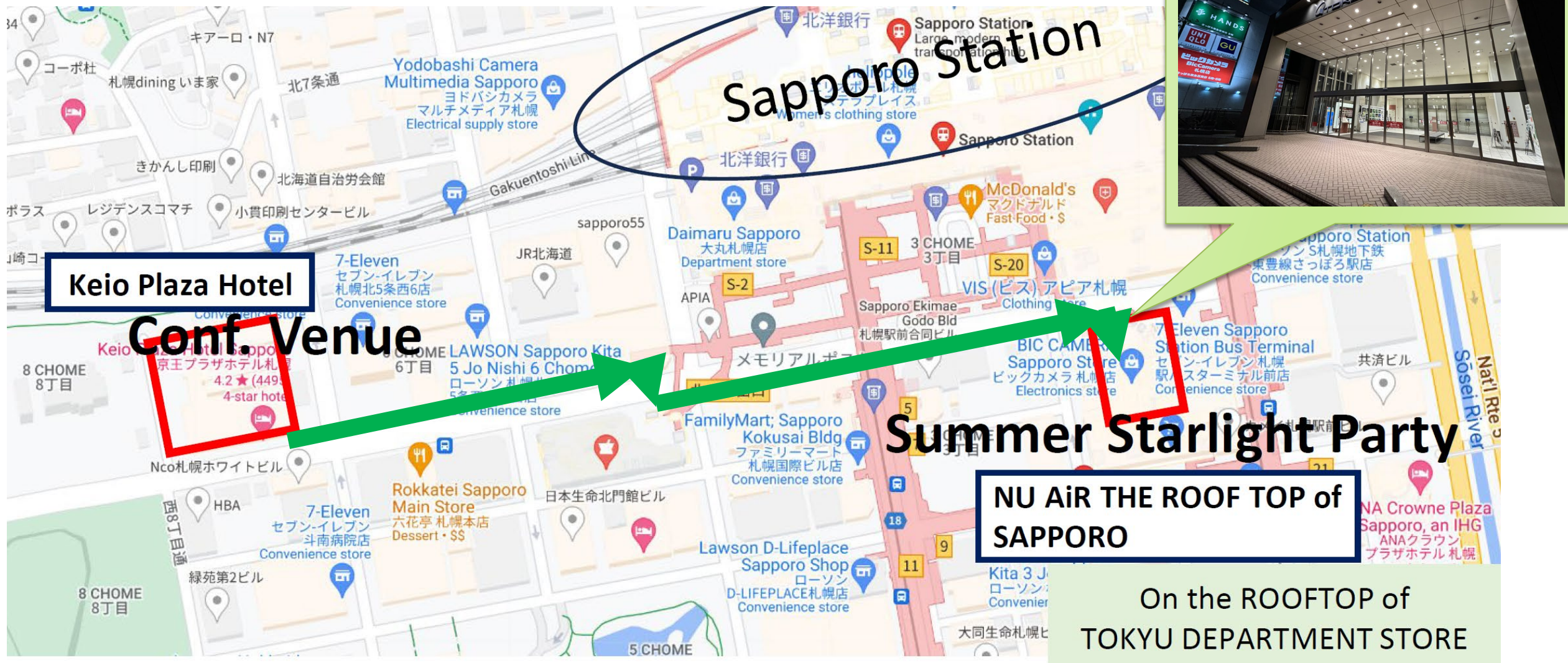
10:00-12:00 on 13 Jul. @ Hokkaido University



After AsiaPEX Session ...

- ▶ Summer Starlight Party (19:30-21:30) !!
 - ▶ Get TICKET and MAP today in THIS ROOM!!

ENTRANCE





Thank you!

