

# TPE Progresses and Purpose of TPE-GHP/GEWEX Joint Workshop



Ailikun

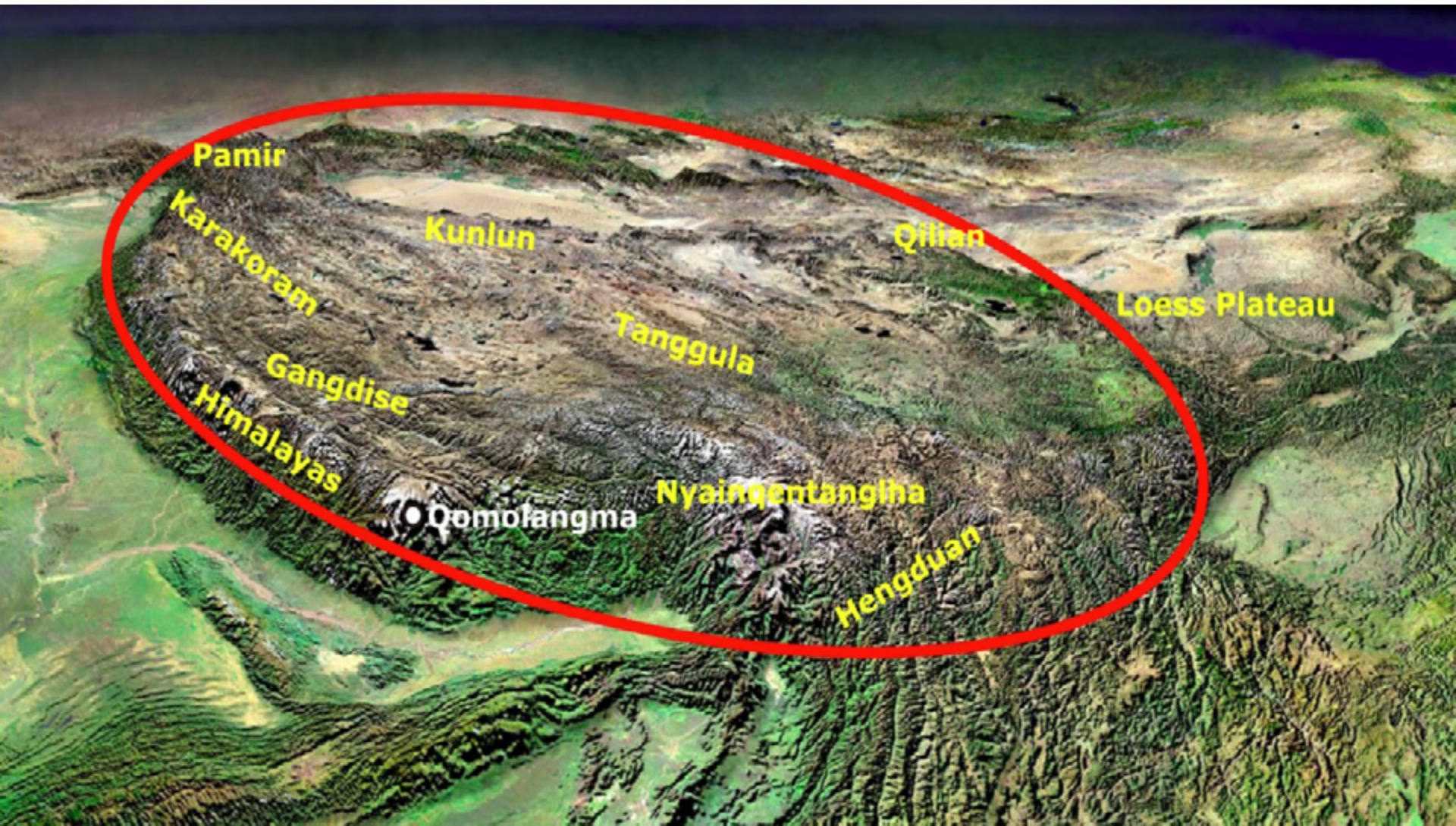
Director of TPE IPO

Institute of Tibetan Plateau Research

Chinese Academy of Sciences

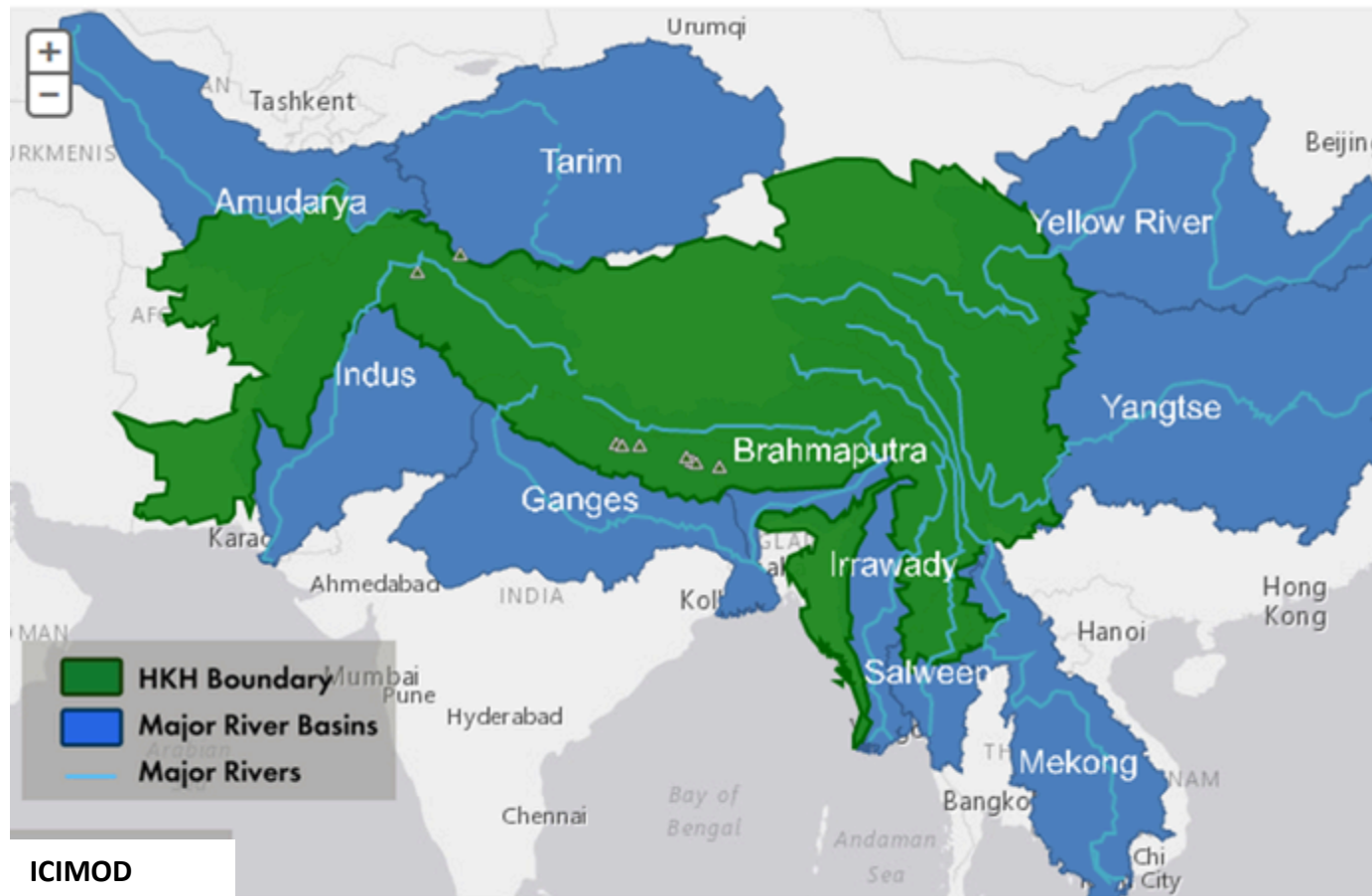
Kathmandu, Nepal, 17-19 Oct. 2017

The Third Pole region covers 5 million km<sup>2</sup> in area with an elevation higher than 4000m by average





# The Third Pole Provides Water Resources and Ecosystem Services for About 2 Billion People



# Launching of TPE Programme in 2009, financially supported by CAS and ITPCAS



**Volker Mosbrugger**

**Lonnie G.  
Thompson**

**Tandong Yao**

# The Objectives of TPE

- ✓ To obtain a system understanding of the evolution of third pole and of its impact on the dynamics of the earth system: past - present - future.
- ✓ To understand the mechanism of Ice-Water-Atmosphere-Ecosystem-Human interaction in Third Pole region to support the sustainable development of the region.

# Key Scientific Questions of TPE

- ✓ What are the key earth system processes and their interactions among multi-spheres in TPE and its surrounding region?
- ✓ What are the impacts of global change to Third Pole environment? And what are the feedbacks?
- ✓ How to protect and safeguard the livelihood local people, and how to support government/people approaching to the UN SDGs?

# **TPE Activities in 2017**



# Third Pole Science Summit – TPE-CSTP-HKT Joint Conference

10-12 July, 2017  
Kunming, China

Third Pole Science Summit – TPE-CSTP-HKT Joint Conference Kunming China July 10, 2017





# TPE Workshop, 12 July 2017, Kunming



# TPE young scientist training, 16-30 July 2017, Beijing & Lanzhou



# TPE Sessions in AGU, EGU, JpGU

2016 Fall AGU



2017 JpGU-AGU



2017 EGU



2016 EGU





# The 2<sup>nd</sup> Comprehensive Science Expedition on Tibetan Plateau (2017-2021)



青藏高原综合科学考察研究  
Comprehensive Scientific Expedition On

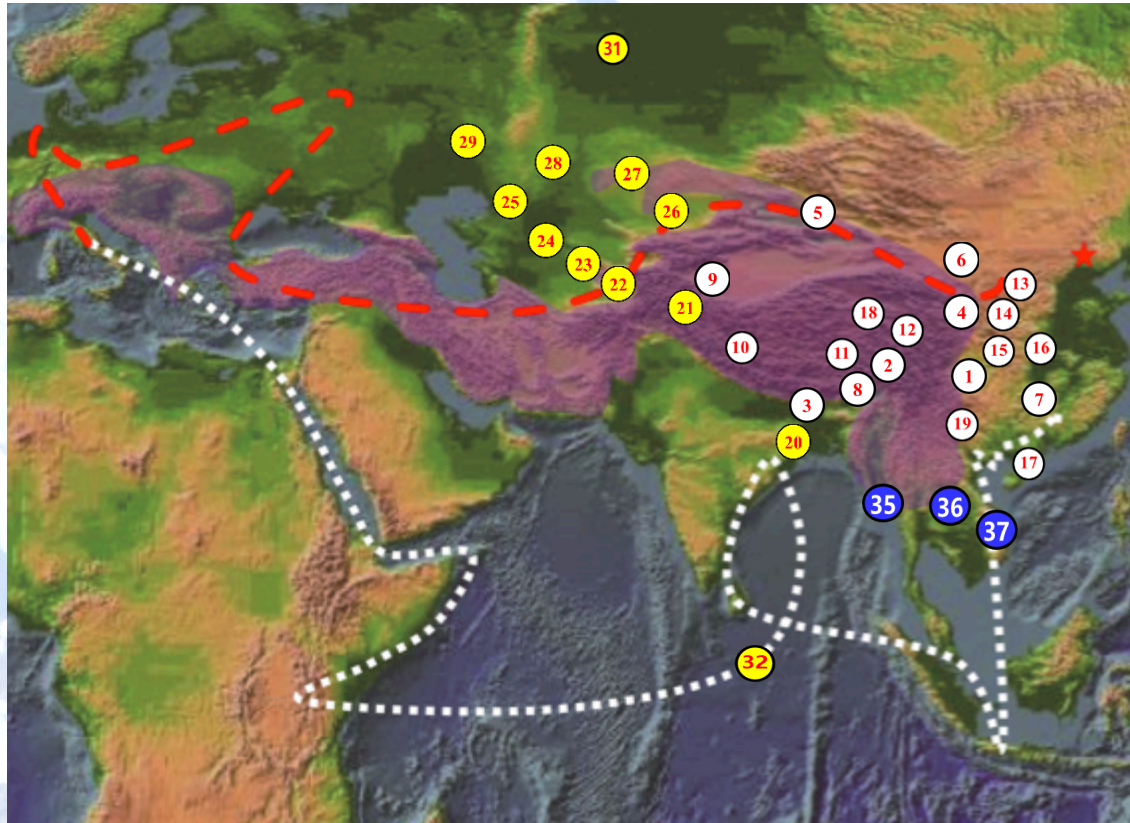


# CAS Strategic Priority A Program: Pan-TPE Environment and Green Development (2018-2022)

- 1. Integrated assessment of regional environment change**
- 2. Green development and technology demonstration**
- 3. Natural disaster and risk assessment**
- 4. Impact of human activity and best utilization of natural resources**
- 5. Climate change impact on ecosystem and biodiversity**
- 6. Westerly-monsoon interaction and water resource change**
- 7. Evolution of Third Pole and its relation with environment and resources**



# Establishment of Regional Observation Network



# Establishment of TPE Regional/Global Network

## Research and Education Centers

## TPE Offices



- Beijing Office: HQ for coordination, research and training
- Kathmandu Center: Observation and training
- US Office: Glacier dynamics and Paleo-climate
- German Office: Ecosystem and human adaptation
- Islamabad Office: Observation and training
- Sweden Office: Earth system modeling

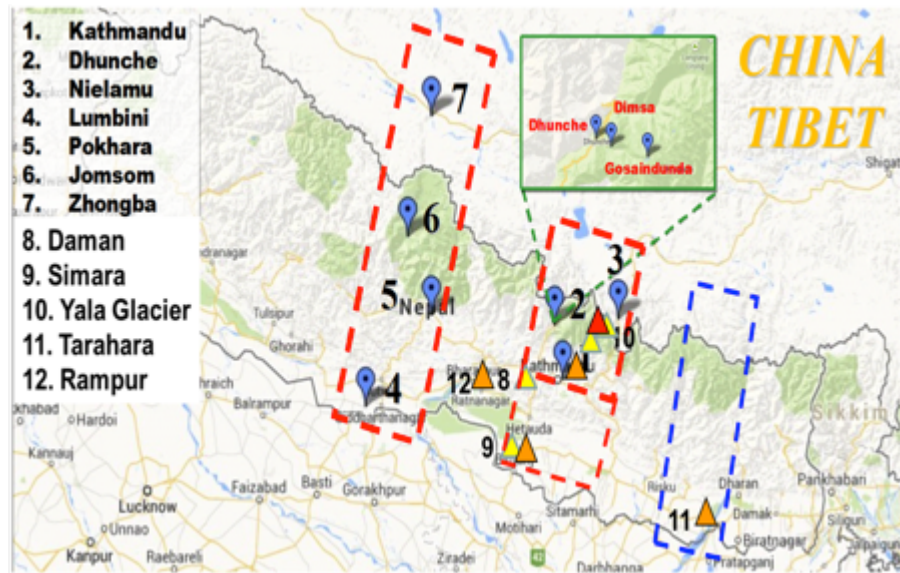




# Kathmandu Center for Research and Education (KCRE), CAS-TU



- ✓ Atmosphere, hydrological cycle, ecosystem, adaptation,
- ✓ Joint observation, expedition and research
- ✓ Young scientists training
- ✓ Workshops and conferences
- ✓ Short and long term visit



# Purpose of this workshop

- ① To better understand what are the key scientific questions, key issues, main gaps and potential solutions in high mountain research of Asia, from the water and energy perspectives
- ② To establish a more practical frame/plan for future collaboration of TPE and GHP/GEWEX
- ③ To draft a white book as a guideline for future research and collaboration in Asian high mountain water-energy research



Climate warming

Asian monsoon

Human activity

Glacier & Snow  
(permafrost)

River Runoff

Lake area/number

Soil moisture

Flood/drought

Agriculture  
Industry

Ecosystem  
biodiversity

Natural/human  
disasters

Water & Land  
management

Disaster risk  
reduction

community  
adaptation

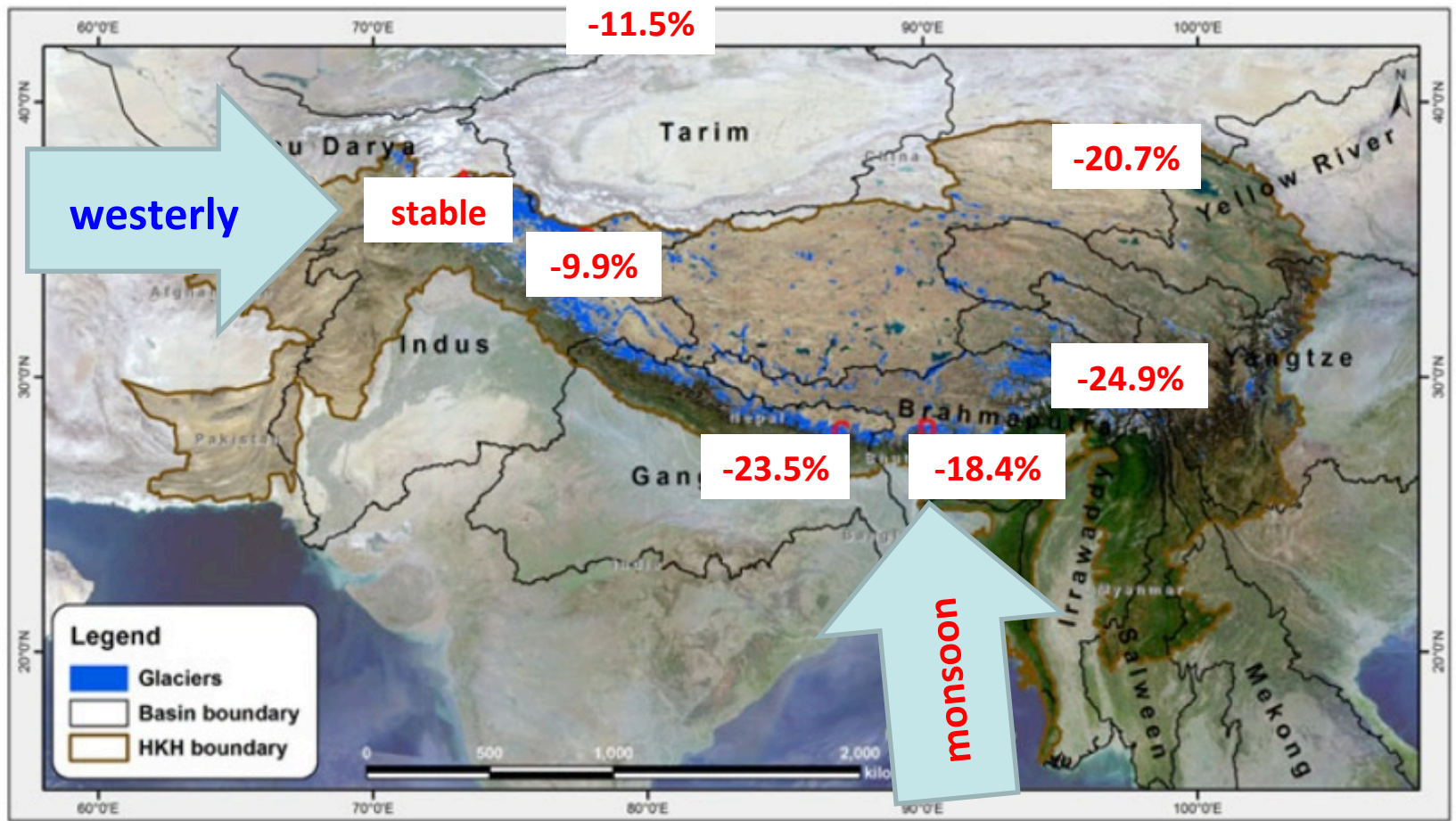


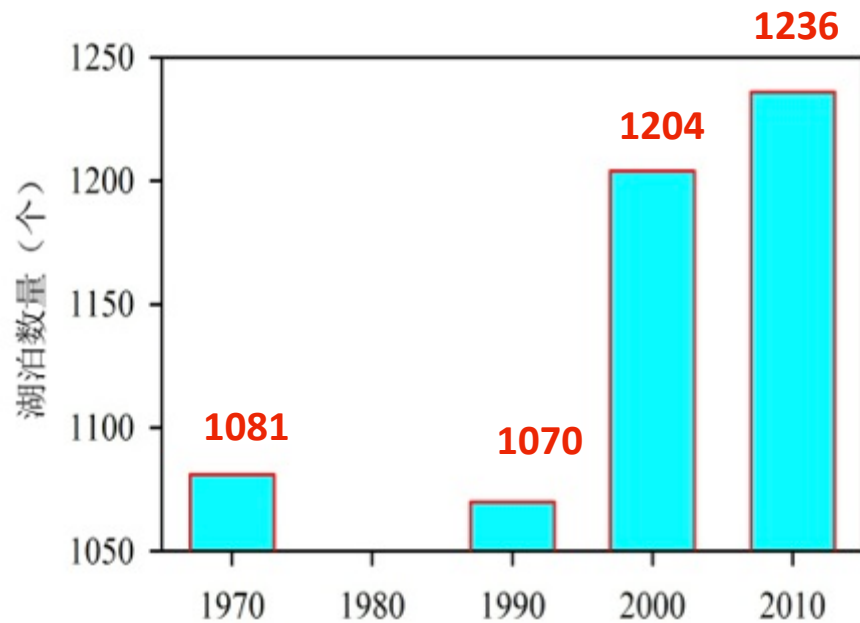
Figure 2. The Hindu Kush Himalayas (brown polygons), major river basins (black polygons) and

**Glacier retreated 17%, permafrost decreased 16% in Tibetan Plateau of China in from 1970 to 2010.**

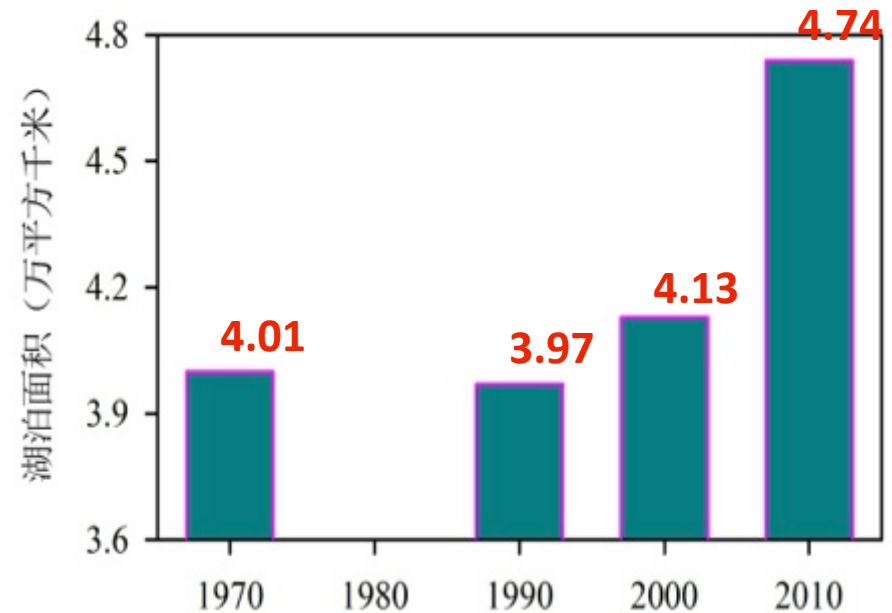
- ✓ The rate of retreat and growth of individual glaciers is highly dependent on glacier characteristics and location. The differences of glacier retreating rate between eastern and western Himalaya-Tibetan Plateau might be the consequences of monsoon and westerly interaction.
- ✓ Glacier (& snow) melt is influenced by debris cover, black carbon deposition, albedo feedback, and sublimation. The monitoring network and observational data in Asian high mountains are lacked very much compared with other regions, and glacier melting process is not well understood by research communities.

# Increasing lakes in Tibetan Plateau of China in last 40 years

## Changes of lake number

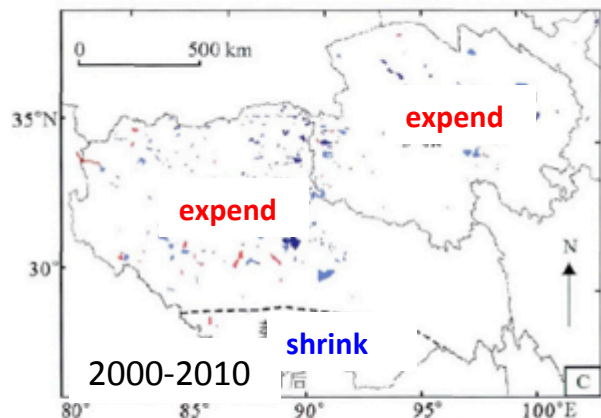
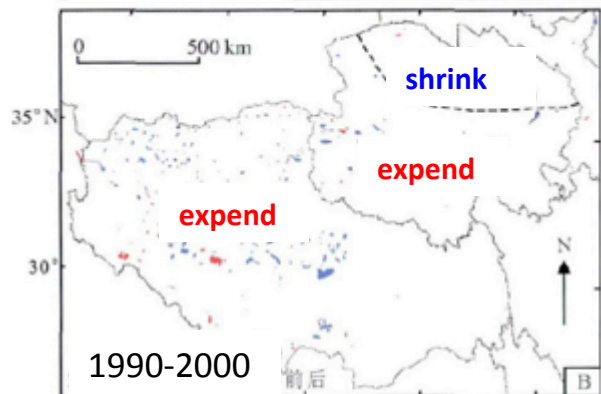
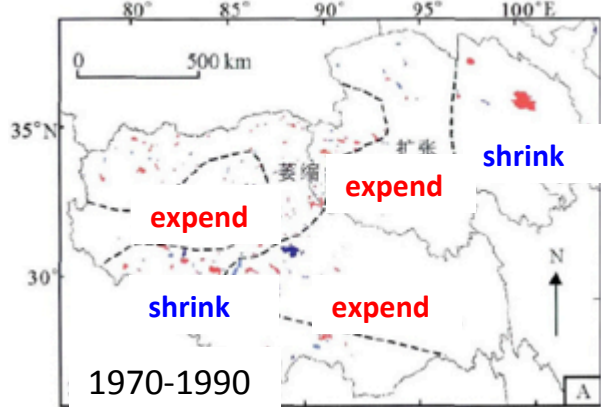


## Changes of lake area (10,000 KM<sup>2</sup>)



Only calculating the Lakes with area > 1 km<sup>2</sup>





湖泊面积  
变化率

■	<math><-20.00\%</math>	■	<math&gt;0.01\% 20\%<="" \sim="" math=""></math&gt;0.01\%>
■	<math&gt;-19.99\% -0.01\%<="" \sim="" math=""></math&gt;-19.99\%>	■	<math&gt;&gt;20.00\%< math=""></math&gt;&gt;20.00\%<>

图3 青藏高原近40年来湖泊面积动态变化

Fig.3 Dynamic changes of lake surface area in the Tibetan Plateau in the past forty years

- ✓ Lake expansion(shrink) is influenced by temperature, precipitation, glacier melting and evaporation, the lake changes in Tibetan Plateau is clearly having decadal scale variation. Why?
- ✓ The contribution from glacier/snow melting to late expansion becomes more and more significant from 2000's. Will it continue expanding as the temperature increasing?
- ✓ The lake numbers and area in southern part of Tibetan Plateau is shrinking from 2000's, the role of evaporation to lake changes in different areas of Tibetan Plateau is not well understood

Lijuan Yuan et al, 2016

Climate warming

Asian monsoon

Human activity

Glacier & Snow  
(permafrost)

River Runoff

Lake area/number

Soil moisture

Flood/drought

Agriculture  
Industry

Ecosystem  
biodiversity

Natural/human  
disasters

Water & Land  
management

Disaster risk  
reduction

community  
adaptation

# Important Events in 2018

## **TPE session in GEWEX Science Conference**

Alberta, Canada, 6-11 May, 2018

**Title: Land-Atmosphere Interactions and Water Cycle  
over the Third Pole Region**

**Conveners: Tandong Yao, Yongkang Xue, Xin Li, Ailikun  
and Bob Su**

## **WMO High Mountain Summit**

?, 2018, China