International Programme of Asian-Australian-African Monsoon (IP-TAM): An Initiative

Gao Yun

Chinese Academy of Meteorological Science, CMA, China

WAIC . ShangHai. 20250726-27

Outline

1. Background
2. Research Content
3. Call for participants

Global warming is driving extreme weather events to become more widespread, frequent, severe, and concurrent, making it critical to align development planning with climate safety to address these compound risks

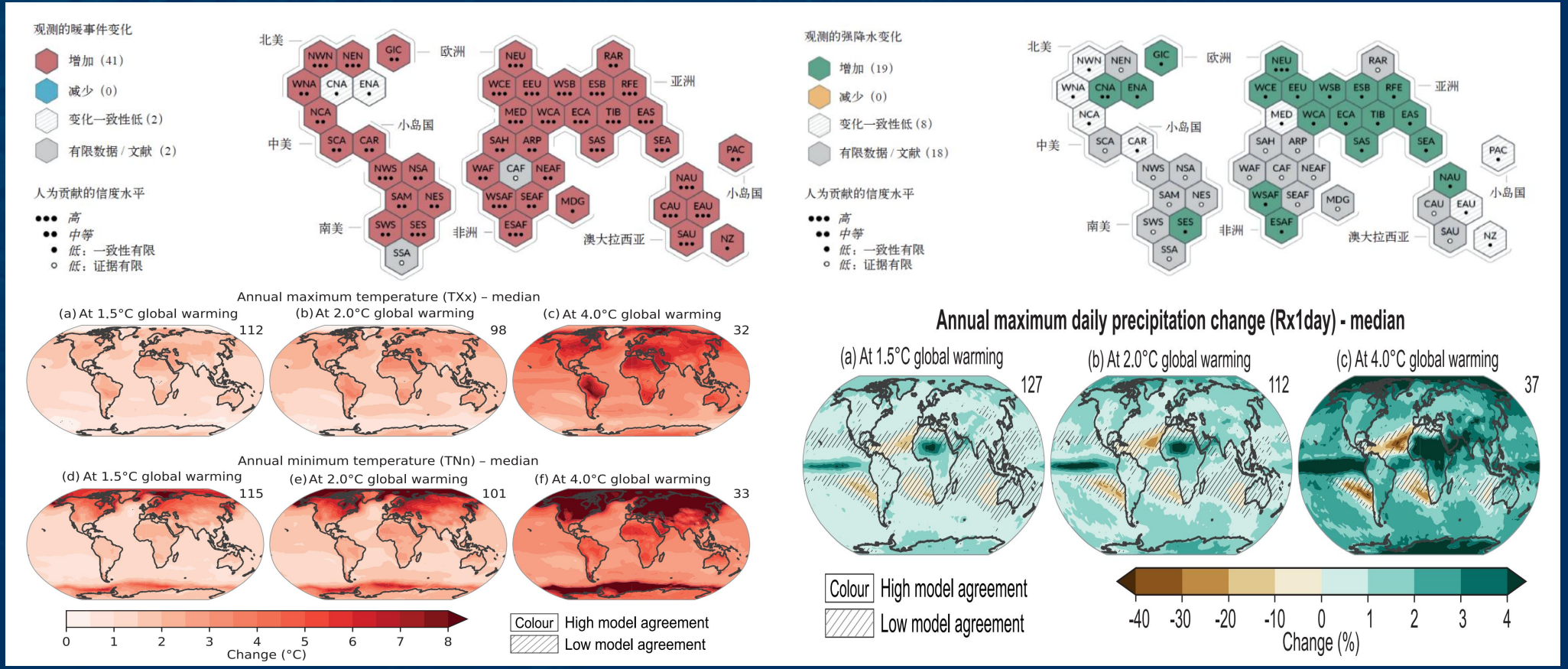
Extreme heatwaves

Severe floods

Now

IPCC AR6

Future

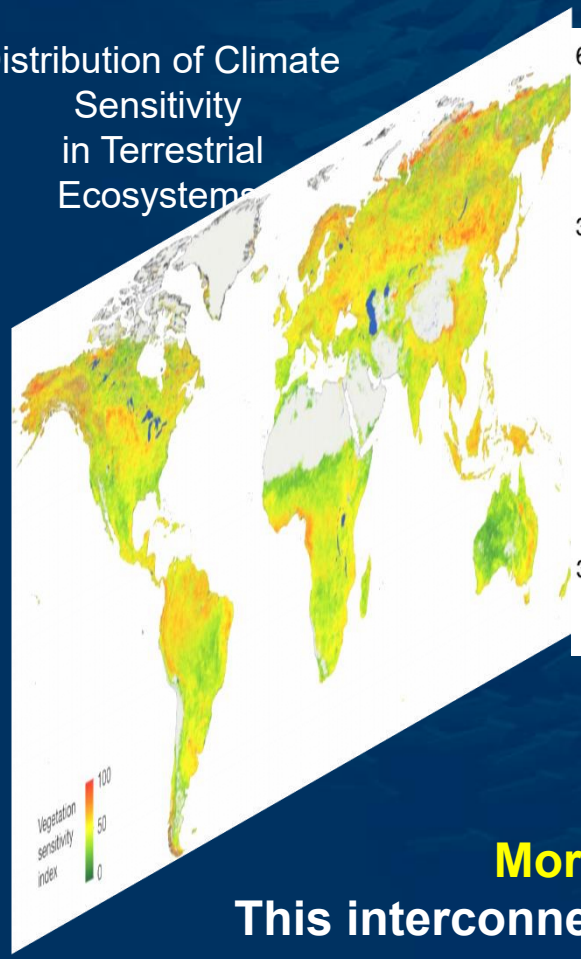


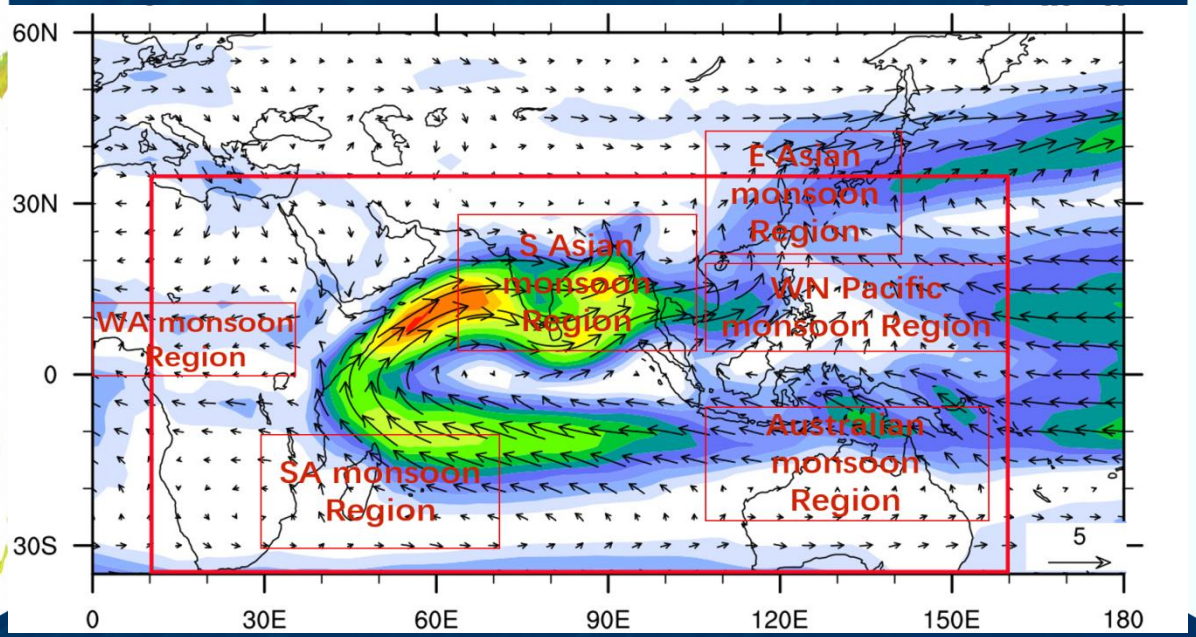
Warm events and heavy precipitation are and will on the rise across the Triple-A Monsoon Domain
Threaten food security and infrastructure

https://interactive-atlas.ipcc.ch/

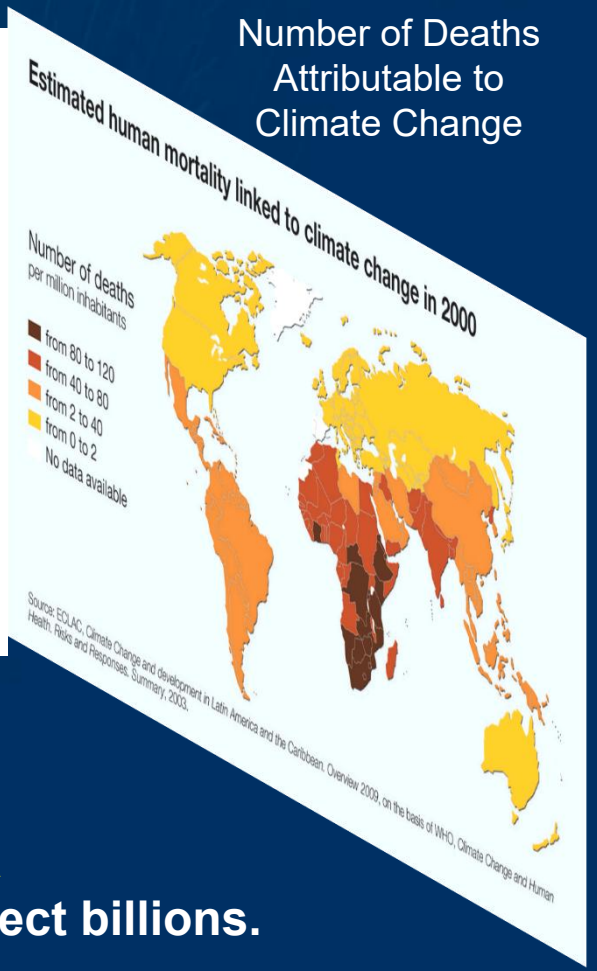
Triple-A Monsoon Domain—a climate change hot spot—faces intensifying torrential rains and prolonged droughts. These destabilize regional food security chains, overwhelm urban infrastructure, and trigger transboundary disaster cascades.

Distribution of Climate Sensitivity in Terrestrial Ecosystems





Number of Deaths Attributable to Climate Change



Domain of Asian-Australian-African monsoon

More than 60% of the world's population lives this area

This interconnected system needs urgent global teamwork to protect billions.

Seddon A et al., **Nature**, 2016

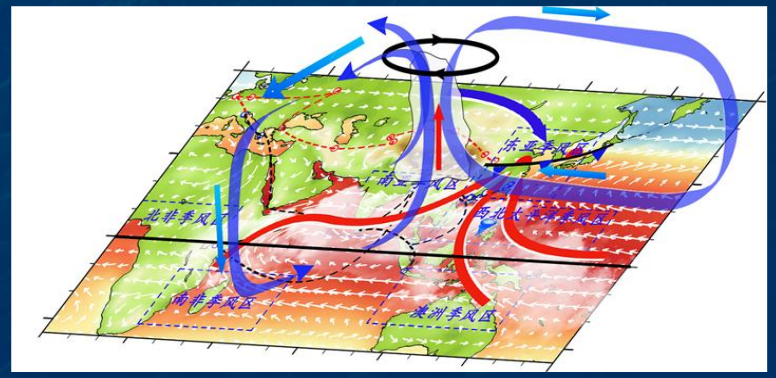
Samaniego et al., **UN ECLAC Report**, 2003

IP-TAM Initiative: A Critical Step to Strengthen Disaster Resilience for 45% of the World's Climate-Vulnerable Populations – Set to Drive Breakthroughs in Early Warning Systems Across over 25 Developing Nations and SIDS

Early Warning Systems (EWS)

EW4All

IP-TAM



Identified Countries for targeted support

IP-TAM aligns with the UN's "Early Warnings for All" initiative and will strengthen early warning systems in these high-risk areas while building resilience based on science.

Outline

1.Background

2.Research Content

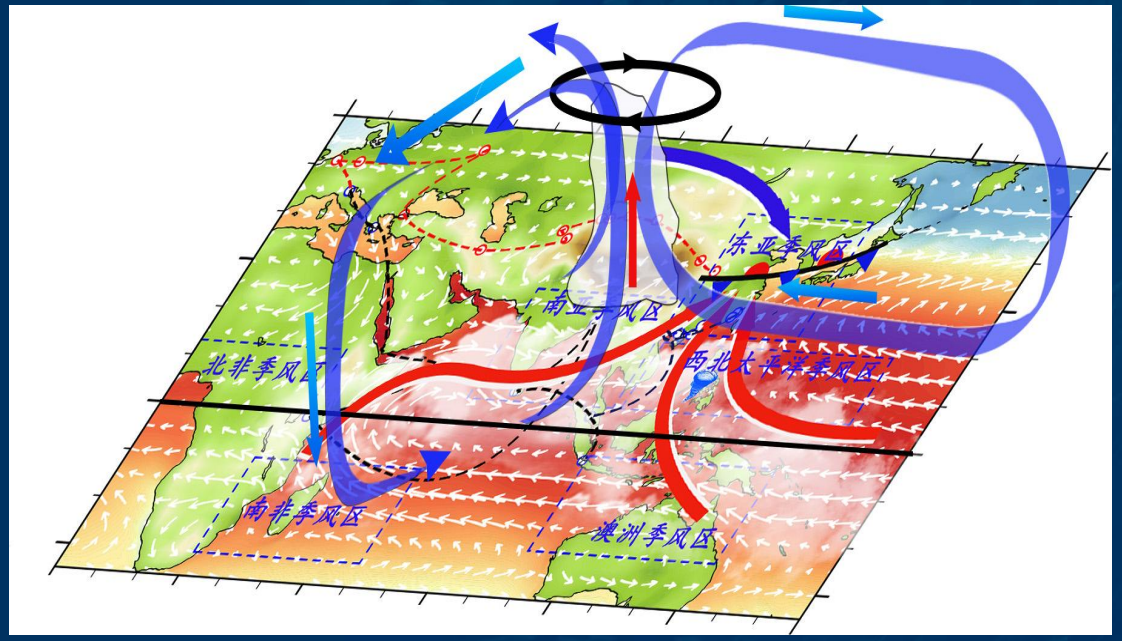
3.Call for participants

The Triple-A monsoon is a unified system comes with unique scientific challenges:

- **Challenge 1:** The Triple-A monsoon circulations form an interconnected system, requiring integrated research to grasp its entirety.
- **Challenge 2:** While multi-scale atmospheric variability in the region is well-studied, its influence on weather and climate extremes remains unclear.
- **Challenge 3:** Roles of multi-spheric interaction variability in triggering extremes under global warming are unknown.
- **Challenge 4:** Land-atmosphere-ocean interactions in the region are poorly understood, with large uncertainties.
- **Challenge 5:** Impacts of human activities in the Triple-A monsoon region on extreme events remain unclear.
- **Challenge 6:** Predictive skills for regional climate anomalies and extreme weather/climate events are low.

IP-TAM aims to address these gaps comprehensively to advance monsoon science by tackling the above challenges

Chinese Scientists Intend to Initiate the International Program of Triple-A Monsoon (IP-TAM)



Atmospheric-oceanic circulation in Triple-A monsoon domain

Scientific Research

Field Observation

To understand Land-atmosphere-ocean interactions, human influences in the Triple-A domain — key to unraveling monsoon dynamics and extreme events .

Strategy Objective

To understand the mechanisms, and improve the numerical simulation and prediction of extreme events in the Triple-A Monsoon region under global warming.

Enhancing monitoring, simulation, and prediction of extreme weather and climate events in Triple-A Monsoon region

Understanding the modulation of human activities on extreme weather and climate events

Exploring the impact of air-land-sea interactions on the variability of Triple-A Monsoon and its linkage to extreme weather/climate events

Revealing the impact of multiscale variability of Triple-A Monsoon on extreme weather /climate events

- **Human activity impacts**
- **Enhanced monitoring via integrated observations**

- **Multiscale monsoon variability and extremes**
- **land-atmosphere-ocean interactions**

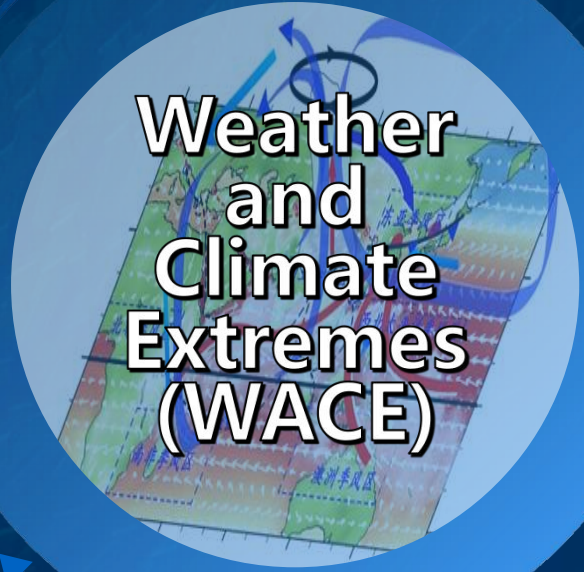
International Program of Triple-A Monsoon Experiment

IP-TAM's Research Covers Six Interdisciplinary Areas:

1. Variability and interconnections of the Triple-A Monsoon (Challenge 1)

2. Regional and global impacts of the Triple-A Monsoon (Challenge 2,6)

3. Triple-A Monsoon and multi-spheric interactions (Challenge 3,4)



4. Relations between the Triple-A Monsoon and human activities (Challenge 5)

5. Interactions between the Triple-A Monsoon and typhoon (Challenge 2,6)

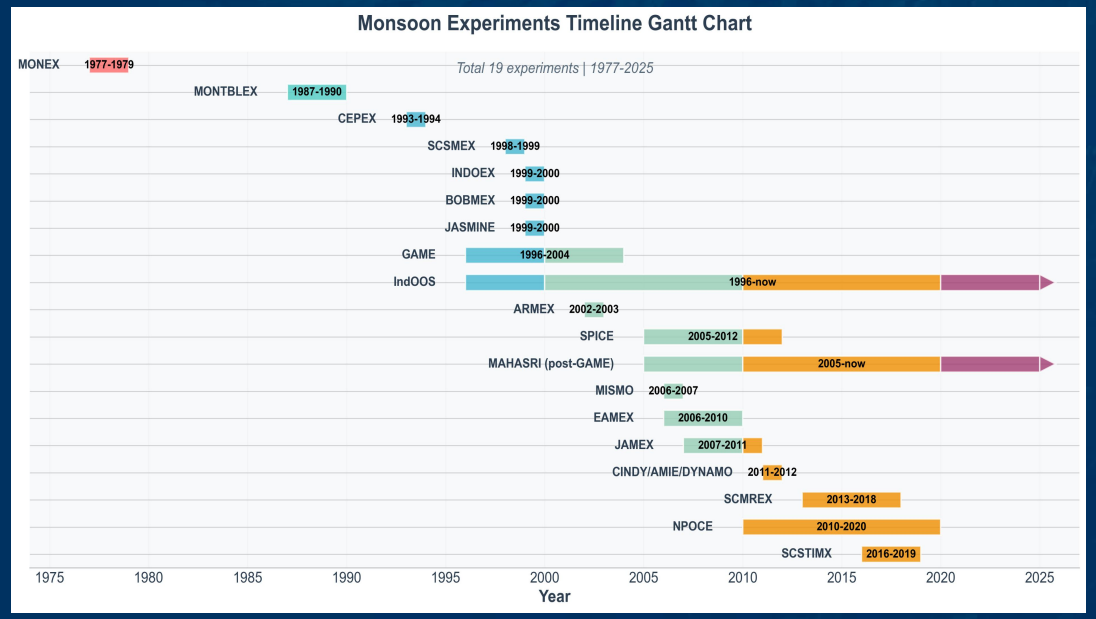
6. Monitoring, simulation and prediction of the Triple-A Monsoon (Challenge 6)

Field Experiments

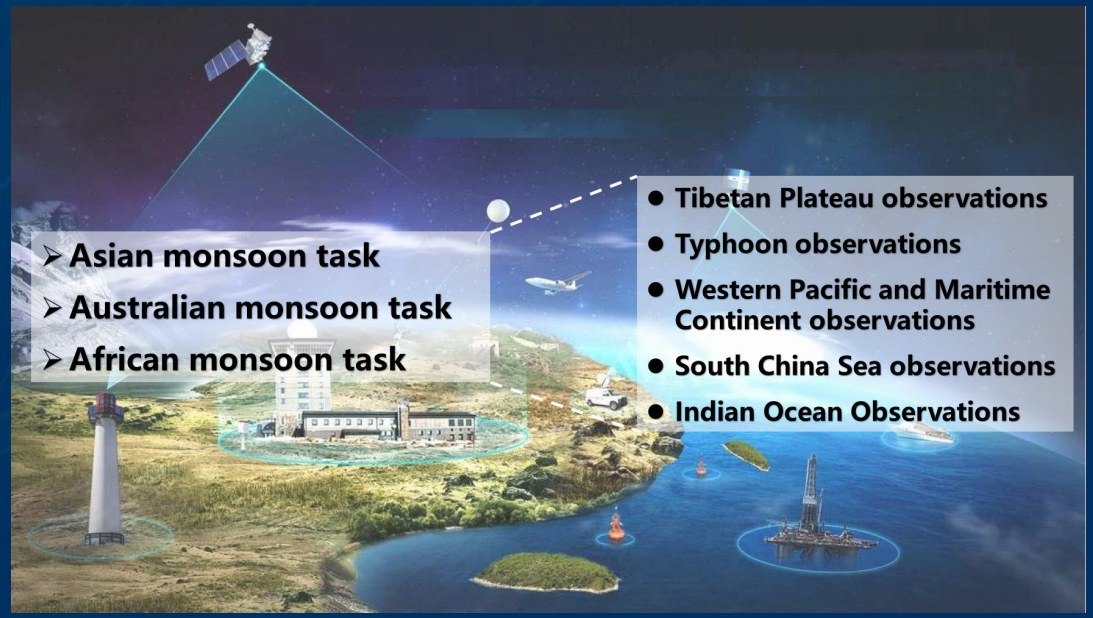
Field experiments are critical，it should adopt an international approach, utilizing air, land, sea, and space-based observing systems for advancing weather and climate extremes prediction.

- Builds on past projects like SCSMEX and GAME.
- **Combine existing networks and expand into areas that haven't been studied enough.**

Current status



IP-TAM



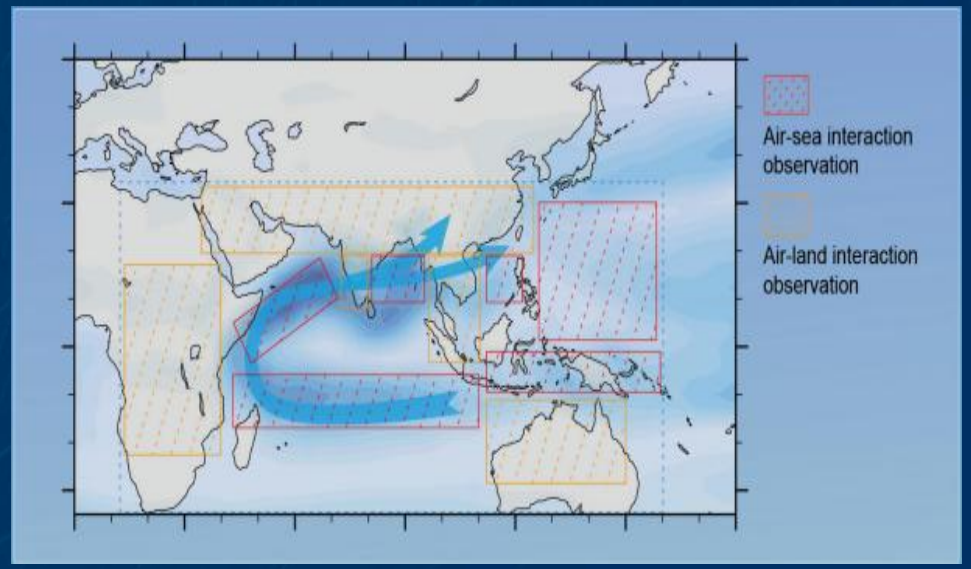
Field Experiments in Details

Observation Period

April to October each year, coinciding with the region's summer monsoon season.

Observation Regions

Focused on the areas of key monsoon flows in the Triple-A Monsoon region, including oceanic, land, and atmospheric interaction monitoring.



Observational Methods

A combination of satellite monitoring, ocean buoy arrays, Argo floats, ship-based observations, conventional and unconventional ground observations.

Key Tasks

This data will be the foundation for our modeling and prediction work.

Outline

1.Background

2.Research Content

3.Call for Participants

International Collaboration History of Monsoon Research

Monsoon research has advanced through global cooperation.
From U.S.-China joint studies in the 1980s to today's global initiatives like GMMIP, working together has driven progress.
IP-TAM seeks to continue this legacy

These collaborations provide a solid foundation for IP-TAM

IP-TAM Has Clear Goals:

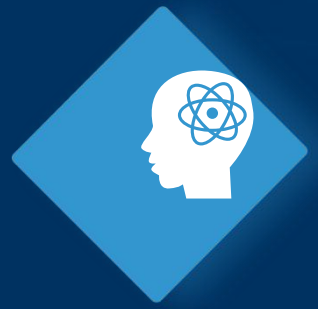
By working together, we can turn scattered data into insights we can act on

Establish a Collaborative Research Platform for Triple-A Monsoon Studies

Build an international cooperative research platform that engages experts from the Triple-A Monsoon region and beyond. This platform will facilitate joint research project design, field observations, and scientific studies.

Utilize and Share Observational Resources

Fully leverage operational observation facilities and scientific experimental infrastructures across the Triple-A Monsoon region to facilitate data sharing and utilization.



Enhance Understanding and Predictive Capabilities

Improve scientific understanding of multi-scale climate variability and extreme weather/climate events across the Triple-A Monsoon region, and enhance monitoring and forecasting capabilities to better support disaster risk reduction and climate change adaptation in the region.

IP-TAM is still in its initiative stage, and we need your expertise….

Principal Investigator

Renhe Zhang

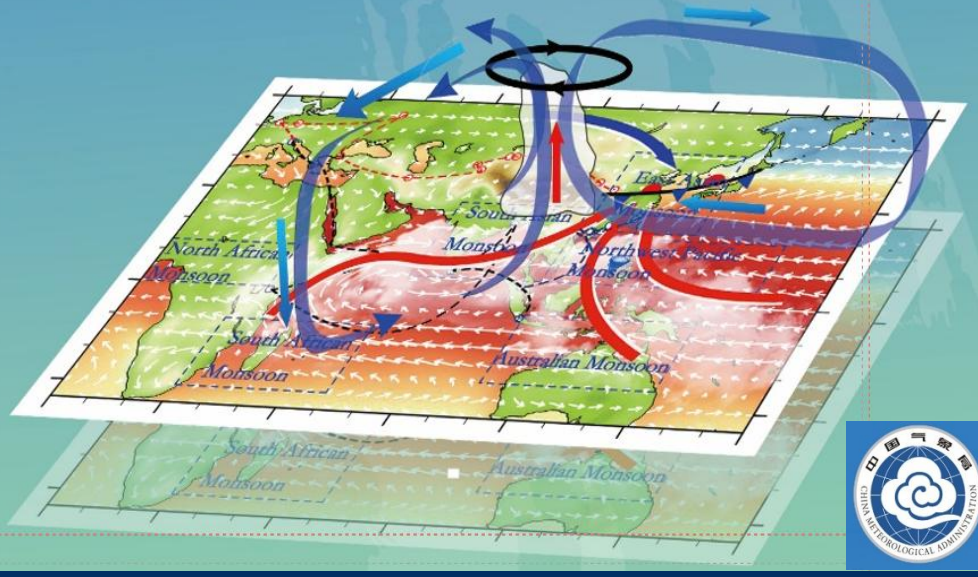
Chief Scientist of Chinese Academy of Meteorological Sciences

Distinguished Professor of Fudan University

Academician of Chinese Academy of Sciences

A Prepared

International Programme of Asian-Australian-African Monsoon (IP-TAM)



Whether you're a scientist, researcher, or organization, you can contribute by:

- **Joining joint research or field experiments.**
- **Sharing observational data to fill gaps.**
- **Collaborating on translating findings into policies.**

A Call for Joint Advancement of IP-TAM

We’re pleased to welcome global meteorological colleagues—and encourage more nations to join this initiative.

It matters for our regions and the globe. Your support will amplify impact, build alignment, and drive progress toward shared goals.

Let’s join forces: strengthening science, resilience, and responses, and advancing it as a WMO priority.

IP-TAM is more than a research program—it’s a shared commitment to safeguarding billions in the Triple-A region from global warming’s impacts. With collective action, we can turn scientific breakthroughs into stronger early warnings, smarter policies, and more resilient communities.

Together, let’s make this vision a reality.

We look forward to your partnership.

Thank you.

Connect information:

E-mail: camscd@cma.gov.cn

Address: No. 46 Zhongguancun South Avenue, Haidian District, Beijing, China

Zip Code: 100081