



IAP missions in China facing a changing world

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- The Climate Challenge facing in China
- Research related to the “Challenge” at IAP
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IAP at a Glance: History

1928: Institute of Meteorology

Nanjing (1928) -> Hankou (1937)-> Chongqing (1938)->

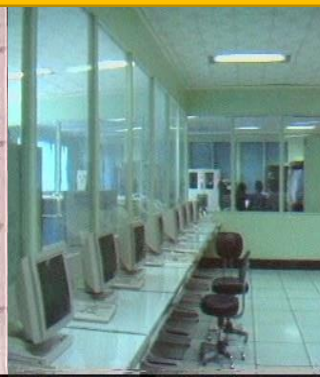
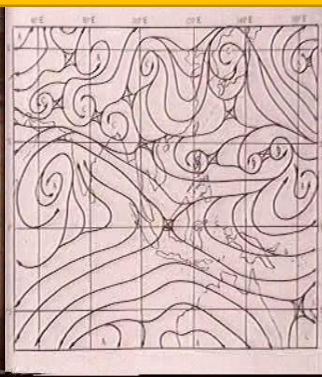
Nanjing (1946) -> Shanghai (1948) -> Nanjing (1949)

1950: Institute of Geophysics and Meteorology

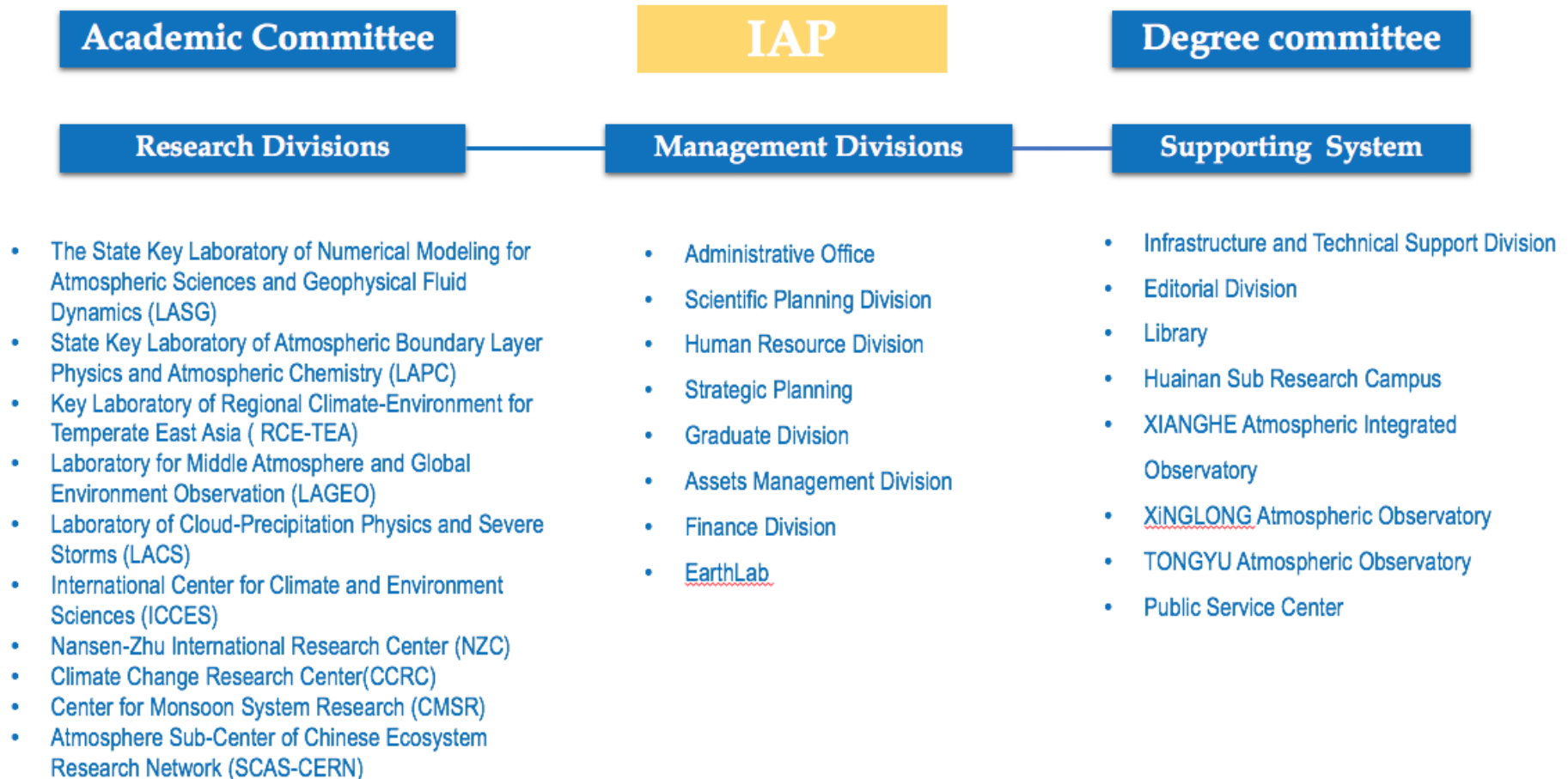
Nanjing (1950)->Beijing (1951)

1966: Institute of Atmospheric Physics

One of eight earliest scientific institutions engaged in the research of modern natural sciences in China



IAP at a Glance: Structure and People



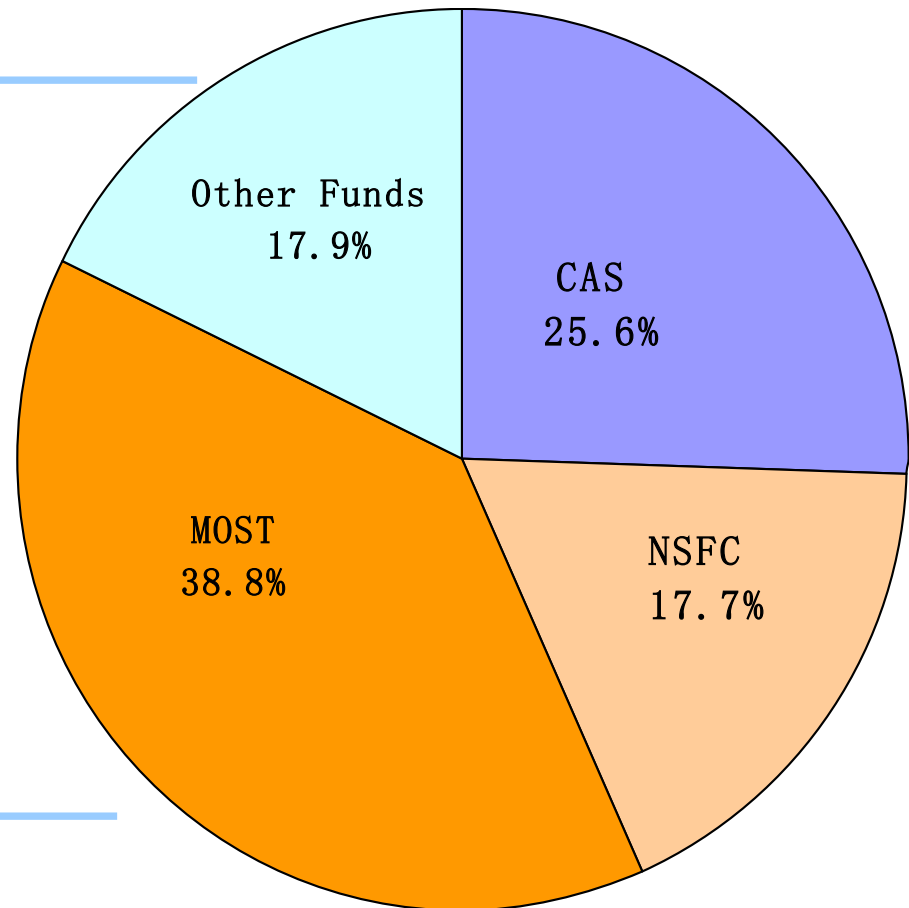
As of 2018, 525 staff work at the IAP, 76% of whom are researchers. At present, it has some 420 students, about 240 of whom are PhD candidates.

IAP at a Glance: Researches Highlights

1. Earth System Model Development and Global Climate Change
2. Atmospheric Chemistry and Environment
3. East Asian Monsoon
4. Middle Atmosphere
5. High Impact Weather
6. Regional Climate-Environment Change

IAP at a Glance: Research Funding

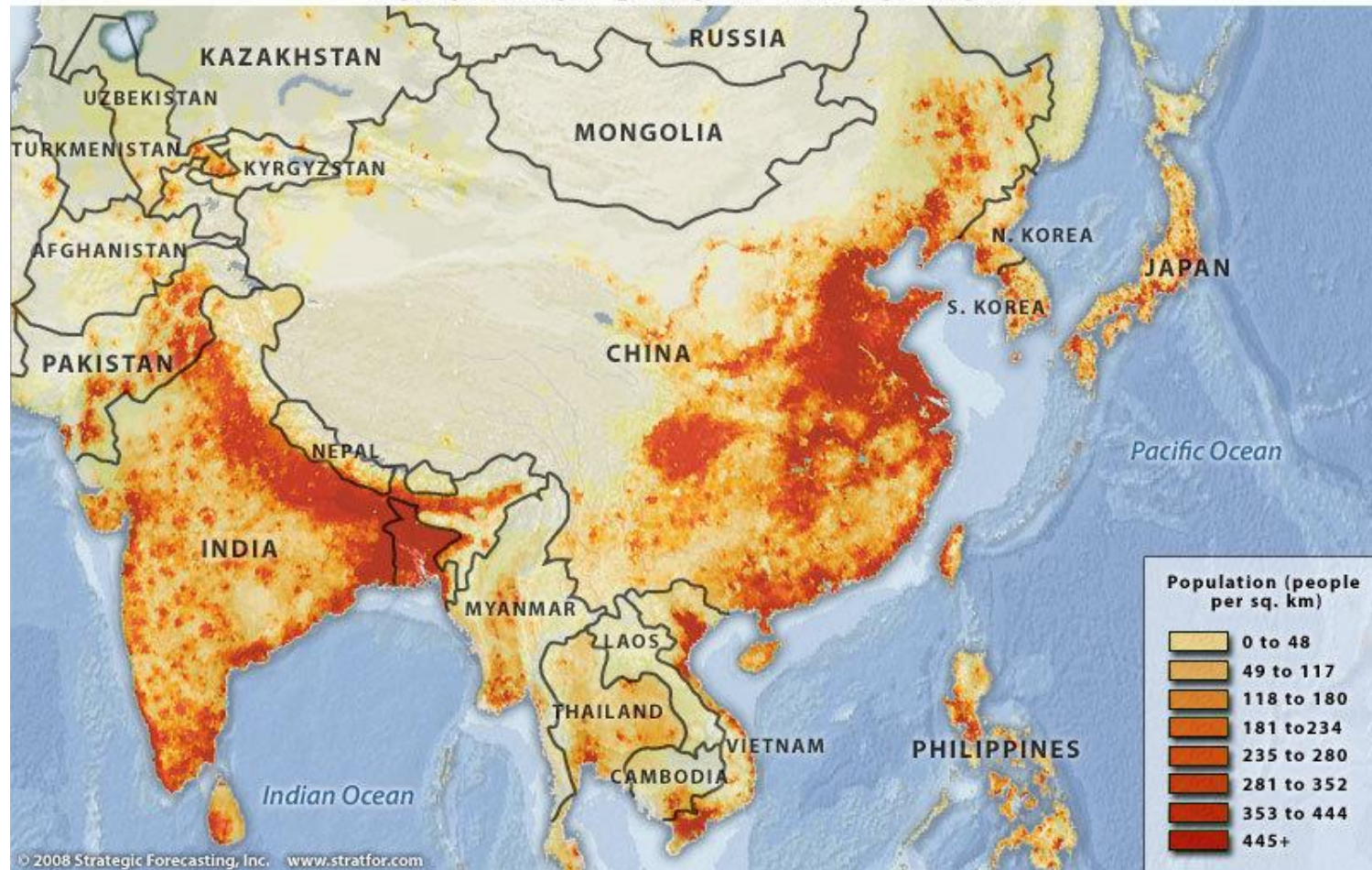
**Three major
funding sources
CAS, MOST, NSFC**



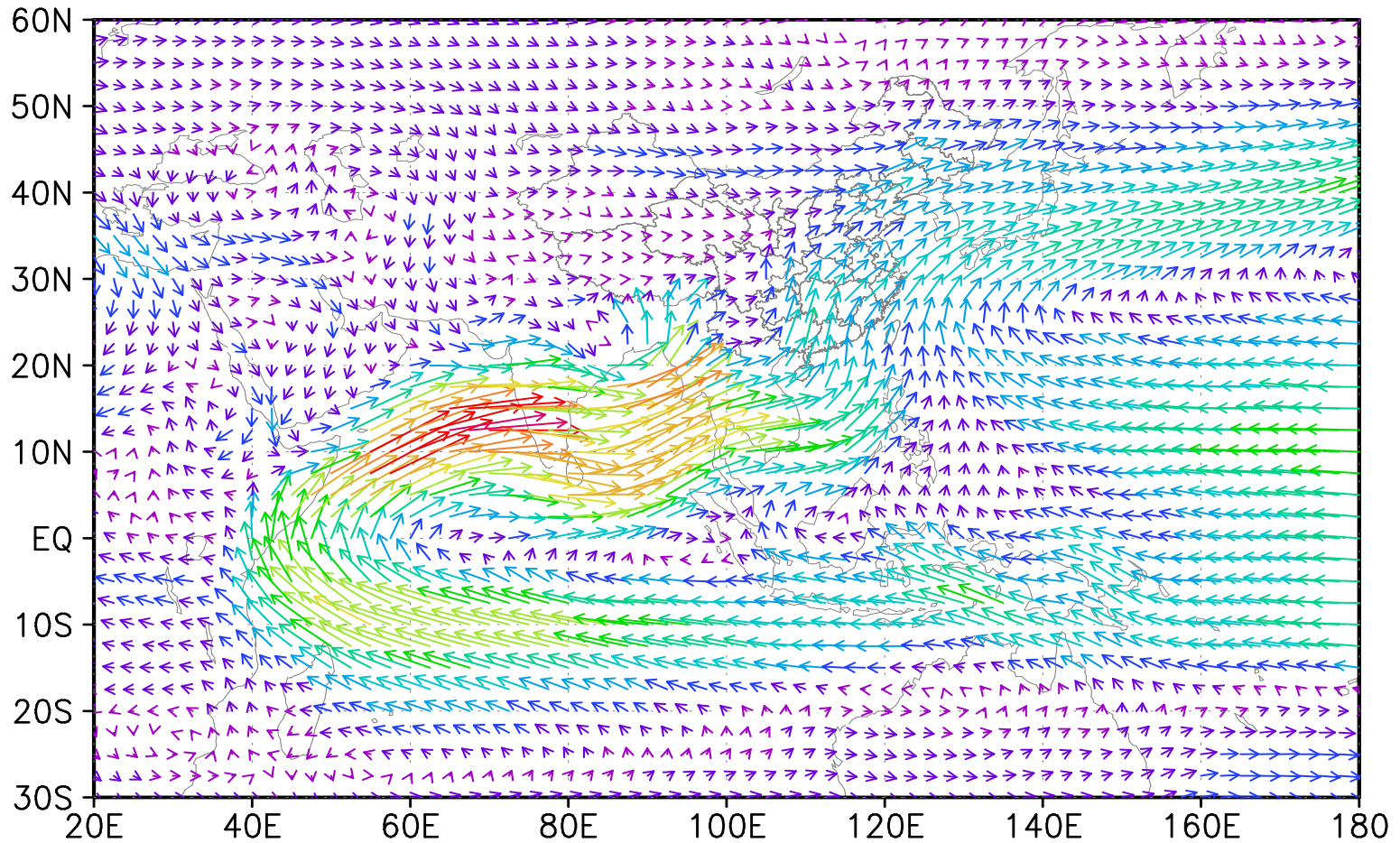
CAS: Chinese Academy of Sciences
MOST: Ministry of Science and Technology
NSFC: National Science Foundation of China

The Climate Challenge facing in China

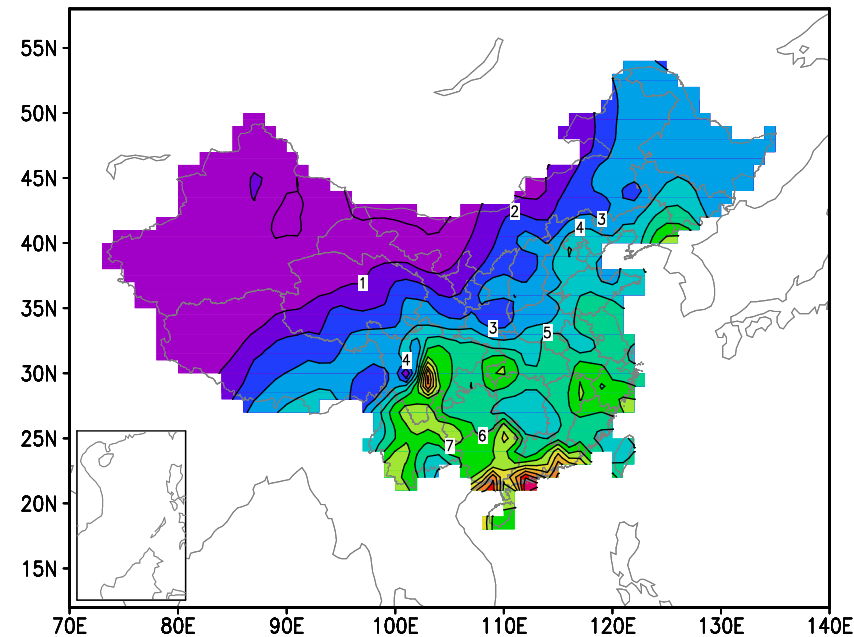
POPULATION DENSITY MAP OF ASIA



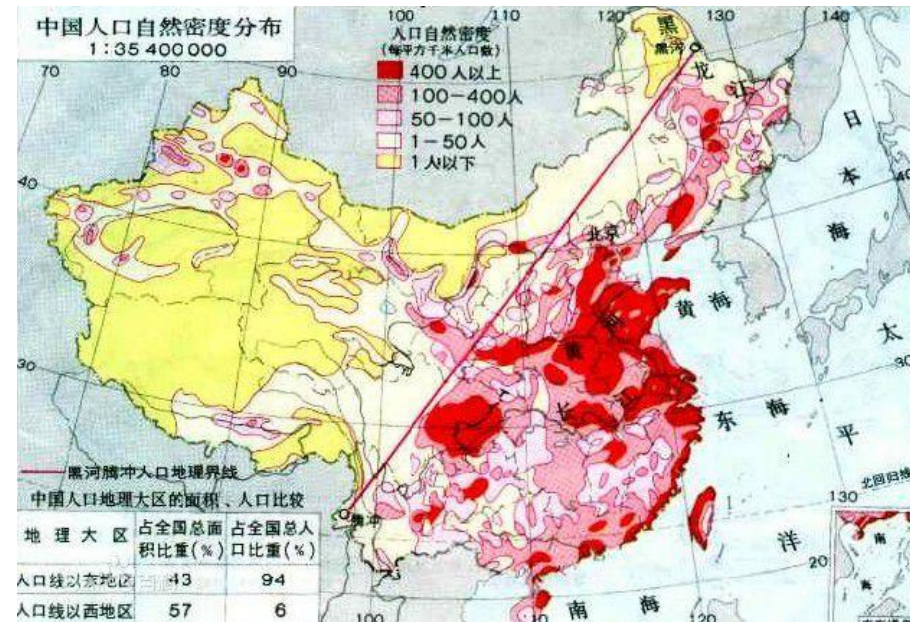
Affected by Asian summer monsoon



Affected by Asian summer monsoon



Summer rainfall



	Area	Population
East	43%	94%
West	57%	6%

Fatalities caused by mega floods in Yangtze River Basin, China

1931

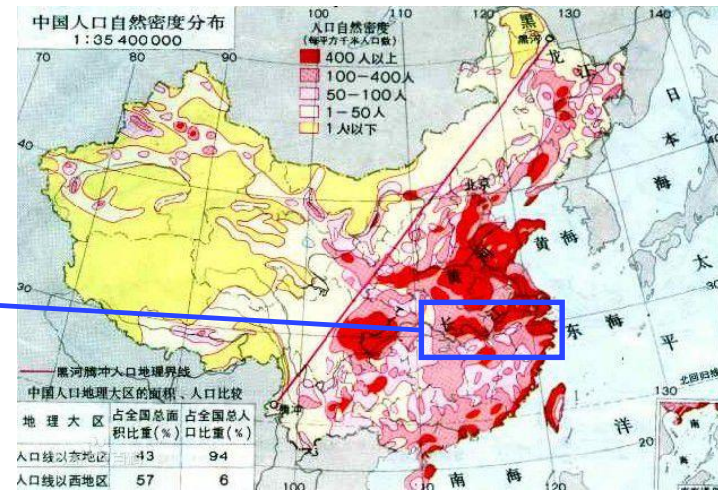
2,000,000-3,000,000

1954

- 33000

1998

- 4150



Floods and droughts occur frequently in China

Extreme precipitation in 2016



Zhou et al. 2018, BAMS

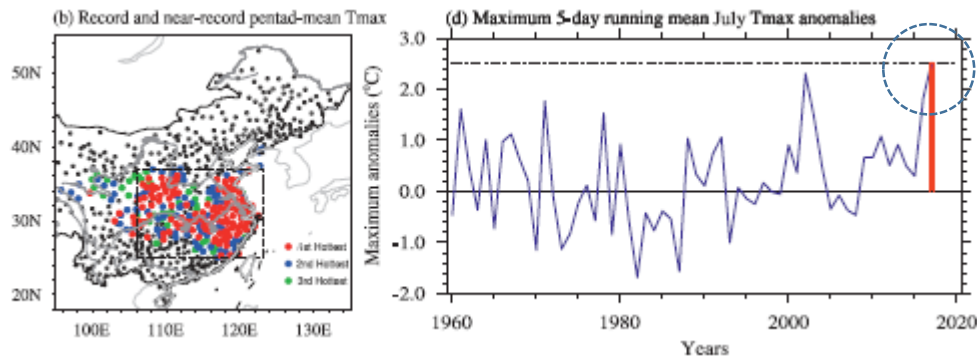
Drought in southwestern China in 2009



Ma et al. 2017, JC

New kind of disasters in China

Record-breaking heatwave in 2017



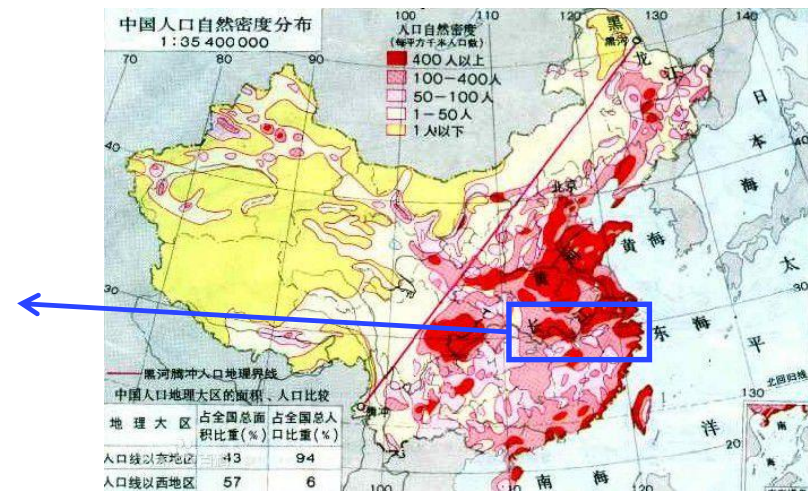
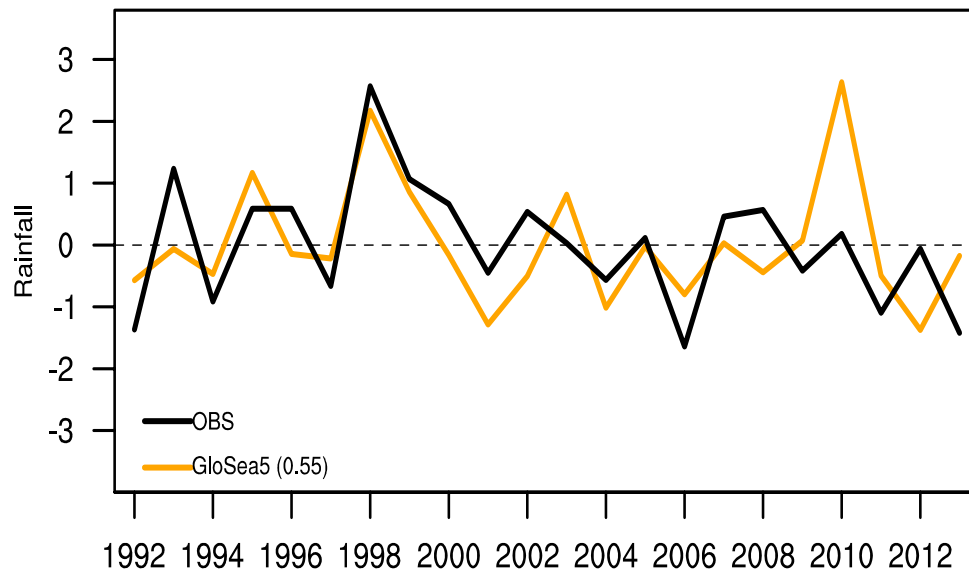
Haze in Beijing in 2013/2015



Research related to the “Challenge” at IAP

Global Seasonal Forecast System 5 (**GloSea5**) predicts Yangtze River Basin rainfall

- ✓ Model version: **HadGEM3 GA3.0**
- ✓ Resolution: **N216L85** O(.25)L75(~50 km atm.)
- ✓ 22-year Hindcast (**1992-2013**)
- ✓ Fixed start dates of **25th Apr, 1st May, 9th May, 10 members** per start date



Li et al., 2016, Environ. Res. Lett.

providing better climate service



INTERNAL USE ONLY

2019 Yangtze River Seasonal Forecasts

05 May 2019

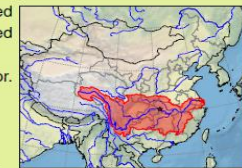
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This document provides forecasts for the Yangtze river region in 2019, based on the Met Office's seasonal forecast system. Forecasts are for area-averaged seasonal mean precipitation rate.

The map on the right shows the **basin average** region we are forecasting for. The location of the Three Gorges Dam is marked with a star.

The current headline results for this region are:



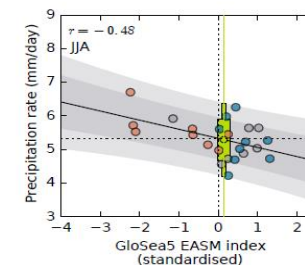
For JJA:

- There is a 45% chance of above-average rainfall for the *basin average*.
- There is a 55% chance of below-average rainfall for the *basin average*.

Background Information: Basin average forecasts

The scatter plots below show the relationships between hindcast EASM index and observed precipitation (GPCC v7 data, 1993–2015), together with the correlation r and the forecast predicted using that relationship, for the seasons labelled. We also show the contingency table (below) for forecasts of above-average precipitation.

Individual years are shown as dots, with El Niño years marked in red ● and La Niña years marked in blue ●. The solid diagonal line shows the linear regression, with shading showing the 75% and 95% prediction intervals from the fit. The horizontal dotted line shows the climatological mean over this period. The **forecast (in green)** is shown as a central estimate (● with vertical line), with uncertainty boxes showing the 75% and 95% prediction intervals from the linear regression.



	Above-average river flow		Observed	
	Yes	No	Yes	No
Predicted	Yes	6 Hits	1 False alarms	1
	No	6 Misses	11 Correct rejections	6
Hit Rate:		50%		
False Alarm Rate:		10%		

Near-term climate prediction

Potential Underestimation of Future Mei-Yu Rainfall with Coarse-Resolution Climate Models

XIAOLONG CHEN

LASG, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China

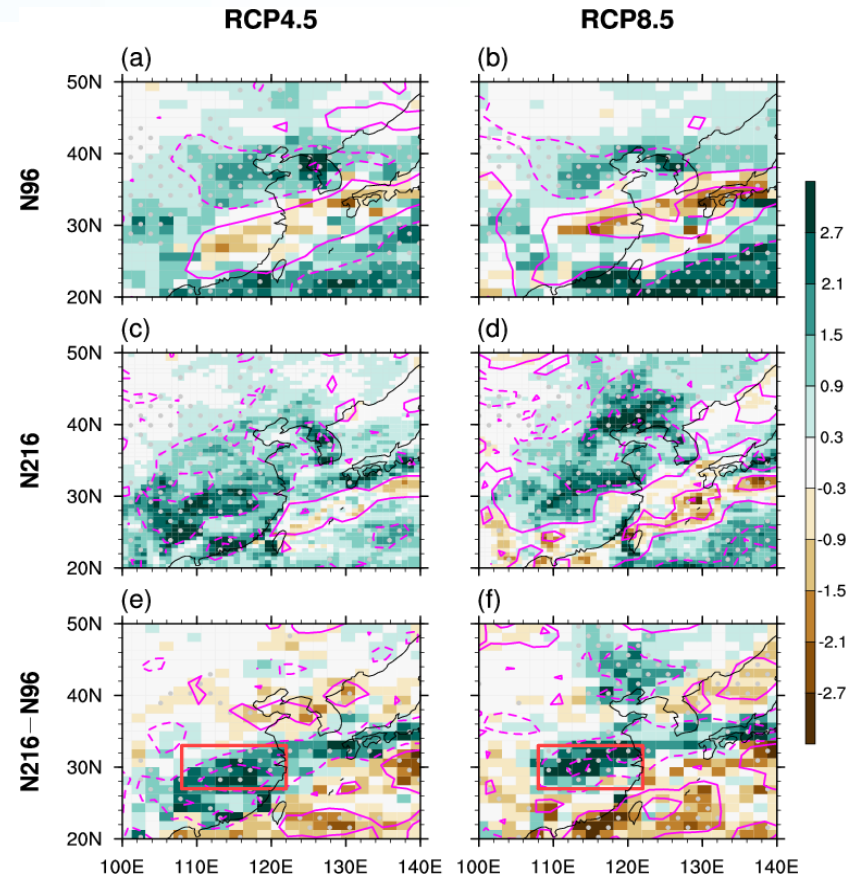
PEILI WU AND MALCOLM J. ROBERTS

Met Office Hadley Centre, Exeter, United Kingdom

TIANJUN ZHOU

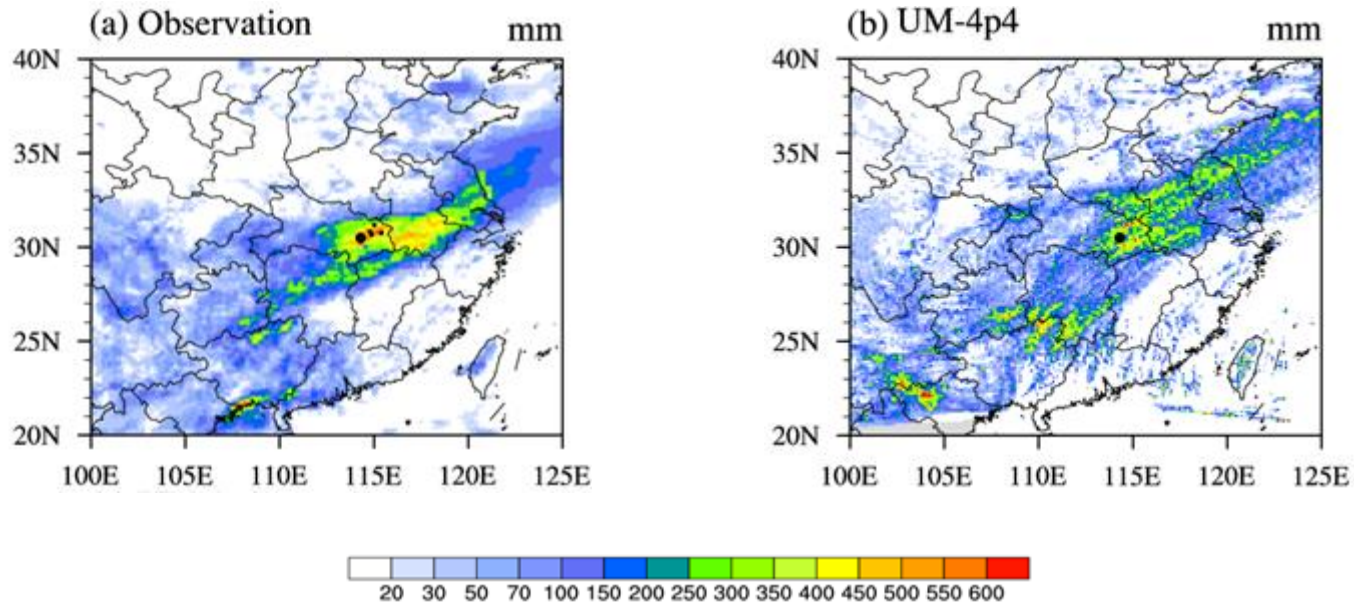
LASG, Institute of Atmospheric Physics, Chinese Academy of Sciences, and University of Chinese Academy of Sciences, Beijing, China

Projected rainfall changes in low (N96) and high (N216) resolutions of HadGEM2-GC2

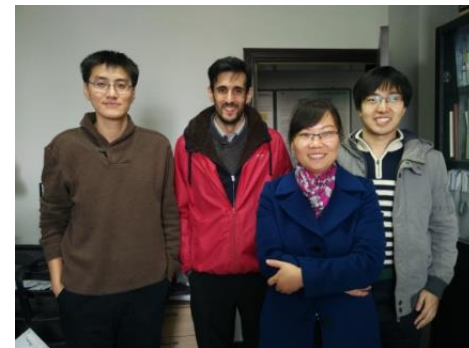


(Chen et al. 2018 JC)

High resolution modelling of the deadly flood event in Wuhan in July 2016



Excellent example of collaboration between IAP, CMA, University of Leeds and the Met Office

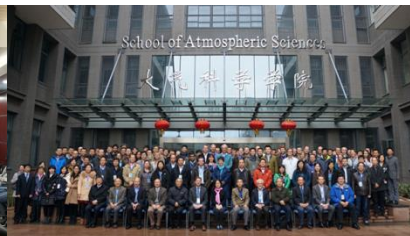


CSSP China Cooperation

CSSP China was established in 2014, supported by the UK-China Research and innovation Partnership Fund, funded in the UK by the Newton Fund. CSSP China partners include China Meteorological Administration's National Climate Centre (NCC) and the Institute of Atmospheric Physics (IAP) at the Chinese Academy of Sciences, the Met Office, as well as other key research organisations in China and the United Kingdom. CSSP China is part of a growing global network of partnerships within the Weather and Climate Science for Service Partnership Programme.

Outcomes

- Strong strategic partnership
- Accelerated and enhanced collaborative science research
- Climate services, developed in partnership



Benefits out of CSSP China

- Frequent and effective researcher exchanges
over 10 person/year from IAP to UK CSSP-China related universities and institutions, and receiving more than 20 scientists/year from CSSP-China Community at IAP
- Jointly educates students and trains early career scientists
- Joint paper published
over 20 papers/year published at IAP co-authored with UK CSSP-China Scientists
- Knowledge highlights, brainstorming and innovations out of the annual meetings and projects meeting



Enhancing the Basic
Scientific Research

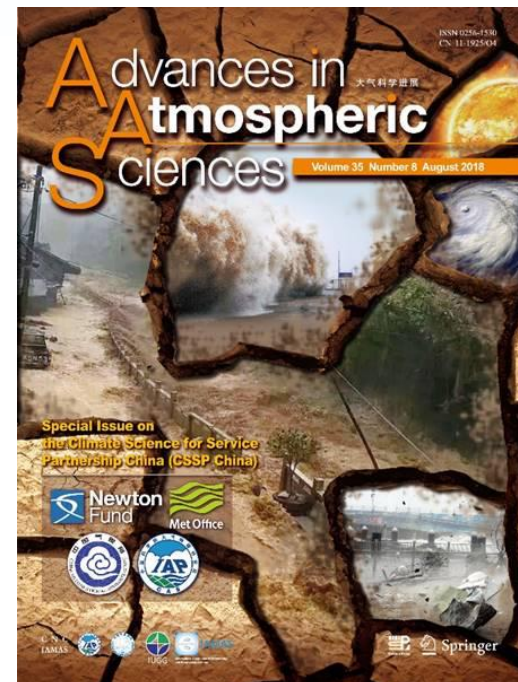


Serve the National Policy
and Strategy

CSSP China Special Issue in *Advances in Atmospheric Sciences*



- With more than 100 scientific publications under its belt, CSSP China has helped improve understanding of the effects of climate change on society and is forging new ways to reduce the risks associated with climate extremes.
- A special issue dedicated to CSSP China was published in June 2018 in ***Advances of Atmospheric Sciences***, a journal published by Springer and indexed by the SCI database.
- The Special Issue has been a big project highlight which helps promote the research and results of the CSSP China project within China.
- The special issue, consisting of 17 research articles, has generated nearly 40 citations within a year.



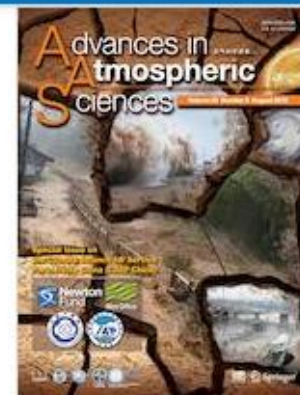


Volume 35, Issue 8, August 2018

Special Issue on the Climate Science for Service Partnership China (CSSP China)

ISSN: 0256-1530 (Print) 1861-9533 (Online)

In this issue (18 articles)



Editorial Notes

Preface to Special Issue on Climate Science for Service Partnership China

Stephen Belcher, Peter Stott, Lianchun Song...

[» Download PDF \(47KB\)](#)

Pages 897-898

News & Views

Collating Historic Weather Observations for the East Asian Region: Challenges, Solutions, and Reanalyses

Fiona Williamson, Rob Allan, Guoyu Ren, Tsz-cheung Lee...

[» Download PDF \(413KB\)](#)

Pages 899-904

News & Views

Development and Pull-through of Climate Science to Services in China

Chris Hewitt, Nicola Golding

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Pages 905-908

Data Description Article

Further-Adjusted Long-Term Temperature Series in China Based on MASH

Zhen Li, Zhongwei Yan, Lijuan Cao, Phil D. Jones

[» Download PDF \(316KB\)](#)

Pages 909-917

Original Paper

A good example of how scientists from UK and China have worked together to better understand East Asian climate and therefore provide better climate service.



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[Advances in Atmospheric Sciences](#)

August 2018, Volume 35, [Issue 8](#), pp 918–926 | [Cite as](#)

Seasonal Forecasts of the Summer 2016 Yangtze River Basin Rainfall

Authors

[Authors and affiliations](#)

Philip E. Bett , Adam A. Scaife, Chaofan Li, Chris Hewitt, Nicola Golding, Peiqun Zhang, Nick Dunstone, Doug M. Smith, Hazel E. Thornton, Riyu Lu, Hong-Li Ren

Original Paper

First Online: 14 August 2018

22

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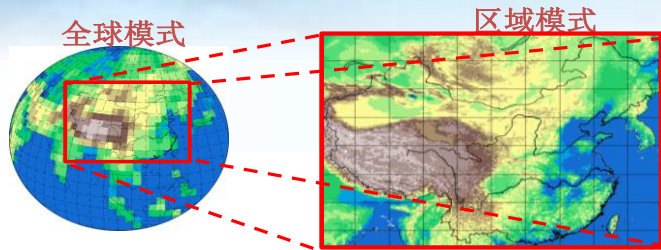


Future Aspirations

EARTH SYSTEM SCIENCE NUMERICAL SIMULATOR FACILITY EarthLab

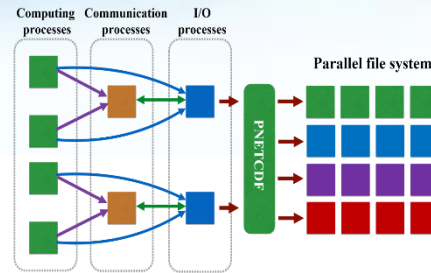
Competent department	Chinese Academy of sciences
Co – construction department	Ministry of Education of the People's Republic of Chian
Construction unit	IAP Tsinghua University, Sugon and the National Satellite Meteorological Center
Location of construction site	CAS'Huairou Campus in Beijing, Area of structure is 24309 m²
Construction period	4 years. Begin at the early of 2018 and is expected to be completed by 2021.

Earth System Science Numerical Simulator Facility(Earth Lab)

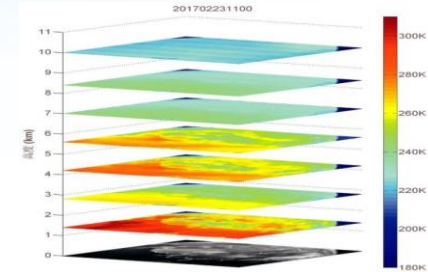


**Earth System
Simulation
(Global)**

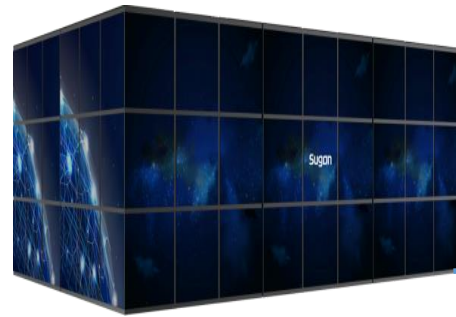
**Regional High-
precision Simulation
(China)**



**Support and
Management System**



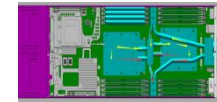
**Database and Data
Assimilation**



**Cooling
System**

**Power Supply
System**

**Supporting
Facilities**



Visualization System

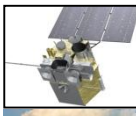
**Educational
network**

**Scientific
network**

**Satellite/ Ground
Stations/Radar/
Other Meteorological
Data**



User Task Submission



Infrastructure: area of structure 24309 m²



Thank you

