



国际气候与环境科学中心

International Center for Climate and Environment Sciences



Annual Report of ICCES

Center of excellence on
Climate and Environment Sciences

(2013.5-2014.4)

Zhaohui Lin

**International Center for climate and Environment Sciences
Chinese Academy of Sciences**

Outline

- ❑ **ICCES overview**
- ❑ **Major research progress**
- ❑ **International collaboration**
- ❑ **Future plans**



I. ICCES overview

- Founded in **1991**; Selected as the representative center of China to join the Network of Centre of Excellence of COMSATS in **1995**; Became secretariat of CAS-TWAS-WMO Forum on climate Sciences in **2000**; Certificated as one of TWAS-CAS Centres of Excellence in **2013**

Center Organization



ICCES currently has **46** staffs in total, with **5** supporting staff and **41** research scientists, including **14** professors and **11** associate professors .

As for 2013, there is around **30** graduate students studying at ICCES.

Vision



The goal of *ICCES* is to become an internationally renowned research center on global climate and environmental sciences, as well as a cooperative base providing technology support, capacity building and talent training for developing countries, to take the lead in initiating, organizing, coordinating and implementing major international scientific cooperation between CAS and other developing countries.

Mission



- To conduct research on the key scientific problems in global climate and environmental changes, such as theories, simulation and prediction of global change, disaster detection and assessment
- To promote the capability of monitoring and forecasting of climatic and environmental disaster
- To provide consultancy for the national and international requirements on sustainable developments, and scientific policies in the negotiation of global climate change
- To provide services to the developing countries with scientific support and advisory, capacity building.

Research Focus

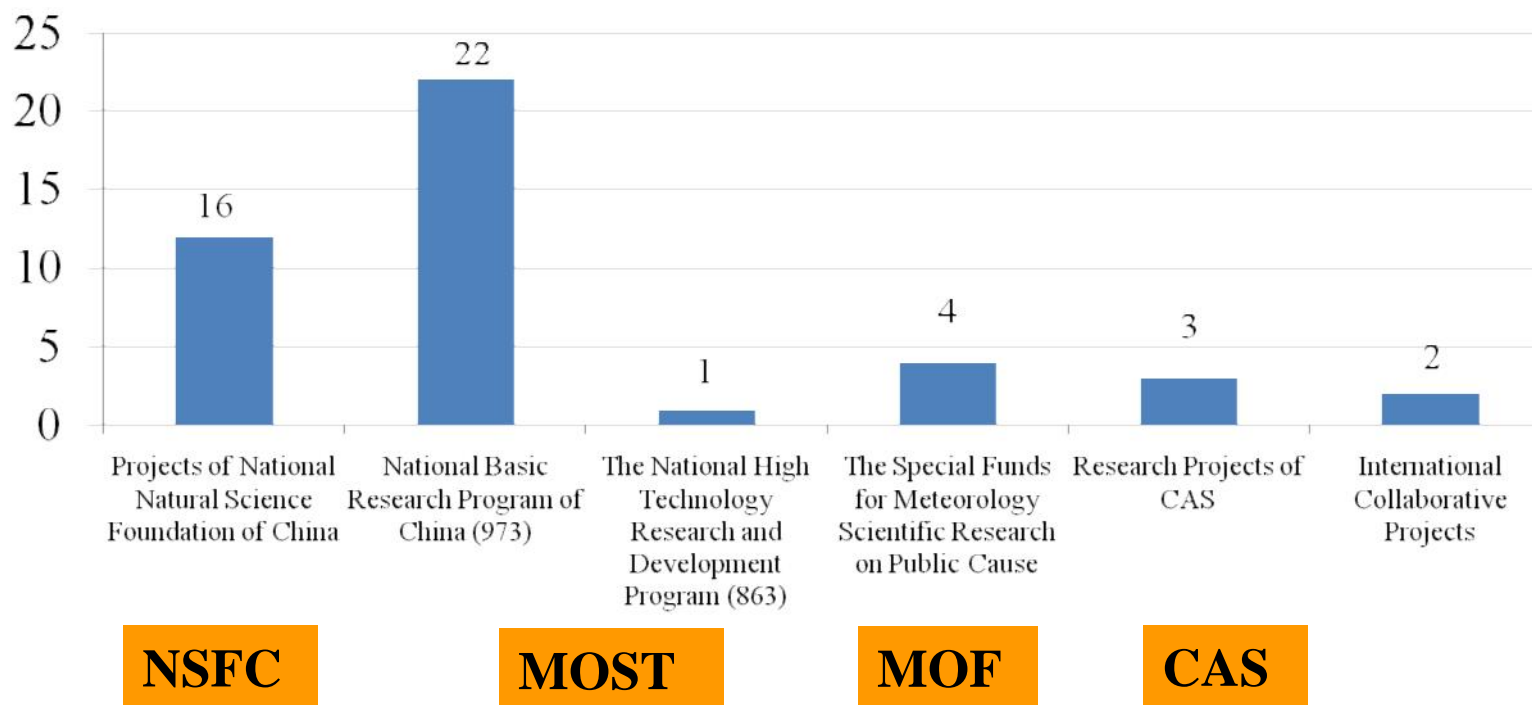


- ◆ **Development of Dynamical Earth System Model and Numerical Simulation**
- ◆ **Meteorological and Environmental Forecast and Related Disaster Assessment Theory and Technique**
- ◆ **Data Assimilation Theory and Methodology**
- ◆ **Earth System Theories and Natural Cybernetics**

On-going Projects

On-going Projects

- ◆ **60** on-going research projects in total, including domestic research projects as well as international collaborative projects;
- ◆ Within the **60** projects, **14** are newly launched in 2013 and 2014;
- ◆ Funds of the **new projects** are over **46,946,000** CNY in total (~ USD 8 million)





Key Ongoing Projects

- **National Basic Research Program of China (973) : Development of the ecological and environmental process model and its improvement**
- **National Basic Research Program of China (973) : Development and evaluation of high-resolution climate model**
- **National High-tech R&D Program (863) : The application system based on quantitative remote sensing using carbon satellites**
- **CAS Strategic Priority Research Program “Climate change: carbon budget and relevant issues- uncertainties for the climate simulation and projection using CAS climate system model”**
- **NSFC Key Project: The modelling and computing methods of a statistical-dynamical model of the population structure within terrestrial ecosystem”**

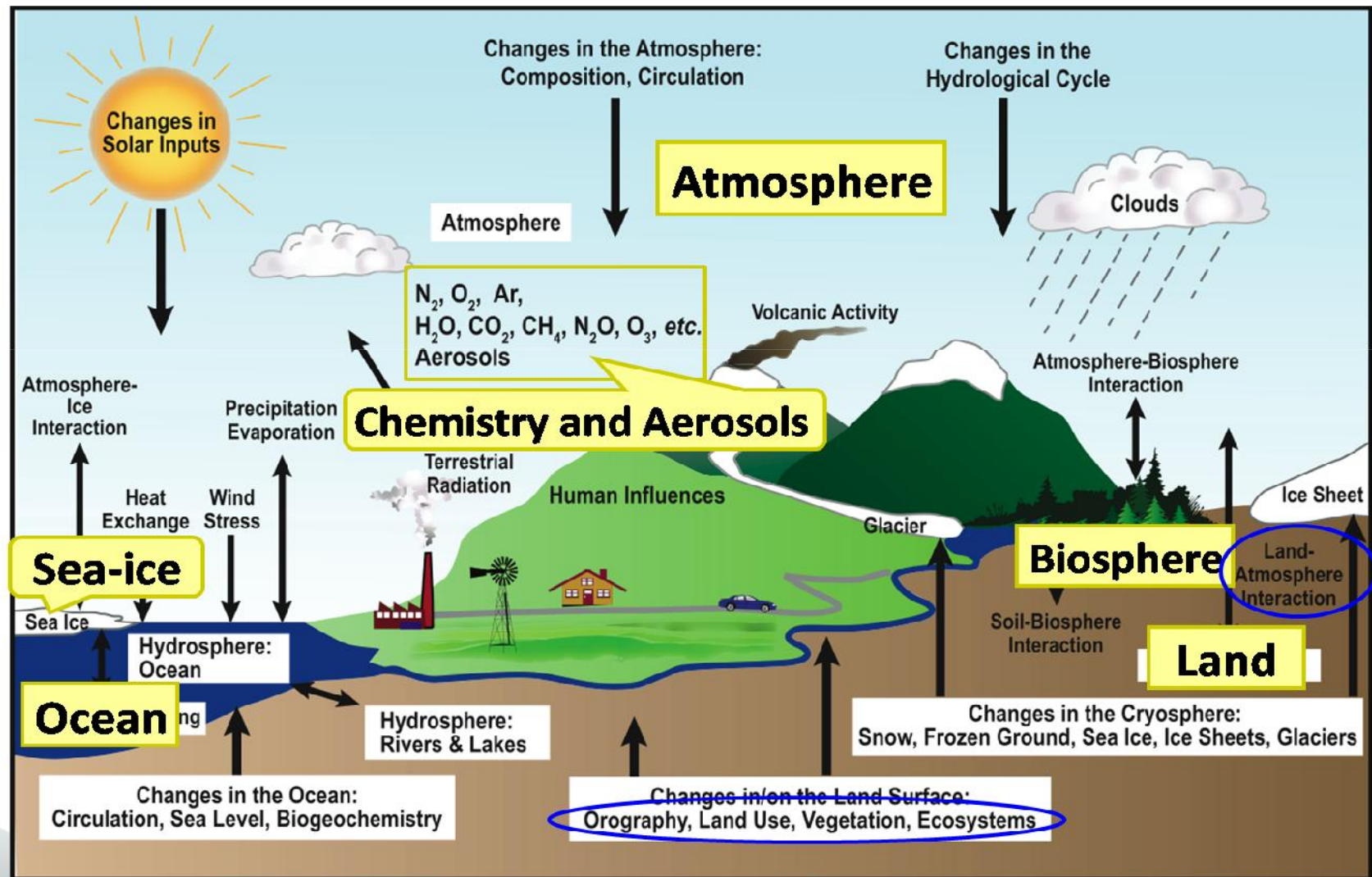
II. Major Research Progress



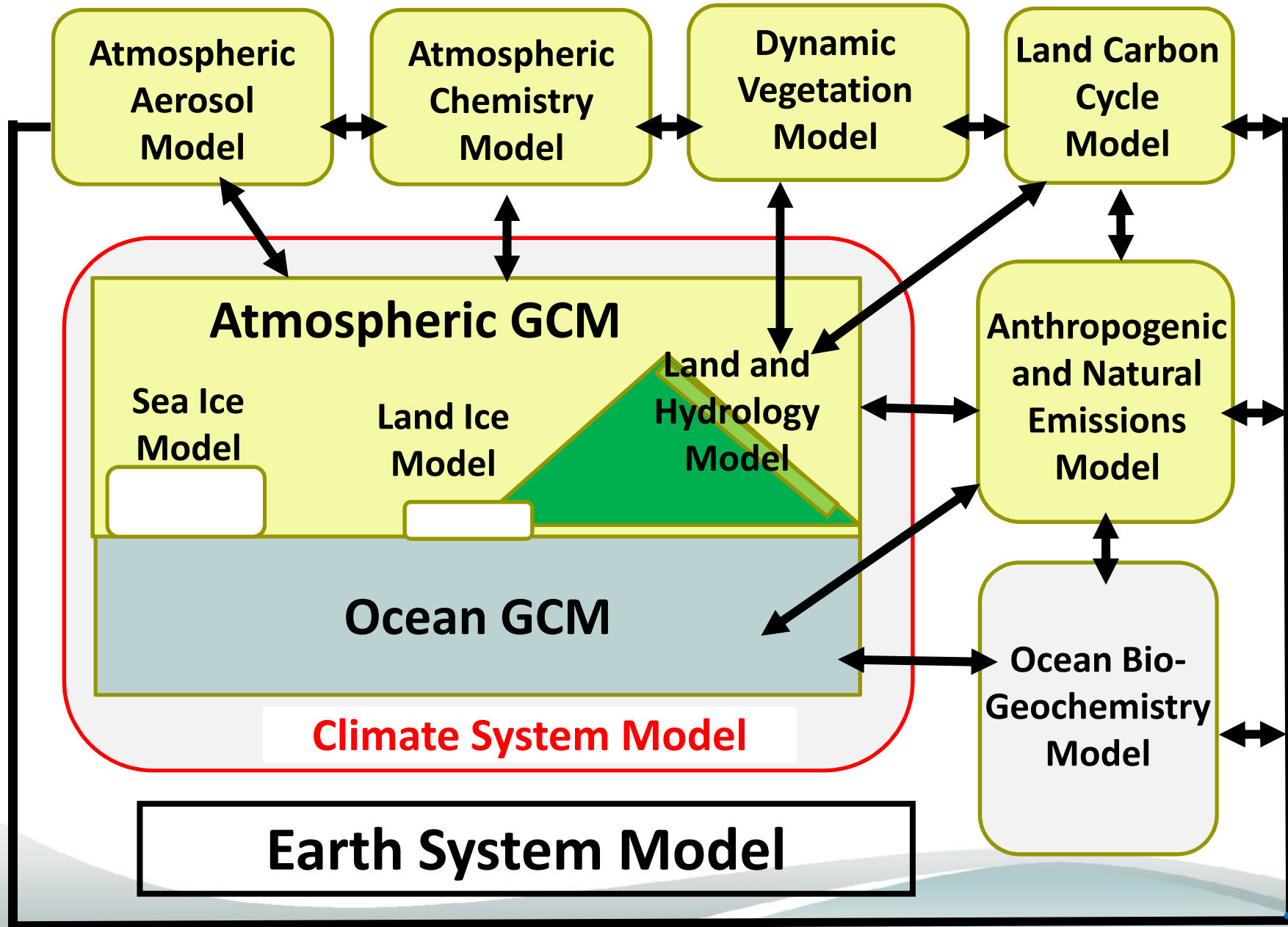
In 2013, ICCES made tremendous progress in different areas related with climate sciences.

- Dynamical earth system model development
- Meteorological and environmental prediction and theories and methods of hazard assessment

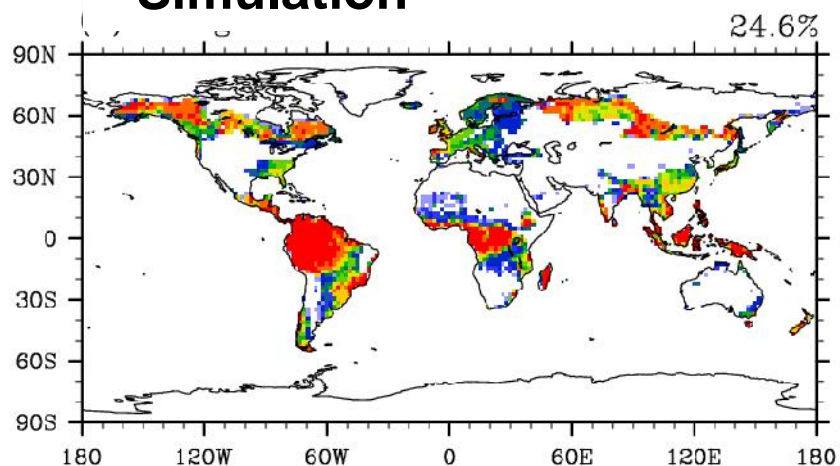
Component and processes in the Earth System



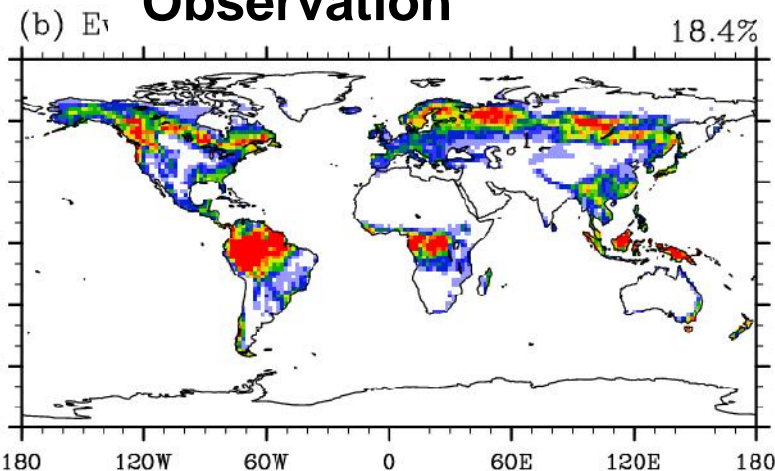
IAP/CAS Earth System Model



Simulation

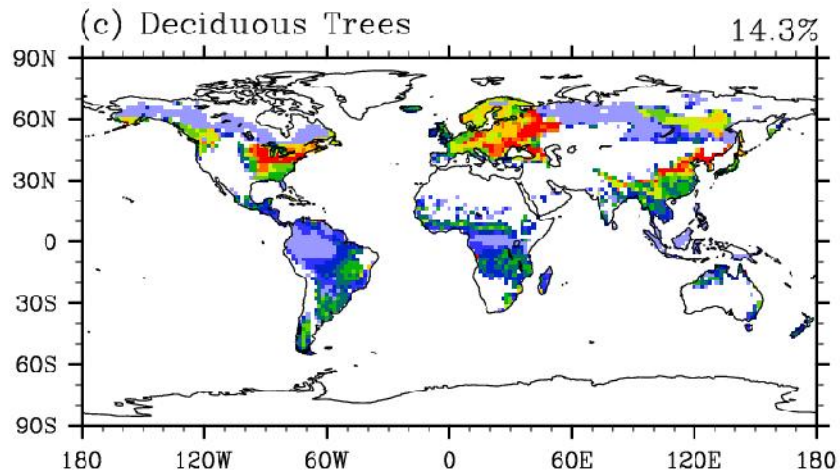


Observation

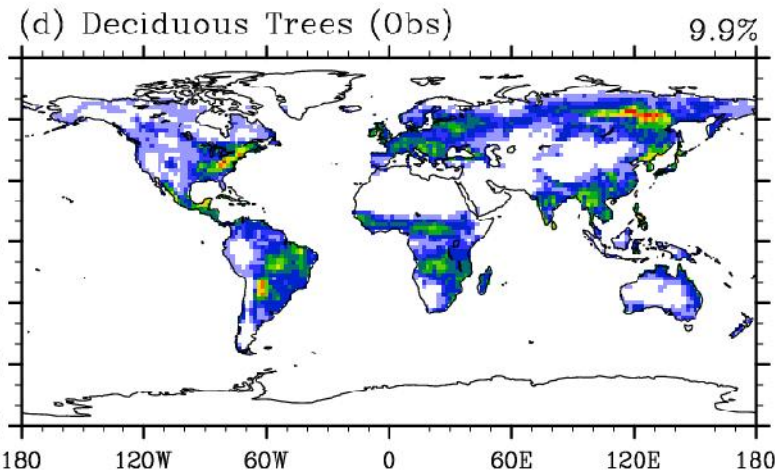


Evergreen
Tree

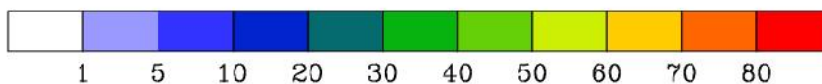
(c) Deciduous Trees



(d) Deciduous Trees (Obs)



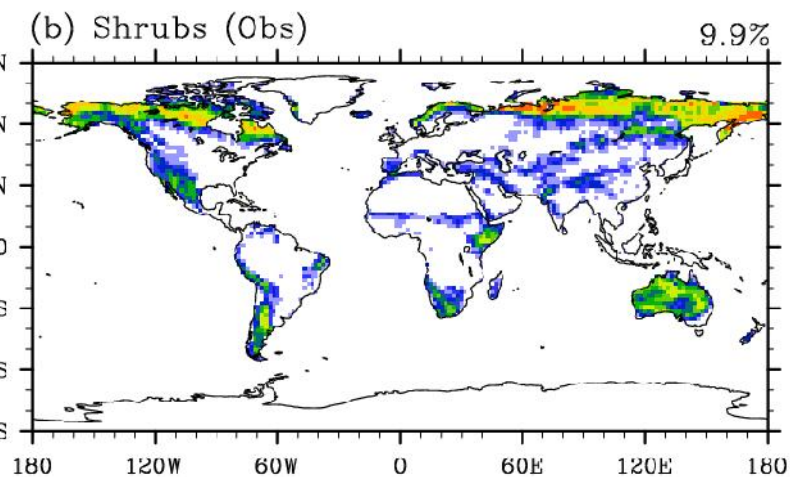
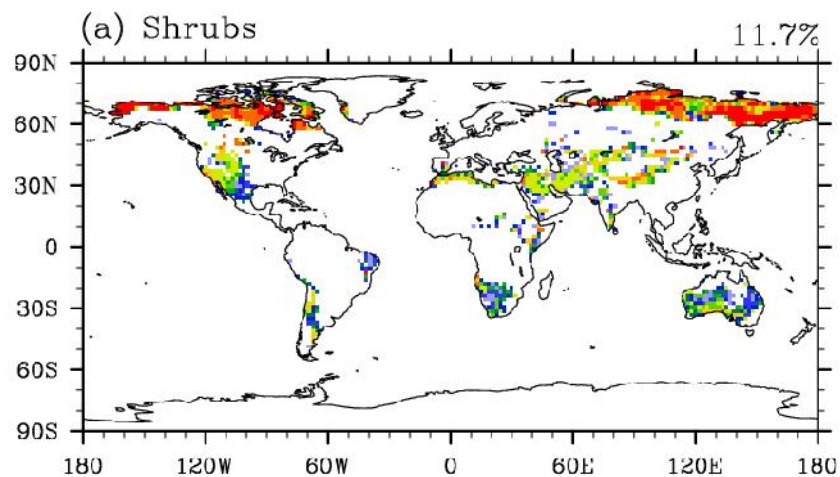
Deciduous
Tree



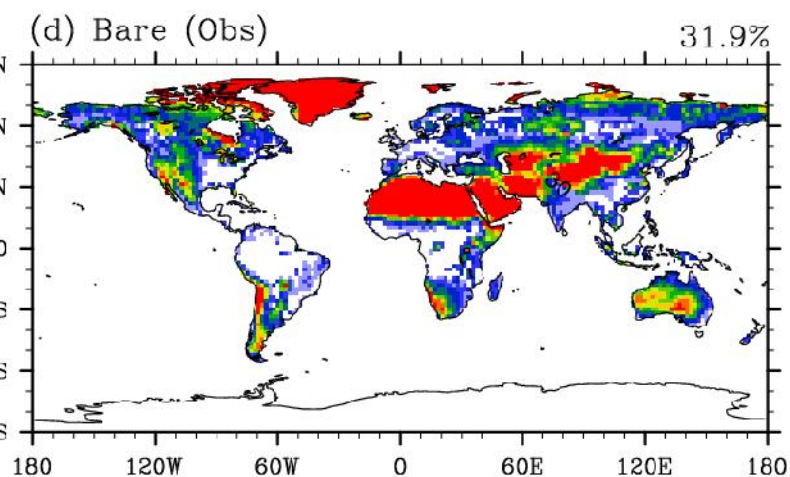
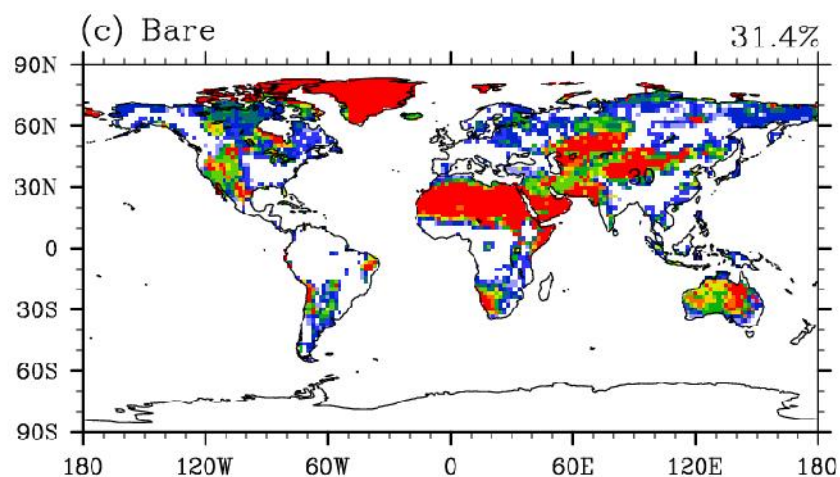
Global Vegetation Distribution

Simulation

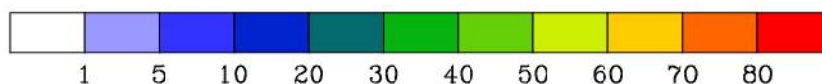
Observation



Shrub



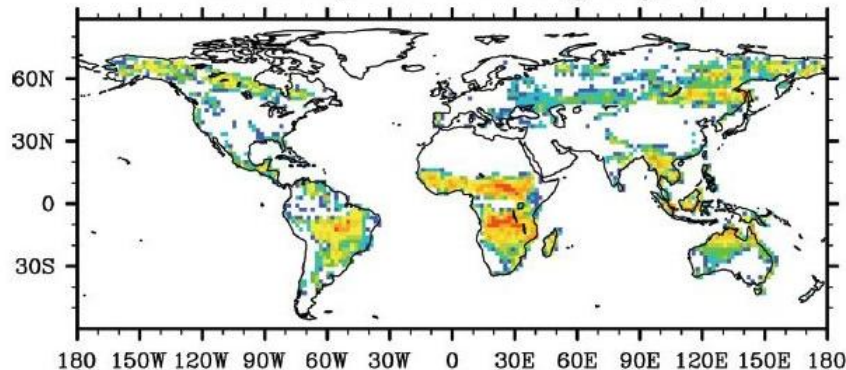
Desert



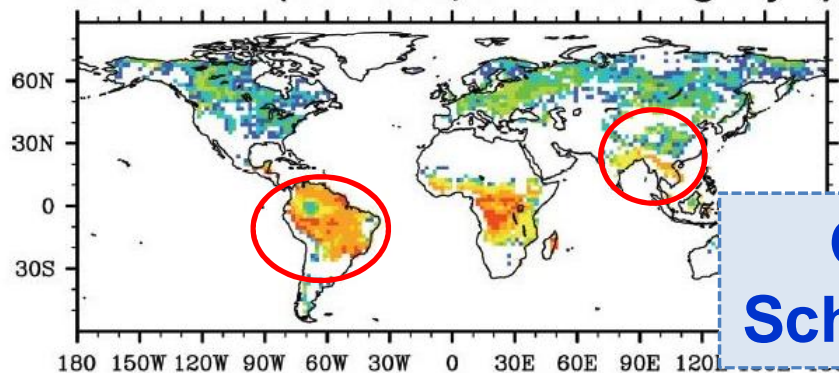
Global Vegetation Distribution

Observation

GFED3 (GFCE=2.1 Pg C yr⁻¹)

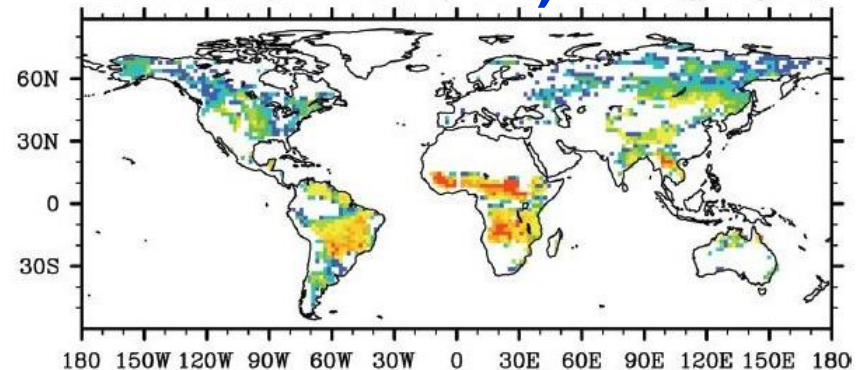


Glob-FIRM (Cor=0.36, GFCE=3.5 Pg C yr⁻¹)

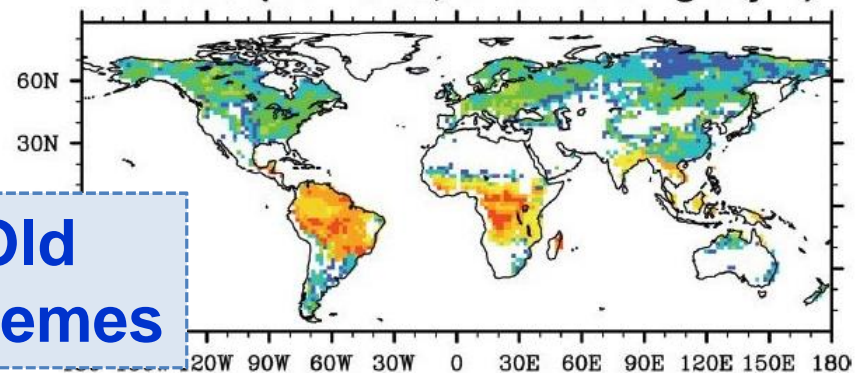


New Scheme(IAP Scheme)

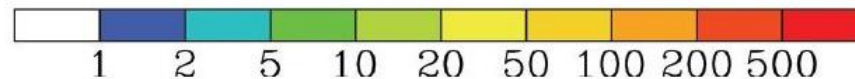
Mod-new (Cor=0.39, GFCE=2.0 Pg C yr⁻¹)



Mod-old (Cor=0.39, GFCE=3.3 Pg C yr⁻¹)



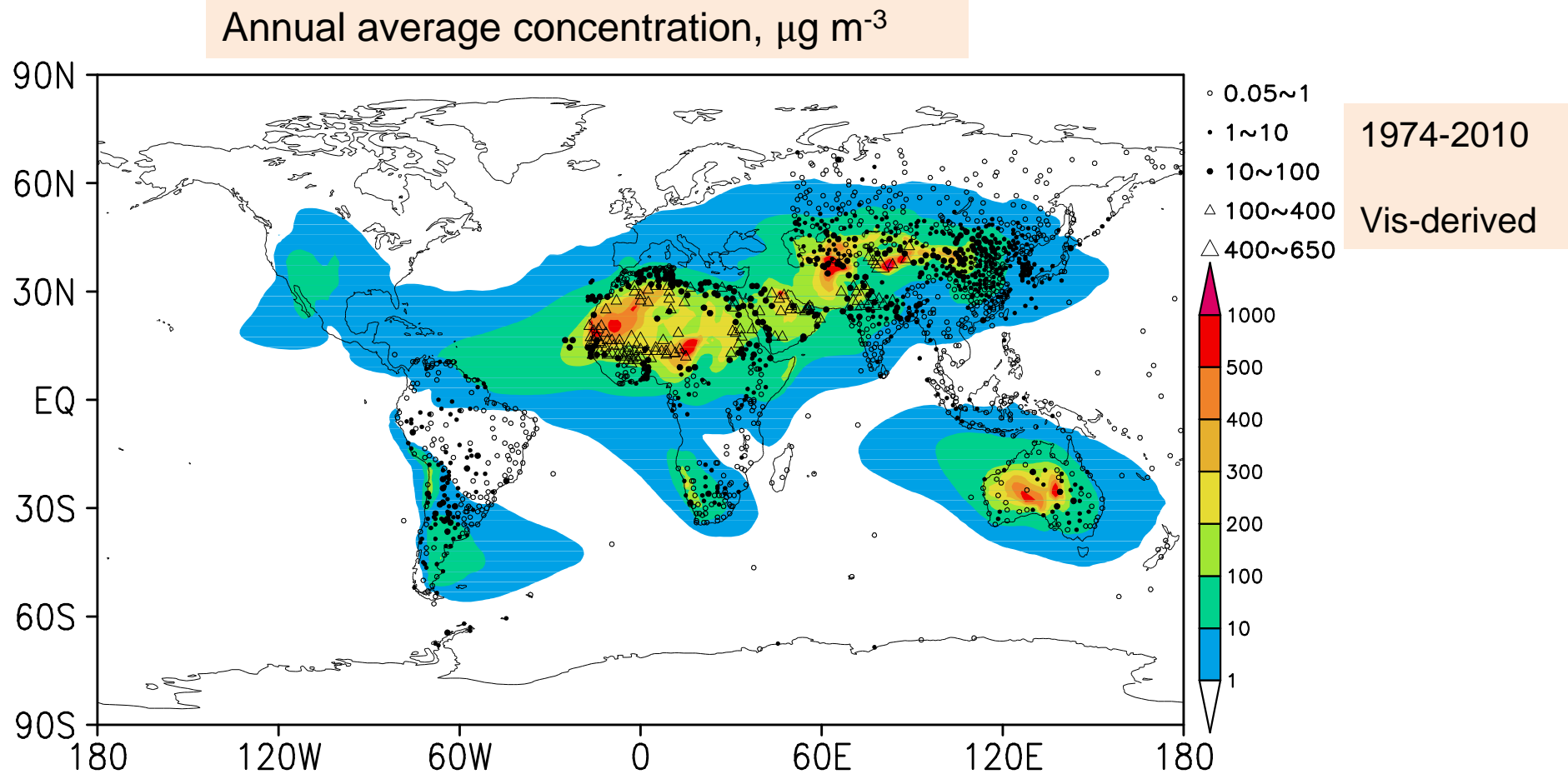
Old
Schemes



Annual Fire Carbon Emissions (g C m⁻² yr⁻¹)

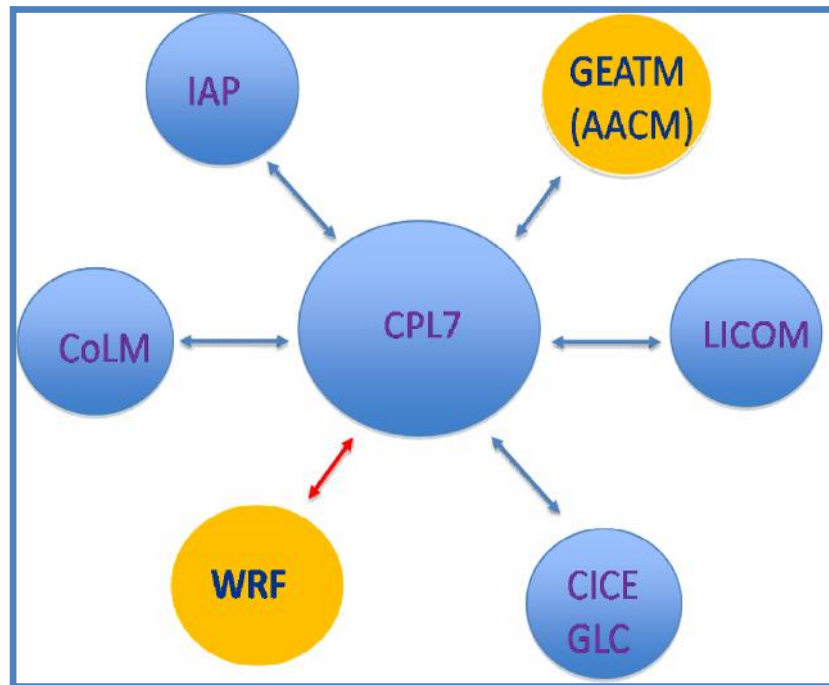
Biases of overestimation of fire carbon emission over Southeast Asia and South America in Glob-FIRM are significantly removed.

Simulation of Global dust distributions

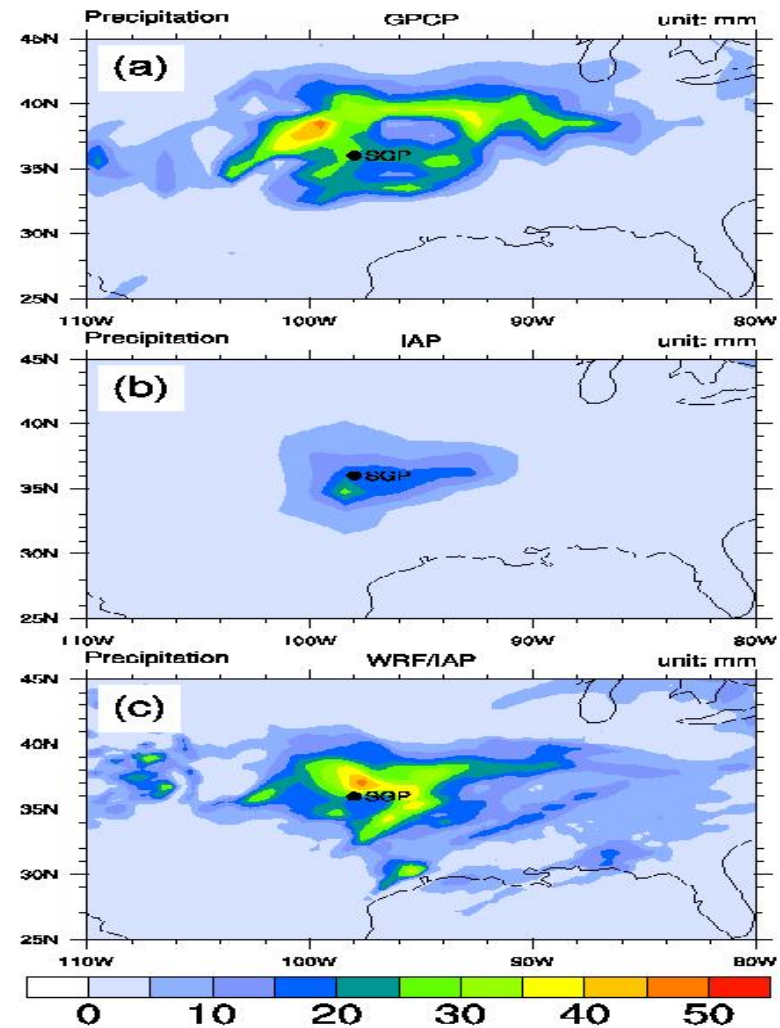


The model reasonably captures the main dust plumes, over North Africa, the Middle East, Central Asia, the Taklimakan, the Gobi deserts, the West Australia and the southwestern part of South America etc.

Severe rainfall simulated by the Mesoscale WRF regional model nested within global model

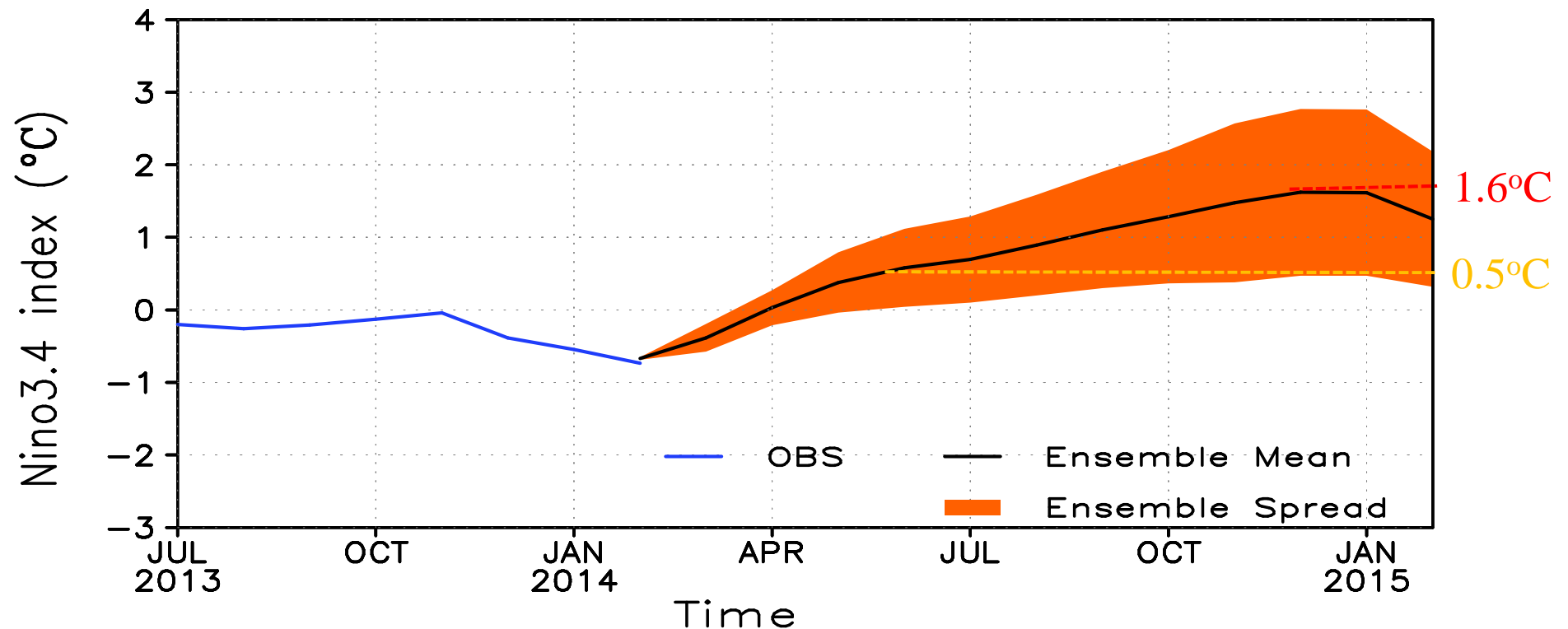


Precipitation in Obs, IAP, and IAP-WRF



(He et al. 2013, JAMES)

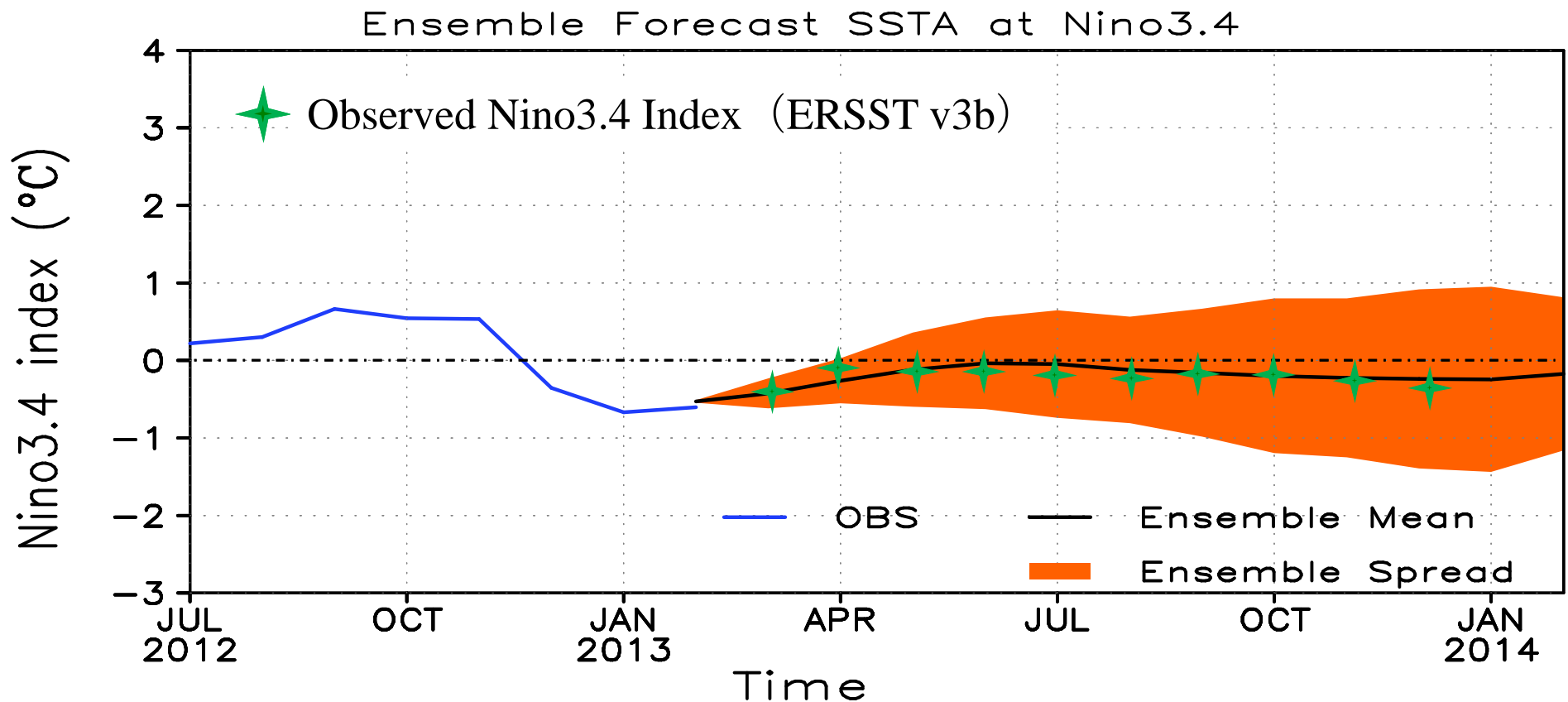
Most recent forecast for Climate Discussion in China (Mar. 2014 Started)



- Chance of (super) El Niño increases during the remainder of the year, exceeding 70% by summer.

Predicted by IAP ENSO EPS

Last forecast for Climate Discussion in China (Mar. 2013 Started)

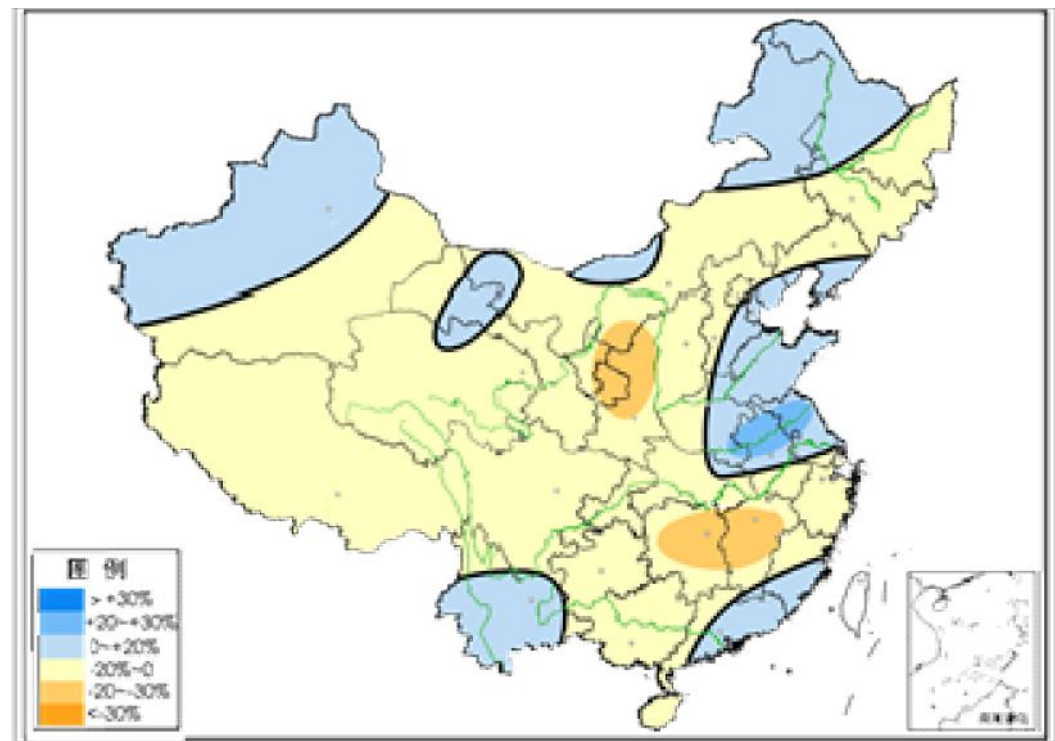


- The slight cold SST over the central-eastern equatorial Pacific will persist in the following 3-4 months, and the Nino3.4 index will be close to zero after Apr. 2013.
- ENSO-neutral conditions will continue into the Northern Hemisphere summer 2013.

Predicted by IAP ENSO EPS

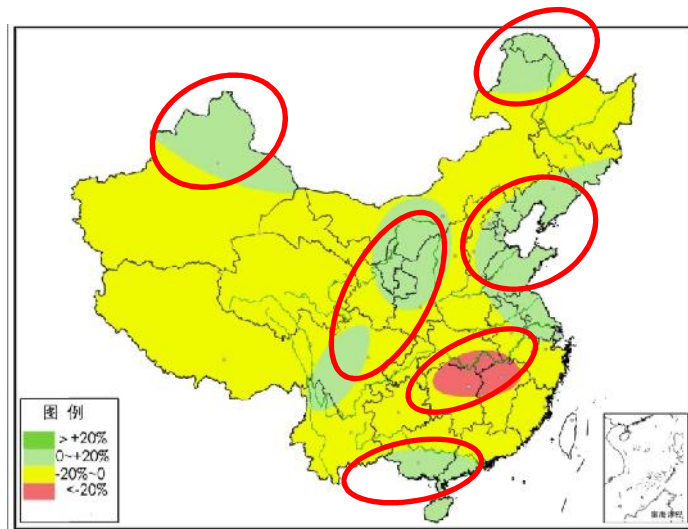
Seasonal Outlook of the Precipitation Anomalies in China in the Summer of 2014

The precipitation in most part of China will be below-normal during the summer of 2014. The precipitation in the Huaihe Valley, the north to the Hetao region, the north and south parts of northeast China, the southeast part of the North China, the Northwest part of the Xinjiang Uygur Autonomous Region and some areas in the southwestern China seemed to be above-normal.

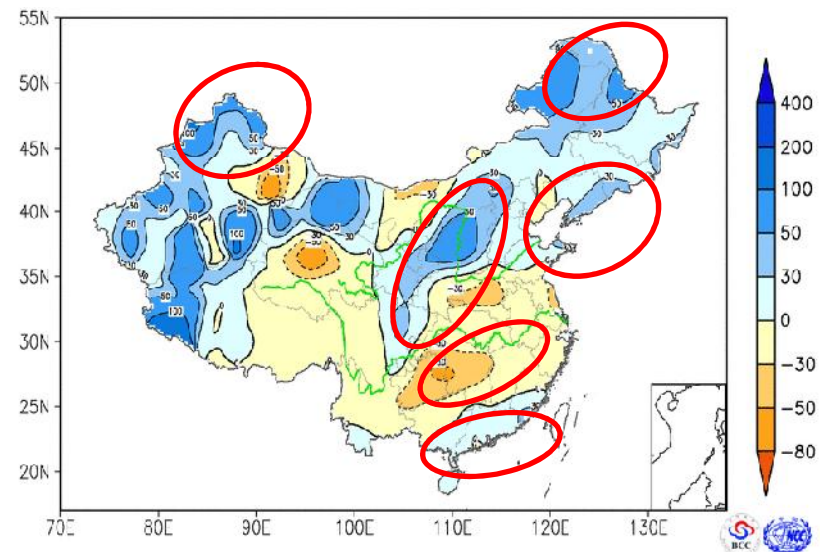


Seasonal Outlook and Observation of Precipitation Anomalies in China in the Summer of 2013

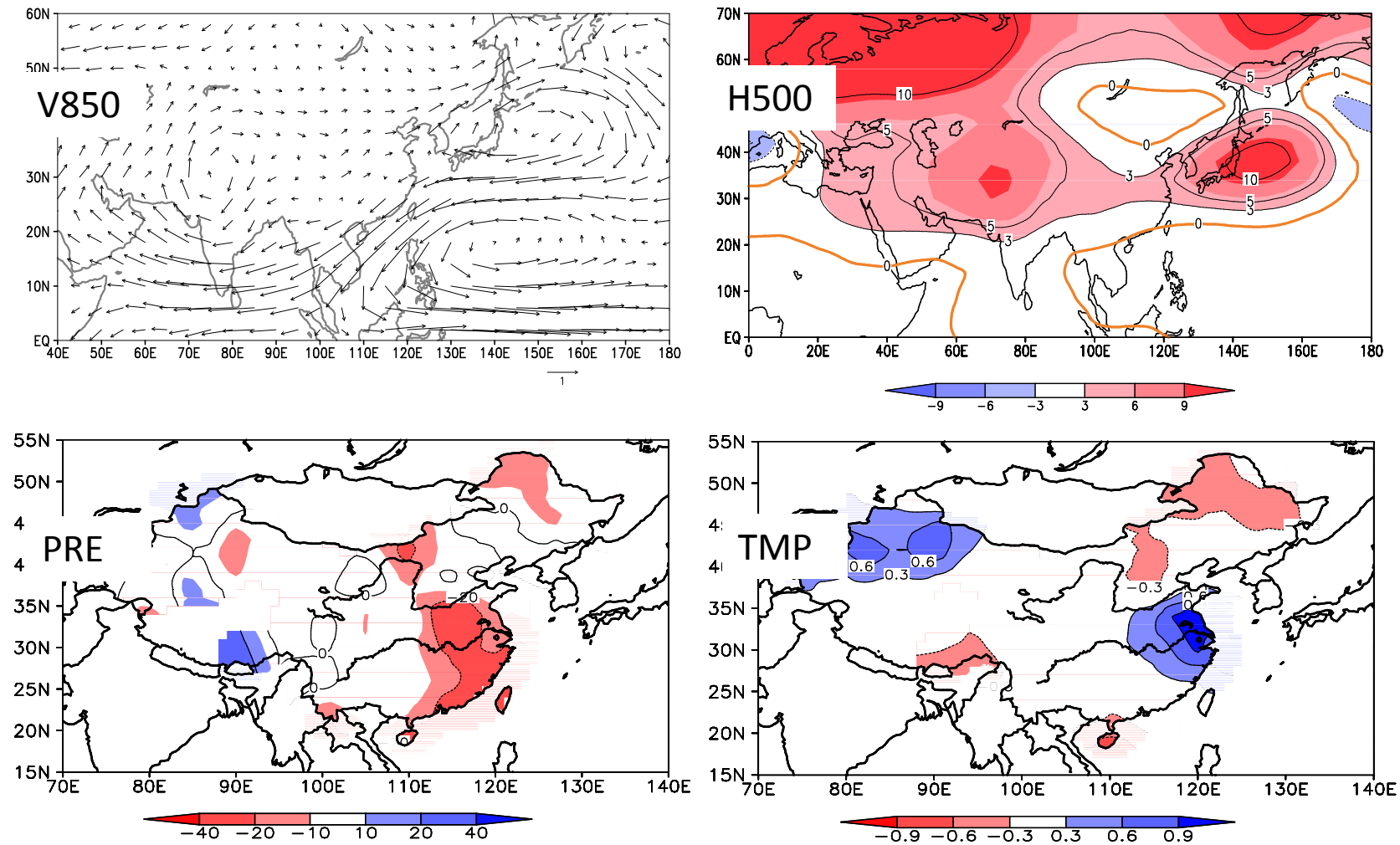
Forecast



Observation
(by National Climate Center)



Springtime dust occurrence frequency predicted by IAP9L-AGCM



Less than normal dust events in Northern China in spring of 2014

Research Outcome Distribution

- Series of News Letter of Climate Prediction

中国科学院大气物理研究所国际气候与环境科学中心
短期气候预测信息
 2013 年第 4 期
 二零一三年五月三十一日
 2013 年汛期(5~8月)黄、海河流域降水趋势预测意见

一、对南海夏季风爆发日期预测

根据国家气候中心预测, 2013年南海夏季风(2013), 2013年5月8日。中国科学院大气物理研究所应用与数值气象中心。

二、对2013年汛期(6~8月)黄、淮

2013年7月23日, 中国科学院大气物理研究所应用与数值气象中心。

2.1 预测意见:

预计2013年汛期(6~8月), 黄、淮上游及分地区降水正常略偏多(图1)。



图4 2013年汛期(6~8月)

2.2 情景体系

1. 目前亦選中太平洋熱了正常兩件位
集合板接系統的情形(圖4)與上述基本一致。

中国科学院大气物理研究所国际气候与环境科学中心
短期气候预测信息
2013年第5期
二〇一三年四月七日

2013年全国汛期降水趋势预测的订正

2013年5月29日。二、国科字例
 批准模式加宽和按设计模型估算。

一、汛期降水趋势订正

1. 预测意见

- 注: 2012 年汛期(6-8 月),
调查有, 东北北部和南部、平北
部和西南部被汉江水淹没。

2. 預測信譽

- 1) 中国科学院中太平洋地质研究所, 2003 年夏季, 未发表。
- 2) 国家地质技术中心湖南州中心, 2003, 未发表。
- 3) IAP-2 AGCM 和 CCSM 大, 七海博士, 西印度, 有科学出版社。
- 4) IAP-2 AGCM 的模拟结果, 2003 年夏季。

中国科学院大气物理研究所国际气候与环境科学中心
短期气候预测信息
2013年第6期
二零一三年六月二十日

2013年梅雨开始日期预测

2013年6月22日,中国科学院大气物理研究所气候预测中心启动最新的气象系统,每日都进行了测试。

一、 预测意见:

- 预计 2019 年长江中下游地区将于 6 月 25~26 日入梅。气象平均入梅日为 6 月 24 日(气象中心监测室提供)。2019 年入梅偏晚。

二、预测依据:

- [illegible]

中国科学院大气物理研究所国际气候与环境科学中心
短期气候预测信息
2014年第2期
二零一四年三月二十七日

2014年汛期(6-8月)我国降水趋势预测意见

一、拓制意见:

统计 1954 年汛期 (6 月 8 日) 淮河流域雨日多 5~7 次, 可能出现局地洪涝, 东南沿海、辽东、冀东、华北南部、鲁北东部和南部、晋北东部、冀北东部地区、新疆北东部以及陕西南部地区属不正常偏多, 苏南苏北和可萨地区属偏少 5~7 次, 表以其它大部分地区属正常或偏少 (表 1)。预计今年夏季旱情台风险较大, 应早防旱。

二、检测依据:

- | | |
|----|--|
| 1) | IAP MSO 的50%的细胞增殖停止, 未能在1-2个月内, 查中未有大体可识别的增殖抑制标志物出现, 说明其细胞死亡, 为中等毒性事件(2级); 因此, 在24h内短期观察条件下中特发性肺纤维化患者。 |
| 2) | IAP 与低浓度(0.025-0.4) 赖氨酸脱羧酶抑制剂, 及其与中大剂量抑制剂无协同作用, 有协同作用。 |
| 3) | IAP 与赖氨酸脱羧酶, 在低浓度时与正常细胞, 有协同作用。 |
| 4) | 21天120天中特发性肺纤维化患者, 在正常生理条件下细胞增殖。 |
| 5) | 21天120天中特发性肺纤维化患者, 有协同作用细胞增殖, 在低浓度时细胞增殖。 |
| 6) | 在正常生理条件下和中等剂量抑制剂, 在正常生理条件下细胞增殖, 在正常生理条件下, 在正常生理条件下, 在正常生理条件下。 |

中国科学院大气物理研究所/国际气候与环境科学中心
短期气候预测信息
2014年第1期
二零一四年一月十四日

关于今冬明春极端天气发生趋势预测

会上,徐绍应强调,2014年1月8日,中国气象局大气物理研究所发布龙卷2013年12月-2014年初我国强对流天气进行了回顾,对今年强对流天气发生趋势进行了预测,并附送中国天气网上报中央办公厅和国务院办公厅。预测意见及建议如下:

一、今冬极端天气回顾

入冬以来,我国北方地区气温普遍偏高,降水偏少,华北地区气温偏高,降水偏少(图1)。2013年12月14-17日,武汉市郊地区出现罕见的大范围强降雪。2013年12月上旬、下旬和2014年1月上旬,武汉中东部出现了大范围雾天气。

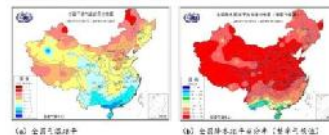


图 1 为 1981 年 12 月 1 日~1984 年 3 月 5 日全湖水位涨落示意图。

中国科学院大气物理研究所国际气候与环境科学中心
 **短期气候预测信息**
 2012年第7期
 二零一二年六月二十八日
 2012年盛夏我国降水趋势预测

短期气候预测信息

2013年第6期
二零一三年十月三十一日

2013/2014年冬季我国气候趋势预测意见

我國小學數學課程的數位模式和統一模型

中国科学院大气物理研究所国际气候与环境科学中心

天气气候预测信息

2013年第9期
二零一三年十月三十一日

2013年夏季预测总结

2018年10月28日,中国科学院大气物理研究所吴志忠对2018年度季刊简报进行了总结。报告从观测和数值两个方面进行了讨论,并提出了未来研究方向。

ENMO 模型。IAPENIO 模型中,中等复杂度 ENMO 事件模型拟合的 ECIAM-ENMO 模式均如图 10 中 4~6 月,赤道中东太平洋保持正常值。结果显示,赤道中东太平洋保持正常偏正位相^[2](图 11),拟合结果与观测结果基本一致。

最新再分析数据, 大气层 2.5、5 层和 CCSM4 模式均预测夏季西太平洋副热带高压南偏, 西脊线南压, 北界南压。结果显示, 2013 年夏季副热带高压南偏, 强度偏弱, 西脊线较常年同期偏南 10 个经度 (图 2), 预测结果与观测基本一致。

夏季降水概况：2月对雨和雨天的预测误差为：预计2002年(184天)：我国大部分地区降水与平均略少；长江中下游地区降水可能稍少于历年；华北南部和南部、华北北部、黄淮和江淮流域降水、河套地区、新疆北部和南部降水均少于历年或略多。实际上，其降水量略多，超过北方大部分地区降水偏多，如内蒙古三河以上黄河中下游，西北北部和南部，黑龙河流域和中部山区，以黄河中游流域和黄河下游为最。根据《中国天气网》。

Research Outcome for Public Consultation

Prediction results was adopted by the central government of China

中国科学院

中国科学院政务信息采用通知

大气物理研究所:

你单位于 2013年8月27日 向办公厅报送的信息
院专家关于近期我国极端天气、气候灾害发生的趋势分
析,被《中国科学院专报信息》2013年第26期 并
上报 中办,已被 中办 刊发《信息综合专报(综合)》
感谢你单位的大力支持,希望继续关注和支持院政务信
及时将本单位的科研成果、发展动态以及针对党和国家的重
等重要信息报送科学传播局,为国家和院改革创新做出贡
献。

联系人: 谢荣发、刘英楠

联系电话: 010-68597597; 68597557

E-mail: rhxie@cashq.ac.cn; yln@cashq.ac.cn

中国科学院科学传播局政务信息处(代)

2013年9月29日

中国科学院

中国科学院政务信息采用通知

大气物理研究所:

你单位于 2013年8月27日 向科学传播局报送的信
院专家关于近期我国极端天气、气候灾害发生的趋势分
析,被《中国科学院专报信息》2013年第26期 并
上报 中办,已被 中办 刊发《信息综合专报(综合)》
感谢你单位的大力支持,希望继续关注和支持院政务信
及时将本单位的科研成果、发展动态以及针对党和国家的重
等重要信息报送科学传播局,为国家和院改革创新做出贡
献。

联系人: 谢荣发、刘英楠

联系电话: 010-68597597; 68597557

E-mail: rhxie@cashq.ac.cn; yln@cashq.ac.cn

中国科学院科学传播局政务信息处(代)

2013年9月29日

中国科学院

中国科学院政务信息采用通知

大气物理研究所:

你单位于 2013年8月18日 向科学传播局报送的信
院大气物理研究所预测我国南方地区未来十年可能频发
强天气,被《中国科学院专报信息》2013年第157期 并
上报 中办 和 国办,已被 中办 刊发《每日汇报》
感谢你单位的大力支持,希望继续关注和支持院政务信
及时将本单位的科研成果、发展动态以及针对党和国家的重
等重要信息报送科学传播局,为国家和院改革创新做出贡
献。

联系人: 谢荣发、刘英楠

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中国科学院科学传播局政务信息处

2013年9月29日

中国科学院

中国科学院政务信息采用通知

大气物理研究所:

你单位于 2013年8月18日 向科学传播局报送的信
院大气物理研究所预测我国南方地区未来十年可能频发强
天气,被《中国科学院专报信息》2013年第157期 采
上报 中办 和 国办,已被 中办 刊发《每日汇报》
感谢你单位的大力支持,希望继续关注和支持院政务信
及时将本单位的科研成果、发展动态以及针对党和国家的重
等重要信息报送科学传播局,为国家和院改革创新做出更大贡
献。

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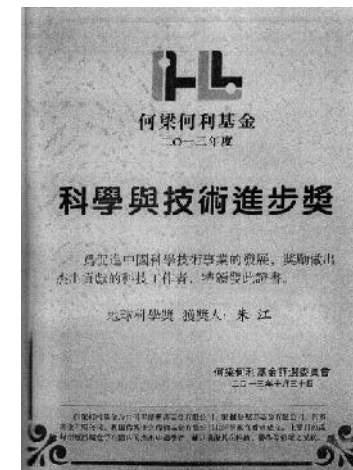
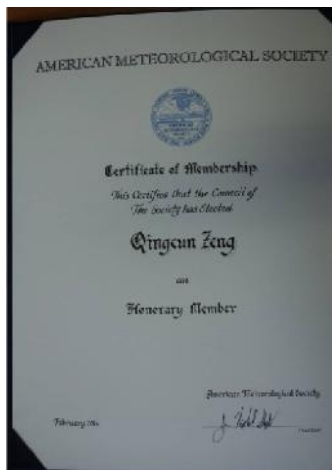
中国科学院科学传播局政务信息处

2013年9月29日

Awards



- ◆ Prof. Qingcun Zeng was awarded the *honorary member of American Meteorology Association (AMS)* in February, 2014.
- ◆ Prof. Jiang ZHU, Dr. Jiping Xie, Dr. Changxiang Yan etc. were awarded the *second price of National Scientific and Technological Progress* in 2013, for their collaborative contribution on “Argo-ocean Observation and Data Assimilation and Improvement of Short-term Climate Prediction in China”.
- ◆ Prof. Jiang Zhu won the *Scientific and Technological Progress Award* sponsored by the Ho Leung Ho Lee Foundation, Hongkong.
- ◆ Dr. Fei Zheng was selected as a member of the “*Young Talent Projects*” by the Organization Department of the CPC Central Committee.





III. International Cooperation

- ◆ **International conferences/workshops**
 - ◆ CAS-TWAS-WMO Forum on oceanography
 - ◆ Joint international conference on Asian monsoon and climate change
- ◆ **International programs**
 - ◆ ICCES-COMSATS joint program on extreme events
 - ◆ China-Thailand joint program on seasonal prediction
- ◆ **COMSATS ITRG on Climate Change and Environment Protection**
 - ◆ Organizing ITRG meetings
 - ◆ Training workshop on Extreme events
- ◆ **International visiting**
 - ◆ Visit international research institutions and universities
 - ◆ Attending international meetings
 - ◆ Host visiting

12th CAS-TWAS-WMO Forum

- ◆ 12th CTWF International Symposium on “Operational Oceanography for Developing Countries” was held on September 9-12, 2013, Beijing.
- ◆ More than 80 scientists from 10 countries, Prof. Romain Murenzi, TWAS Executive Director and Dr. Mitrasen Bhikajee, deputy executive secretary & director for Capacity Development, Intergovernmental Oceanographic Commission of UNESCO attended 12th CTWF.



12th CAS-TWAS-WMO Forum



Sessions of 12th CTWF:

- Operational Ocean Forecasting
- Ocean Research and Modelling
- Ocean Observations and Data Analysis
- Ocean Data Assimilation

News articles on 12th CTWF

A crucial focus for least developed nations

filed under: [Information & communication technologies](#), [oceanography](#), [CAS](#), [fellowships](#), [marine ecosystems](#), [engineering](#), [WMO](#), [2013](#), [IOCCG](#), [IOC](#), [LDCs](#)

10 September 2013. The world's poorest countries and their allies should focus on Internet and communications technology to build momentum in science and engineering, TWAS Executive Director Román Mureñzi said at a conference in Beijing.

Without computing technology and internet broadband access in the Internet, researchers in Least Developed Countries (LDCs) cannot effectively participate in the global scientific enterprises, Mureñzi said. His remarks opened an international oceanography forum organized by the Chinese Academy of Sciences (CAS), the World Meteorological Organization (WMO) and TWAS.

If you're a scientist in an LDC, but you lack computers and broadband, then 'even if you can gather data, how do you analyse it?' Mureñzi asked. 'How do you store it? How do you share it with colleagues?' The risk is that, while other countries advance, the LDCs only fall further behind.' [Read the full text of Román Mureñzi's talk.]



Román Mureñzi

Science in the world's 49 Least Developed Countries is a crucial focus for TWAS. Scientists from some of those nations were in attendance at the 12th CAS-TWAS-WMO Workshop Forum, an international workshop on operational oceanography for developing countries.

The four-day forum is intended to strengthen collaboration among researchers from developing countries who work in operational oceanography by exploring common scientific and infrastructure issues. It is sponsored by the CAS-TWAS-WMO Forum and hosted by CAS's Institute of Atmospheric Physics (IAP), and the International Center for Climate and Environment Science (ICCES).



News article on 12th CTWF on CAS website



News article on 12th CTWF on Weibo of UNESCO Beijing Office

News article on 12th CTWF on TWAS website

Asian Monsoon and Climate Change Conference

- ◆ International Conference on “Asian Monsoon and Climate Change” was held on January 20-21, 2014, Islamabad.
- ◆ This meeting was organized by Centre for Climate Research and Development (CCRD), CIIT, Pakistan; Potsdam Institute for Climate Impact Research (PIK), Germany and **ICCES, CHINA.**
- ◆ More than **70** scientists from **9** countries attended the international conference.



Thailand-China Cooperative Research Project

- ◆ **Project Title: Development of Seasonal Climate Forecast System in Thailand Using IAP-DCP Model; funded by Thailand Research Fund (TRF)**
- ◆ The kick-off meeting of Thailand-China Research Project was held on October 17, 2013 during Thai Delegations' visit to ICCES from October 12 to October 19.
- ◆ ICCES researchers introduced latest scientific achievements made by ICCES, including model development and seasonal prediction activities
- ◆ The two parties arrived at a tentative action plan for this project, including the transferring of IAP Dynamical Seasonal Prediction System to KMUTT.



COMSATS ITRG-CCEP Activities

◆ Leading Center of COMSATS Thematic Research Group on Climate Change and Environment Protection (ITRG-CCEP)

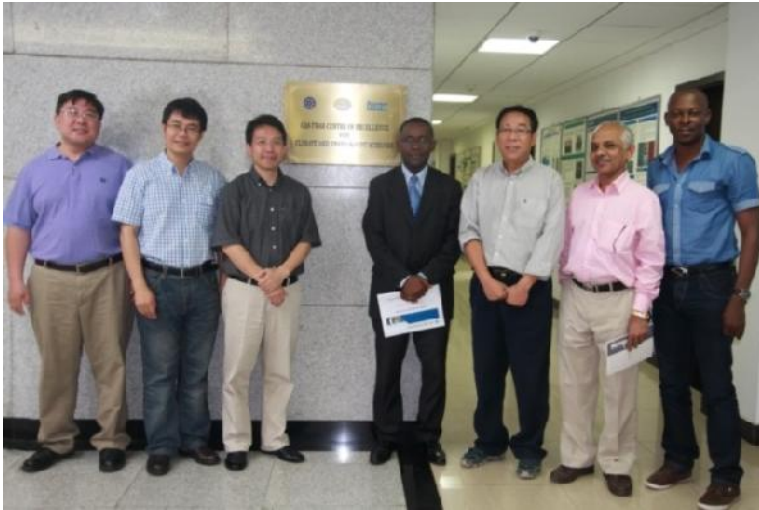
◆ Organized 2 progress meetings of COMSATS ITRG

- ✓ 2nd meeting of COMSATS ITRG-CCEP on July 21, 2013, Beijing.
- ✓ 3rd meeting of COMSATS ITRG-CCEP on January 22, 2014, Islamabad.

◆ 2013 ICCES International Training Workshop on “Extreme Weather and Climate Events” was held on July 14-23, 2013, Beijing.



TWAS Executive Director Visited ICCES



Prof. Murenzi visited ICCES and had a nice talk with the visiting scholars from Nigeria and India



Prof. Murenzi attended 12th CTWF and delivered a speech at the opening ceremony

China-Thailand Collaboration

◆ ICCES Delegation visited Thailand from November 29th to December 5th, 2013, and visited

Kings Mongkut's University of Technology Thonburi (KUMTT)

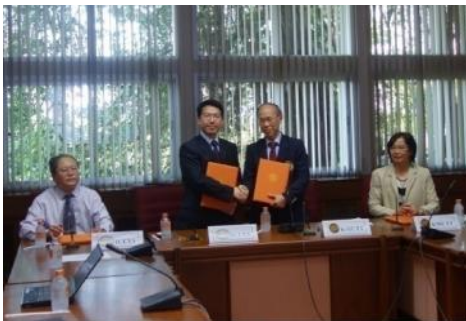
Joint Graduate School of Energy and Environment (JGSEE)

Hydro and Agro Informatics Institute (HAI), Ministry of Sciences and Technology of Thailand

Thailand Research Fund (TRF)

Thailand Meteorological Department (TMD)

Phuket Rajabhat University (PRU)



MOU Signing Ceremony at KMUTT



The meeting with HAI delegation



The meeting with TRF delegation



MOU Signing Ceremony at PRU

China-Thailand Collaboration

◆ ICCES signed MOU with KMUTT and PRU, and will

1. conduct collaborative researches on climate sciences
2. apply for international research projects as cooperation partners
3. share the observed data
4. jointly organize international training workshops



- Will promote the cooperation between ICCES and Thailand universities and research institutes on climate research
- The starting point of realizing the blueprint of developing scientific cooperation on climate research with institutes and universities of ASEAN nations (the Association of Southeast Asian Nations).

Future plan



■ ESM development:

- ✓ Release the first version of CAS Earth System Model by the end of 2014

■ Climate and Environment Prediction:

- ✓ Upgrade the IAP seasonal climate prediction system using climate component of CAS Earth System Model, and apply in the real-time prediction in 2015

■ International Collaborations:

- ✓ International conferences: 2014 CTWF on Extreme Events、Training workshops
- ✓ Hosting short-term visits for young scientists from developing countries through CAS-TWAS scholarship
- ✓ Supervise foreign students pursuing PhD degrees

13th CAS-TWAS-WMO Forum



Basic Information:

1. Theme: Extreme Weather and Climate: Past, Present, Future
2. Time: September 8-11, 2014
3. Venue: Beijing

Tentative Sessions

- a) Inland and Coastal Flooding
- b) Heat Wave and Drought
- c) Extreme Events of Air Pollution
- d) Society Impact of Extreme Events

Important Dates

- Deadline for On-line Registration: **May 15, 2014**
- Deadline for Abstract Submission: **June 15, 2014**
- Notice of Abstract Acceptance: **July 1, 2014**

Online registration

<http://2014ctwf-icces.csp.escience.cn>



THANK YOU !

Prof. Dr. Zhaohui Lin

Director of ICCES

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<http://www.icces.ac.cn>

