

Sustainability Activities at Peking University

-- an example of China's universities

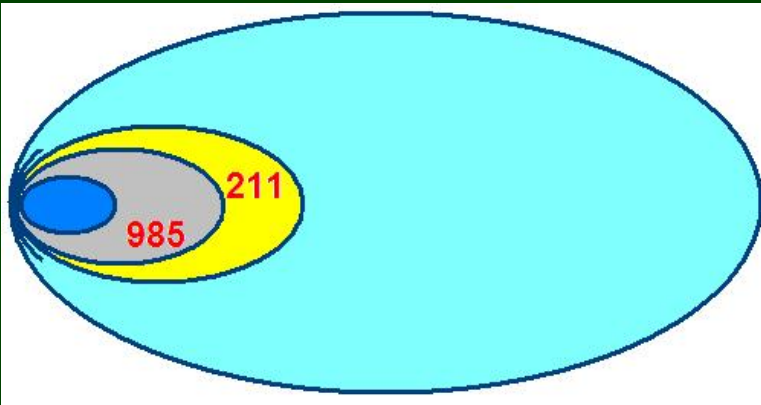
Li Xiaoming, Peking University

September 20, 2011

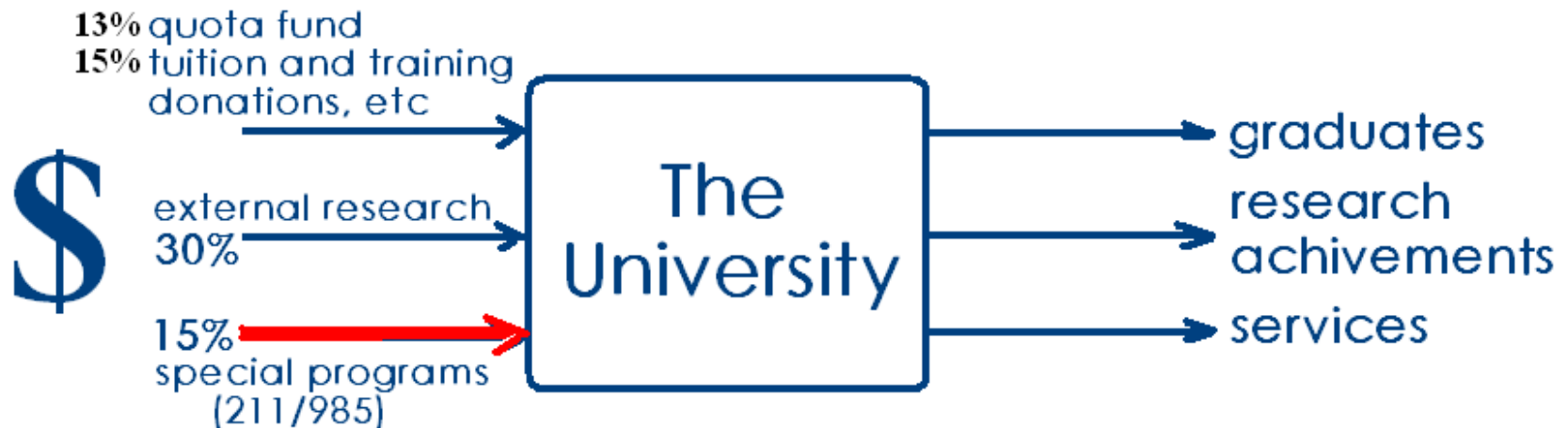
Outline

- A perspective of China's universities
- A perspective of Peking University with an emphasis on its components in computing and sustainability
- Sustainability as a pursue of responsible universities in 21th century
- A few cases of sustainability activities at Peking University

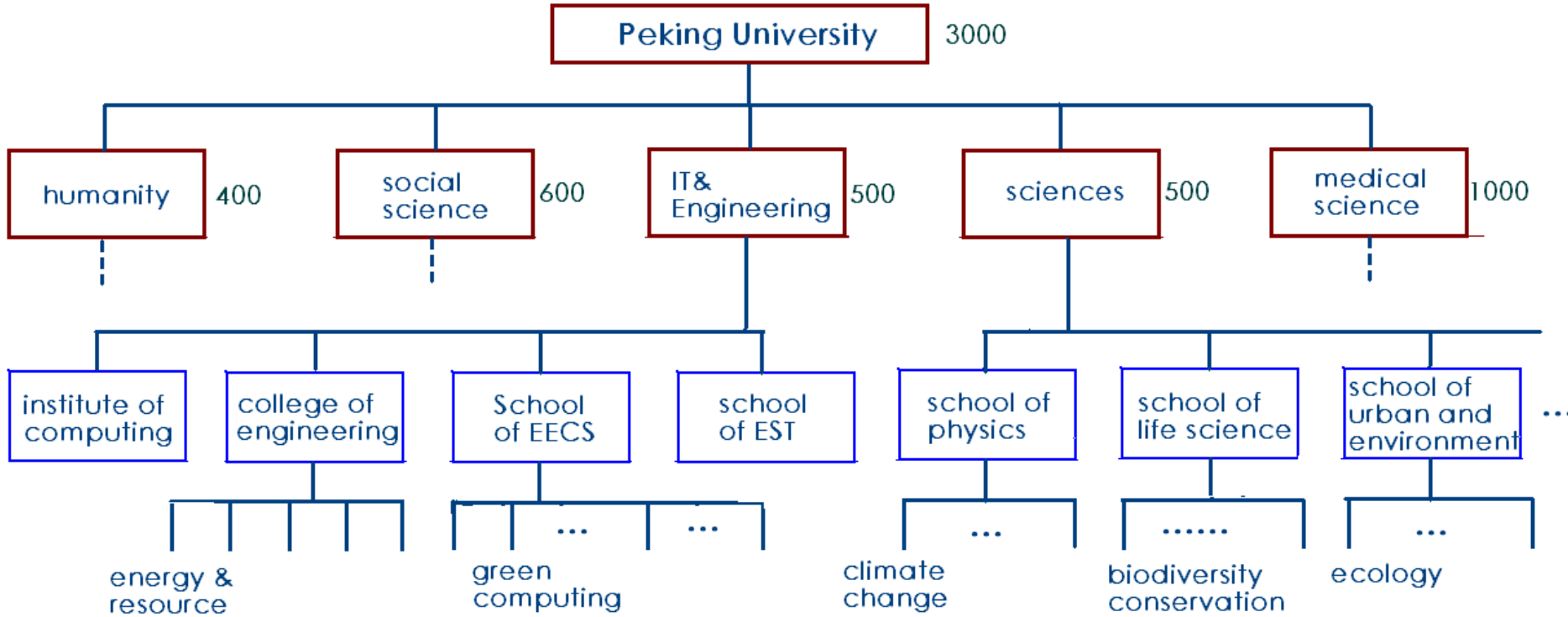
A Perspective of China's Universities



- Research Funding sources
 - NSFC
 - MOST
 - Other central government agencies
 - Provincial governments
 - Industries



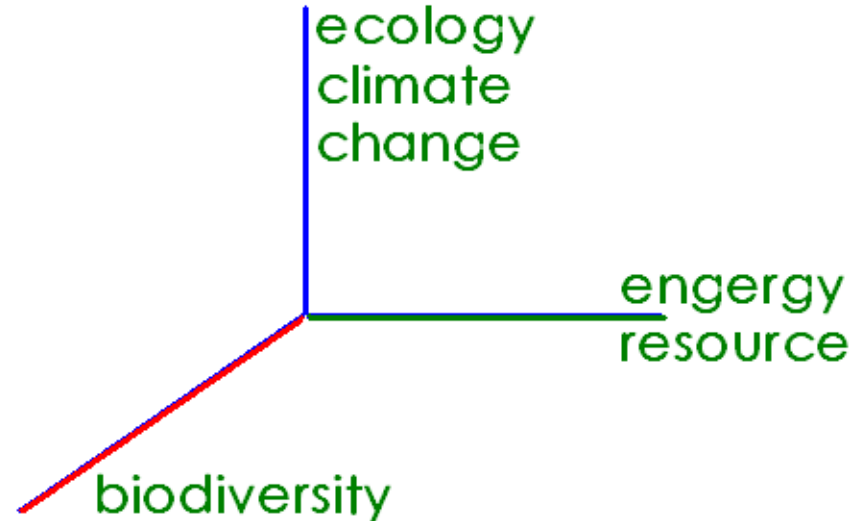
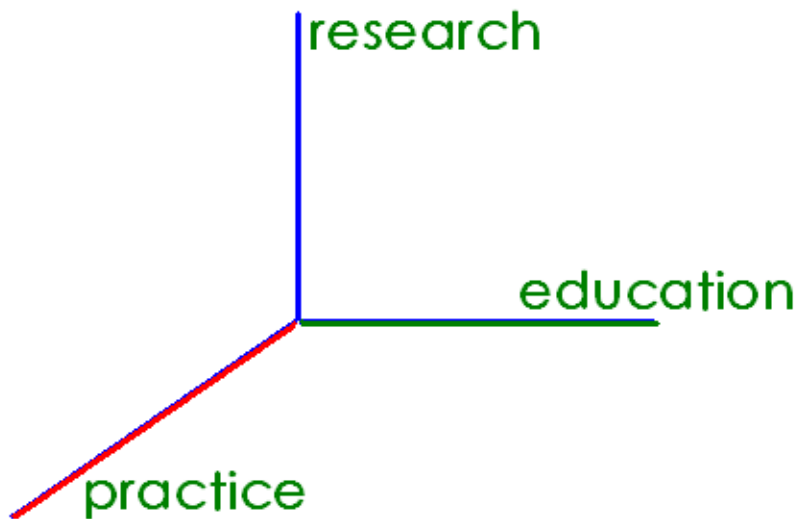
A Perspective of Peking University



with an emphasis on sustainability and computing

Sustainability as a Pursue of the University

- contributing to global importance, besides traditional academic excellence



Trace and initiatives

- Center for Environmental Sciences (1982) → China Sustainable Development Research Center at PKU (1993) → School of Environmental Science and Technology (2007)
- Green campus campaign (as a response to IARU initiative)
 - more than 100 species are identified on campus
 - GHG emission management on campus
 - ...



Global Alliances

- Global Honor College (since 2008)
 - Columbia, Harvard, Yale, U of Washington, MIT
 - Waseda U, National U of Singapore, Korea U. PKU
- PKU-Waseda Center for Sustainable Development
- International Alliance in Sustainable Development: an international alliance for a new academic discipline (2011)
 - Columbia, Oxford, Tokyo, and others around 20 Universities

education components



Water and sediment science

- Prof. Ni Jinren
- Treatment of Dianchi Lake and Xiangjiang
- Flooding control, ecological protection and sustainable development – a Sino-Canadian collaboration project
- SPO – a collaboration of NUS, PKU, and Oxford
– Water is the central theme

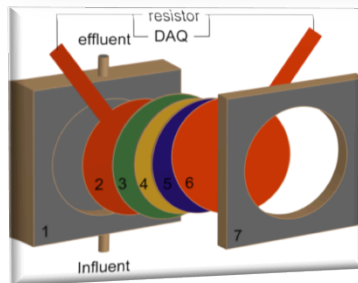


SPO R&D Program

•Efficient systems for safe drinking water



•Integrated technology based on “3R”



SPO-T
Research and
Technology
Transfer

SPO-D
Manpower
Training and
Networking

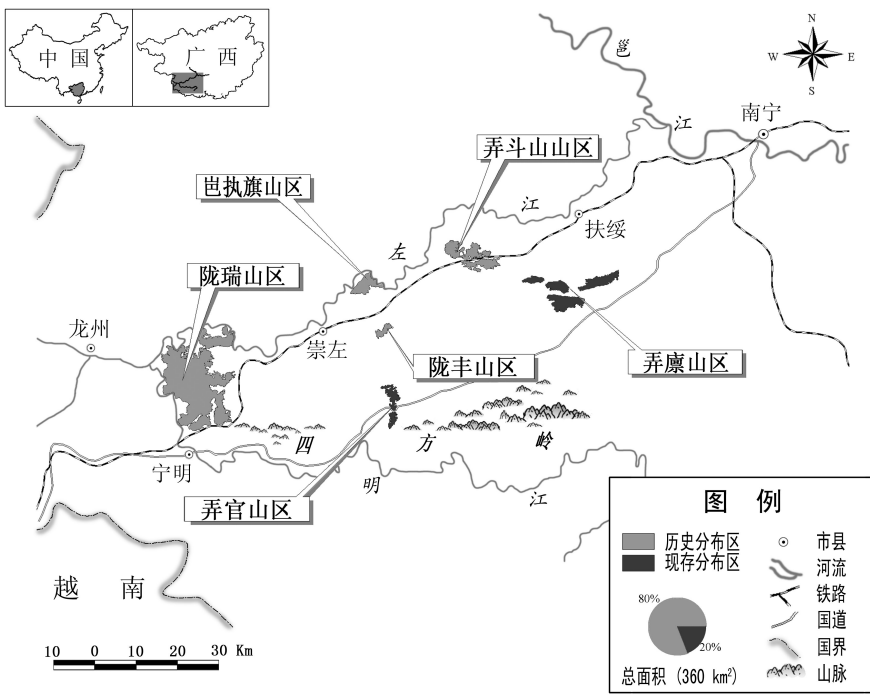
SPO-M
Technology
Exploitation



•Organic wastewater treatment

•River ecological rehabilitation

Social Biology, Population Genetics, and Ecological Physiology of the White-Headed Langur



- White-headed langur-*Trachypithecus leucostriatus*
- Main distribution < 80km²
- Total population: < 1000 individuals
- Critically endangered species by IUCN

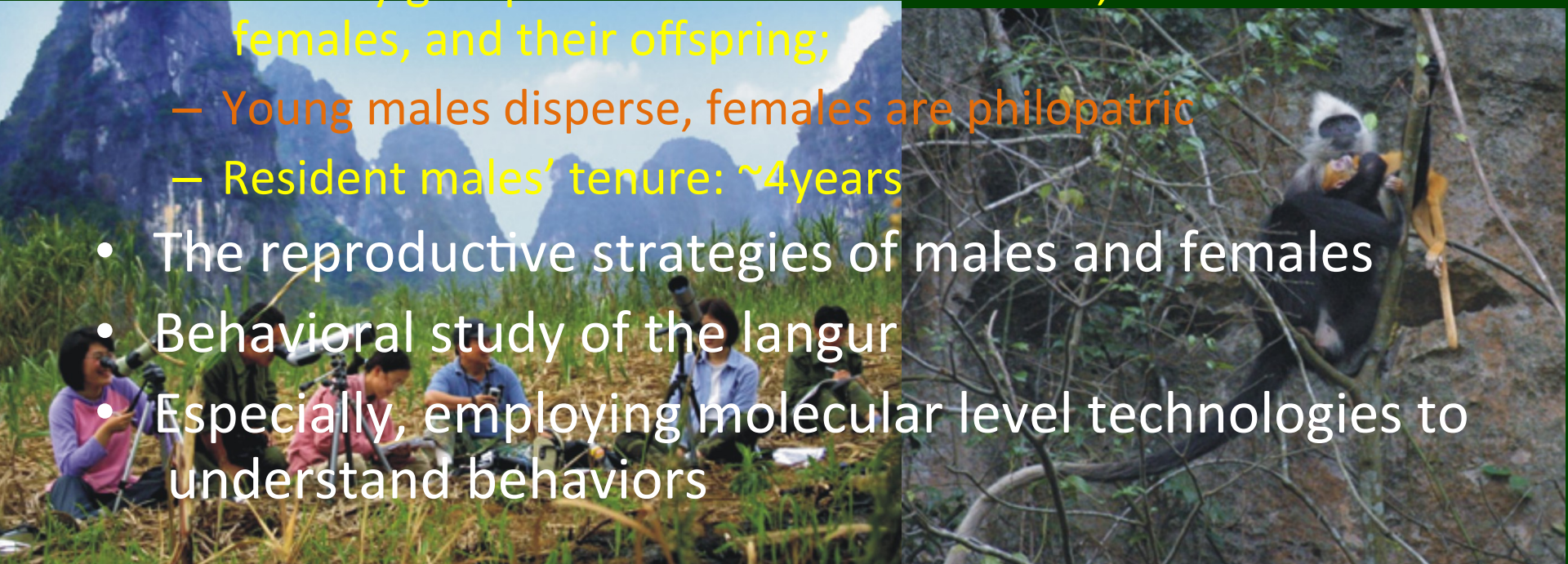
A research base was established 2002





What's the research ?

- Comprehensive measures for protection
- Historical distribution and current population census
- Social structure and reproduction parameters
 - Family group: the only social form that can reproduce
 - A family group consists of one adult male, several adult females, and their offspring;
 - Young males disperse, females are philopatric
 - Resident males' tenure: ~4years
- The reproductive strategies of males and females
- Behavioral study of the langur
- Especially, employing molecular level technologies to understand behaviors



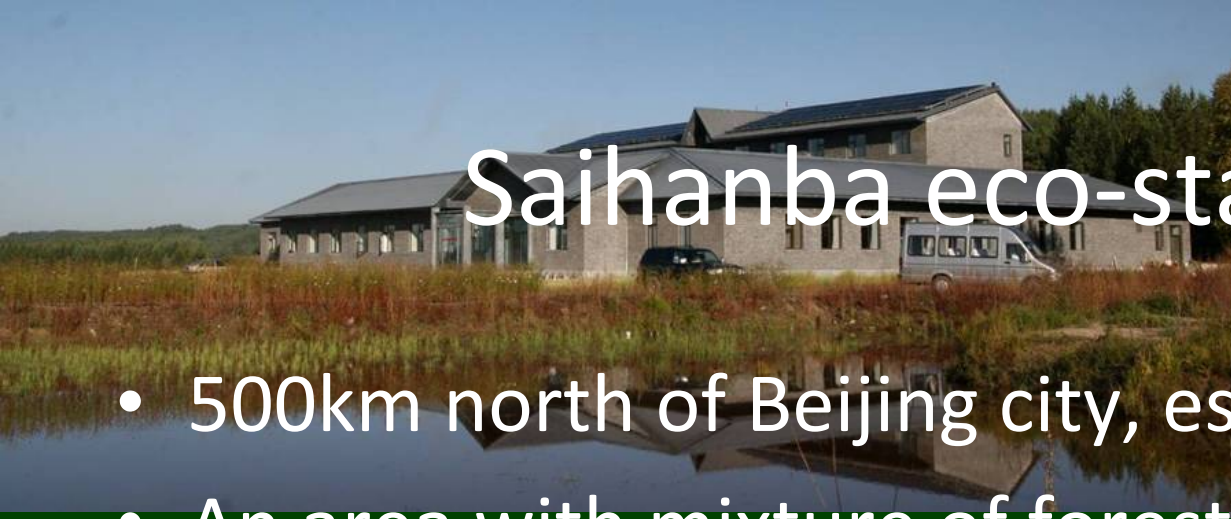
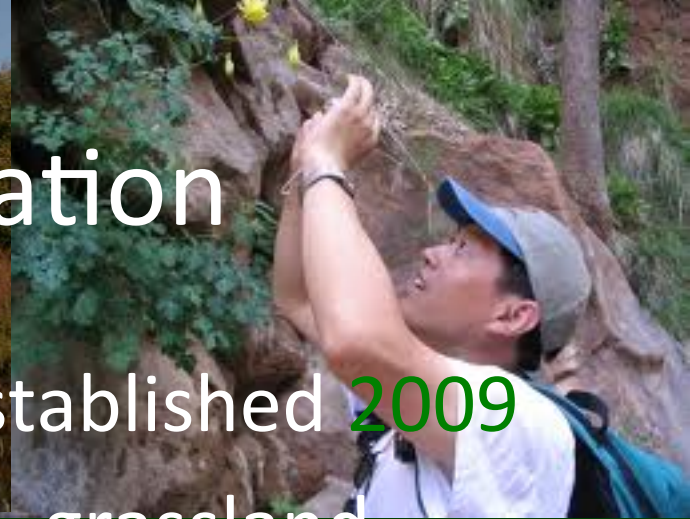
Computing needs in their research



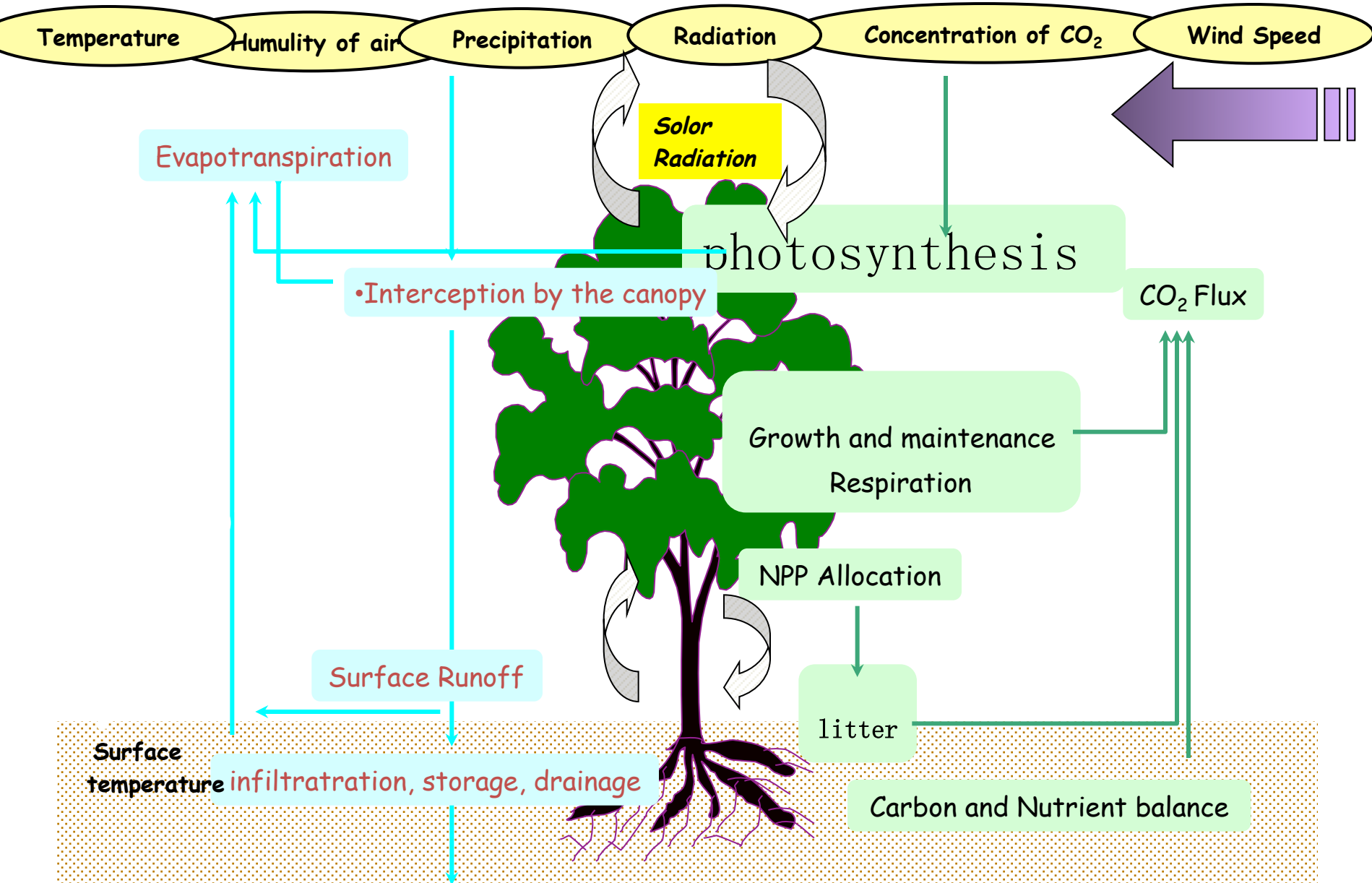
- Who is who ?
- High performance video processing

Saihanba eco-station

- 500km north of Beijing city, established 2009
- An area with mixture of forest, grassland, wetlands, and desertification – an ideal location to investigate ecological change
- Attracting scientists around the world
- Led by Prof Fang Jinyun, a renowned expert in Carbon source/sink analysis. His student, Piao Shilong, is also becoming a prominent scientist in this area.

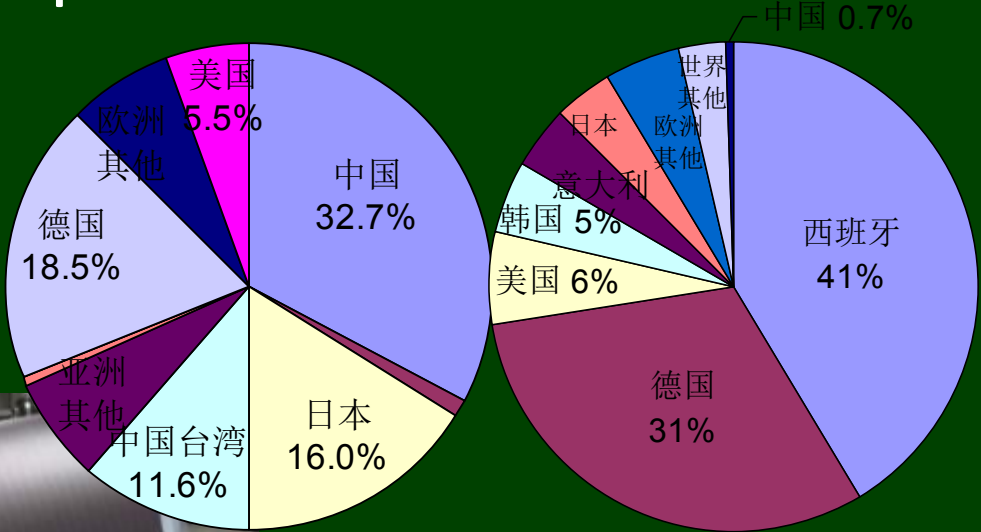
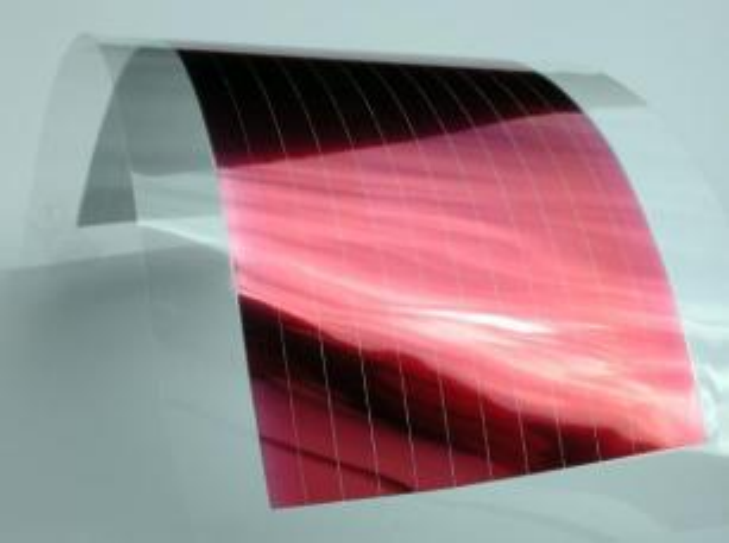
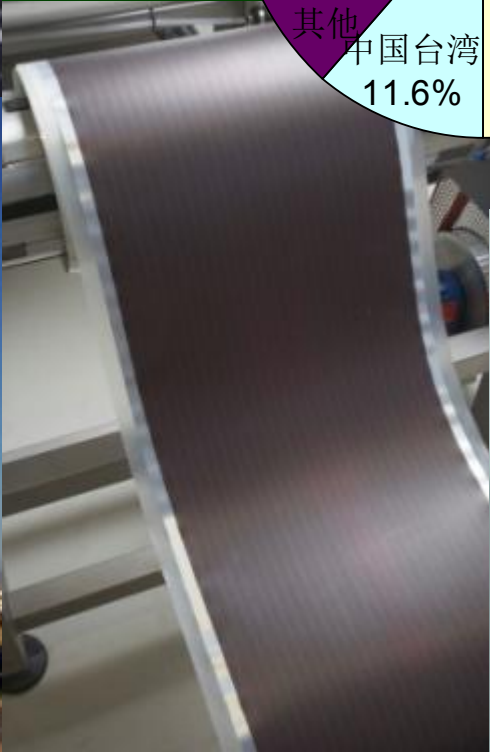


Global ecosystem model ORCHIDEE



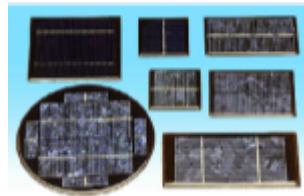
Solar Energy

production vs installation



Solar Photovoltaics

- Wire-shaped flexible dye-sensitized solar cells
 - *Prof. Zou Dechun's Group in Chemistry*
 - *Nanostructures: 50 micron -PV*
 - *Can be woven in any shape*



Dimension Down
Flexible



Fiber shaped
Weaveable



Solar Decathlon China 2013

- On Jan. 18, 2011, the US DoE, Chinese Nat'l Energy Admin. and Peking University signed an agreement to hold Solar Decathlon in China in 2013.
- The history of the US DoE Solar Decathlon dates to the inaugural event in 2002. Since then, the Solar Decathlon has been held biennially in 2005, 2007, and 2009 on the National Mall in Washington, D.C.



Solar Decathlon China 2013

- SD challenges collegiate teams around the world to design, build, and operate solar-powered houses that are cost-effective, energy-efficient, and attractive.
- The winner of the competition is the team that best blends affordability, consumer appeal, and design excellence with optimal energy production and maximum efficiency



Caring the Mother Rivers -- the Choice of Sanjiangyuan

The Yellow River





The Yangtze

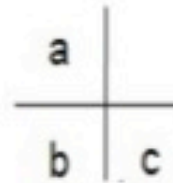


澜沧江 The Mekong

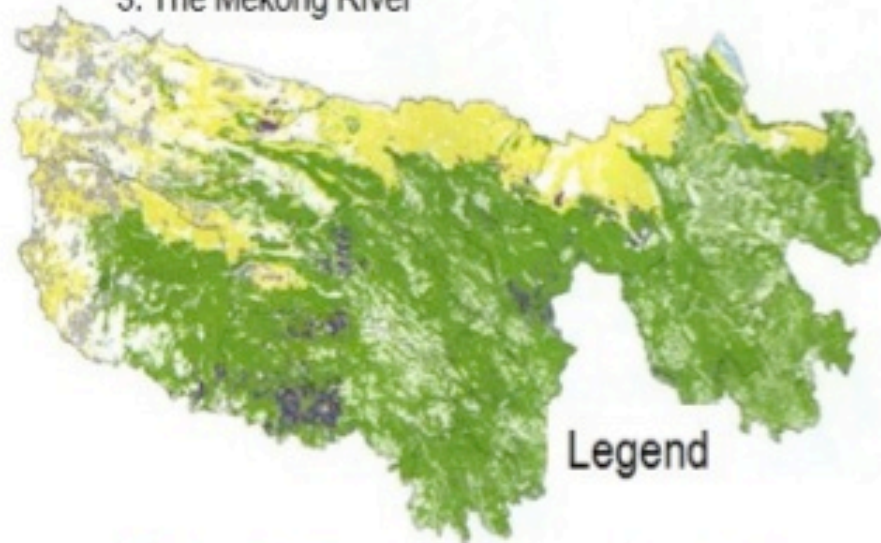
Studies of Sanjiangyuan



1: The Yellow River 2: The Yangtze River
3: The Mekong River

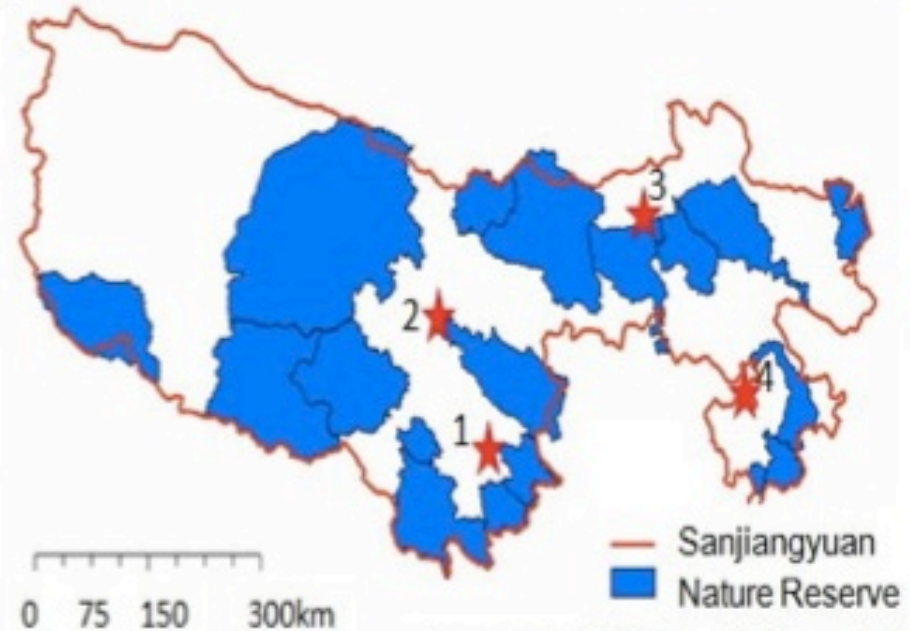


- a) The location of Sanjiangyuan in China
- b) Land use of Sanjiangyuan Region
- c) Nature Reserves in Sanjiangyuan Region



Legend

- 高山草原
- 高寒草甸
- 温性草甸
- 沙地
- 沼泽



Sanjiangyuan
Nature Reserve

- Legend 1: Yushu 2: Qumalai
3: Maduo 4: Dari

- The area, vegetation and large protected areas (150,000km²)

Unique biodiversity



Blue Poppy

Snow leopard



Tibetan Wild Ass



Poisonous grass



Ecological crisis

Grassland degradation



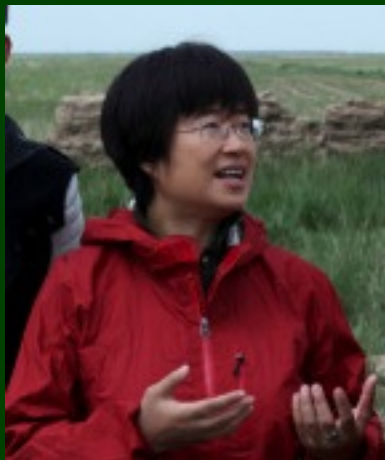
Land degradation



Desertification

What happened ?

- Climate change?
- Population increase/over grazing?
- Rodents invasion?
- Nomads vs. settlements? – behavior change?
- What else?



Causes of Degradation

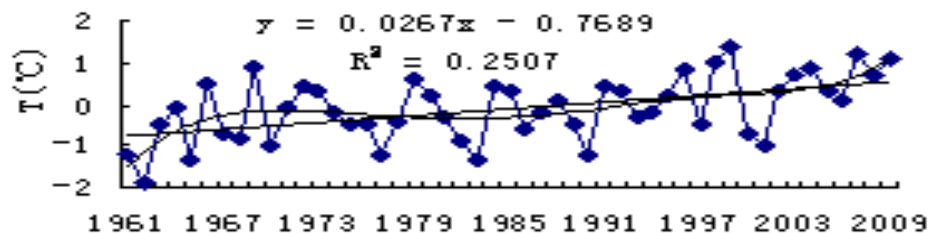
Natural

- Warming
- Erosion by wind and water
- Freeze thawing
- Drought
- Snow storm
- Pests

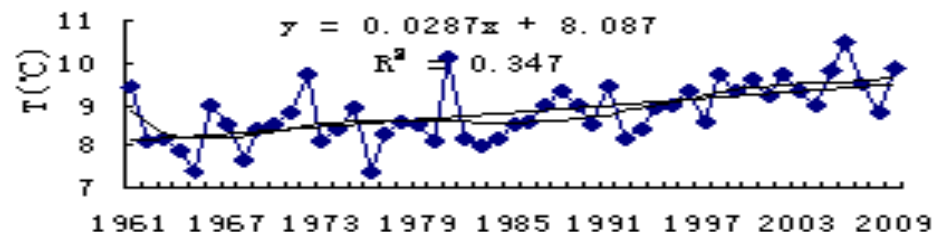
Anthropogenesis

- Cultivation
- Overgrazing
- Livestock stepping
- Settlements
- Medicine harvesting
- Mining
- Road and cable building

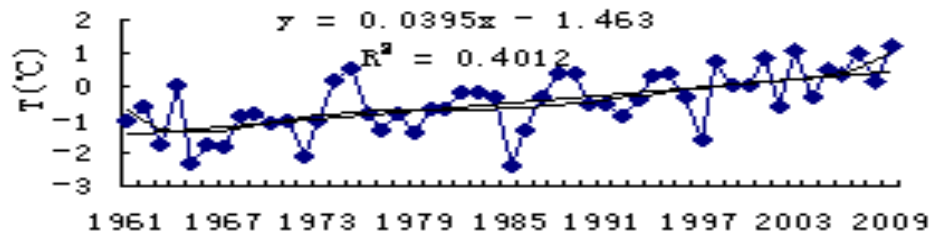
春季



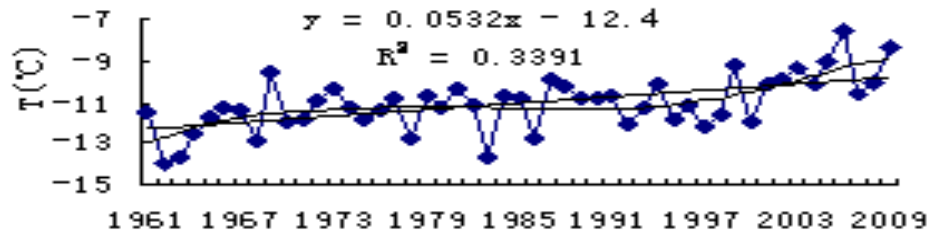
夏季



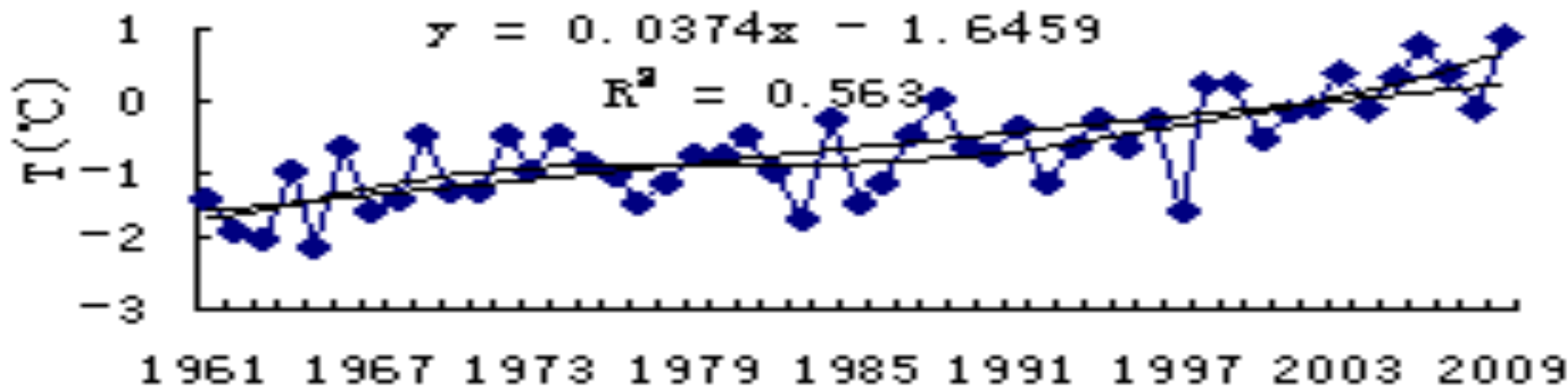
秋季



冬季



年



Temperature 1961-2009 (Qinghai Meteorology Institute)
 Winter temperature increase: 0.53C/10 yrs

Conservation and development should be based on better scientific evidences and analysis



- Pika, the key species of the Plateau, is often mistakenly blamed on damaging grassland

Another type of SEZ

-- a proposal to the government

- Based on several years of field studies
 - Combining issues of biology, ecology, sociology, culture, economy, and government policy
- The proposal: Special Ecological Zone
 - A candidate of both natural and cultural world heritage
 - Demonstrate a balanced development and conservation model: integrating objectives of livelihoods, social development, cultural conservation and governmental performance in context of ecological conservation
 - Experiment payment for ecosystem services
 - Establish research and training system



The future: a NEW BALANCE in a changing context

Conclusions and Acknowledgement

- Sustainability is a high profile and pervasive theme in many Chinese universities.
- Computing is playing an observable role, but CS people are usually not involved much.
- Funding situation is reasonable, and international collaborations are highly encouraged.
- I thank Lu Zhi, Yao Meng, Zhang Shiqiu, Zhang Dongxiao, Ni Jinren, Piao Shilong, and Liu Hongyan for providing me with the wonderful materials and the delightful chat while I prepare this presentation.