

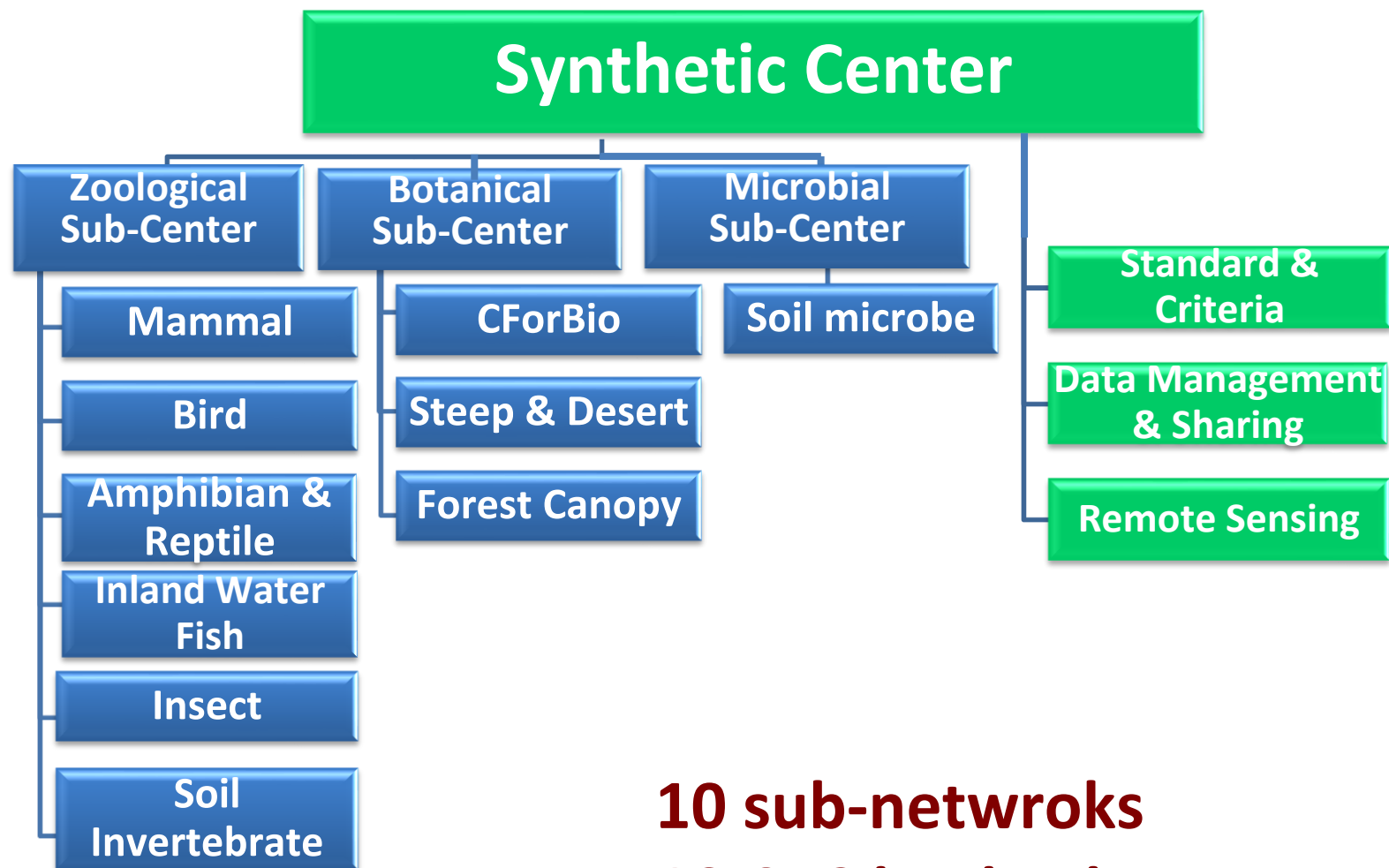
# Progress of Sino BON

Xiaojuan Feng

Institute of Botany, Chinese Academy of Sciences

2023-02-01

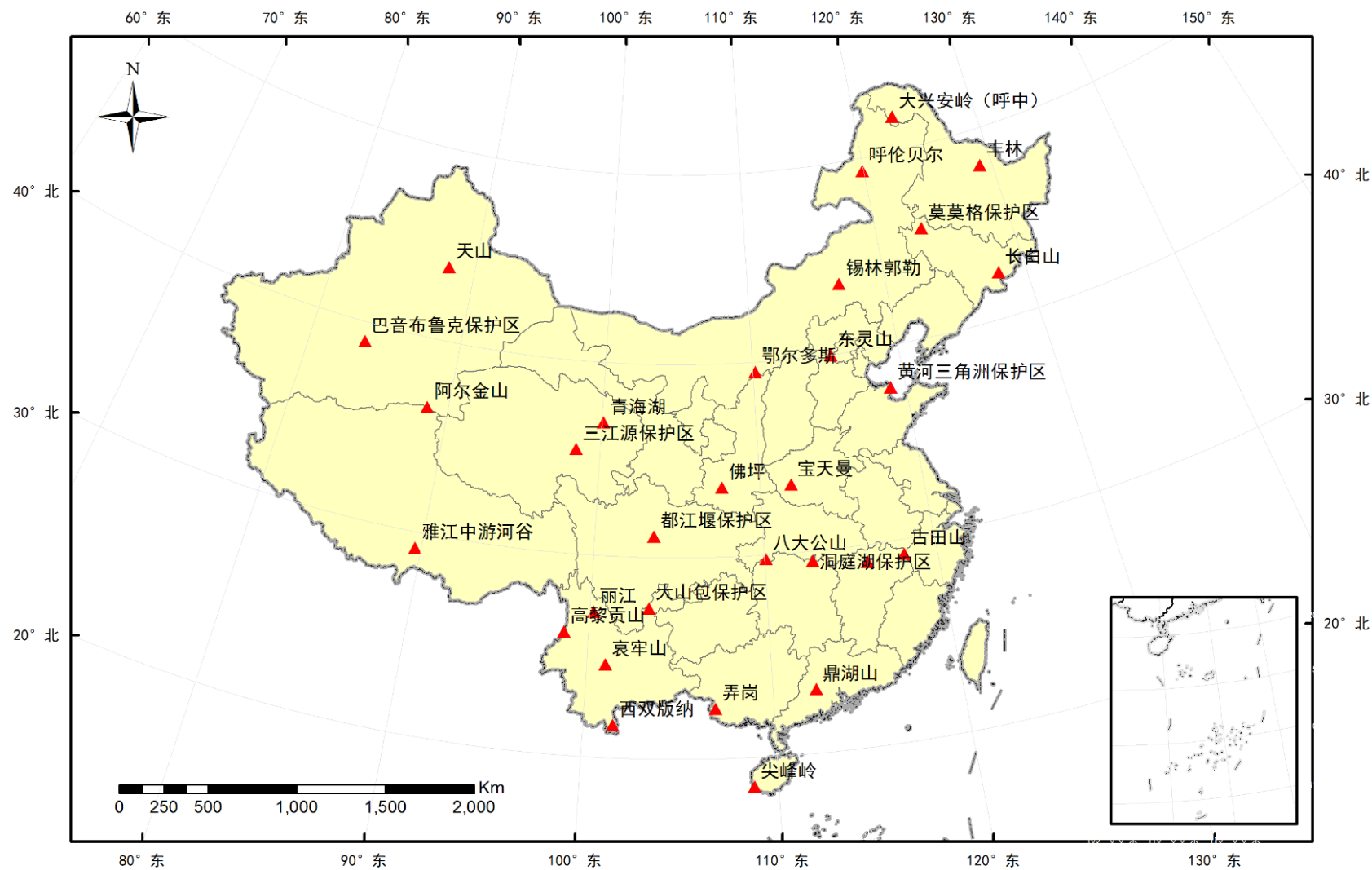
# Sino BON: Participants



**10 sub-networks**  
**19 CAS institutions**



# Sino BON: Monitoring sites

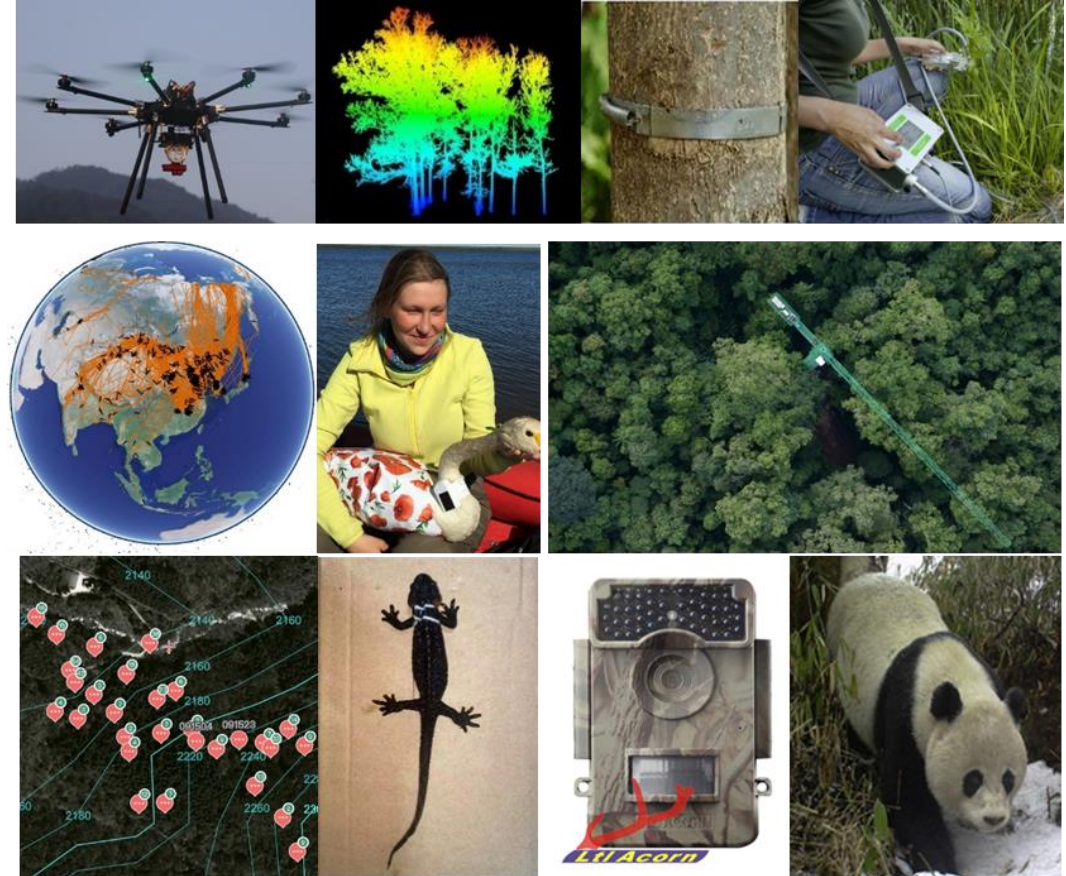




# Sino BON: Monitoring



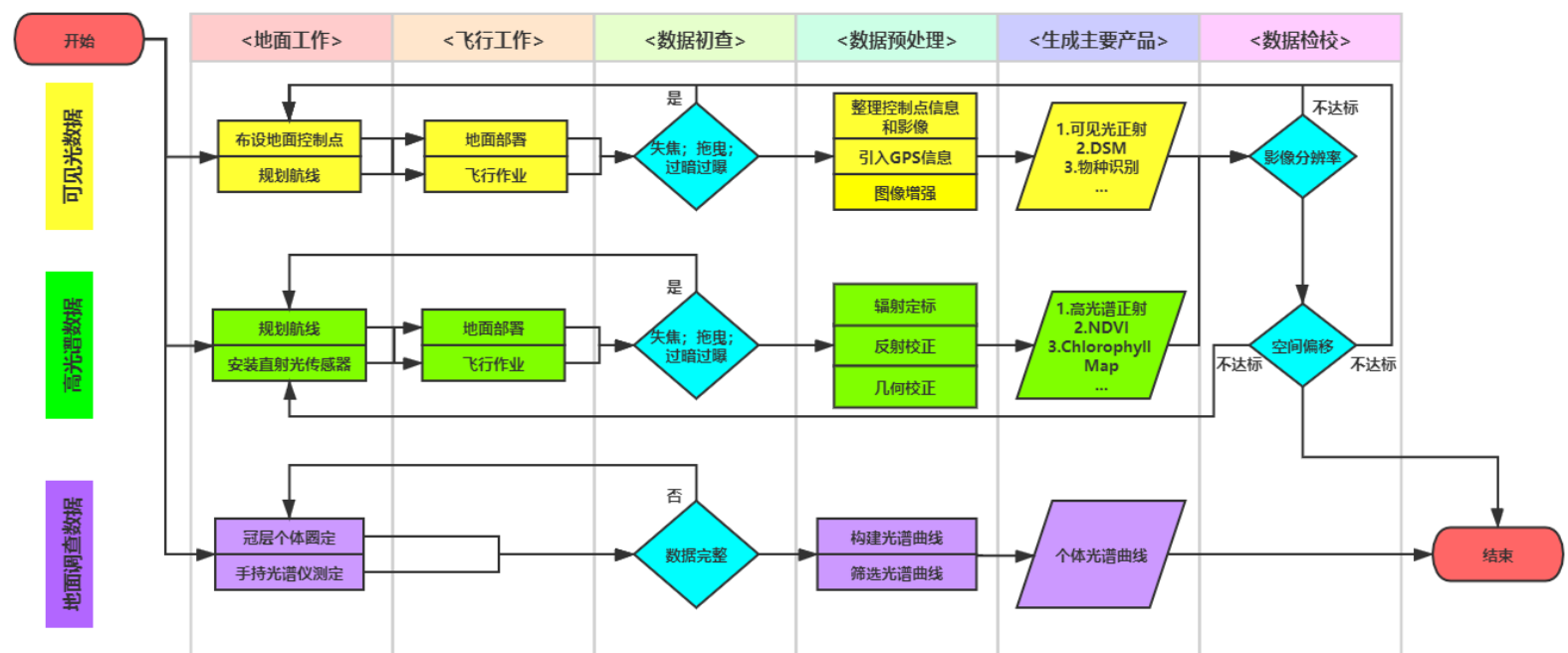
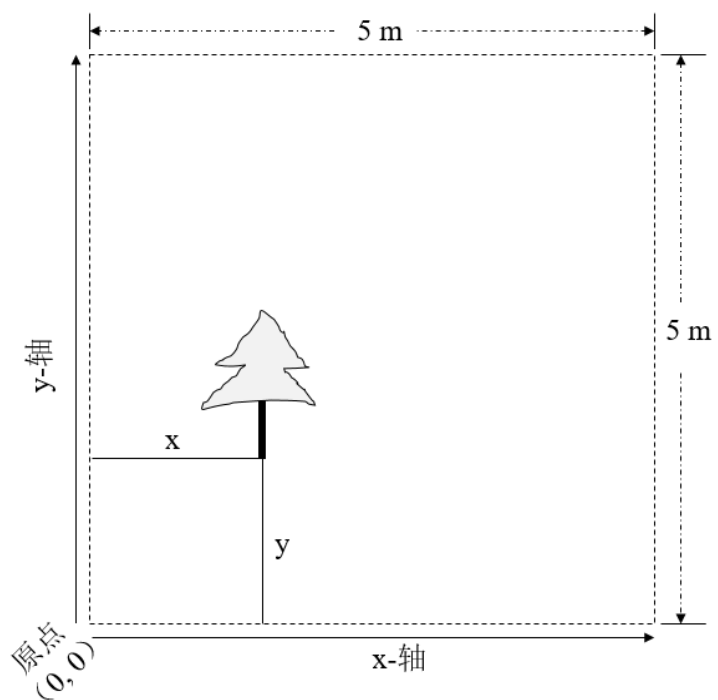
- Combination of manual observation and advanced technologies, such as satellite tracking (birds), infrared camera (mammals & birds), LiDAR (vegetation), ID tracking (amphibia), and tower crane (forest canopy), etc..
- Integrated long-term series monitoring at the gene, species, population, community, ecosystem to landscape levels.



# Sino BON: Standard & Criteria

Standard and criteria for monitoring and data quality control are important guarantees for network cooperation.

10 Monitoring specifications covering traditional manual observation and advanced technologies will be published in 2023.





# Sino BON: Capacity building



## Training Workshops for monitoring technology

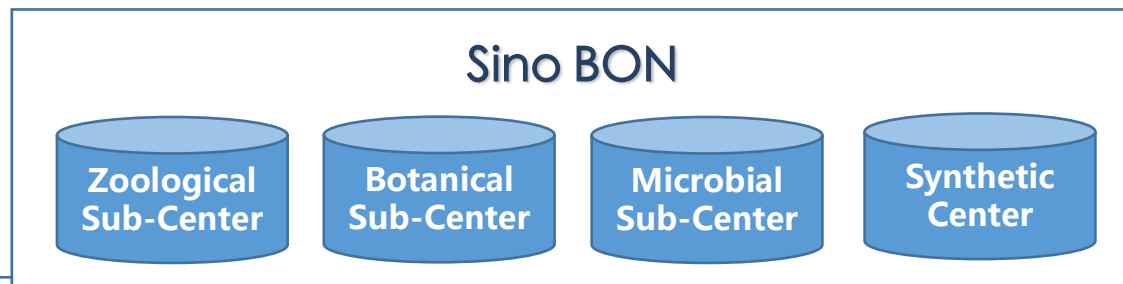
- Workshops on the Application of LiDAR to Forest Ecology
- Training Seminars on Infrared Camera Monitoring on Wildlife Diversity
- Training course on grassland fieldwork techniques
- Workshop on New Methods of Ecological Remote Sensing



# Sino BON: Data & outputs

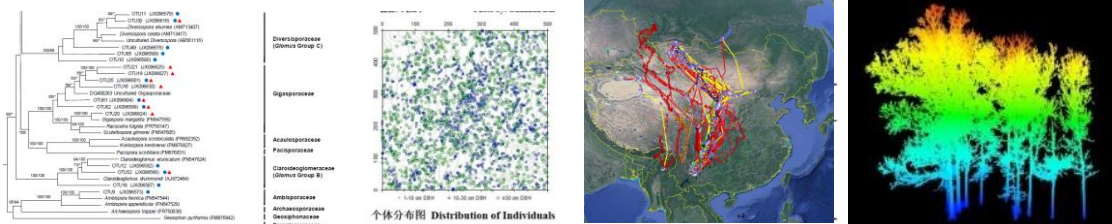


## Standard Data

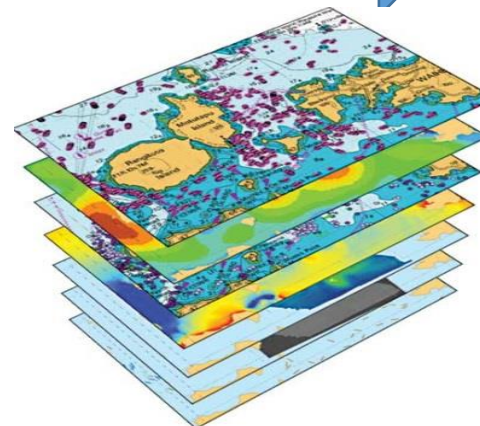


## Gene—Species—Population—Community—Ecosystem—Landscape

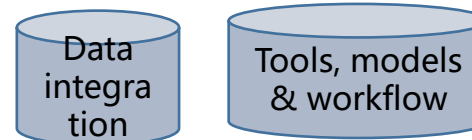
- Microbial gene(DNA analysis)
- Plant distribution (Field observation)
- Animal distribution/migration (Camera/Satellite tracking)
- Landscape data (LiDAR)



## Analysis



Biodiversity and ecological layers based on standards



## Outputs

- Scientific discoveries
- Services





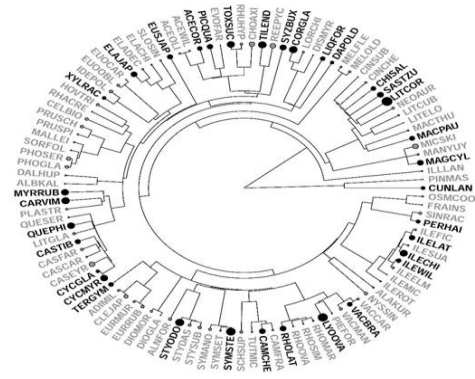
# Scientific discoveries



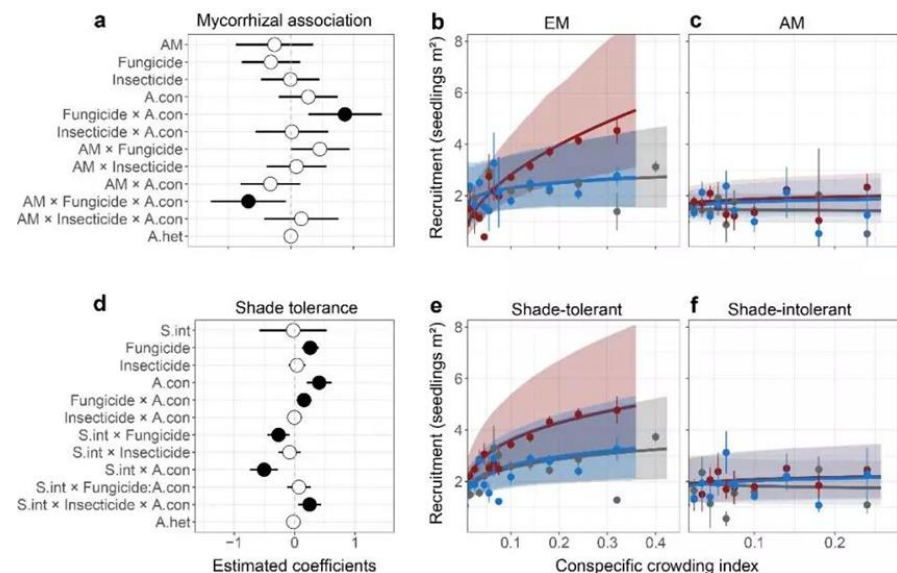
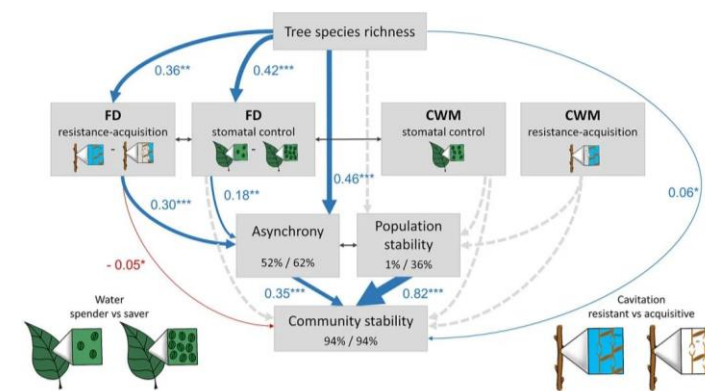
## Reveal changes in forest plant diversity and the maintenance mechanisms

- Revealing plant-fungi interactions regulating the coexistence of species in subtropical forests
- Revealing pathogenic fungi and insects regulating the coexistence of woody plant species in temperate forests
- Revealing the law of "functional mix-and-match" of high-yield forests and the influence mechanism of tree species diversity on forest

Science, 2019; Nature Communications, 2020; Nature Ecology and Evolution, 2021; Science Advances, 2021



Rhizo-fungal community for 332 individual trees

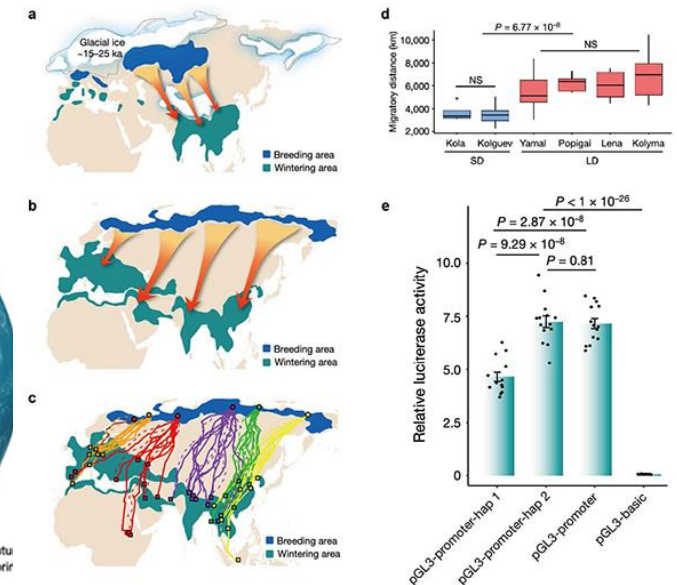
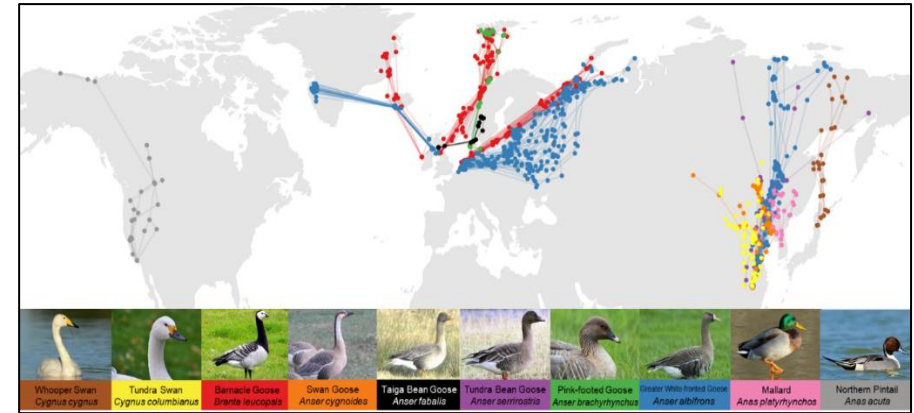




# Scientific discoveries

## Satellite tracking technology promoted bird migration monitoring and research, and boomed “movement ecology”

- Revised “green wave theory”, which cannot be considered a ubiquitous driver of herbivorous waterfowl spring migration. The findings could further elucidate the mechanisms driving bird migration and to better conserve migratory birds
- Revealing the main causes of peregrine migration routes and the key genes for its long-distance migration: long-term memory was the most likely selective agent for divergence in ADCY8 among the peregrine populations

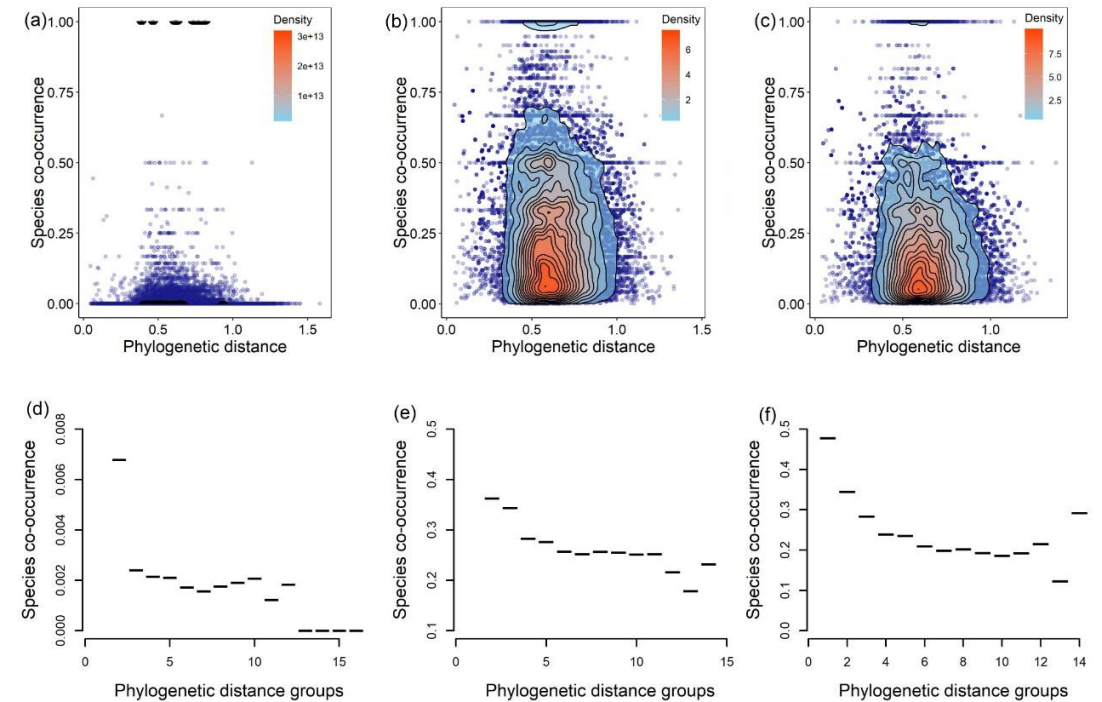


# Scientific discoveries



## Coexistence mechanism of Lepidoptera larvae in subtropical forests of China

- Showing phylogenetic distance of herbivores, as well as diversity and functional traits of their host plants, jointly drive herbivore coexistence
- Providing new insights into species coexistence of insect herbivores, as mediated by host plant diversity
- Highlighting the significance of functionality in shaping species coexistence of herbivores in plant-arthropod systems



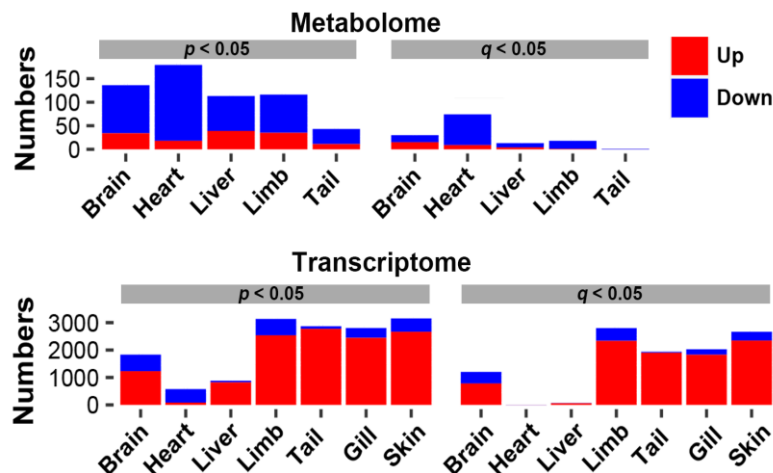
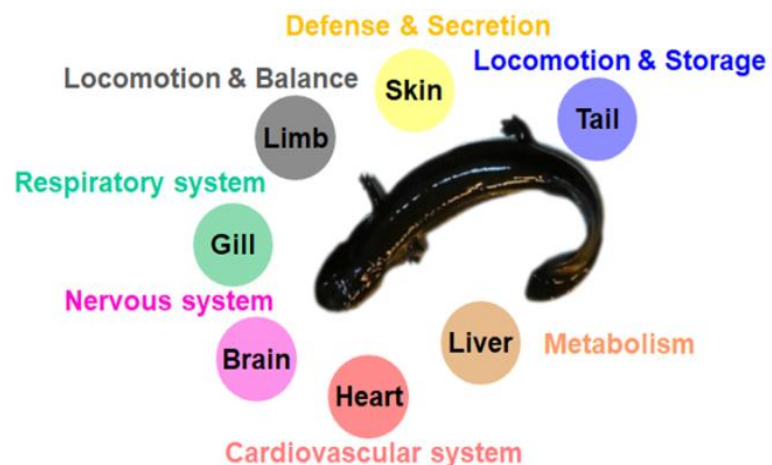
**Relationship between Lepidoptera co-occurrence and phylogenetic distance**

[Journal Ecology, 2019](#); [Molecular Ecology, 2020](#);  
[Ecological Monographs, 2022](#)

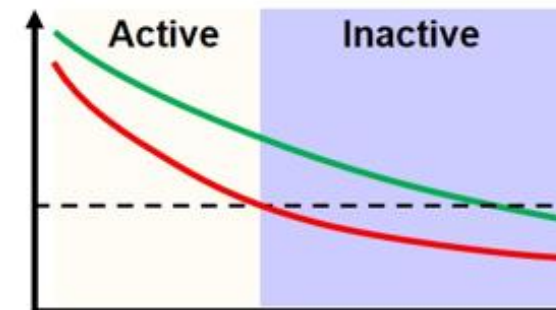
# Scientific discoveries



## Multidisciplinary integration research: monitoring and genomics



— : 心脏最大效能  
— : 器官代谢活性



- Showing remarkable organ heterogeneity of *Andrias davidianus*--the largest extant amphibian-- in response to cold and providing a novel insight into the regulatory mechanisms underlying cold survival strategies of ectotherms

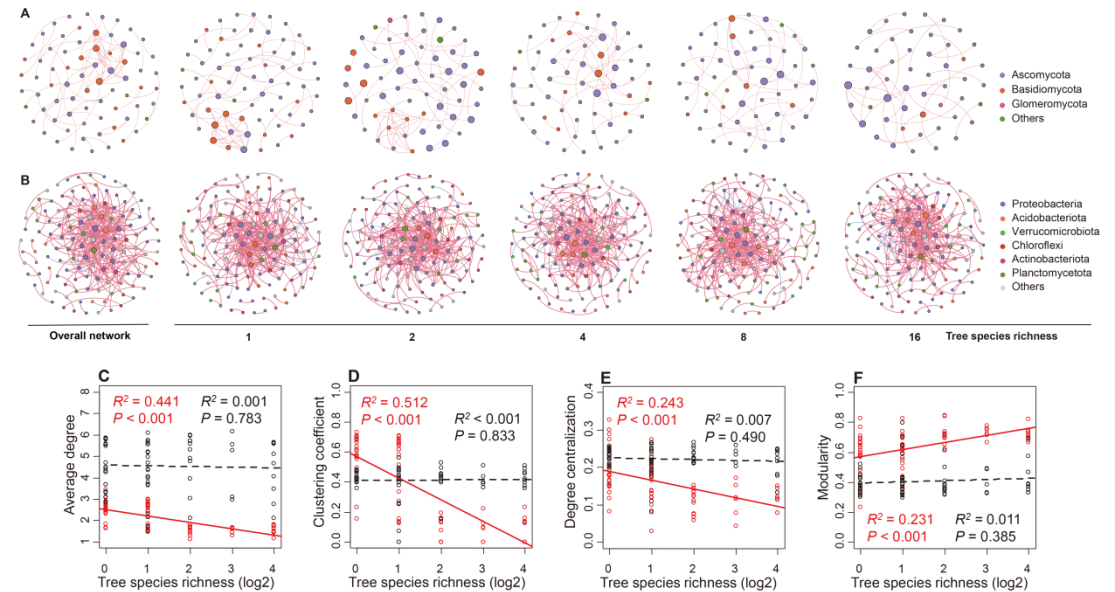


# Scientific discoveries



## Influence mechanism of subtropical forest species loss on soil microbial composition and network structure

- Demonstrating the community assembly and potential drivers of the co-occurrence network structure of soil fungi and bacteria differ in the subtropical forest
- Highlighting plants play more important roles in shaping community assembly and interactions of fungi than of bacteria in the subtropical tree diversity experiment



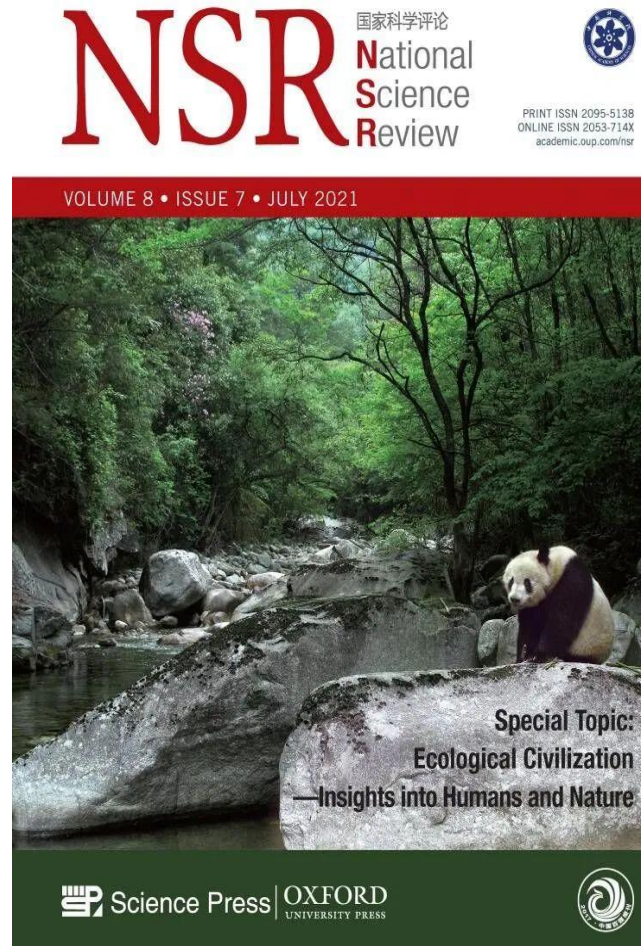
**Architecture and features of the fungal and bacterial co-occurrence networks in different tree species richness classes**

# Scientific supporting for COP 15



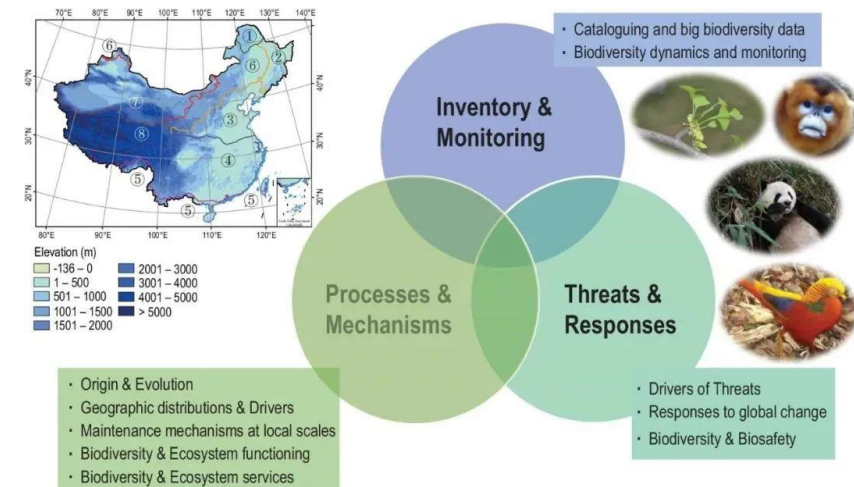
Based on Strategic research on the post-2020 Global Biodiversity Framework (GBF), publishing special issues of

- National Science Review: Ecological Civilization: Insights into Humans and Nature
- Biodiversity Sciences: COP 15



## The global significance of biodiversity science in China: an overview

Xiangcheng Mi<sup>1,†</sup>, Gang Feng<sup>2,†</sup>, Yibo Hu<sup>3</sup>, Jian Zhang<sup>4</sup>, Lei Chen<sup>1</sup>, Richard T. Corlett<sup>5,6</sup>, Alice C. Hughes<sup>5,6</sup>, Stuart Pimm<sup>7</sup>, Bernhard Schmid<sup>8</sup>, Suhua Shi<sup>9</sup>, Jens-Christian Svenning<sup>10</sup> and Keping Ma<sup>1,11,\*</sup>



# Scientific supporting for policy makers



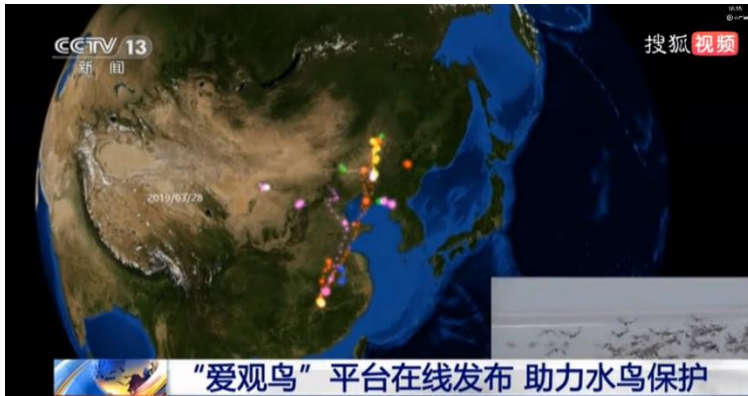
## Assessment of the threat status of amphibians and reptiles in China

- About 107 amphibian species and 53 reptile species were added compared with the 2015 version of “China’ s Red List of Biodiversity: vertebrates” .
- The assessment results will provide important support for the conservation and management of amphibian and reptile diversity in China.





# Public services





# THANK YOU

