

## Field Station Network Cornerstone Research Infrastructure Project “Multi-Tower LiDAR/ECFlux Platform for the Structure and Function of Secondary Forest Ecosystems,” funded by Chinese Academy of Sciences, Passed Completion Assessment



Guirui Yu (ChinaFLUX) explained the EasyFlux® Web displays to the academicians and other audience members. The three from right to left in the 1st row behind Guirui Yu were Jiaojun Zhu (Principal Investigator), Xinhua Zhou (ECFlux system field configuration designer), and Tia Gao (Field Executive).

During August 11 and 12, 2019, the Bureau of Science and Technology for Development (BSTD), Chinese Academy of Sciences (CAS), administrated an Assessment Committee to field-assess the completion of the Field Station Network Cornerstone Research Infrastructure Project “Multi-Tower LiDAR/ECFlux Platform for the Structure and Function of Secondary Forest Ecosystems” (Project #: KFJ-SW-YW006, funded by CAS) in the Chinese Ecological Research Network (CERN) Qingyuan forest site (Fig. 1). The major members in the Assessment Committee were Yiyu Chen (Academician, Former President, National Natural Science Foundation of China), Bojie Fu (Academician, Research Center for Eco-Environmental Sciences, CAS), and Guirui Yu (Academician, ChinaFLUX Founder, Institute of

Geographic Sciences and Natural Resources Research, CAS) (Fig. 2). The committee was authorized by CAS and the assessment processes were administrated by the CAS administration team led by Yaping Zhang (Vice President of CAS, Academician) (Fig. 2). The Institute of Applied Ecology (IAE), CAS, formed an IAE reporting group, led by Jiaojun Zhu (Project Principal Investigator, Institute Director) (Fig. 2), to address the accomplishments to the Assessment Committee and the CAS administration team. The group also included Xinhua Zhou (Application Scientist, Campbell Scientific, US), the designer of ECFlux instrument field configuration. The completion assessment required two procedures: field visit assessment and committee completion assessment.

**Field visit assessment:** Jiaojun Zhu presented to the Assessment Committee and CAS administration team the construction accomplishments for the cornerstone research infrastructure of the multi-tower LiDAR/ECFlux platform, including the upgraded supporting research resources of long-term forest plot arrays, sub- and whole-watershed hydrology stations, data center (Fig. 3), and other research sites (Fig. 4). While visiting, he briefed the project significances and design considerations to address the research topics on secondary forest ecosystems over mountainous terrains popular in the northeast. Xinhua Zhou explained the advancements of instrument configuration design and described the closed-path CO<sub>2</sub>/H<sub>2</sub>O eddy-covariance (EC) flux systems, atmospheric CO<sub>2</sub>/H<sub>2</sub>O profile systems, and other profiles of wind, air temperature, relative humidity, soil moisture, and soil temperature as well as other micrometeorology sensors (Figs. 3 and 4). Tian Gao and Qingda Chen (graduate student) demonstrated the LiDAR scanning operations in a vertically moving facility attached to individual towers (Fig. 4).

**Committee completion assessment:** Ming Sun (Vice Director, BSTD) addressed the background of the project and appointed Yiyu Chen as the Assessment Committee Chair in charge of the completion assessment. After detailing the background of a multi-tower platform to promote the cutting-edge research in secondary forest ecosystems over mountainous terrains, Jiaojun Zhu reported construction tasks, project accomplishments, platform operations, management protocols, funding uses, and platform functions to support multi-disciplinary research and inter-institutional collaborations. The team collaborations of current research based on this platform, ongoing research activities on the platform, and prospective research topics using this platform were also reported. Afterward, the Assessment Committee reviewed the official documents for the project, audited the funding records, questioned less apparent details, and recommended the strategies for future uses. The committee assessed the project-established multi-tower LiDAR/ECFlux platform as a cornerstone infrastructure able to acquire accurate, multiple-temporal and -spatial systematic data for secondary forest ecosystems. The project was executed as scheduled. The project completed four construction components: multi-tower, LiDAR system, supplementary

observation facilities (ECFlux systems and hydrologic stations), and data center. The fundamental construction complied with engineering standards. The installed instrumentation systems were running well in a stable and reliable status. The documentation filed by the IAE reporting team met the requirements for the completion assessment. The committee unanimously approved the completion of this project.

During the assessment, the committee suggested enhancing the collaboration with related field laboratory stations in CERN, speeding up the production of funded research projects, and promoting the influence of production on the international forest and ecology community. For this cornerstone infrastructure, the committee also advocated for IAE to develop an operation and management protocol, set a by-law for data use, and share the data with the scientific community.

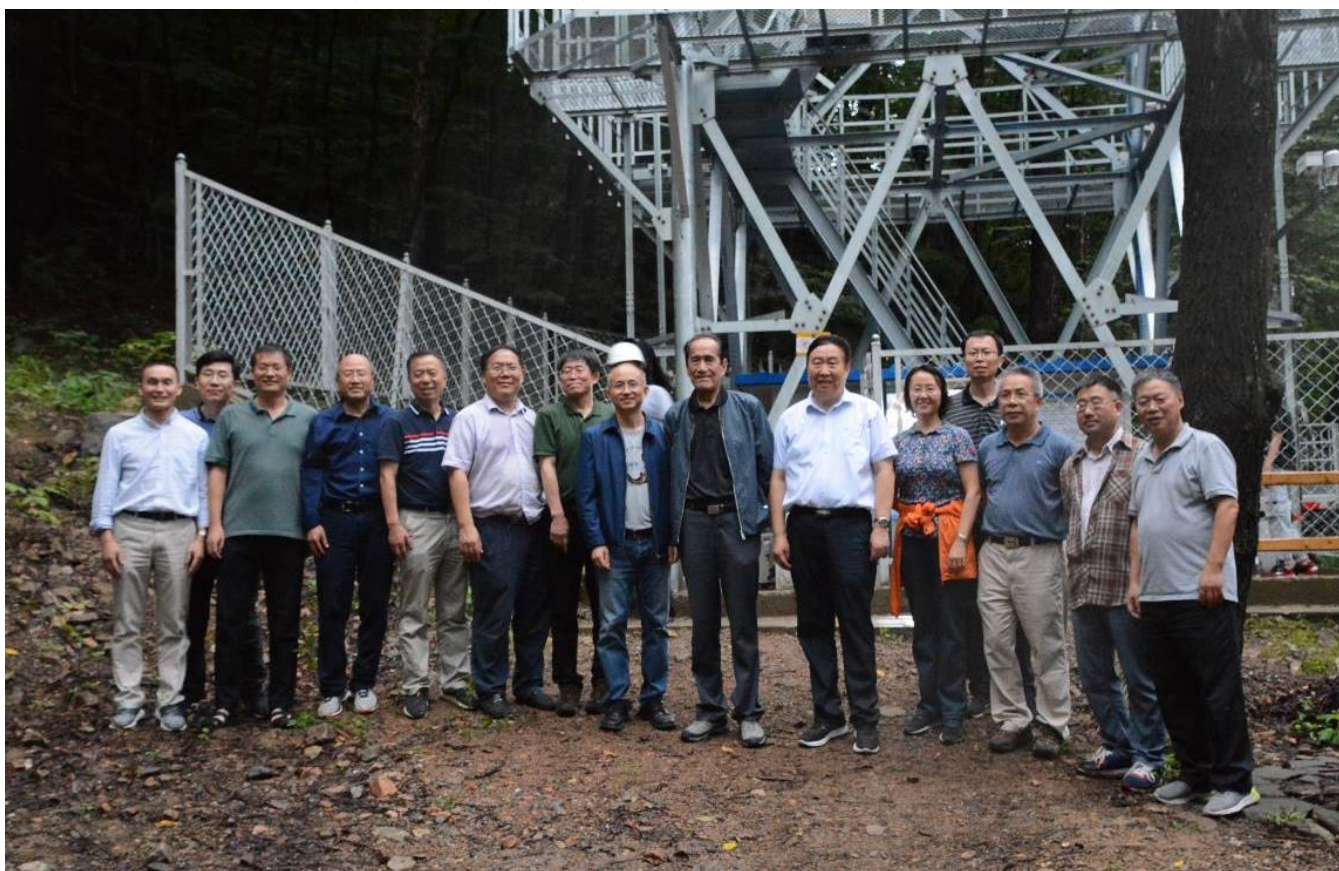
Yaping Zhang presented closing remarks, hoping Qingyuan Forest CERN and BSTD will develop the policies of efficiently sharing the cornerstone infrastructure through opening the infrastructure to scientists for use domestically and internationally, finding a way to promote the influence of the cornerstone infrastructure, contributing more to research activities, and enhancing the establishment of cornerstone infrastructure systems and the ability to use the network as a research tool. Along the road to establishing the field stations and cornerstone infrastructure, the goals are to broaden facility visibility, address major national needs, propose creative and innovative ideas, lead to development of new science and technology, and contribute research to the social adoption of ecological civilization.

*See the following pages for associated images.*



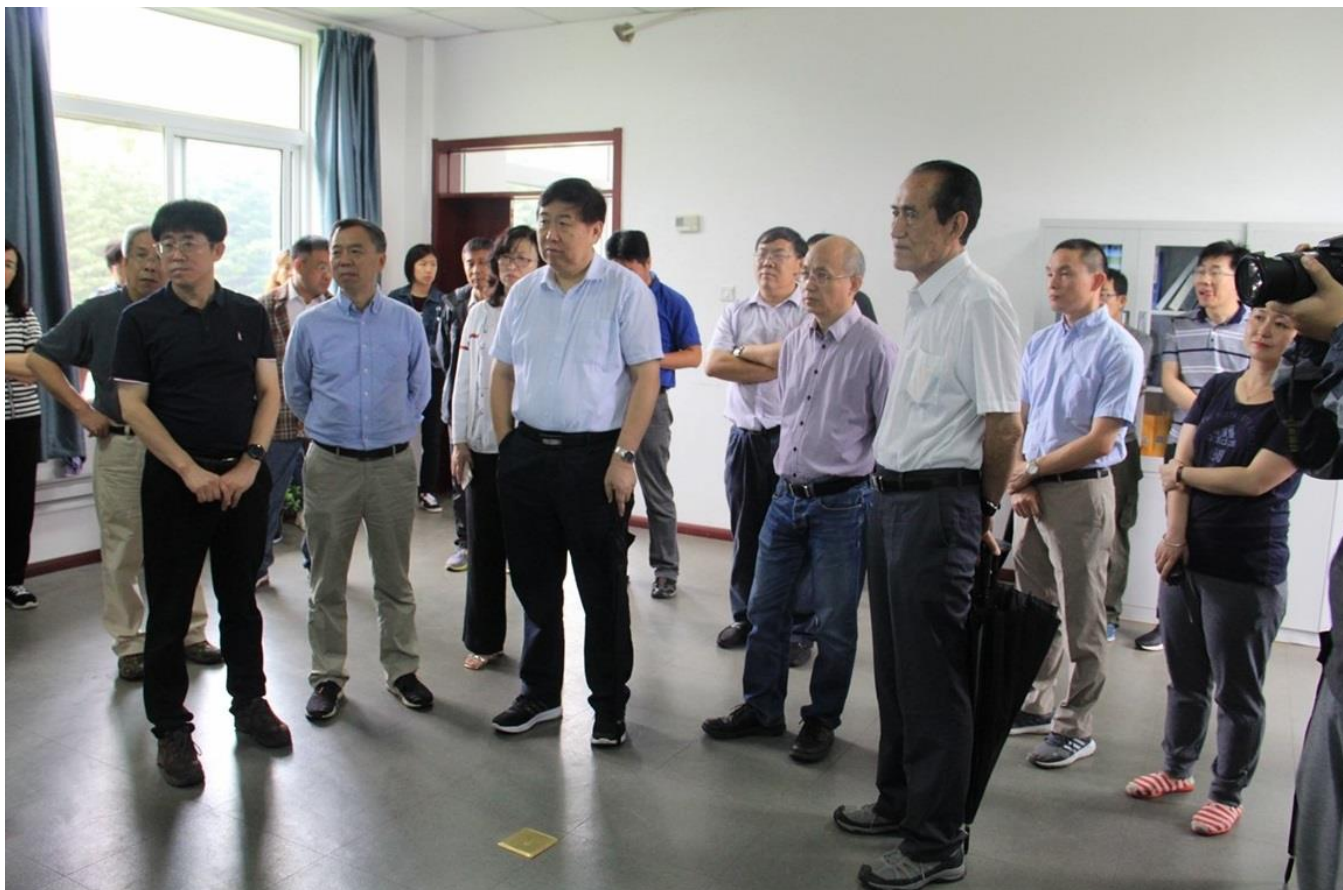


**Fig. 1** The three towers facilitating studies on forest ecology and management over the watershed of Qingyuan Forest CERN, Chinese Academy of Sciences are located inside three forest sites categorized as natural deciduous broadleaved mixed forest (left nearest tower), natural Mongolian oak forest (right tower), and planted larch forest (farthest tower). The three forests represent the major types of secondary forest ecosystems in Northeast China.



**Fig. 2** Field visit assessment on completion of the “Multi-Tower LiDAR/ECFlux Platform for the Structure and Function of Secondary Forest Ecosystems” by the Assessment Committee chaired by Yiyu Chen (Academician, 9th from left), including high profile scientists Bojie Fu (Academician, 10th from left) and Guirui Yu (Academician, 1st from right), and the Chinese Academy of Sciences (CAS) administration team led by Yaping Zhang (Vice President of CAS, Academician, 8th from left). Both committee and team were accompanied by the Institute of Applied Ecology reporting team led by Project Principal Investigator Jiaojun Zhu (Institute Director, 7th from left).





**Fig. 3** China academicians and ChinaFLUX leading scientist visited the Qingyuan Forest CERN data center run by EasyFlux® Web (Campbell Scientific). China academicians Bojie Fu (front, 3rd from left), Yaping Zhang (front, 2nd from right), and Yiyu Chen (front, 1st from right), and the Assessment Committee were watching the EasyFlux® Web displays.



**Fig. 4** Long-term measurement systems: Closed-path eddy-covariance flux measurement system (CPEC310, top-left), atmospheric profile system (AP200, top-right), tower-based LiDAR scanning operation (bottom-left), and watershed hydrology station (bottom-right).