

Space-born Multi-beam laser radar on ‘Gou Mang Hao’ satellite

Zhao Yiming^{(a), (b)*}, Yang Jukui^{(c)*}, Zhang xinwei^(d), Huang Jin^(d), Pan chao^(a), Sun li^(c),
Li Fei^(a), Peng Huan^(c), He Tao^(d), Li Jing^(a), Guo Aiyan^(d)

(a) Beijing Research Institute of Telemetry, China Aerospace Science and Technology, CASC, Beijing, China. zym_bird@126.com

(b) Beijing Research Institute of Technology, Beijing, China

(c) Beijing Institute of Space Mechanics & Electricity, China Aerospace Science and Technology, CASC, Beijing, China, chainsunny@qq.com

(d) Institute of Remote Sensing Satellite, China Aerospace Science and Technology, CASC, Beijing, China

Abstract: To decrease the effect global environmental conditions due to the increase in atmospheric carbon content, China has proposed the Dual-Carbon goals, promoting the inherent requirements for sustainable development and the construction of a shared human destiny. On August 4, 2022, the "Gou Mang Hao" satellite was successfully launched. This satellite is the world's first passive and active joint observation remote sensing satellite for forest carbon sinks. It is designed to achieve high-precision remote sensing measurements of forest vegetation biomass, aerosol distribution, and chlorophyll fluorescence.

The main payload, a Multi-beam laser radar, is a main and passive composite detection laser radar that integrates capabilities such as vegetation detection, atmospheric detection, and high-resolution camera detection. The multi-beam laser radar was constituted by 5-beam vegetation lidar, and dual-wavelength atmospheric lidar and a high resolution camera, especially the three departments use the same telescope. It can achieve high-precision detection of wide-width vegetation canopy height, dual-wavelength atmospheric vertical profile detection, and high resolution imaging detection. The detection accuracy of canopy height is up to 0.3m, the vertical resolution of atmospheric vertical profiles is 15m, and the resolution of multispectral imaging is 2m.

Up to now, the multi-beam laser radar has been in operation for more than 23 months, providing data for global vegetation detection and atmospheric detection. This information supports in taking reasonable measures to achieve the "dual-carbon" goals and global sustainable development.