



## A Comprehensive Monitoring System for Land-Atmosphere Interactions at Solar Farms on the Tibetan Plateau

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As traditional fossil energy resources become increasingly depleted and the associated environmental and ecological problems intensify, the importance of developing new energy sources, particularly solar energy, has steadily increased. Among them, installed solar power capacity has grown rapidly, and its share in total energy consumption has continued to rise. However, the large-scale deployment of solar power generation can exert different influences on the climatic and ecological environment.

The Gonghe region of Qinghai hosts the largest integrated solar and wind power generation base in China and is also among the largest in the world. In this study, a comprehensive land-atmosphere interaction monitoring system was established at two representative sites in Gonghe, Qinghai: a 500-MW photovoltaic (PV) power station and a 50-MW concentrated solar power (CSP) station. The monitoring instruments mainly include planetary boundary layer towers, eddy covariance systems, four-component radiation balance measurements, multi-layer automatic weather stations, optical-microwave scintillometer, soil temperature and moisture networks, and phenological cameras. In addition, unmanned aerial vehicle (UAV) remote sensing and UAV-based eddy covariance observation experiments were conducted. This study introduces the development of the land-atmosphere interaction monitoring system and presents preliminary observational and modeling results.