

Analysis of Solar Radiation Measurements at BSRN Lulin Candidate Station

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Solar radiation plays an important role in the global energy balance, and largely determines the climatic conditions of the Earth. In order to better understand the solar radiation reaching Earth's surface, ground-based observations were established at Lulin Atmospheric Background Station (LABS; 23.47°N, 120.87°E; 2,862 m a.s.l.), which is now a Baseline Surface Radiation Network (BSRN) candidate station. This research focuses on the overall climatology of solar radiation at LABS during the period of 2010 to 2016. Previous studies show that from the 1980s to present, global brightening, which refers to a decadal increase in surface shortwave radiation, has been observed in many regions of the world. Equipped with broad-band shortwave and longwave radiometers (Kipp & Zonen CMP21 and CGR4, respectively) at LABS, we can analyze the seasonal variations and long-term trends of solar radiation from 2010 to 2016, and detect the global brightening phenomenon. In addition, comparisons with the solar radiation measurements at Mt. Jade (23.29°N, 120.57°E; 3,850 m a.s.l.) are included, enhancing the knowledge of radiation characteristics for the mountain area in central Taiwan. The long-term changes in aerosol optical depth (AOD) at LABS will also be analyzed, showing whether it accounts for the increasing and decreasing of surface solar radiation.

Keywords:

Surface solar radiation, global dimming/brightening phenomenon, aerosol optical depth



Figure 1. The overall view of Lulin station.



Figure 2. Sun tracker and radiometers used at Lulin station.