

## Investigating Long-term Variations in Solar Irradiance in the Jiangxi Province, China

*Suoquan Zhou<sup>1</sup>, Jie Song<sup>2</sup>, Shanlie Sun<sup>3</sup>, Renying Gu<sup>3</sup>, Jianhong Shi<sup>3</sup>*

1Key Laboratory of Meteorological Disaster of Jiangsu Province, Nanjing University of Information and Science Technology, Nanjing, 210044, China

2 Department of Geography, Northern Illinois University, DeKalb, IL 60115, USA

3Nanjing University of Information and Science Technology, Nanjing, 210044, China

### **Abstract:**

Poyang Lake is the largest freshwater lake in China. Variation in solar irradiance is a key factor in determining surface energy and water budget in the Poyang Lake watershed, which occupies the Jiangxi Province for the most part. In order to understand the causes of long-term variation in observed water resources, spatial and temporal variations of solar irradiance in the Jiangxi Province need to be obtained. Although nearly 90 standard weather stations distributed in the Jiangxi Province have recorded daily sunshine hours and pan evaporation in addition to routine meteorological observations since 1957, direct measurement of shortwave radiation has been available only until 1991 at two stations.

Previous studies have derived solar irradiance from daily sunshine hours data based on an empirical equation, but spatial and temporal variations of the empirical parameters have been found to be problematic in estimating long-term solar irradiance at the regional scale. In this paper, applying Penman-Monteith equation, we have estimated solar irradiance at 90 weather stations using observed data set: pan evaporation, mean air temperature, wind at 2 meters, relative humidity and cloud amount. The estimated values are verified well with solar irradiance direct measurement. It is found that annual solar irradiance at each station has shown a clear decreasing trend during 1957-2005 although its values vary with station and year. The cause of solar irradiance reduction is further analyzed together with long-term observations of low cloud cover and total cloud cover at each station. It seems that the solar dimming can be explained partially by increases in cloud cover, and the rest may be attributed to increases in aerosol content.

### **Corresponding Author: Jie Song**

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#### **Suoquan Zhou**

Mailing address: Key Laboratory of Meteorological Disaster of Jiangsu Province, Nanjing University of Information and Science Technology, Nanjing, 210044, China

E-mail: [zhousuoquan@nuist.edu.cn](mailto:zhousuoquan@nuist.edu.cn)

#### **Jie Song**

Mailing address: Department of Geography, Northern Illinois University, DeKalb, IL 60115, USA

E-mail: [jsong@niu.edu](mailto:jsong@niu.edu)

**Shanlie Sun**

Mailing address: Nanjing University of Information and Science Technology, Nanjing, 210044, China

E-mail: [ppsunsanlei@126.com](mailto:ppsunsanlei@126.com)

**Renying Gu**

Mailing address: Nanjing University of Information and Science Technology, Nanjing, 210044, China

E-mail: [xycti@163.com](mailto:xycti@163.com)

**Jianhong Shi**

Mailing address: Nanjing University of Information and Science Technology, Nanjing, 210044, China

E-mail: [nuistgry@163.com](mailto:nuistgry@163.com)