

# 利用衛星觀測數據建立臺灣地區長期歷史日射量資料庫

## Long-term Surface Insolation Derived from Satellite

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### 摘 要

地球接收來自太陽的輻射量，影響大氣系統的能量收支平衡，也是地球上所有生命的能量來源。日射量值可應用於農業、建築、能源等多元領域應用，臺灣雖位於亞熱帶地區，日照充足，但因季風導致天氣多變，影響地表接受日射量多寡。因此建立長期日射量資料庫，增加臺灣氣候資料的完整度用以探討氣候變化趨勢，進而發展調適氣候改變的因應作為。故利用日本地球同步衛星，包含MTSAT-1R (Multifunctional Transport Satellites-1R)、MTSAT-2 (Multifunctional Transport Satellites-2) 及向日葵8號 (Himawari-8) 衛星可見光及紅外頻道資料反演歷史日射量資料，反演過程考慮影響日射量因子 (如天文幾何、大氣效應及地形等) (胥，2015與鄭，2017) 反演歷史日射量，建立2011至2019年臺灣地區之網格日累積日射量資料庫。反演之日射量與局屬31個測站觀測結果相關性達0.94，均方根誤差0.003MJ/m<sup>2</sup>，平均絕對誤差1.9MJ/m<sup>2</sup>，整體各月平均差異小於2MJ/m<sup>2</sup>，2014年後衛星反演明顯高估現象。2011至2019年逐月月平均冬季日射量值略為增加趨勢。

**關鍵字：**日射量、地球同步衛星

### Abstract

Solar radiation is not only the primary energy sources of all life on the Earth, but also balancing the energy of atmosphere. Solar radiation data can be applied to agriculture, building and energy resources region. In order to understand the long-term trend of surface insolation in Taiwan during climate change, building of long-term dataset of insolation is necessary. In this study, we use the visible and infrared channel data from Japan's geostationary meteorological satellites, which including Himawari-8, MTSAT-2 and MTSAT-1R, to estimate daily accumulated surface insolation between 2011 and 2019. The correlation coefficient of daily accumulated insolation between satellites estimation and 31 stations from CWB is 0.94, root mean square error (RMSE) is 0.003 MJ/m<sup>2</sup>, and the bias of daily accumulated insolation is less than 2 MJ/m<sup>2</sup>. The results also show that the daily accumulated insolation derived from satellites overestimated than CWB stations after 2014, and the monthly mean insolation in winter increased slightly between 2011 and 2019.

**Key words:** Insolation, geostationary meteorological satellites