以臺灣氣象署潮位站未校驗資料估算海平面變化趨勢之風險

The Risk of Estimating Sea-Level Trends from Uncalibrated Tide-Gauge Records in Taiwan CWA

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摘　要

全球海平面上升訊號僅約每年數毫米量級，國際海洋觀測系統（GLOSS，隸屬IOC/UNESCO）為支撐長期趨勢監測與衛星測高校準等高精度應用，訂定潮位站觀測應達1公分準確度之標準。本署潮位站現行維運機制，在現場定期校驗與基準比對上仍面臨實務限制。若基準面發生偏移而未即時偵測與記錄，將對數十年資料之長期趨勢產生系統性偏差，偏移發生的時間點甚至可能使趨勢方向的研判整個翻轉；而在缺乏完整維護紀錄佐證下，即使事後由時序資料回溯發現偏移，其修正量仍可能存在數十公分以上的不確定性，實際數值因資料中斷長短、切分時間點與偵測方法而異。此外，現行15天之維護時限雖考量現場作業限制，但客觀上增加資料缺測風險，使部分月份較難達到國際潮位資料庫（如UHSLC）計算月平均值所需之資料完整度門檻。

本報告彙整歷來委外研究於相同測站產出的海平面趨勢結果，說明其在空間上呈現鄰近測站彼此不一致、沿岸分布不連續等不合理現象，凸顯現有資料品質難以支撐可信的長期趨勢推估。最後提出一套區分「metadata完整度」與「校驗可信度」兩軸向的測站資料分級架構，作為建立資料溯源性及推動海平面相關研究之參考依據。

關鍵字：潮位，觀測，校驗，誤差，偏差，資料品管，海平面變化

Abstract

Global mean sea-level rise is on the order of only a few millimeters per year. The Global Sea Level Observing System (GLOSS, under IOC/UNESCO) sets a 1 cm accuracy target for tide-gauge observations to support long-term trend monitoring and satellite altimeter calibration. Current maintenance at CWA tide stations faces practical limits in on-site calibration and benchmark comparison: an undetected datum shift can bias decades-long records, and depending on when it occurs, may even reverse the sign of the estimated trend. Without complete maintenance records, even a shift later identified from the time series can carry tens of centimeters of correction uncertainty, varying with gap length, segmentation point, and detection method. The current 15-day repair window, while reflecting on-site constraints, objectively raises the risk of data gaps, making it harder for some months to meet the completeness threshold used by international archives (e.g., UHSLC) for computing valid monthly means.

This talk compiles sea-level trends previously derived by different contracted teams from the same stations, showing spatially incoherent results—inconsistent rates among neighboring stations and discontinuous coastal patterns—indicating that current data quality cannot support reliable long-term trend estimation. It closes with a station-classification framework separating metadata completeness from calibration credibility, to support data traceability and inform future sea-level research.

Key words : tide station, observation, calibration, error, bias, data quality control, sea water level variation