

Assessment of the impact of Landsat 7 Scan Line Corrector data gaps on Sungai Pulai Estuary seagrass mapping

ABSTRACT

The data gaps in the Landsat 7 Enhanced Thematic Mapper Plus (ETM+) Scan Line Corrector (SLC)-off imagery as a result of SLC failure are well recognized. The degradation introduced by their use in scientific applications is concerning to Landsat users. SLC-off data gaps cause problems in many applications of ETM+ images, but no literature reported the problem in seagrass mapping. To investigate the impact of SLC-off data loss on the seagrass information extraction, two types of data were compared: (a) data with interpolation after the SLC anomaly, termed the BInterpolation ON (ION)[^], and (b) the data without interpolation, termed the BInterpolation OFF (IOFF)[^] image, for the Sungai Pulai estuary seagrass meadows of Malaysia. Additionally, the random shifting of SLC-off stripes was tested by swipe analysis of SLC-off image pairs. Overall, the SLC-off scene analysis suggests that a gradual increase of data gaps from the central part toward the edge may cause a cumulative error of 2 % based on an object's distance from the nadir path. The random shifting of SLC-off stripes may be completely invisible if a single SLC-off stripe passes over a targeted small seagrass meadow such as the Tanjung Adang Laut shoal, which has a spatial extent of 11.07 ha. The data gaps eventually lead to misinterpretations and produce erroneous seagrass distribution maps. The coexistence of SLC-off stripes and their random shifting phenomenon have caused non-overlapping regions between SLC-off scenes acquired on different dates. Future research should develop suitable methods for gap-filling and resolve aquatic remote sensing mapping issues by using knowledge from the present research.

Keyword: Aquatic remote sensing; ETM+ SLC-off; Landsat; Data gap; Sungai Pulai estuary; Seagrass mapping