ICEComb – A New Software Tool for Satellite Laser Altimetry Data Processing and Visualisation

Bruno Silva¹, Luiz Guerreiro Lopes², and Pedro Campos²,³

¹Postgraduate Programme in Informatics Engineering, University of Madeira, Funchal, Portugal
²Faculty of Exact Sciences and Engineering, University of Madeira, 9020-105 Funchal, Madeira Is., Portugal
³Interactive Technologies Institute (ITI/LARSys), 9020-105 Funchal, Portugal

Processing, handling and visualising the large data volume produced by satellite altimetry missions is a challenging task. A reference tool for the visualisation of satellite laser altimetry data is the OpenAltimetry platform, a tool that provides altimetry-specific data from the Ice, Cloud, and land Elevation Satellite (ICESat) and ICESat-2 satellite missions through a web-based interactive interface. However, by focusing only on altimetry data, that tool leaves out access to many other equally important information existing in the data products from both missions.

The main objective of the work reported here was the development of a new web-based tool, called ICEComb, that offers end users the ability to access all the available data from both satellite missions, visualise and interact with them on a geographic map, store the data records locally, and process and explore data in an efficient, detailed and meaningful way, thus providing an easy-to-use software environment for satellite laser altimetry data analysis and interpretation.

The proposed tool is intended to be mainly used by researchers and scientists to aid their work using ICESat and ICESat-2 data, offering users a ready-to-use system to rapidly access the raw collected data in a visually engaging way, without the need to have prior understanding of the format, structure and parameters of the data products. In addition, the architecture of the ICEComb tool was developed with possible future expansion in mind, for which well-documented and standard languages were used in its implementation. This allows, e.g., to extend its applicability to data from other satellite laser altimetry missions and integrate models that can be coupled with ICESat and ICESat-2 data, thus expanding and enriching the context of studies carried out with such data.

The use of the ICEComb tool is illustrated and demonstrated by its application to ICESat/GLAS measurements over Lake Mai-Ndombe, a large and shallow freshwater lake located within the Ngiri-Tumba-Maindombe area, one of the largest Ramsar wetlands of international importance, situated in the Cuvette Centrale region of the Congo Basin.

**Keywords:** Laser altimetry, ICESat/GLAS, software tool design, data visualization, Congo Basin.

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