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# Inundation downscaling for the development of a long-term and global inundation database compatible to SWOT mission

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The Global Inundation Extent from Multi-Satellite (GIEMS) provides multi-year monthly variations of the global surface water extent at about 25 kmx25 km resolution, from 1993 to 2007. It is derived from multiple satellite observations. Its spatial resolution is usually compatible with climate model outputs and with global land surface model grids but is clearly not adequate for local applications that require the characterization of small individual water bodies. There is today a strong demand for high-resolution inundation extent datasets, for a large variety of applications such as water management, regional hydrological modeling, or for the analysis of mosquitos-related diseases. Even for climate applications, the GIEMS resolution might be limited given recent results on the key importance of the smallest ponds in the emission of CH4, as compared to the largest ones. If the inundation extent is combined to altimetry measurements to obtain water volume changes, and finally river discharge to the ocean (Frappart et al. 2011), then a better resolved inundation extent will also improve the accuracy of these estimates. In the context of the SWOT mission, the downscaling of GIEMS has multiple applications uses but a major one will be to use the SWOT retrievals to develop a downscaling of GIEMS. This SWOT-compatible downscaling could then be used to built a SWOT-compatible high-resolution database back in time from 1993 to the SWOT launch date. This extension of SWOT record is necessary to perform climate studies related to climate change. This paper present three approaches to do downscale GIEMS. Two basins will be considered for illustrative purpose, Amazon, Niger and Mekhong.

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