

## GIEMS-D3: A new long-term, dynamical, high-spatial resolution inundation extent dataset at global scale

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The Global Inundation Extent from Multi-Satellites (GIEMS) provides multi-year monthly variations of the global surface water extent at 25kmx25km resolution. 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.

A new procedure is introduced to downscale the GIEMS low spatial resolution inundations to a 3 arc second (90 m) dataset. The methodology is based on topography and hydrography information from the HydroSHEDS database. A new floodability index is adopted and an innovative smoothing procedure is developed to ensure the smooth transition, in the high-resolution maps, between the low-resolution boxes from GIEMS. Topography information is relevant for natural hydrology environments controlled by elevation, but is more limited in human-modified basins. However, the proposed downscaling approach is compatible with forthcoming fusion with other more pertinent satellite information in these difficult regions. The resulting GIEMS-D3 database is the only high spatial resolution inundation database available globally at the monthly time scale over the 1993-2007 period. GIEMS-D3 is assessed by analyzing its spatial and temporal variability, and evaluated by comparisons to other independent satellite observations from visible (Google Earth and Landsat), infrared (MODIS) and active microwave (SAR).