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Global-scale analysis of satellite-derived time series of naturally inundated areas as a basis for floodplain modeling

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Abstract. Floodplains play an important role in the terrestrial water cycle and are very important for biodiversity. Therefore, an improved representation of the dynamics of floodplain water flows and storage in global hydrological and land surface models is required. To support model validation, we combined monthly time series of satellite-derived inundation areas (Papa et al., 2010) with data on irrigated rice areas (Portmann et al., 2010). In this way, we obtained global-scale time series of naturally inundated areas (NIA), with monthly values of inundation extent during 1993–2004 and a spatial resolution of 0.5°. For most grid cells (0.5°×0.5°), the mean annual maximum of NIA agrees well with the static open water extent of the Global Lakes and Wetlands database (GLWD) (Lehner and Döll, 2004), but in 16% of the cells NIA is larger than GLWD. In some regions, like Northwestern Europe, NIA clearly overestimates inundated areas, probably because of confounding very wet soils with inundated areas. In other areas, such as South Asia, it is likely that NIA can help to enhance GLWD. NIA data will be very useful for developing and validating a floodplain modeling algorithm for the global hydrological model WGHM. For example, we found that monthly NIAs correlate with observed river discharges.

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