EGU22-9619, updated on 10 Jan 2024
https://doi.org/10.5194/egusphere-egu22-9619
EGU General Assembly 2022

Assessing long-term changes in annual monsoon inundations in the Mekong Delta (Cambod linking remote sensing and in-situ measurements to overcome data scarcity

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The annual monsoon inundations are vital in maintaining the fertility and productivity of the delta of the Mekong, Soutl which traditionally last from July until November, nutrient-rich sediments are deposited on the floodplains, groundwater the shallow waters. Consequently, local agriculture and fisheries are keyed to the timing of flood arrival and recession a recent years, the hydrological dynamics of the region have shifted. The Mekong's hydrological regime has been impa hydropower infrastructure, and climate change.

Yet the effects of these changes on the spatio-temporal patterns of inundations in the Mekong Delta remain largely unstu for this is data sparsity: there is a lack of consistent long-term data on spatial inundation dynamics. No concerted in-situ recently, while optical earth observation satellite missions such as Landsat often fail to provide data during the wet se approaches struggle with insufficiently precise elevation data - due to the flat topography of the Mekong Delta, even high capture small-scale dykes that determine whether large swaths of land become flooded.

To cope with this data-scarce environment, we propose an innovative methodology harnessing recent satellite m measurements. This approach uses remote sensing data from the Sentinel-1 and 2 missions operated by the European S optical and synthetic aperture radar (SAR) data at a spatial resolution of 10 m and a return frequency of 5-6 days. Furth cover, which makes it particularly well-suited for operational flood monitoring purposes. After deriving inundation maps fr to water levels measured at a local hydrological station through a correlative approach to create a water-level flood evolution of inundation patterns in the Mekong Delta since the 1990s. To quantify uncertainties, comparisons with hi Landsat images, and with a high- resolution DEM were carried out.

The approach was tested in two study areas in the Cambodian Mekong Delta. The results indicate that the accuracy of th basis lies at 87%, reaching up to 93%. The spatio-temporal analysis shows that inundation incidence in the early wet sea average duration of inundations has decreased by 19 days. This illustrates that annual monsoon inundations have becom impacts on agriculture, fisheries, and ecosystems.

How to cite: Orieschnig, C., Belaud, G., Venot, J.-P., and Massuel, S.: Assessing long-term changes in annual monsoon inund an innovative approach linking remote sensing and in-situ measurements to overcome data scarcity, EGU General Assembl EGU22-9619, https://doi.org/10.5194/egusphere-egu22-9619, 2022.