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Satellite-derived information on inundation seasonality and extent in a global wetland data set

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Natural wetlands are the world's largest source
of methane to the atmosphere. Boreal wetlands, dominated by flooded and
non-flooded peatlands, account for ∼50% of global wetland area and ∼30% of wetland methane emission. Tropical wetlands, composed primarily of forests inundated via riverine flooding, account for ∼40% of the world's wetland area and two-thirds of emissions. Understanding climate-sensitive processes prevailing in the world's natural wetlands is crucial to understanding and predicting their biogeochemical responses to interannual and longer-term climate variations. The wide spectrum of vegetation, hydrological regime, soils, and seasonality means that no single system describing local and regional wetland environments encompasses their global diversity particularly with regard to methane-relevant information. This lack undermines efforts to characterize and model wetlands and their methane emissions under current and future climates. Historically, methane models have been applied to externally-defined wetland data sets due to the unmet challenge of modeling the distribution of wetlands themselves. We report on the integration of monthly, decadal satellite-derived data on inundation seasonality and extent with a global wetland data set characterizing vegetation and other methane-relevant environmental information. We report results in the framework of a newly-developed, methane-centric wetland-classification system jointly applicable to wetland data distributions and to wetland sites represented in the methane-flux literature. We propose applications of the new satellite-augmented data set to modeling methane emissions, and to guiding the development of models of wetland distribution