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Estimate of net primary production of aquatic vegetation of the Amazon floodplain using radar satellite imagery.

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Abstract. The Amazonian research community acknowledges that a better understanding of the regional carbon cycle of the Amazon floodplain will only be possible when the biogeochemical processes become understood on a regional scale. To help achieve this understanding, a method using satellite SAR (Synthetic Aperture Radar) imagery for seasonal mapping and assessment of the net primary production (NPP) of aquatic vegetation of the Amazonian floodplain is proposed. The input data for the NPP model are (i) total biomass of aquatic vegetation determined by RADARSAT and JERS-1 imagery and (ii) spatial area occupied by aquatic vegetation determined by RADARSAT and JERS-1 imagery. Inversion of radar imagery into total biomass of aquatic vegetation was performed. After correction for monthly biomass losses, the NPP of one growth cycle of aquatic vegetation was calculated in the image domain. The total mean net primary productivity of *Hymenachne amplexicaules*, the dominant aquatic vegetation in the area, was on average 2920 g C m^{-2} or a total carbon uptake of $1.9x10^{12}$ g C yr^{-1} for the entire area (395 km^2). Spatially, the lower values of produced organic carbon (< 900 g C m^{-2}) are in regions where the plants only developed in the beginning of hydrological cycle; generally, values are higher (>5000 g C m^{-2}) in regions closer to the Amazon River where the influence of the nutrient rich water is stronger. The productivity of this largely spread C3 species is about four times the productivity assumed for the Amazon floodplain in some process-based global models. Therefore, the productivity of a diverse and complex wetland such as the Amazon floodplain can undoubtedly be underestimated by using these models. The results of this study are promising to provide large-scale NPP estimates of aquatic vegetation in wetlands, such as the Amazon floodplain.