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Projected increases in the annual flood pulse of the western Amazon

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The impact of a changing climate on the Amazon basin is a subject of intensive research due to its rich biodiversity and the significant role of rain forest in carbon cycling. Climate change has also direct hydrological impact, and there have been increasing efforts to understand such dynamics at continental and subregional scales such as the scale of the western Amazon. New projections from the Coupled Model Inter- comparison Project Phase 5 (CMIP5) ensemble indicate consistent climatic warming and increasing seasonality of precipitation in the Peruvian Amazon basin. Here we use a distributed land surface model to quantify the potential impact of this change in the climate on the hydrological regime of the river. Using extremes value analysis, historical and future projections of the annual minimum, mean, and maximum river flows are produced for a range of return periods between 1 and 100 years. We show that the RCP 4.5 and 8.5 scenarios of climate change project an increased severity of the wet season flood pulse (7.5% and 12% increases respectively for the 100- year return floods). These findings are in agreement with previously projected increases in high extremes under the Special Report on Emissions Scenarios (SRES) climate projections, and are important to highlight due to the potential consequences on reproductive processes of in-stream species, swamp forest ecology, and socio-economy in the floodplain, amid a growing literature that more strongly emphasises future droughts and their impact on the viability of the rain forest system over the greater Amazonia.