Weather types and rainfall in the Amazon basin

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A neuronal method (Self Organizing Maps or SOMs) is used to identify weather types over tropical South America from total wind at 850 hPa in ERA-40 reanalysis.

Weather types are associated with daily rainfall in two regions of the Amazon basin where the long term hydrologic variability is the strongest. In the south-western basin, important rainfall is associated with a weather type characterized by negative geopotential anomalies over the Chaco region and positive ones behind, that promote the convergence of north-western wind anomalies (monsoon flux around summer) and southern anomalies over the Bolivian lowlands. In the north-western Amazon basin, important rainfall is associated with a weather regime characterized by positive geopotential anomalies over the Chaco region that promote strong southern wind anomalies over western Amazon and their convergence with the trade winds. We show that the progression of extra tropical perturbations and their incursion toward low latitude, favoured by the N-S orientation of the Andes, partly control the characteristics of weather types over tropical South America.

The frequency of weather regimes allows explaining partially rainfall variability at interannual and pluriannual time scales. In addition, weather type's frequency is able to explain the occurrence of exceptional floods in the Amazonian Basin Rivers.