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Interannual Variability of Moisture Sources: Lagrangian Analysis of transport from the Caribbean Sea to Central America

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The Caribbean Sea represents the main moisture source for Central America, this source-receptor relation has been shown to present a marked seasonal behavior. A Lagrangian analysis has been recently applied by the authors to the analysis of the 2000-2004 period and a new approach has been performed for an extended period in order to explore the interannual variability. ERA-40 data was used as input for the Lagrangian model FLEXPART and once the trajectories for a set of particles were obtained; specific humidity variations along the trajectories were computed for each particle and the difference between evaporation and precipitation was obtained over a vertical atmospheric column. Clustering analysis was applied to obtain the mean Lagrangian trajectories. This work encourages the role of the Caribbean Sea as a moisture source and emphasizes the observed seasonal pattern. A new perspective of the interannual variability of the moisture transport is provided by this analysis through which the role of ENSO (El Niño-Southern Oscillation) and the AWP (Atlantic Warm Pool) variability is more evident. The role of the CLLJ (Caribbean Low Level Jet) was analyzed in the interannual and seasonal scales as a moisture conveyor structure. Variations in the SST and SLP fields associated to the strengthening of the wind fields were considered as well as evaporation variations in the Caribbean Sea. The results are in agreement with the bimodal pattern of precipitation in Central America; this work provides an integral view of the multi-scale interactions between oceanic and atmospheric variables in the analysed tropical region.