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Probing ENSO influences on subtropical humidity using tracers of last saturation

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We have evaluated the impact of ENSO on subtropical humidity dynamics using a tracer-based last-saturation method based on the NCEP/NCAR Reanalysis dataset and the NCAR MATCH tracer transport model. Reconstructions of relative humidity from last-saturation tracer fields are consistent with the reanalysis relative humidity. Analysis of DJF-averaged North Pacific last-saturation pathways shows substantial extratropical influence on subtropical humidity during both the El Nino and La Nina phases, with a more poleward influence during the La Nina phase. This more poleward influence during La Nina is consistent with the reduced humidity in the subtropics during La Nina and with the poleward migration of the Pacific storm tracks during La Nina. These results suggest that the extratropical influence on subtropical humidity during ENSO is consistent with ENSO-driven variations in the Pacific storm track. The findings reported here further support the notion that the dryness of the subtropics is determined outside of the tropics, rather than directly from subsidence associated with Hadley circulation. Furthermore, the results suggest that interannual variability of subtropical humidity can be linked to last-saturation trajectories that vary coherently with ENSO modes.