



Influence of ENSO on Wintertime North Pacific Atmospheric River, Water Vapor Transport and Precipitation

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This study investigates the influence of ENSO on atmospheric river (AR), water vapor transport and precipitation over the North Pacific region during winters of 1979/80 to 2016/17. During El Niño events, the westerly jet over the North Pacific extends southeastward. An anomalous cyclonic flow is located over the basin region, indicating a deepened Aleutian Low. More moisture is transported towards the northwestern Pacific and the west coast of North America. Meanwhile, the AR frequency over the northwestern Pacific and the northeast Pacific increases, the AR frequency over central North Pacific decreases. The magnitude of the water vapor transport of the AR days is markedly stronger than that of the non-AR days. The poleward transport is performed during the AR days, not during the non-AR days. In addition, ARs which landfall along the west coast of North America are detected basing on the 85th percentile of peak daily moisture flux. ARs which landfall north of 43°N significantly increases during El Niño. The hydroclimate effects of ENSO on anomalies in precipitation over North Pacific region are also discussed. Over the northwestern Pacific region, the precipitation anomaly during AR days contributes to 50% of the total precipitation anomaly. Over the central North Pacific, 90% of the total negative anomaly in precipitation is attributed to that during AR days. Over the northeastern Pacific, the positive anomaly in precipitation along the California coast is mainly attributed to that during AR days while the decreases in precipitation over the Gulf of Alaska is due to that during non-AR days.

During La Niña events, AR frequency is reduced accompanied by an anomalous anticyclonic water vapor transport over the eastern North Pacific. The AR frequency over the northwestern Pacific also decreases. While, the AR frequency over central North Pacific increases. Being different from El Niño, the poleward transport around the dateline region during the AR days is stronger. It carries large amounts of water vapor to the Arctic via the Bering Strait. On the precipitation aspect, the negative anomaly in precipitation during non-AR days contributes to 90% of the total anomaly over the northwestern Pacific. Over the central North Pacific, the total anomaly in precipitation is mainly attributed to that during AR days. Over the northeastern Pacific, the anomaly in precipitation along the California coast is mainly due to that during non-AR days, while the decreases in precipitation over the Gulf of Alaska is resulted from that during AR days.