ENSO diversity workshop

Title: Zonal Surface Currents and the Evolution of the Two Types of El Nino

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Zonal surface currents (ZSC) in the tropical Pacific respond to El Nino activities, and then alter ocean advection to influence the development of El Nino. As such, a better understanding of ZSC variations during El Nino can be useful for the prediction of the subsequent development of El Nino. In this study, we examine the ZSC anomaly patterns associated with the Eastern-Pacific (EP) and Central-Pacific (CP) types of El Nino. Twenty-year OSCAR (Ocean Surface Current Analyses – Real time) product available from 1992 to 2011 is used for this purpose.

The associated ZSC anomaly pattern is found to cover the central-to-eastern equatorial Pacific during the EP El Nino but is confined mainly in the western Pacific during the CP El Nino. At the peak phase of the EP El Nino around December and January, the basin-wide eastward currents reverse to westward and initiate the decaying of the EP El Nino. The maximum westward currents are located near the dateline, leading to the CP La Nina afterwards. In contrast, in response to the local warming of CP El Nino, eastward ZSC anomalies occur in the western Pacific and the westward ZSC anomalies occur in the eastern Pacific, which result in an ocean temperature advection that speed up the termination of CP El Nino events. The maximum westward currents are located in the eastern Pacific, resulting in the EP type of La Nina.

It is concluded that the different ZSC anomaly patterns can drive the two types of El Nino into different decaying processes. It is also shown that the ZSC leads SST by 2 to 3 months at the equatorial Pacific, which can be utilized for the prediction of the two types of El Nino.