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Westerly wind bursts: ENSO's tail rather than the dog?

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Westerly wind bursts (WWBs) in the equatorial Pacific occur during the development of most El Nino events and are believed to be a major factor in ENSO's dynamics. Because of their short time scale, WWBs are normally considered part of a stochastic forcing of ENSO, completely external to the interannual ENSO variability. Recent observational studies, however, suggest that the occurrence and characteristics of WWBs may depend to some extent on the state of ENSO components, implying that WWBs, which force ENSO, are modulated by ENSO itself. Satellite and in situ observations are used to demonstrate the dependence of the WWBs on the SST. Intermediate and hybrid coupled models are used to study the consequences of the modulation of WWBs by the large scale SST. It is suggested that the modulation of WWBs by the equatorial Pacific SST is a critical element of ENSO's dynamics, and that WWBs should not be regarded as purely stochastic forcing. Furthermore, the stochasticity of the WWBs becomes secondary and they may be viewed as part of the large scale ENSO dynamics.