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Effect of the main predictors on the quality of ENSO forecasting over the last decades.

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The ENSO forecast is one of the most important tasks of modern climatology. To date, the El Nino forecast is created using a dozen models - both dynamic and statistical. McPhaden (2012), showed that the prognostic significance of such an important El Niño predictor as the average heat content of the ocean (warm water volume - WWV) has recently decreased. On the other hand, a number of studies (Capotondi and Coauthors, 2015, Gushchina and Dewitte, 2011, Puy et al., 2016) showed that there are other ENSO predictors associated with intraseasonal tropical variability (ITV), such as Madden-Julian oscillations (MJO) and convectively coupled equatorial Rossby waves (ER). But even they do not possess exceptional stability and their role changes on the scale of decades (Gushchina and Dewitte, 2017).
To estimate the contribution of ITV components and WWV in evolution of ENSO a simple statistical forecast model of SST anomaly was applied. We revisit the statistical model of Clarke and Van Gorder (2003) by replacing as a predictor, their index of surface winds by the ER and MJO activity index. Our motivation is to evaluate to which extent the statistical model can be useful in predicting not only the occurrence and magnitude of an event, but also its type (i.e EP versus CP) considering the peculiarities of the ER and MJO activity index with regards their relationship with the two types of El Niño. Thus, instead of predicting the $NINO_34$ index directly, we consider a statistical prediction model for both the E and C indices. Evaluation of the model showed that the WWV contribution is decreased in 21st century at longer lead times and increased in shorter lead time. In opposite the ITV contribution increases at longer lead times which results in higher predictive values of the MJO and Rossby waves in the beginning of 21st century. Comparison with other prognostic models have shown that the proposed model in a number of cases appears to be more successful with a lead time of about one year, and can overcome ENSO spring persistence barrier.
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