Predictability of Long-lived of Rossby Wave Packets during Southern Hemisphere Summer

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Abstract

Rossby wave packets (or RWPs) are atmospheric synoptic scale perturbations that appear in the high atmosphere of mid-latitudes that are precursors of extreme weather events such as heatwaves, extreme rainfall, coldspells and extropical cyclone development among other phenomena. Most of these packets tend to last between 3-6 days, but under certain conditions, they can gain enough stability to last from several days to 2-3 weeks in the atmosphere before disappearing, RWPs that last more than 8 days in the atmosphere are referred as long-lived RWPs or LLRWPs. Therefore, a skillful prediction of the apparition and propagation of LLRWPs can improve extreme weather prediction in the sub-seasonal scale. In this study, we assess the skill of the NCEP and IAP-CAS sub-seasonal models at predicting the formation and propagation of RWPs that last more than 8 days (long-lived RWPs or LLRWPs) during summer in the southern hemisphere,. Results show that both models can predict the development of a LLRWPs, but forecasted LLRWPs rapidly loose energy after the 7th lead day of simulation, limiting LLRWPs prediction to the synoptic time scale. On the one hand, LLRWPs forecast is more skillful in both models when the packets begin their propagation in the eastern Pacific or in the western South Atlantic basin. In addition, we also obtain high skill forecasts when both models correctly forecasts the development of a strong cyclonic circulation at the beginning of the western Pacific basin. On the other hand, low skill simulations display a blocking situation to the south of Australia. Lastly, an inactive MJO seems to favor the development of high skill forecasts in both models, whereas low skill forecasts are observed during phases 3 to 6 of the MJO in the NCEP model and stages 3 and 8 appear with more frequency than usual in the IAP-CAS model

Keywords: long-lived RWPs, ENSO, SAM S2S