EGU24-375, updated on 20 May 2024
https://doi.org/10.5194/egusphere-egu24-375
EGU General Assembly 2024

Subseasonal forecast of the MJO over Tropical America

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The Intraseasonal Oscillation (ISO) is commonly divided into two oscillations: the Madden-Julian Oscillation (MJO), which commonly occurs from November to April in winter, and the Boreal Summer Intraseasonal Oscillation (BSISO), which occurs from May to October. Recent studies have classified these two modes into different types using cluster analysis. Here, we analyze the oceanic and atmospheric variables from the reanalysis ERA5 to determine the influence of MJO and BSISO over the Tropical Americas during the period 1980-2018. We also evaluate how the models of the S2S represent the diverse types of MJO and BSISO by using the Pearson correlation, the root mean square error, and the Brier skill score.

The analysis shows that the four MJO types (slow, fast, stationary, and jumping) exhibit no convective signal over the Tropical Americas and the three BSISO types (canonical, north dipole, and east-expansion) have a strong signal on OLR, winds at 850 and 200 mb over the Tropical Americas. Considering the MJO types, the jumping and slow MJO reveal a small warm pool area, areas where the sea surface temperatures (SSTs) are higher than 28.5°C, over the Mexican Pacific, while the stationary and fast MJOs do not reach such high temperatures. Slow (fast) MJO has strong negative (positive) anomalies in SSTs over the central and Eastern Pacific Ocean. Considering the BSISO types, the canonical BSISO has the strongest westerly burst signal before the initiation of the BSISO events over the Maritime Continent, followed by easterly winds later. In contrast, the east-expansion BSISO shows weaker winds and negative OLR anomalies over Mexico. The northward dipole produces a small warm pool area over the Eastern Pacific Ocean when compared to the canonic and east expansion BSISO.

We conclude that the MJO and BSISO types have different physical mechanisms for modulating the intraseasonal changes in the atmospheric and oceanic variables over the Tropical Americas. We also find that the ECMWF model has the best correlation skill when compared to other models from the S2S project.