EMS Annual Meeting Abstracts
Vol. 16, EMS2019-119, 2019

New sources of the seasonal tropical cyclone predictability in the western North Pacific

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Seasonal tropical cyclone (TC) activity in the western North Pacific (WNP) is influenced by Sea Surface Temperature (SST) in Indian Ocean and Pacific basin; this makes it possible to issue skillful seasonal TC predictions for the WNP. The Japan Meteorological Agency (JMA) makes use of its latest seasonal prediction system (JMA/MRI-CPS2, Takaya et al. 2018) to produce experimental predictions of the seasonal TC activity in the WNP. Comprehensive skill evaluation of JMA/MRI-CPS2 hindcasts during the period 1981-2010 presented meaningful skills of statistically significant correlations in predicting a TC number, TC density, TC genesis location and Accumulated Cyclone Energy (ACE). Furthermore, through a posteriori evaluation and attribution analysis in the real-time experimental operation period, we witnessed new predictability sources for the seasonal TC prediction in the WNP, in addition to El Niño-Southern Oscillation (ENSO). Two cases are presented in this presentation. The first case is the early summer (March-April-May) of 2016. Our analysis clearly suggests that quiescent WNP TC activity in the early summer 2016 is attributable to a warm Indian Ocean SST condition associated with a so-called "Indian Ocean capacitor effect" that mediates preceding El Niño influence to the WNP monsoon in the summer following El Niño (Takaya et al. 2017). Another case is the summer (June-July-August) of 2018 that exhibited marked enhanced TC activity due to warm SST associated with the Pacific meridional mode (Takaya 2019, submitted). Our sensitivity experiments with a partial nudging to climatological SST indicated a strong association between the WNP TC activity and these oceanic conditions. These results highlight new sources of the seasonal TC predictability in addition to ENSO, which was traditionally thought to be the primary and dominant driver. Better understanding and progresses of the climate modelling pave the way for an operational service of the seasonal TC prediction.