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Oral
This study investigates tropical influences on the subseasonal predictability of two high-impact precipitation events over California that spanned late December 2022 – mid January 2023 and late February – early March 2023. These events occurred within persistent large-scale flow patterns featuring repeated landfall of cyclones and related atmospheric rivers (ARs) over the U.S. West Coast. These patterns each appeared to form in response to enhanced tropical convection associated with Madden-Julian Oscillation (MJO) events propagating from the Indian Ocean to the western tropical Pacific. For both cases, the extratropical pattern and the California precipitation were poorly forecast at subseasonal lead times (e.g., weeks 3–4) by operational models.

The hypothesis that subseasonal forecast errors for the two events were related to a misrepresentation of the MJO is tested with a set of ensemble reforecast experiments conducted with the NOAA Unified Forecast System model (version HR1). Nudged forecasts, in which the state variables in the tropics are nudged to the ECMWF ERA5 reanalysis, are compared against control forecasts run without nudging. The forecasts are initialized at 0000 UTC on 15 December 2022 and 2 February 2023. Results
reveal that for both cases a “perfect” representation of the tropics in the nudged forecasts yields marked improvements in the week 3–4 forecast for the extratropical flow and the concomitant precipitation over California. Tests of different nudging configurations produce qualitatively consistent results. Synoptic-dynamic processes linking improved representation of tropical processes, especially those associated with the MJO, to reductions in extratropical forecasts errors are diagnosed and discussed.
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