Eviatar
Bach
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Oral
(Virtual Talk)
Predicting the temporal and spatial patterns of South Asian monsoon rainfall within a season is of critical importance due to its impact on agriculture, water availability, and flooding. The monsoon intraseasonal oscillation (MISO) is a robust northward- propagating mode that determines the active and break phases of the monsoon, and much of the regional distribution of rainfall. However, dynamical atmospheric forecast models predict this mode poorly. Data-driven methods for MISO prediction have shown more skill, but only predict the portion of the rainfall corresponding to MISO rather than the full rainfall signal.

Here, we combine state-of-the-art ensemble precipitation forecasts from a high-resolution atmospheric model with data-driven forecasts of MISO using a novel method. The ensemble members of the detailed atmospheric model are projected onto a lower- dimensional subspace corresponding to the MISO dynamics, and are then weighted according to their distance from the data- driven MISO forecast in this subspace. We thereby achieve improvements in rainfall forecasts over India, as well as the broader monsoon region, at 10–30 day lead times, an interval that is generally considered to be a predictability gap. The temporal correlation of rainfall forecasts is improved by up to 0.28 in this time range. Our results demonstrate the potential of leveraging the predictability of intraseasonal oscillations to improve extended-range forecasts; more generally, they point towards a future of combining dynamical and data-driven forecasts for Earth system prediction.
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