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Empirical models of climate prediction and predictability from sub-seasonal to multi-decadal scales

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A seamless empirical modeling approach that can be used to make forecasts and evaluate their predictability on time scales ranging from sub-seasonal to multi-decadal is discussed. The model used, a linear inverse model (LIM) derived from observed simultaneous and time-lag correlation statistics of both the ocean and atmosphere, makes forecasts whose skill is competitive with current global forecast coupled GCMs. At all forecast time scales, for some seasons and regions LIM skill is actually higher on average than the CGCM. LIM can thus serve as a key forecast benchmark, and in particular can help to focus on where CGCM improvements should be targeted to yield the most significant forecast gains. The geographical and temporal variations of forecast skill are also generally similar between the LIM and CGCMs. This makes the much simpler LIM an attractive tool for assessing and diagnosing overall climate predictability as well as the predictability of tropically-based climate modes such as the MJO, ENSO, and the PDO.