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Wintertime Temperature Predictability in China

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Seasonal climate prediction remains a challenge and has bee receiving a lot of attention in China. Many studies have shown that early-season surface boundary anomalies are significantly correlated with wintertime atmospheric circulation variability in the Northern Hemisphere, and thus provide great predictability for seasonal climate variability in China. Here we use four summer-autumn predictors (the Eurasian snow cover, Arctic sea ice, sea surface temperature (SST) of in the North Pacific and tropical Indian Ocean) to predict the upcoming winter land surface temperatures of China. We first perform singular value decomposition (SVD) analyses between anomaly fields of these predictors and 160-station temperature in China during the period of 1979-2011, and find the key areas of interaction between these predictors and wintertime temperature in China. We then create cross-validated hindcasts of winter temperature using as the above four predictors, and calculate the anomaly correlation coefficient (ACC) at each station. It is found that the above four predictors explain a large fraction of temperature variance. ACC is above 0.5 for most stations over east China, and ranges from 0.6 to 0.8 over many stations of northeastern and southwest China. Autumn sea ice and snow cover contributes to larger predictability in northeastern China, while both autumn snow cover and summer SST contributes to larger predictability in southwestern China. Overall, these four predictors may present a significant potential for winter temperature predictability in China and significantly improve the hindcast skill.