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Editorial

Climate Variability and Predictability at Various Time Scales

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Climate change, variability, and predictability are a core component of climate dynamics. Recent advances in climate sciences have introduced new theories and technologies in detecting, diagnosing, analyzing, and predicting the climate variability on various time scales ranging from intraseasonal, seasonal, interannual to decadal-interdecadal time scales. This special issue is a small showcase of the efforts and progress made by international researchers in analyzing, diagnosing, and understanding climate change and climate variability at various time scales.

The six papers collected in this special issue can be roughly grouped into three topical categories. The first category detects the climate change signal and analyzes the possible forcing responsible for the climate change including natural forcing and anthropogenic forcing, focusing on the time scales from decades to centuries (S. Talento and M. Barreiro; K. Zhuang and J. Giardino; X. Wang et al.). The second category focuses on seasonal and interannual climate variability (M. H. González et al.; S. Hameed and N. Riemer). Emphasis is placed on the analysis of local precipitation (Southern America and Sahel) and the mechanism responsible for these local climate variability at seasonal and interannual time scales. The third category addresses the potential predictability study for one of climate system components, the lake ecosystem, through sensitivity experiments of the growth of initial perturbation (X. Wang et al.). In particular, a novel nonlinear approach, called conditional nonlinear optimal perturbation (CNOP), was used here to carry out the sensitivity experiments. It has been argued that the CNOP is better than the conventional singular value (SV) method in characterizing the error growth of models of the initial perturbation.

This special issue is intended to promote the study of climate variability and predictability and to stimulate the continuing efforts to understand and predict climate variability on various time scales.

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