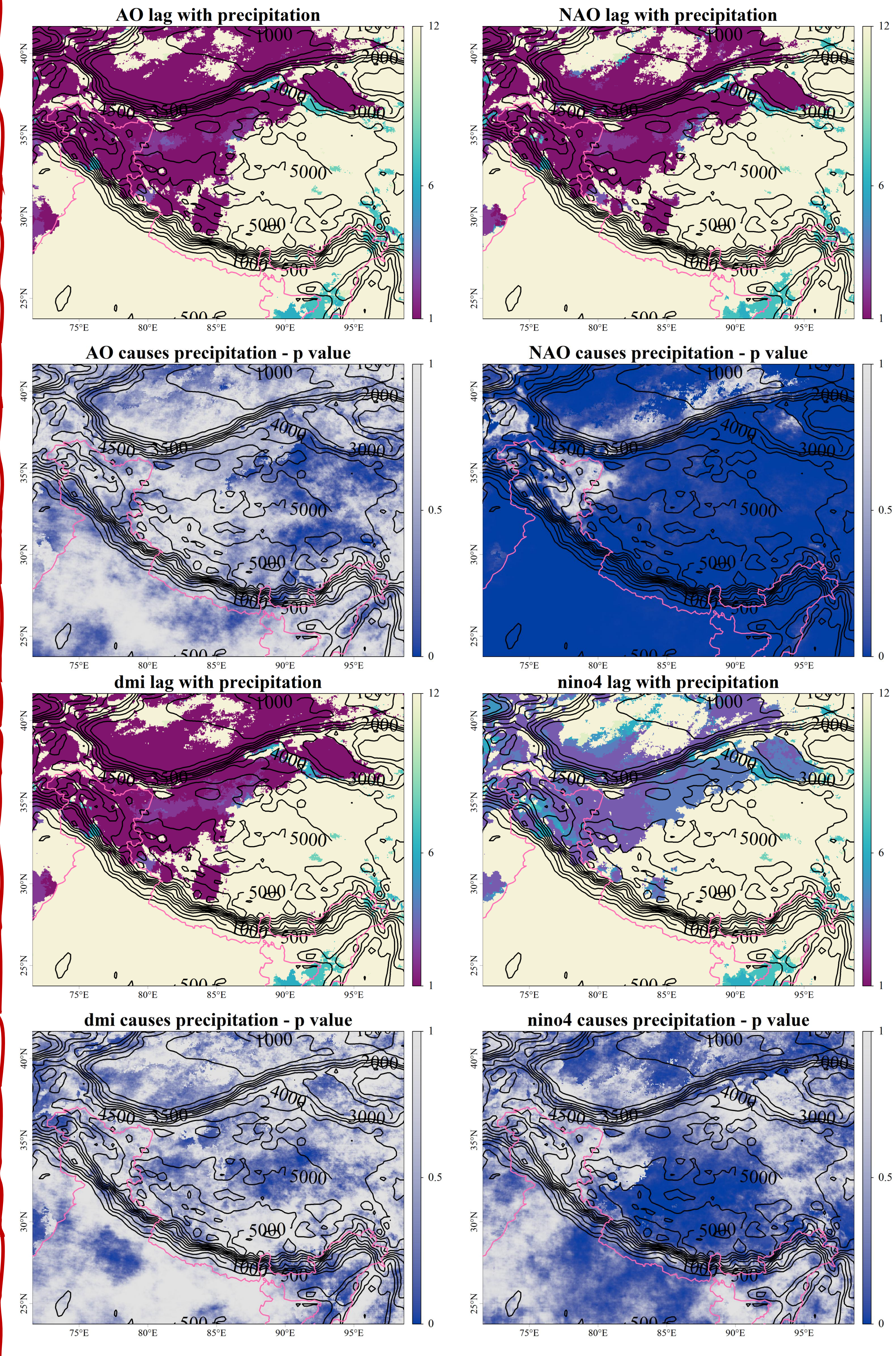


Himalayan snow is driven by oceanic-atmospheric couplings around the world



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How seas whisper to snow: teleconnections drive spatio-temporal variability of snow cover in Western Himalayas

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The high Himalayas host a vast cryosphere, critical for both local and global environmental stability. While a few former studies have examined point-scale precipitation variabilities, others have focused on snow cover (SC) trends at regional scales. We investigate how SC in the Western Himalayas varies across spatio-temporal scales, and what factors drive these variabilities. Towards this, we derive a historical record (1868–2023) of SC for six high-mountainous watersheds from satellite (Landat) observations. We calculate three characteristics of SC extent: Fractional SC, fractional Temporal SC, and Principal Components (PC) of Normalized Difference Snow Index. Eigen-vectors of the PCs establish the association between the spatial distribution of SC variability and basin topography. The study found that these SC characteristics are driven substantially by the North Atlantic and the Pacific at interannual time scales. The study found that several climate variability modes drive separate SC components during different seasons. In general, during winter and summer, SC variations are primarily influenced by the North Atlantic, Arctic, and Pacific. In monsoon and fall, apart from local hydroclimatic conditions, the Indian Ocean plays a major regulator of SC, along with the

