



The winter Pacific-North-American pattern in the early 19th century in proxy-based reconstructions and climate simulations

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Reconstructions of past climate behavior often describe prominent anomalous periods that are not necessarily captured in climate simulations. In this contribution, we illustrate the case of the winter Pacific/North American pattern (PNA) in the early 19th century. During this period, the interdecadal strong positive PNA phase described by a PNA reconstruction based on tree-rings from northwestern North America contrasts with the slight tendency towards negative winter PNA anomalies in an ensemble of state-of-the-art coupled climate simulations. In an attempt to reconcile the simulated and reconstructed behaviors, the robustness of PNA reconstructions based exclusively on geophysical predictors from northwestern North America is investigated following a pseudo-proxy analysis in the same simulation ensemble. The reconstructed early-19th-century positive PNA anomaly emerges as a potentially reliable feature, although it is subject to a number of sources of uncertainty and potential deficiencies. The pseudo-reconstructions demonstrate that the early-19th-century discrepancy between reconstructed and simulated PNA does not stem from the reconstruction process. Instead, reconstructed and simulated features of the early-19th-century PNA can be reconciled by interpreting the reconstructed evolution during this time as an expression of internal climate variability, hence distinguished from the externally-forced signal described by the ensemble mean and unlikely to be reproduced in its exact temporal occurrence by a small ensemble of climate simulations.