

Late Victorian Holocaust: paleoclimate detection and attribution study of the 1876-78 megadrought

Liora Hostyk¹, Kevin Anchukaitis², Ben Cook², and Richard Seager²

¹ Barnard College, New York NY; ² Lamont-Doherty Earth Observatory of Columbia University, Palisades NY

In a series of catastrophic climate-related events in the late 19th century, a combination of drought, famine disease, and colonial economic policies resulted in substantial and sustained human consequences across Asia, with a death toll estimated between thirty to sixty million. Some historians now consider this akin to colonial genocide, but the climatic context of that period is still not completely understood. Here, we investigate how unusual such the drought was in terms of spatial extent and severity, and the associated atmospheric and oceanic forcings. Analysis of a tree-ring reconstructed moisture index shows that droughts of this severity and extent did occur several times from 1870-1950, and five hundred years worth of reconstructed drought data likewise reveal that they occur more often than would be expected from random chance. Investigation of the average sea surface temperature and geopotential height anomalies for these Great Droughts demonstrate that they are consistently associated with El Niño events, as well as a possible connection with midlatitude atmospheric anomalies similar to those associated with the Arctic Oscillation. Observational evidence therefore allows us to develop hypotheses about the connections between large severe droughts and climate patterns that will be tested with general circulation modeling experiments.