Full understanding of Antarctic sea-ice variability suffers from scarcity of data in the pre-satellite era. Although sea-ice variability is but one of many factors affecting Antarctic ice cores, ice-core records from the adjacent continental ice sheet offer a possible solution to this challenging problem. We apply tools from the field of artificial neural networks (ANNs) to reconstruct centennial-scale records of West Antarctic sea-ice variability using ice-core datasets from West Antarctic sites (e.g., Siple Dome, US ITASE) and satellite-based records of sea ice. As a nonlinear, highly flexible tool, ANNs offer a potential solution for relating ice-core predictors to sea-ice targets, e.g., seasalt chemistry to sea-ice edge.

Results point to a well-trained ANN being a necessary but not always sufficient prerequisite for developing sea-ice reconstructions outside the satellite era from extended ice-core datasets. Limited overlap (ca. 25 years) of ice-core and sea-ice records strongly influences reconstruction uncertainty and requires additional training procedures. Ice-core data outside the calibration period are not always similar enough to the training data to be trustworthy predictors. Trends in sea-ice data may also create problems (most notably in the eastern Bellingshausen Sea Region).

Independent, ensemble reconstructions for Amundsen Sea (140-115 W, 1890-1972) sea ice edge, based on (1) seasalt Na and (2) Cl records from 10 ice core sites, present an overall picture of stability with interannual variability comparable to the satellite record and modest decadal variability plus spectral characteristics of the Antarctic Circumpolar Wave. Additional reconstructions and confidence assessments will further test these conclusions.