Directions in New Historical Disaster Studies Based on High Resolution Paleoclimate Data

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Past changes in temperature and precipitation during last two millennia are now being reconstructed in Japan and East Asia at annual time resolution using various paleoclimate proxies such as tree rings, including large scale database of tree ring width and tree-ring cellulose oxygen isotope ratios, and literature records, covering diary weather descriptions and documentary climate disaster reports. By comparing those high resolution paleoclimate datasets with historical and archaeological evidences, it might be possible to elucidate how people in local societies of past periods reacted to climate disasters due to cold summer, severe flood or drought in detail. So far, reconstructed variations in summer temperature and precipitation during early modern, medieval and ancient ages have clarified apparent coincidences that multi-decadal variations in summer temperature and precipitation often underlain many large famines and/or warfare at the corresponding periods. This fact implies a universal mechanism that societies cannot successfully react to disasters, including earthquake and tsunami, which reoccurs after long pausing periods, more than multi-decades. In this paper, I proposed a statistical research strategy to elucidate what kinds of societal properties enhanced (reduced) people's damages owing to the disasters by extracting and analyzing of numerous historical examples on multi-decadal or longer time intervals of large climate changes and their societal consequences. This statistical approach to historical researches starting from high resolution paleoclimate data may develop a new possibility to strengthen traditional historical and archaeological methodologies. Although I cannot conclude now about the important factors determining degree of people's damages by the disasters, medieval and early modern examples suggest that relationships between distribution economy and local societies might have played key roles.

Key words: history of disasters, paleoclimate, climate change, tree ring, oxygen isotope ratio