

How can we activate collaborations with history and archaeology? –Lesson from Historical Climate Adaptation project

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Introduction

Earth and planetary sciences belong to historical sciences dealing with past natural and human phenomena as well as history and archaeology. Although many inter-disciplinary researches have been conducted between them, there are a lot of problems originating from differences of their essential philosophy. Here, I will discuss how to activate collaborations with history and archaeology based on my experiences as the leader of “Historical Climate Adaptation Project” in Research Institute for Humanity and Nature (RIHN) from 2014 to 2018.

Fundamental Strategy of the Project

RIHN is an inter-university research institute, accepting many research proposals aiming to solve a global environmental problem by inter-disciplinary approaches between natural and human sciences. In the framework of RIHN, we created three steps of research strategies. 1) To reconstruct variations in past climate at annual resolution for last several millennia in Japan. 2) To compare paleoclimate data with numerous historical and archaeological archives. 3) To elucidate characteristics of societies resilient or vulnerable to climate changes by comparing many historical cases. Although I initially imaged the unidirectional data provision from paleoclimatology to history and archaeology except for the study of historical climatology, the inter-disciplinary communications actually made unexpected progress in the paleoclimatology, especially in the establishment of super-long chronology of tree-ring cellulose oxygen isotope ratio.

Results of Inter-Disciplinary Collaboration

Tree-ring cellulose oxygen isotope ratio is a novel proxy to reconstruct past summer precipitation precisely even in humid and temperate areas like Japan where traditional dendroclimatology was not very successful. We planned to establish the long-term datasets over Japan. At the beginning, historians and archaeologists were regarded as users of the data, but they actually contributed to the creation and refinement of data by various ways. After receiving the data, they answered to paleoclimatologists as follows. (1) Active provisions of excavated woods and old architectural woods for isotopic analyses. (2) Critical evaluation of the paleoclimate data from the viewpoint of history and archaeology. (3) Request to improve the resolution and extension of paleoclimate data. Paleoclimatologists welcome (1), but it was not easy to answer to (2) and (3) because such criticisms and requests are not usually originating from themselves. However, the request (3) finally made us enable the tree-ring based millennial scales climate reconstruction, by combing the tree-ring oxygen and hydrogen isotope ratios, which were validated by critical evaluations of historians and archaeologists (2). It promoted many studies in paleoclimatology, history and archaeology. However, it was not easy to elucidate “societal systems resilient to climate change” because we had not shared the research purposes between natural and human sciences.

Conclusion

The unprecedented length and precision of paleoclimate data are the results of active inter-disciplinary communications. Although the unidirectional data provision was not successful, the critical interactions improved both the data quantity and quality. On the other hand, the sharing of research philosophy between natural and human sciences was necessary to promote “real inter-disciplinary” research. In the project, I found the fact that historians and archaeologists do not usually study history to solve contemporary problems. Rather, they focus on the difference in people’s sense of values between past and present. Because the future must be different from the present as well as the past, it is very important to promote collaborations between natural scientists who seek the universality in history and human researchers who understand the diversity of history in order to make sustainable society. That was my most important finding in the project.

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