The role of paleoenvironmental studies for the global change prediction - Lessons from last 1000 years

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How does the global change, such as global warming, continue in the future? What kinds of impact does it make upon our society? How can we meet impacts of the coming global change? They are the most serious concerns of human beings, and many international scientists group, such as IPCC and IGBP, are now tackling those difficult problems. While simulation studies using global climate models are necessary to predict future changes in global environments, how can we ensure the accuracy of the prediction? Of course, it is necessary to promote process studies on present global changes and improve mechanical contents of the model. But, there is an intrinsic difficulty in long-term global change predictions, being compared with day-by-day weather forecasts. Although the weather forecast have been improved by the try and error method, it is impossible to learn from failures in long-term (50 or 100 years) predictions. However, the paleoclimatic and paleoenvironmental studies can provide the models with chances of try-and-error practices. Various kinds of proxies such as tree and coral rings, ice core, marine and lake sediments, peat, stalagmite, old documents and so on, can give us series of records on historical climate and environment variations, which can make it possible in combination with historical records of external forcing to verify the performance of models. Paleoenvironmental scientists are now developing more accurate and detailed proxies on past climate and environment as well as past forcing, and making new data sets day after day. Here, I will review state of the art in paleoenvironmental studies with special emphasis on last 1000 years and discuss the subjects towards the global change predictions.