Application and analysis of stable isotopes (oxygen and carbon) in coralline algae, coastal waters in Korea

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A "whitening event" is a phenomenon in which coralline algae, a type of red algae, covers the bedrock, and seaweed forests are diminished or disappears owing to changes in the coastal marine environment. Coralline algae are pink when alive; when dead, they turn white, giving the appearance of a white desert in the ocean. These events, which can last hundreds of meters, have been observed in both temperate and tropical oceans.

Coralline algae, which is a type of red algae, turn white due to a process known as bleaching. This occurs when the algae lose its pigment, which is due to stress factors such as changes in water temperature, pH, light, and nutrient levels. The algae is an important component of coral reef ecosystems, and Bleaching of coralline algae can result in severe implications for the health of the coral reef ecosystem and the dependent species.

Coral is utilized as a tracker for the restoration of paleoceanography because it keeps records of periodic changes in geochemical elements in the skeleton as a result of the surrounding ocean environment. Studies have been conducted to restore past water temperatures and marine environments by analyzing corals such as _Porites_ (Indo-Pacific), _Panova_ (Eastern Pacific Equatorial Area), and _Montastrea_ (Caribbean Sea), which are most commonly used in paleoceanographic studies. Unfortunately, all research is focused on tropical areas, and there is an absence of research in the mid-latitude region with a temperate environment.

In this study, the marine environment (temperature, salinity, etc.) is restored through coralline algae skeletal mineralogy analysis (oxygen isotopes, carbon isotopes, and elemental analysis) of coralline algae, which are the main factors of the whitening event. Research on marine environmental changes, which are specific concerns include upwelling in coastal areas, the inflow of river water, and heavy metal pollution, is indeed pursued in addition to various aspects of climate change.

The study of global environmental changes and marine pollution using coralline algae is an excellent chemical indicator that can predict the future through past records.