A geochemical and Sr-Nd isotopic study of silicate weathering and implication on the carbon cycle

【Principal Researcher】Silpa AMMINI SASIDHARAN, Assistant Professor, Department of Earth Science, Interdisciplinary Faculty of Science and Engineering

【Purpose and content of research】

Weathering of the **silicate minerals** is a crucial process on earth's surface, acting as a carbon sink and playing a significant role in the carbon cycle and global climate. The primary objective of this proposed research is to gain a comprehensive understanding of element mobility and chemical reactions involved in the weathering of the common rock-forming silicate minerals like **olivine, pyroxene, and plagioclase** which are commonly found in basalts. **Basalts** are one of the common rock-forming silicates that readily respond to weathering and has been the focus of studies on weathering profiles. The study will focus on basalts from different geological generations exposed in the **San'in area** of SW Japan.

Whole rock geochemical and **isotopic compositions** will be analyzed to determine the extent of weathering and identify the selective weathering characteristics of these minerals. This research is expected to provide valuable insights into the **atmospheric CO2 removal through chemical weathering** and the contribution of silicate minerals to the carbon cycle.

Samples were collected from the Cenozoic volcanoes **Daikonjima and Ejima** from Shimane Prefecture where Cenozoic basalts and scoria are exposed.

【Research achievement (acquired knowledge, results, research papers, conference presentations, potential applications for external research grants through this research project)】

A systematic sampling of basalt and scoria from Daikonjima and Ejima has been conducted. The samples represented **varying degrees of weathering and alteration** effects. Thin section observations of the collected samples indicated varying degree of alteration of the chief mineral **olivine into iddingsite** along the boundaries of the mineral grain. The specially polished thin sections were analyzed for the chemistry and minerals representing parent source were identified.

From the whole rock geochemical characteristics, at least **three groups of basalts** were identified.

The preliminary mineral chemistry and geochemistry were carried out and published as a part of undergraduate thesis submitted in February 2023 (**Shinohara, 2023MS**). The Sr-Nd isotope geochemistry part of this project is going on and is expected to be completed by August 2024. The findings will be presented in national conference in September and the contents are planned to be published within this financial year.