

Report for the Joint Use/Research of the Institute for Planetary Materials, Okayama University for FY2023

5/21/2024

Category: International Joint Research General Joint Research Joint Use of Facility
Workshop

Name of the research project: Geochemical and clay mineral signature on weathering and erosion process in Chemoga watershed, Ethiopia

Principal applicant: Alebachew Tareke Kehali

Affiliated institution and department: United Graduate School of Agricultural Sciences, Tottori University

Collaborator

Name: Hiroshi Kitagawa (Ass. Professor)

Affiliated institution and department: Pheasant Memorial Laboratory

Institute for Planetary Materials Okayama University 827 Yamada, Misasa, Tottori 682-0193, Japan

Research report:

- 1) Please write the research report with free format, but include followings: research purpose, actually conducted research, and research outcomes. If necessary, you can add another page.

Research purpose: The purpose of this study is to assess the influence of lithology on weathering, erosion, sedimentation, and the paleoenvironment of the Chemoga watershed in the upper Blue Nile region of Ethiopia. It is essential to investigate these geologic materials' physical and chemical properties to understand weathering and erosion. Precise knowledge of the mineralogy and geochemistry of these materials is crucial to provide the constraints on their genetic relationships. To accomplish this, we employed geochemical elemental analysis and clay mineralogy.

Actually conducted research: The major-element analysis of volcanic rocks, sediments, and soils was conducted using X-ray fluorescence (XRF) at the Misasa Institution of Planetary Materials. Additionally, X-ray diffraction (XRD) was utilized to characterize the clay minerals present in sediments and soils. Presently, we are engaged in laboratory work about trace elements using an inductively coupled plasma mass spectrometry (ICP-MS) machine. These analytical methodologies

yielded valuable insights into the fundamental properties of the samples, such as lithologic features and the extent of weathering/alteration.

Research outcomes: Based on the major oxide elemental analysis and clay mineralogy analysis of the study region, we categorized the region according to the intensity of chemical weathering, as evidenced by the clay mineral gradient alteration along the latitude. Subsequent analysis revealed that the region is presently undergoing moderate to intensive chemical weathering, which likely significantly contributes to the observed erosion in the area. The samples collected predominantly comprised basaltic rocks from various geological periods, core and surficial sediments, and soil samples. Analysis of the diverse samples indicates that significant chemical fractionation likely occurred within the geological materials of the region, potentially influenced by factors such as lithology/provenance, climate, tectonics, and transportation routes. The repercussions of these factors are likely mirrored in the abundance of trace elements in our ongoing research.

- 2) For the workshop, please write the report for the workshop. Also, attach the program, abstracts, and list of the participants etc. we have not made any workshop participation.
- 3) Please add Collaborator's Name, Affiliated institution and department as needed.
- 4) Please answer the question on the next page.