GEOCHEMICAL COMPLEXITY ALONG THE GREAT RIFT – A PLANETARY ANALOG FOR MAGMA EVOLUTION WITHIN SILL AND DIKE NETWORKS. S.S. Hughes[1], S.E. Kobs Nawotniak[1], A. Sehlke[2], W.B. Garry[3], D.S.S. Lim[2] and J.L. Heldmann[2], [1]Idaho State University, [2]NASA Ames Research Center, [3]NASA Goddard Space Flight Center, (email: hughscot@isu.edu).

Introduction: Field reconnaissance and laboratory analyses of lava flows by the FINESSE (Field Investigations to Enable Solar System Science and Exploration) team have focused on the Great Rift of Idaho and surrounding features on the eastern Snake River Plain. We continue to evaluate these systems in order to gain insight into magmatism related to lunar floor-fractured craters (FFCs) such as the Humboldt, Alphonsus and Oppenheimer craters; linear rilles such as Rima Ariadaeus and Hyginus Rille; and various volcanic constructs that likely represent sites of compositional variability such as the Hortensius Domes, Gruithuisen Domes, and the Marius Hills. In several previous presentations, we reported morphological (differential GPS, field imagery and microscopy) and geochemical (XRF, major and trace element) analyses of the Kings Bowl fissure system, Wapi lava field and nearby volcanics exposed in the southern segment of the Great Rift. These features were compared to the preliminary data from Highway, North Crater, Big Craters, Blue Dragon, and Serrate lava flows in the northern segment. As noted previously, these flows were emplaced within a relatively narrow time period (~2.1 – 2.3 ka). Additional new geochemical data from both segments extend our assessments to reveal much greater geochemical diversity both within and between volcanic deposits.

Results: Geochemical data confirm three previously recognized compositional clusters: (1) the Wapi and Kings Bowl **basalts** (tholeiitic), (2) the Big Craters and North Crater **hawaiites**, and (3) the Highway and Serrate **latites**. The new data also confirm that the flows within each cluster are chemically distinct from each other without much overlap, which will ultimately enable high-resolution (m-scale) geologic interpretations and flow-margin mapping. Major and trace elements are interpreted to represent combinations of reservoir mixing, crustal contamination and fractional crystallization of magma in shallow dikes and sills along volcanic rift zones, which may be common features of magmatic systems on the Moon and other planetary bodies. Recent studies and interpretations of lunar volcanic features such as fractures, cones and pyroclastic deposits, along with crustal dynamic models derived from gravity and structural data, indicate similar potentially complex processes of shallow igneous intrusion and dike injection along fissure systems. Our interpretation that magma supply along the Great Rift involves complex, interconnected networks of dikes and shallow sills may lead to a better understanding of sill emplacement, dike injection and eruption within FFCs and myriad volcanic systems on the Moon, other planets and possibly some asteroids.