

Cenozoic Alkaline Volcanism in Melbourne Province, Northern Victoria Land, Antarctica: Geochronological and Geochemical Characteristics

JONG IK LEE¹, JIHYUK KIM², MI JUNG LEE¹ AND
PHILIP KYLE³

¹Korea Polar Research Institute (KOPRI)

²Busan National University

³New Mexico Institute of Mining and Technology (NMT)

The West Antarctic Rift System (WARS) is one of the largest intracontinental rift systems on Earth, and its evolution resulted in extensive Cenozoic alkaline volcanism in the western Ross Sea and adjacent Transantarctic Mountains. The volcanic rocks produced by this process are classified as the McMurdo Volcanic Group, which comprises three major volcanic provinces and numerous volcanic fields. The Melbourne Province, part of the McMurdo Volcanic Group, includes the active volcanoes Melbourne, Rittmann, and The Pleiades and is situated on the thick crust of the uplifted Transantarctic Mountains. Furthermore, over 50 small, isolated volcanic vents, known collectively as the Northern Local Suite (NLS), are distributed across a 400 km area within the province. We present here new ⁴⁰Ar/³⁹Ar ages and geochemical data on the lavas of the small local suites of the NLS. This contributes to a better understanding of the temporal and spatial evolution of Cenozoic magmatism in Northern Victoria Land (NVL). The NLS lavas are mainly basanitic scoria cones and small vents that share many geochemical features with the major volcanic fields. In the NLS, alkalinity and Sr-Nd-Pb isotopic ratios show co-variations, but these are not linked to eruptive age or location. The isotopic characteristics of the NLS lavas indicate that the source of the parental basanites is thought to be a metasomatized mantle including a focal zone (FOZO) component. The degree of partial melting and subsequent interaction with surrounding mantle peridotite produced the compositional diversity of the parental magma. Their geochemical and isotopic characteristics show no spatiotemporal correlation but suggest that a similar lithospheric mantle source has been consistently tapped throughout at least 20 Ma of WARS evolution.