

**ECLOGITES IN PERIDOTITES, WESTERN GNEISS REGION, NORWAY:
CHARACTERISTICS AND ENIGMATIC Sm-Nd RESULTS**

MEDARIS, L.G. Jr.¹, SINGER, B.S.¹, ZHANG, X.¹, FOURNELLE, J.H.¹,
GHENT, E.D.², BRUECKNER, H.K.^{3,4}, MEHTA, K.³

¹Department of Geology & Geophysics, University of Wisconsin, 53706 Madison, Wisconsin, USA

²Department of Geology & Geophysics, University of Calgary, T2N 1N4 Calgary, Alberta, Canada

³School of Earth & Environmental Sci., Queens College & Graduate Center of CUNY,
11367 Flushing, NY, USA

⁴Lamont-Doherty Earth Observatory of Columbia University, 10964 Palisades, NY, USA
e-mail: medaris@geology.wisc.edu

Eclogites in ortho- and paragneisses of the Western Gneiss Region (WGR), a.k.a “country-rock” or “external” eclogites, yield Sm-Nd grt-wr-cpx and U-Pb zircon ages of 400 - 420 Ma and document Scandian high-pressure (HP) metamorphism in the WGR. Eclogites also occur within WGR peridotites near their margins and are referred to as “internal” eclogites. Such eclogites are compositionally distinct from external ones, yield significantly older Sm-Nd ages, and introduce additional complexity in interpretation of the geological evolution of the WGR.

Internal eclogites have a wide range in composition, *e.g.*, SiO₂, 40.4 - 52.7 wt%; Fe-number, 25.4 - 85.1, and include both *ne-* and *hy-*normative types. The large degree of scatter in element compositional plots and common mineralogical layering indicate that such eclogites do not represent melt compositions, thus precluding their use in petrotectonic modelling. The internal eclogites contain a HP assemblage of grt + omp + rt ± am ± ilm ± ap, in which some garnet grains show prograde compositional zoning and many contain inclusions of Al-rich amphibole. Minimum temperatures and pressures for the eclogite assemblage are 660 - 765 °C and 12.2 - 18.1 kbar, based on Fe-Mg partitioning between grt and cpx and the Jd content of cpx.

Sm-Nd mineral isochrons for internal eclogites yield pre-Scandian, but widely scattered, ages of 574 ± 38 Ma, Raudkleivane, Almklov-dalen; 997 ± 33 Ma, Eikremsaeterfoss, Almklov-dalen; 888 ± 37 Ma, Raubergvik (BRUECKNER & MEHTA, this study), and 599 ± 42 Ma, Gurskebotn (JAMTVEIT *et al.*, 1991). Such ages may record one or more pre-Scandian HP events, hints of which are found in some external eclogites. Alternatively, the ages may be spurious, resulting from disequilibrium induced by the pervasive influx of fluids from surrounding gneisses into the margins of the peridotite bodies. Biotite in a retrograded, K-metasomatized eclogite yields a nearly concordant ⁴⁰Ar/³⁹Ar plateau age of 524 ± 2 Ma. However, the isochron suggests that excess argon may comprise ≥ 20 % of the ⁴⁰Ar, thus we infer that this apparent age does not constrain the cooling history of the internal eclogites. ⁴⁰Ar/³⁹Ar age spectra from amphibole in two retrograded samples indicate cooling to 500 °C by 446 ± 2 and 411 ± 5 Ma, consistent with Silurian-Devonian ages determined regionally.

Reference

JAMTVEIT, B., CARSWELL, D.A., & MEARNS, E.W. (1991): *J. Metamorphic Geol.*, 9, 125-139.