Geochemical features of alkaline volcanism in the southern extreme of Paraná Basin, NW Uruguay

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The northwestern region of Uruguay is geologically underlain by the southern extreme of the Paraná Basin, known as Norte Basin. The sedimentary infill comprises Devonian to late Cretaceous sedimentary sequences, intercalated with early Cretaceous volcanic and intrusives rocks related to the Large Igneous Paraná Province [1]. This magmatic event is represented by basalts and mafic sills of tholeiitic affinity. Recent studies have shown the occurrence of undersaturated mafic lavas, cross cutting the basaltic pile and interpreted as possible volcanic necks. The samples are porphyritic textured with olivine (hortonolite/fayalite) and augite phenocrysts in a hypocrystalline groundmass composed of olivine, augite, plagioclase microlites, nepheline and opaque minerals (mainly ulvospinel and pirite).

The lithogeochemical results show SiO_2 = 40.11–42.84 wt. %, Al_2O_3 = 12.23–12.83 wt.%, MgO = 7.80-8.29, $Fe_2O_{3(total)}$ = 12.58-13.77, (Na_2O + K_2O) = 5.29–6.11 wt.%, A/CNK = 0.30–0.43, and ΣREE = 347.30 – 390.90. All samples show metaluminous nature and they are classified as basanite/tephrite.

Moreover, these lavas are enriched in light rare earth elements (La/Lu = 237.27 - 277.33) compared to chondrite, and enriched in large ion lithophile elements (LILEs), heavy rare earth elements (HREEs) and high field strength elements (HFSEs, Nb, Ta, and Ti). They represent the first record of volcanic rocks of alkaline nature for the southernmost portion of the Paraná magmatic province and for Uruguay.