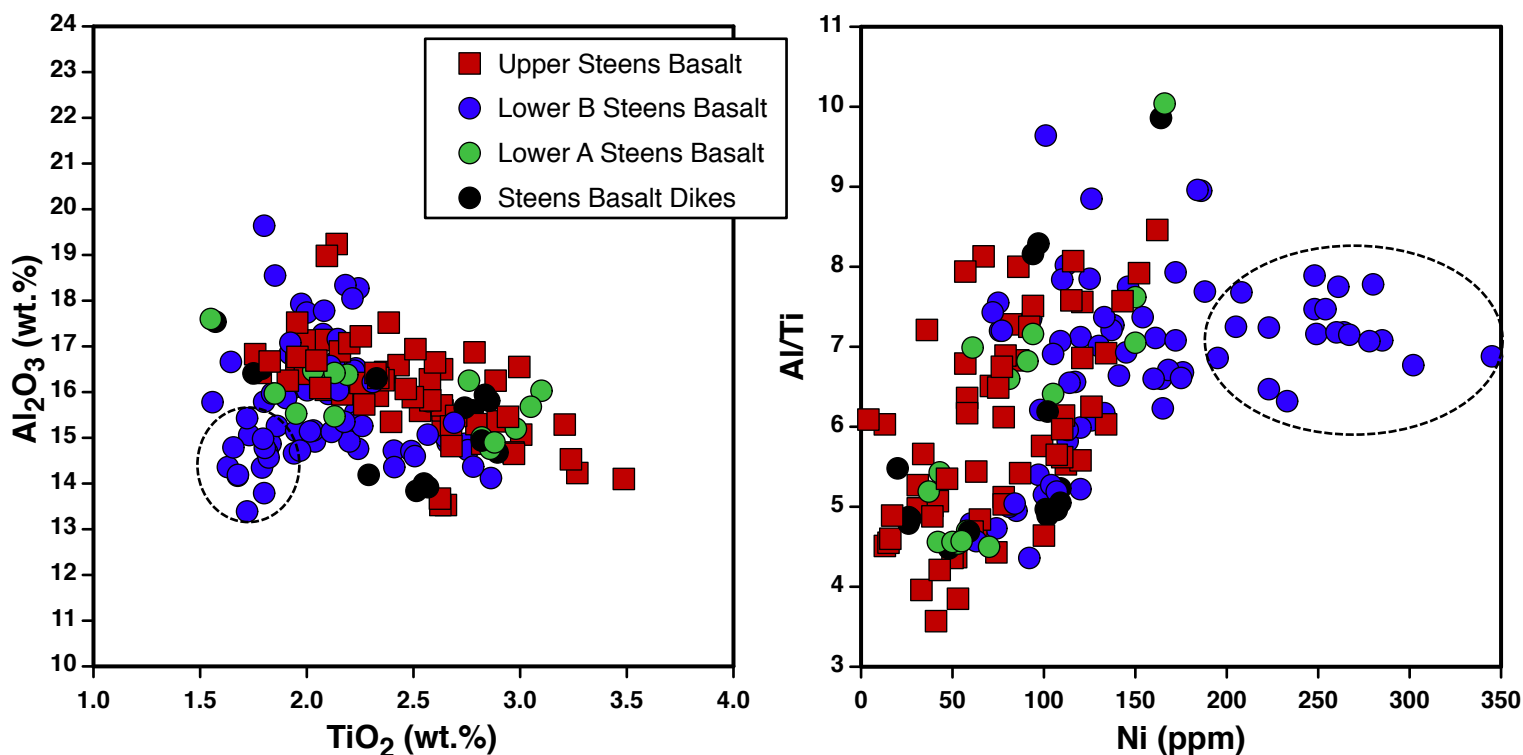


Supplement 5. Plots to Demonstrate Lack of Cryptic Alteration in Steens Basalt Samples



Following the method of Sawlan (2017), we have checked the Steens Basalt samples for evidence of cryptic alteration by anoxic water. Figures show a general inverse correlation of Al_2O_3 and TiO_2 for the Steens Basalt, as well as a general decrease in Ni with increasing differentiation. The correlation indicates no obvious alteration by anoxic waters (Sawlan, 2017). However, for some samples (outlined within the oval black dashed line) Al/Ti is roughly constant, which might be interpreted as alteration according to Sawlan's method. These samples represent an olivine only fractionation trend from a parent with the highest Ni ppm. Al_2O_3 and TiO_2 increase together before plagioclase crystallization begins at approximately 7.5 wt.% MgO and 175 ppm Ni.

The Steens Basalt samples cover a large compositional range (1.5-3.5 wt.% TiO_2) compared to the Sentinel Bluffs member of the Grande Ronde Basalt (1.7-2.1 wt.% TiO_2), thereby limiting the applicability of Sawlan's method in detail. The fractionating mineral assemblage over the smaller range of Sentinel Bluffs compositions is constant, therefore the trends in Al/Ti can be expected to be linear. In the Steens Basalt, where the fractionating assemblage changes from olivine only in most mafic rocks and some samples containing cumulus plagioclase, these trends will vary as the fractionating assemblage changes.