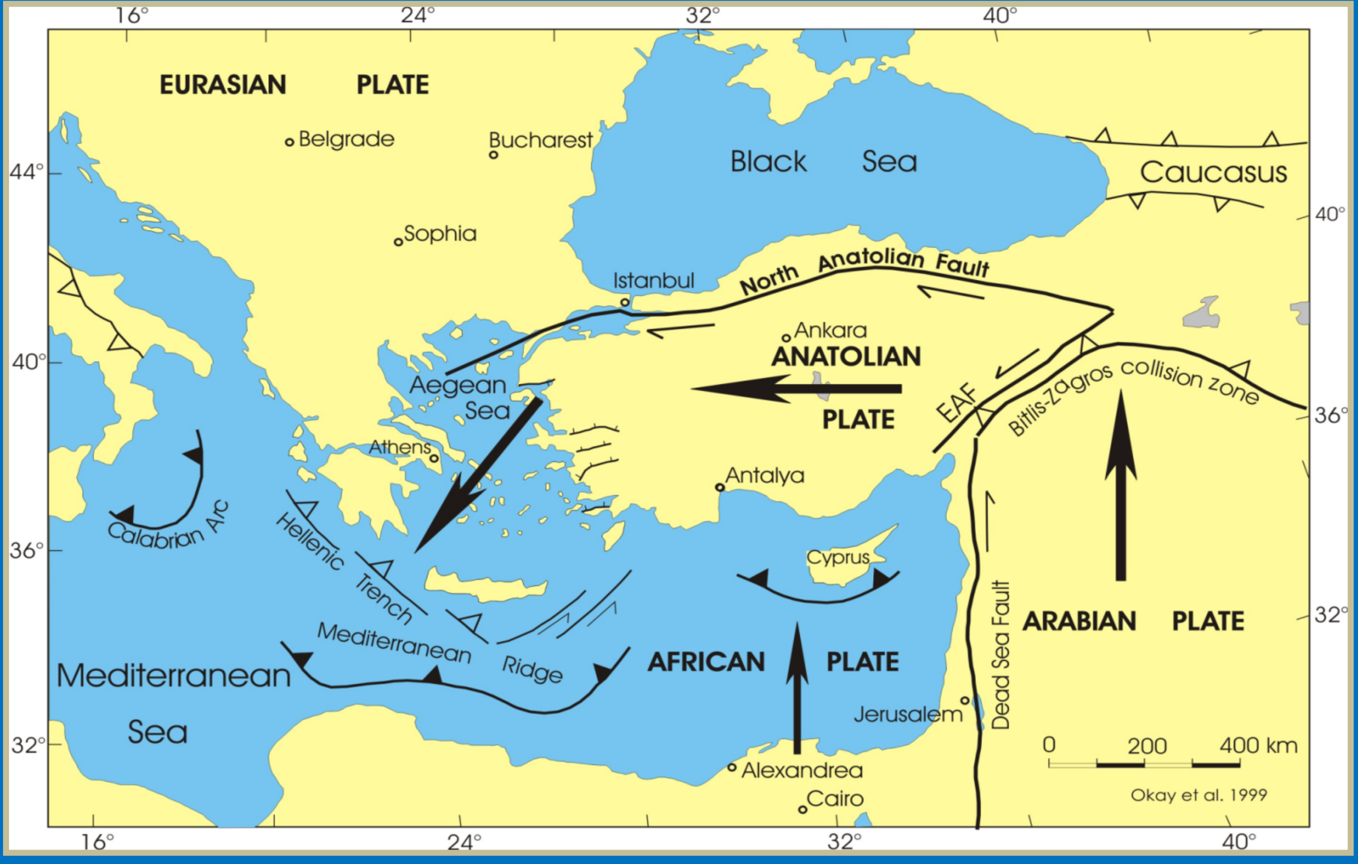
New insights for the mantle source components of the most primitive recent basaltic rocks from central and western Anatolia: Evidences for the involvement of pyroxenite and the peridotite source domains

Department of Geological Engineering
HACETTEPE UNIVERSITY

Biltan Kürkcüoğlu &Tekin Yürür

Turkey: Setting the Tectonic Stage

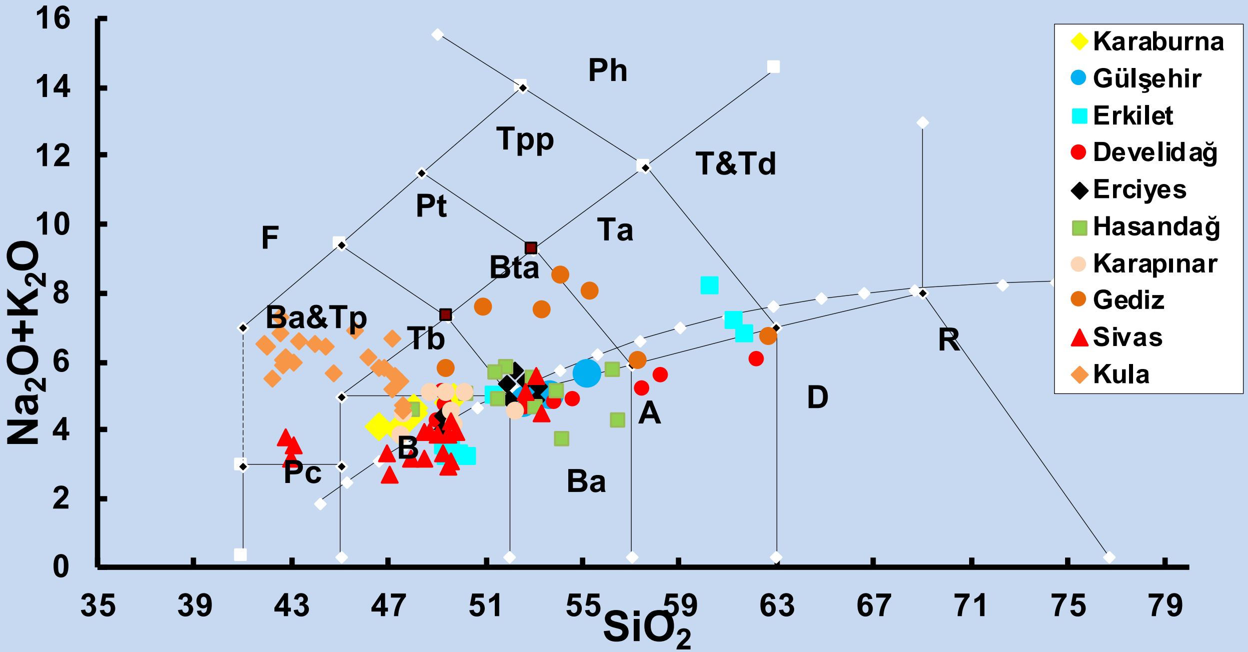


CHEMICAL COMPOSITIONS AND AGES OF CENTRAL AND WESTERN ANATOLIAN BASALTS

Basaltic rocks	SiO_2 (%)	MgO (%)
Karaburna basalts	46.6- 49.63	5.83-7.54
Gülşehir basalts	52.6-55.24	5.36-7.07
Sivas Basalt	46.97-53.05	7.27-10.58
Erciyes basalts	49.21-54.37	4.62-7.07
Erkilet basalts	49.32-51.47	6.4-7.23
Develidağ basalts	49.14-54.69	4.17-6.90
Hasandağ basalts main vent South of Hasandağ Cinder Cones	48.39-51.89	7.15-10.51
Karapınar	49.07-52.18	7.07-10.34
Kula	42.62-49.08	4.57-10.91
Gediz	49.48-55.37	4.28-9.63

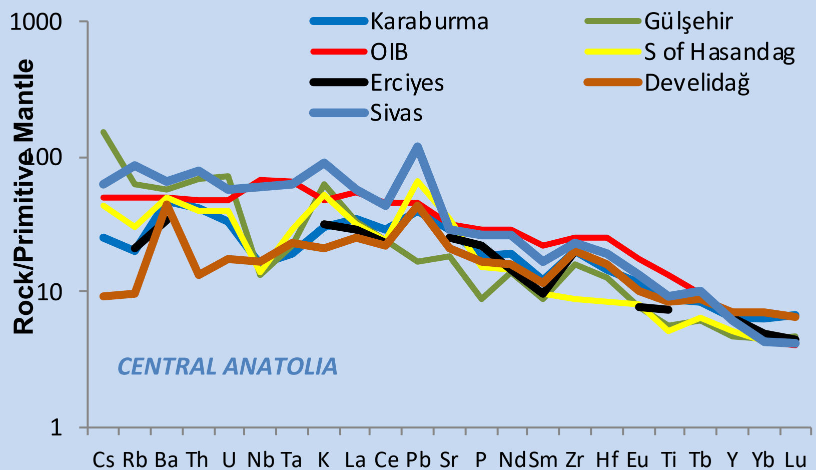
AGES	LITERATURE
Karaburna basalts **1228 ± 46.4 Ka**	Doğan , 2011
Gülşehir basalts **408.6 ± 28.5 -94.5 ± 18.2 Ka**	Doğan , 2011
Sivas Basalt **3.34 ± 0.08 Ma**	Türkecan et al., 2000
Erciyes basalts **1.734 ±0.069 Ma** **0.53 ±0.04 – 0.15 ±0.07**	Notsu et al.,1995 Ercan et al.,1991
Erkilet basalts **3.1 ±0.4 Ma** **5.29 ±0.46 Ma**	Türkecan et al., 1991 Dönmez et al., 2003
Develidağ basalts **3.1 ± 0.2 Ma**	Dönmez et al., 2003
Hasandağ basalts **0.092 Ma** South of Hasandağ Cinder Cones	Deniel et al.,1998
Karapınar **0.714 -0.02 Ma**	Ercan et al., 1990, 1992,

Mafic lavas abundant at many locations in Central and Western Anatolia



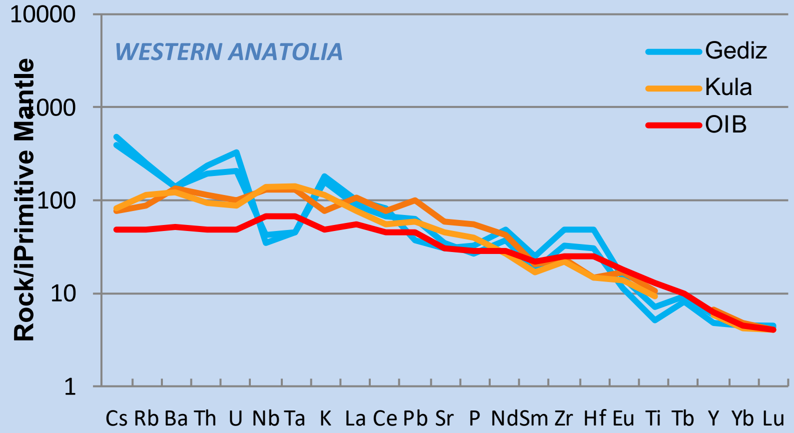
Data from: Kürkcüoğlu et al., 2001; Kürkcüoğlu, 2010, Kürkcüoglu et al., 2015; Güçtekin et al,, 2009; Aldanmaz, 2002; Furman et al., (in review; Gall et al., (in review), This study

Multi Element Patterns

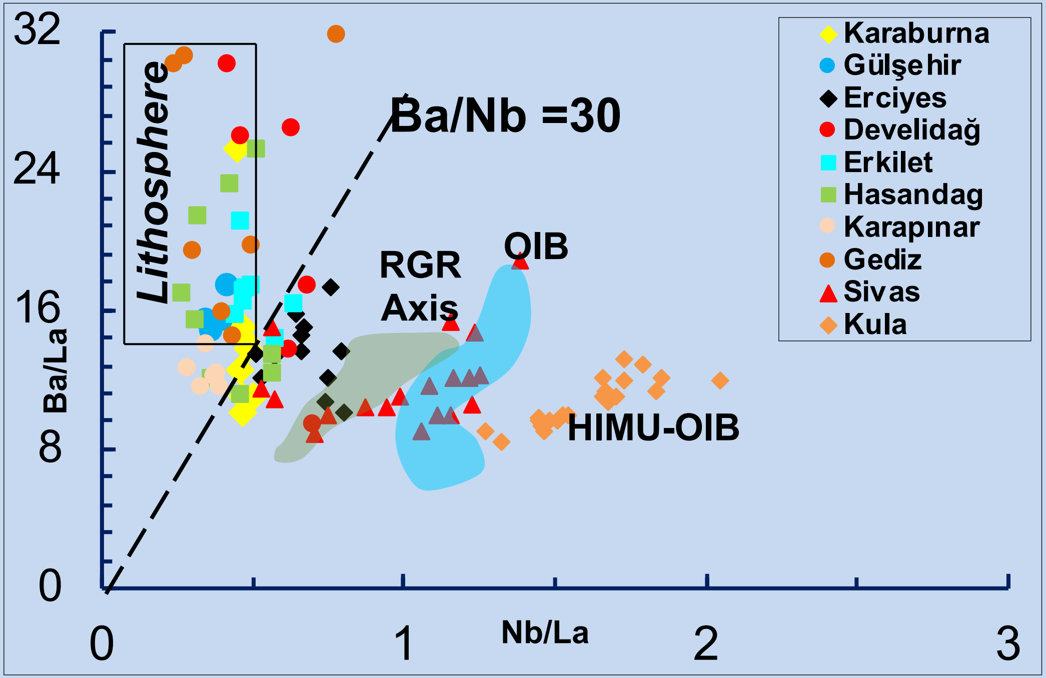


Multi –element patterns indicate the lithospheric inputs and also display OIB-like elemental signature in Sivas basalt in Central Anatolia, Kula basalt in Western Anatolia

Data from: Kürkcüoğlu et al., 2001; Kürkcüoğlu, 2010, Kürkcüoglu et al., 2015; Güçtekin et al,, 2009; Aldanmaz, 2002; Furman et al., (in review; Gall et al., (in review), This study



Trace elements

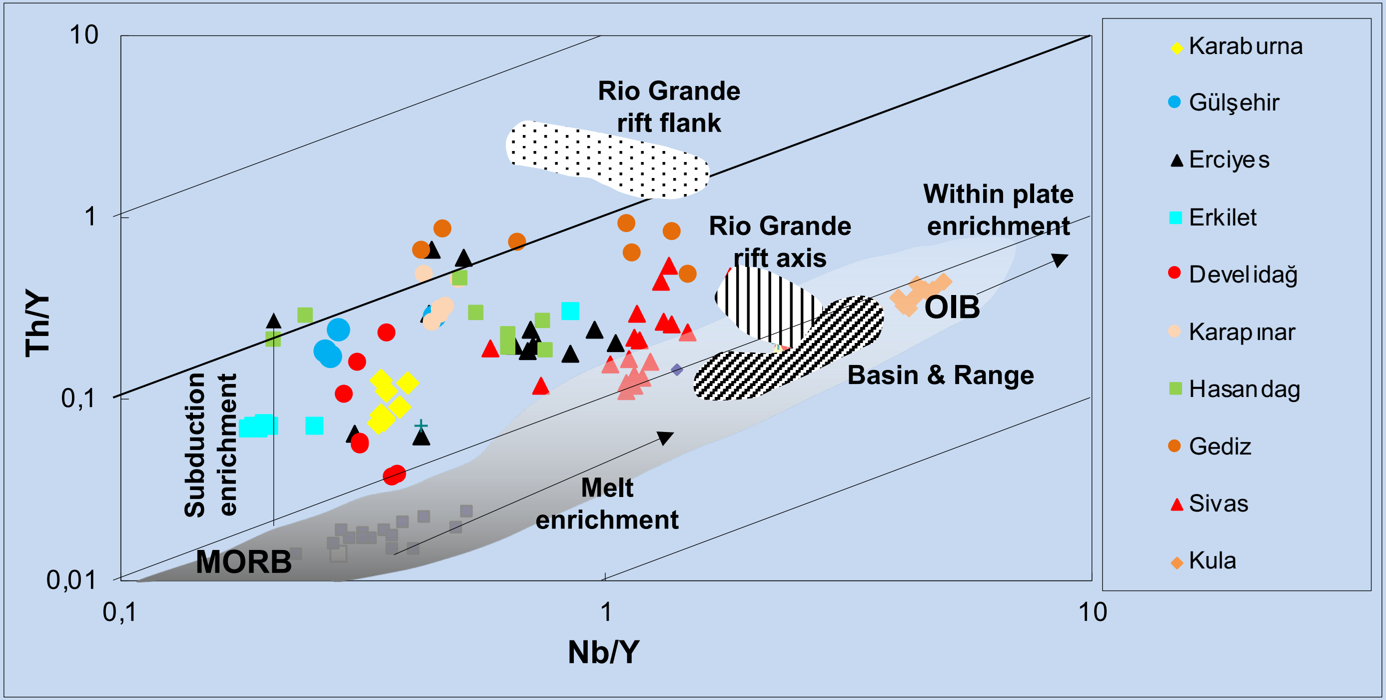


Low Nb/La (< 1) and high Ba/La ratios imply lithospheric involvement.

Sivas basalts in the East and Kula basalts in the West display asthenospheric origin.

Data from: Kürkcüoğlu et al., 2001; Kürkcüoğlu, 2010, Kürkcüoglu et al., 2015; Güçtekin et al,, 2009; Aldanmaz, 2002; Ormerod et al., 1991; Gibson et al., 1993; Chen and Frey, 1985; Furman et al., (in review; Gall et al., (in review), This study

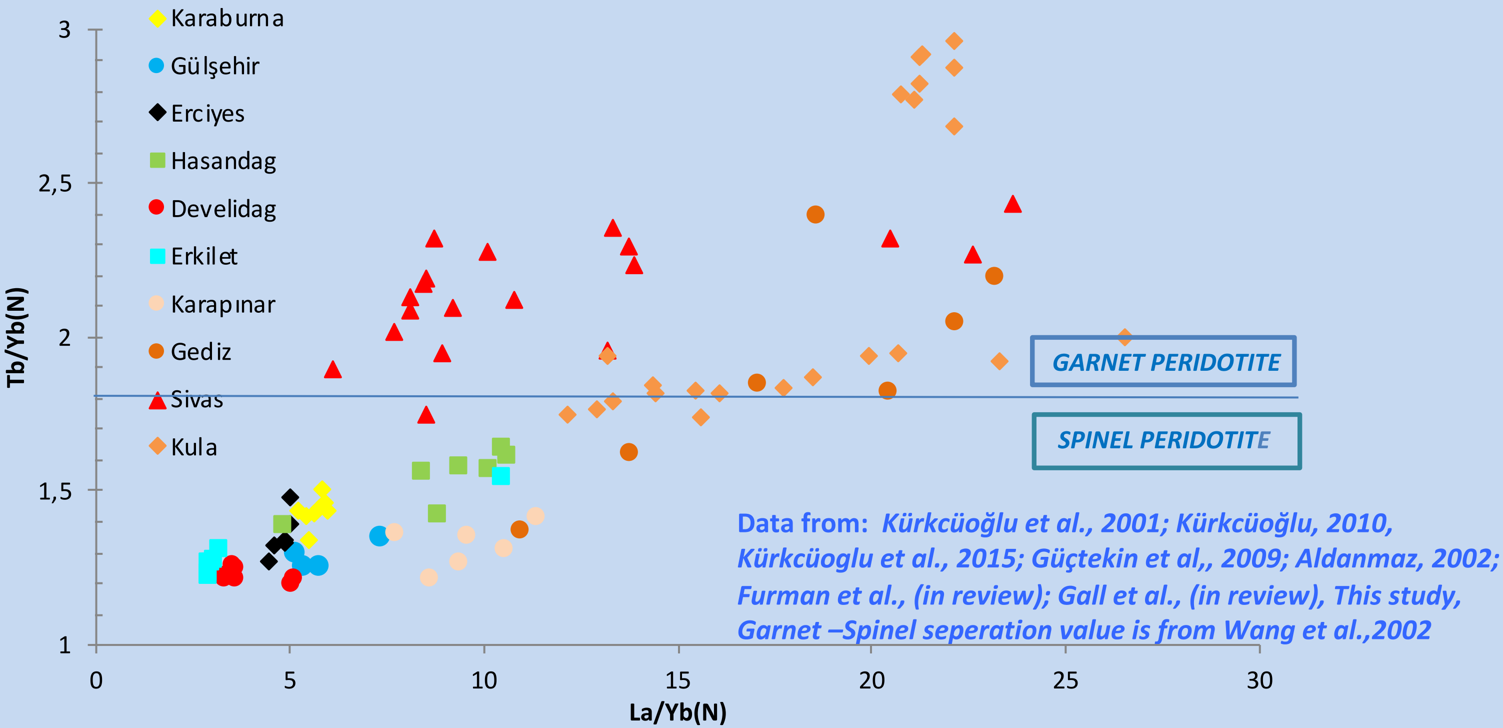
Trace elements



Data from: Kürkcüoğlu et al., 2001; Kürkcüoğlu, 2010, Kürkcüoglu et al., 2015; Güçtekin et al,, 2009; Aldanmaz, 2002; Gibson et al., 1993; Fitton et al., 1991Furman et al., (in review; Gall et al., (in review), This study

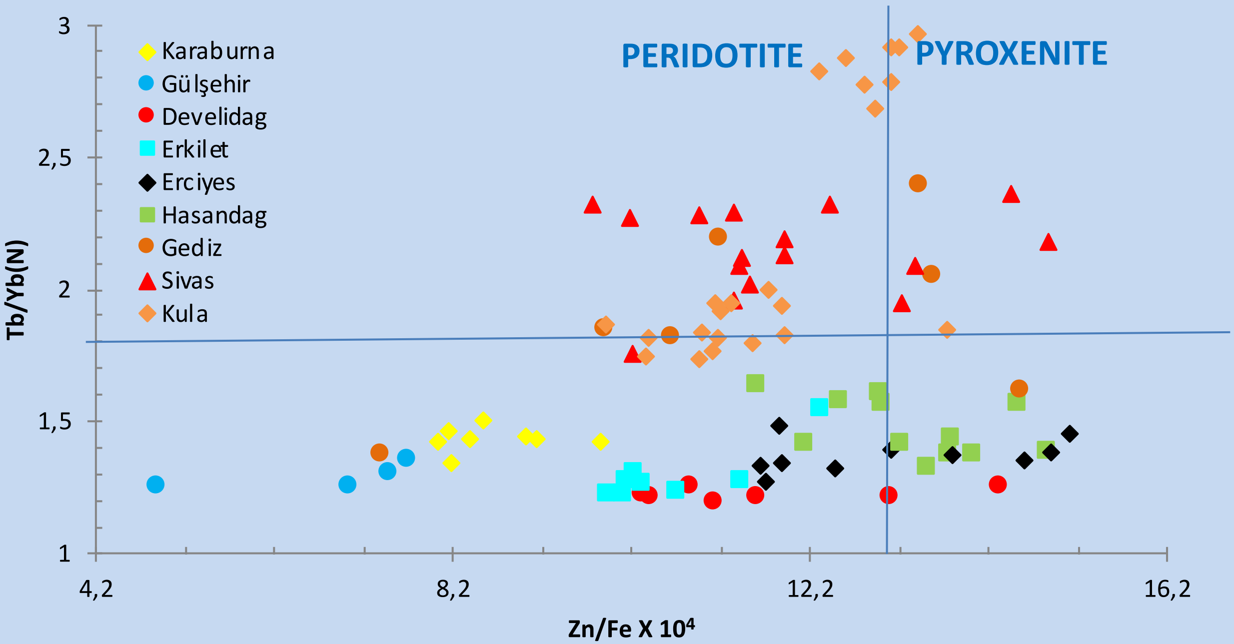
Source Constraints

Sivas basalt in central Anatolia, Kula and Gediz basalts in western Anatolia are related with garnet peridotite source



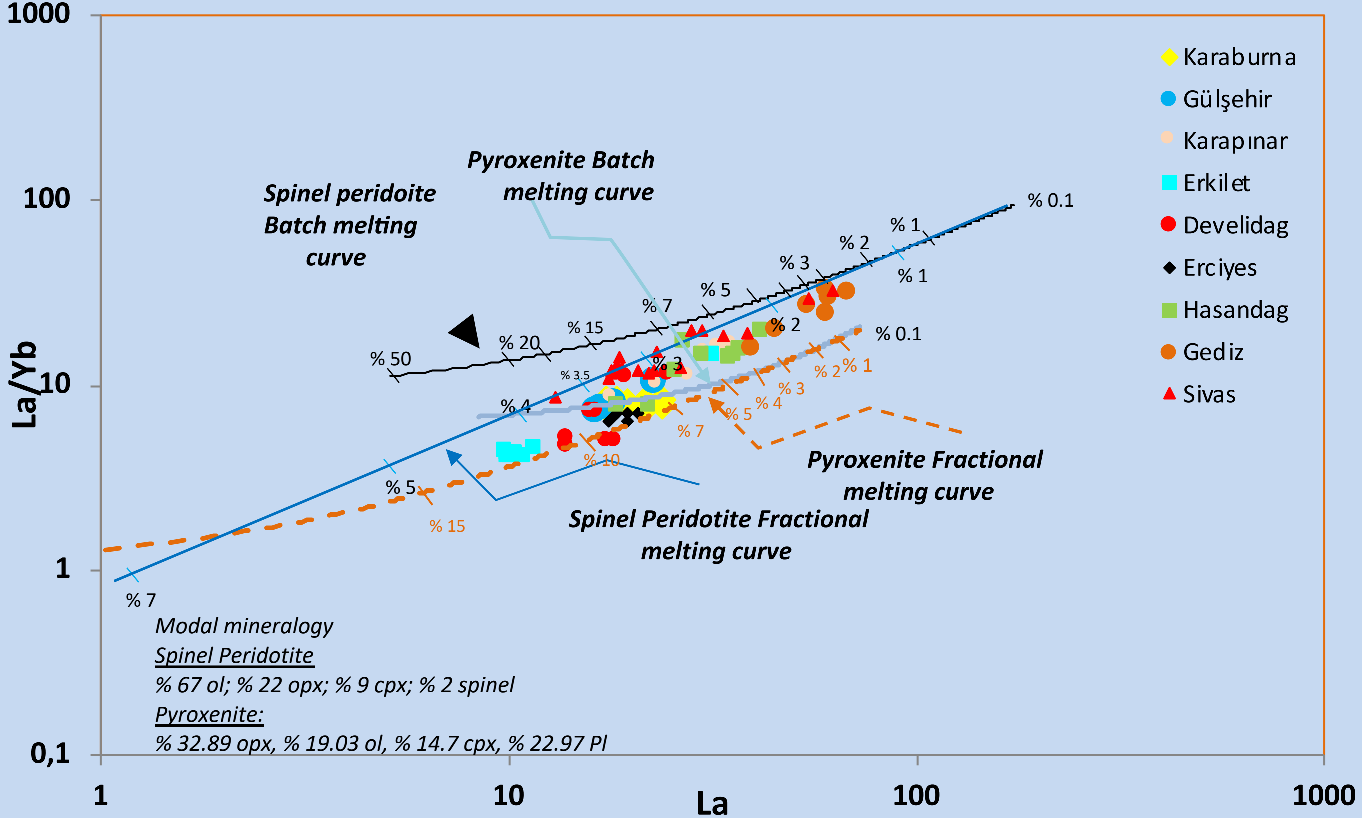
Source Constraints

Both of the source domains were involved in generation of the basaltic rocks rather than single source melting



Peridotite-Pyroxenite seperation values are from Le Roux et al., 2011

Melting Model



Basalts from many different locations are derived from both of the source domains by low degrees of melting, ranging between 3 -10 %

Conclusions

Zn/Fe ratio displays the separation between ;

-peridotite-derived (Zn/Fe <12)

-pyroxenite-derived (Zn/Fe ; 13-20) melts *(Le Roux, et al.,2011; Ducea, et al.,2013)*

-In Central Anatolia, Monogenetic Sivas basalts, basaltic rocks from Erciyes and Hasandağ stratovolcaneos, basaltic rocks from Develidağ complex expressing the generation from peridotite and pyroxenite source domain.

-These geochemical features suggest;

Single mantle sources component is not solely responsible for the genereation of basaltic rocks.

Trace element content, Zn/Fe ratios and as well as the melting model imply that peridotite and pyroxenite source domain were involved in generation of recent basaltic rocks in central and western Anatolia, and the source melting is related with the HFS/REE and HFS/LIL elemental variations