









Outcrop showing a mafic dike intruding a leucocratic country rock on a section of the Caborca Terrane on the road from Tepoca to Hermosillo Sonora, Mex. (28.51 N; 109.46W)

#### Abstract

New data from the 90-50 Ma Laramide magmatic arc of northwest Mexico advance our understanding of regional basements. The Caborca block that moved southeast from southwestern North America and the accreted Cortes and Guerrero accreted terranes have been studied for a number of years. Our recently acquired U-Pb ages and isotopic and elemental data from rocks of Sonora and Sinaloa add to previously published information and especially include new information for southern Sonora from where only a Few data were previously reported. The goal is to better understand the source of radiogenic isotope ratios for Laramide plutons, the changing influence in these rocks from different regional basements, and the effects of plate tectonic rates and subduction.

From seven samples collected from the Mazatzal block in the north to the Guerrero terrane in the south, we determined increasing ages of 75 to 100 Ma and εHf of -5 to +7 that indicate a decreasing crustal source moving away from the craton. From four of these samples, we measured Sri, εNd and Pb 206/204 of 0.7087 to 0.7061, -10 to -3, and 18.9 to 19.6 respectively. The Sri and εNd values indicate the same decreasing crustal source as for EHf. The increasing Pb isotope signature may indicate increased incorporation of subducted oceanic sediments.

Elemental analysis were obtained on 62 samples collected from the four terranes: 3 from Mazatzal, 3 from Caborca, 50 from Cortes, and 6 from Guerrero terranes. Their average SiO2 wt% was 73.5, 68.7, 66.3, and 64.8, respectively, suggesting an increasingly primitive mantle component moving away from the craton. From these analysis we found K2O to be 4.9 wt% for the Mazatzal part of the craton and 3.6 to 3.3 for the accreted terranes. The average Sr/Y and La/Yb ratios were calculated for these four areas. The average Sr/Y ratio was 2 for Mazatzal, 33 for Caborca, 28 for Cortes, and 14 for Guerrero. The average La/Yb ratios showed a similar pattern, 9, 20, 21, and 10, respectively. This indicates a shallower magma source for the Mazatzal part of the craton, a deeper source for the Caborca and Cortes terranes, and an intermediate source depth for the Guerrero terrane.

# Characterizing Proterozoic basements and accreted terranes in northwest Mexico using new ages and isotopic and elemental data of Laramide magmatism in Sonora and Sinaloa states

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Fig 1: Variation of K<sub>2</sub>O with latitude. Notice that magmas are slightly evolved from South to North



Fig. 4: The <sup>187</sup>Hf/<sup>186</sup>Hf (ɛHf) hafnium isotope ratios show a progresion of higher in the south nearer the subduction zone to lower in the north further from the subduction zone, implying that progressing away from the craton north to south, the magma source change from more crustal to more mantle.



Fig: 7: The North to South increasing Pb isotope signature may indica te increased incorporation of subducted oceanic sediments.







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Fig 2: The La/Yb ratio can be used to suggest deep versus shallow magma sources. This plot suggest that magma in the northern terranes tended to come from a deeper source than in the southern terranes.

Fig 5: The progression of épsilon Neodimium values, from higher in the south to lower in the north, suggest the same as the Hf, i.e. a decreasing crustal component moving away from the craton.



Fig. 3: The ages show a general progression of older in the south nearer the subduction zone to younger in the north further from the subduction zone.



Fig 6: Lower initial strontium values to the south indicate a mantle source for the magmas as well as higher initial values indicate a cratonic surce to the north, i.e, crustal contamination decreases from north to south.



Fig 9: Monzonite sample 18004Eb from a iron mine in Rosario Tesopaco Sonora, gave an age of 92.4±1.5 Ma

Fig 11: Geographical location of samples analyzed in this study. The four terranes from South to North are the Gerrero, Cortes, Caborca and the Mazatzal, which have different geochemistry, age and source depth as shown in this poster.





### Conclusions

. Trace elements Sr/Y and La/Yb suggest a shallow to deeper source from south to north.

2. Ages decrease with distance from the subduction zone.

3. Hf, Sr, Nd radiogenic isotopes suggest a decreasing crustal component moving from north to south.

4. The increasing Pb isotope signature may indicate increased incorporation of subducted oceanic sediments from north to south.

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