

Implications of Late Miocene volcanism for closing the Panamanian seaway

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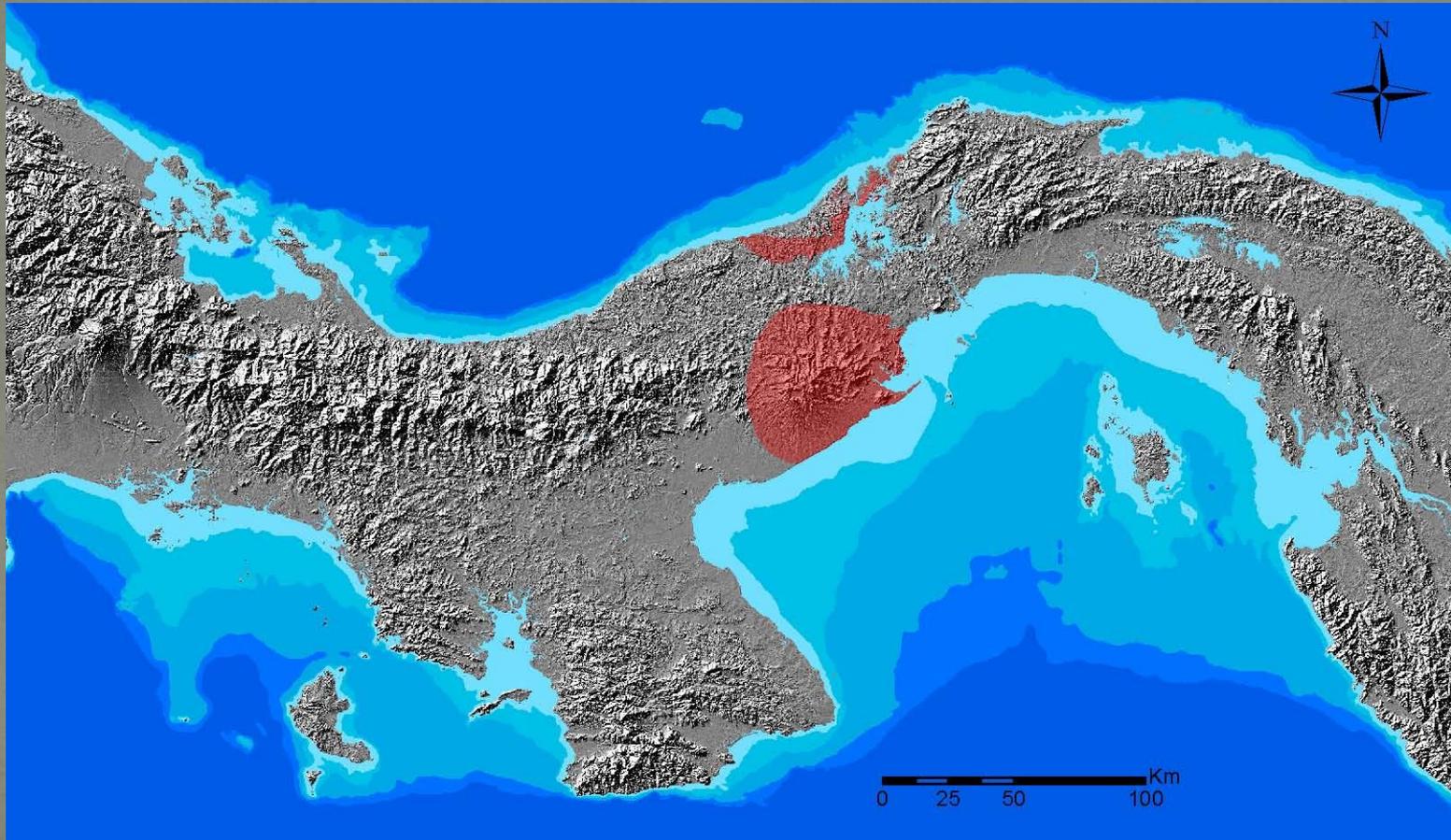
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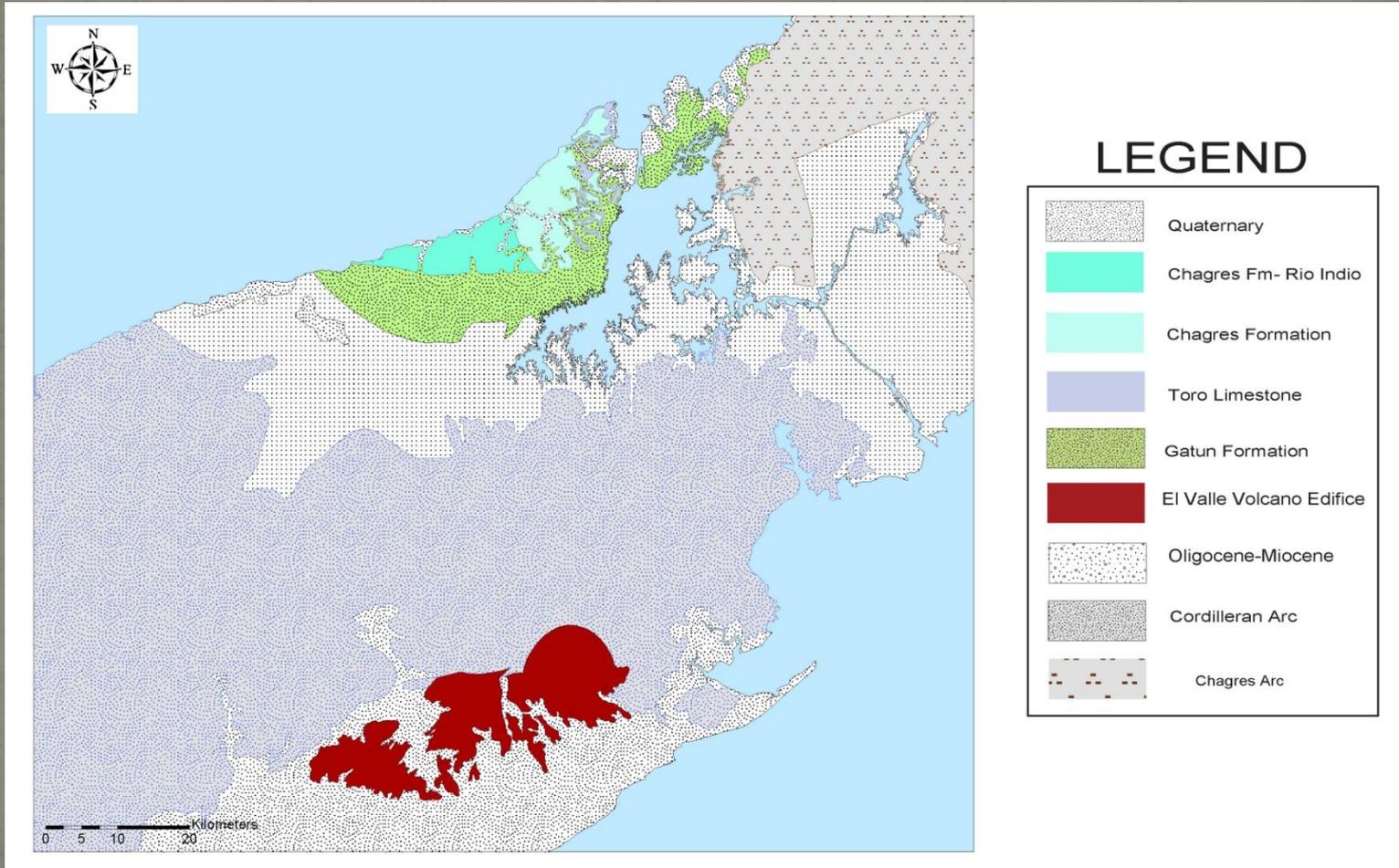
⁴Universidad de los Andes

LOCALIZATION



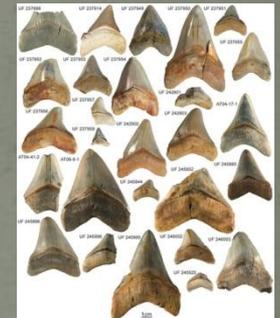
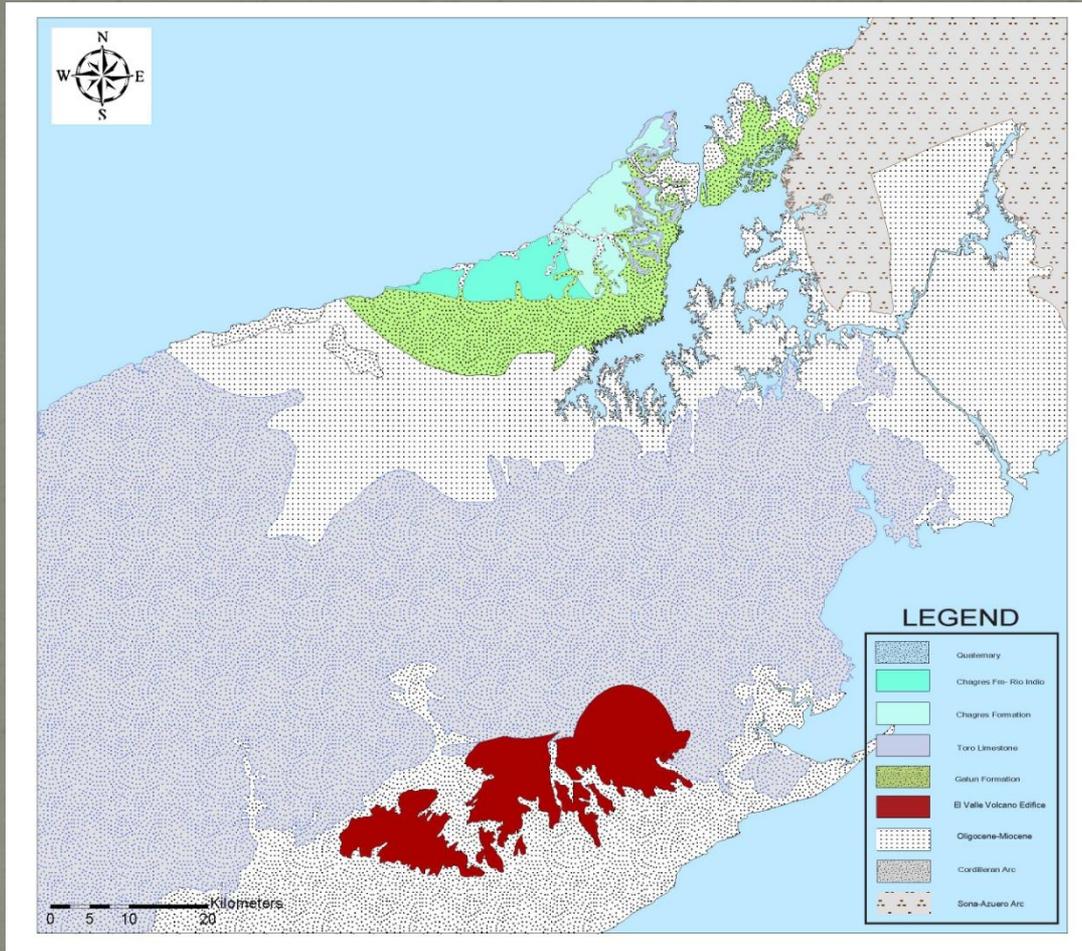
INTRODUCTION

El Valle Volcano

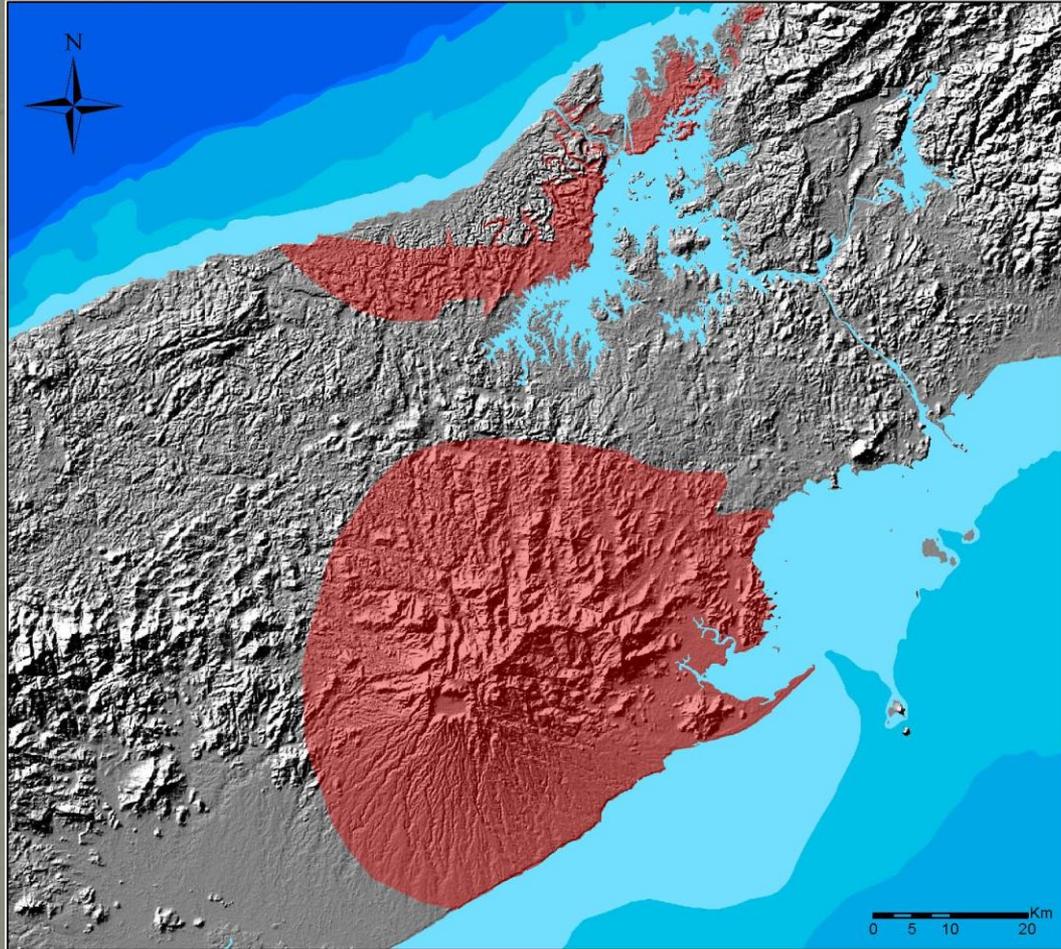


INTRODUCTION

Gatun Formation



PALEOGEOGRAPHIC SIGNIFICANCE



METHODS

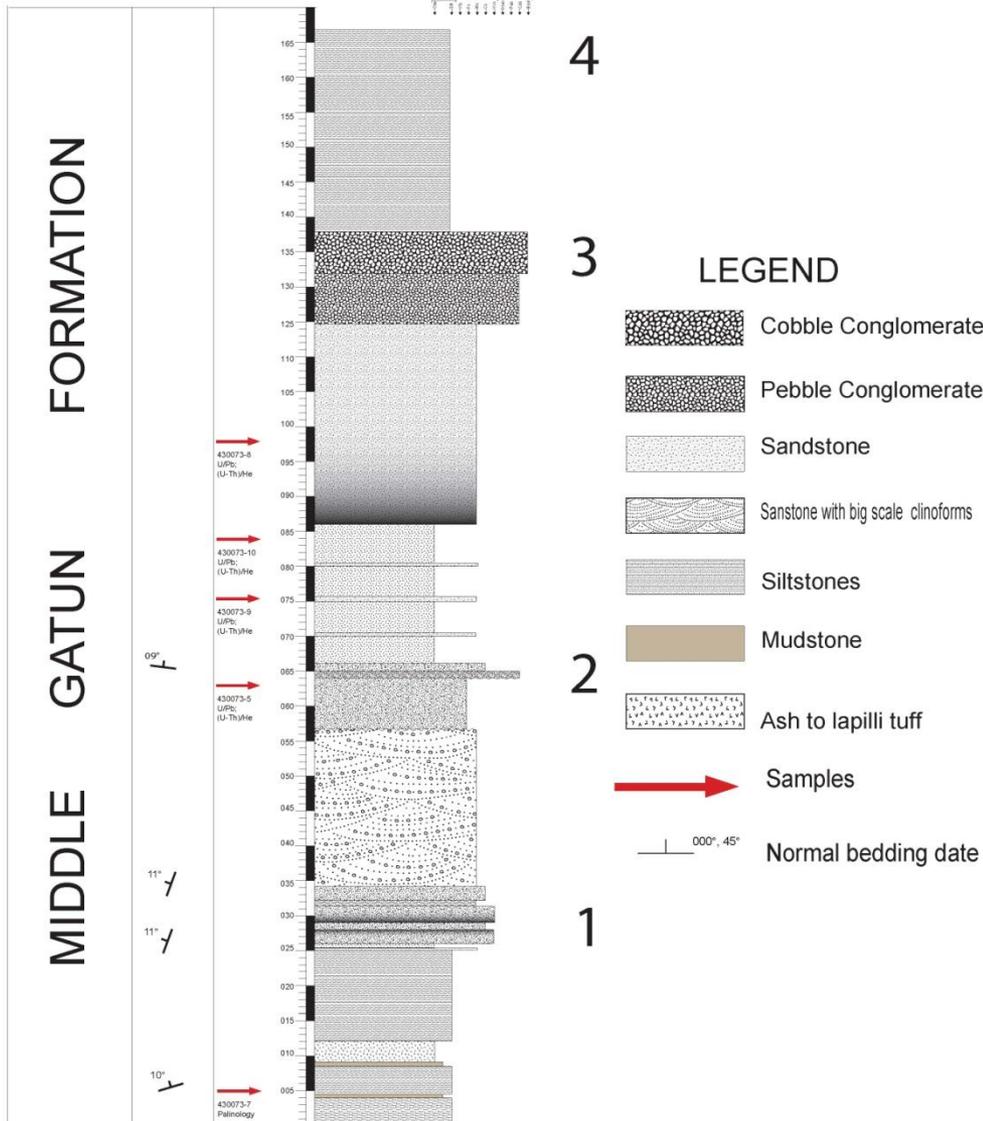
- Stratigraphic and sedimentological field observations
- Geochronology
 - U/Pb dating in zircons
 - Ar/Ar dating in feldspars
- Thermochronology
 - (U-Th)/He dating in apatites
- Geochemistry
 - Trace elements
 - Rare Earth Elements
- Compare with data sets published for El Valle Volcano in previous publications Defant et al, 1991; Hidalgo, 2011; Wegner, 2010.

STRATIGRAPHY AND SEDIMENTOLOGY

The Panama Canal Expansion



STRATIGRAPHY

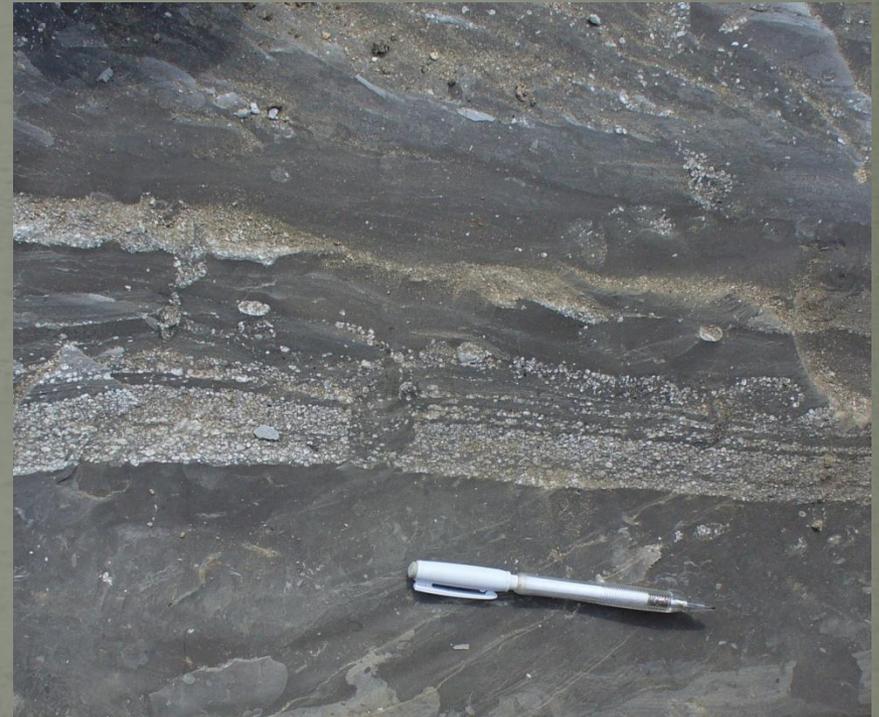
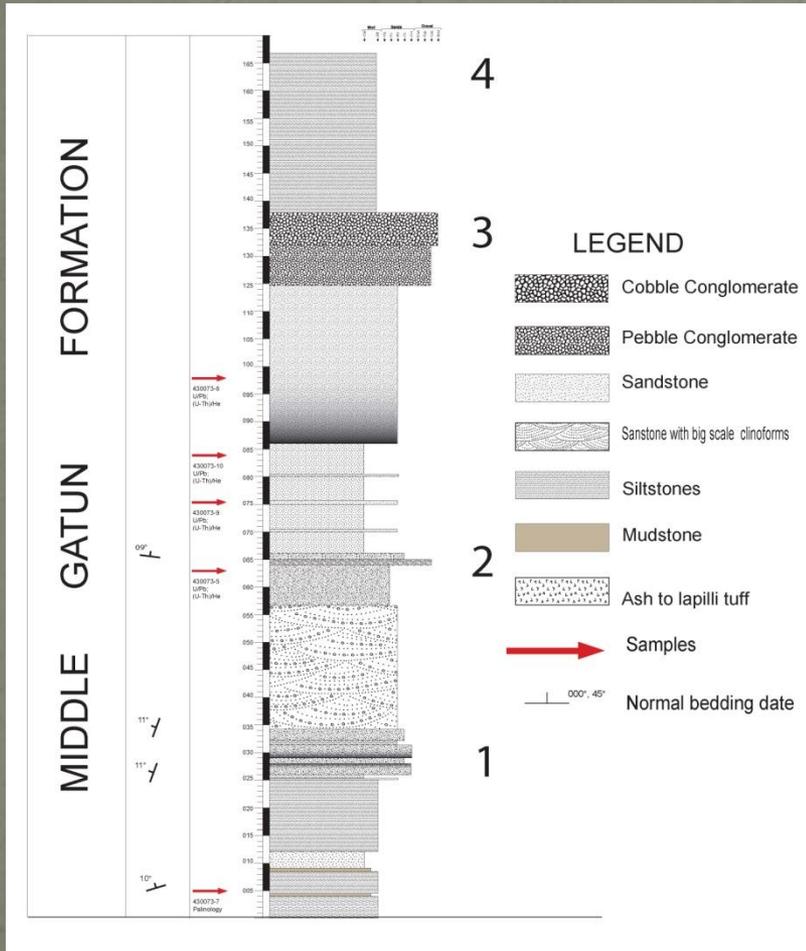


- 4 regressive - transgressive cycles in this section
- Jones, 1950; Geology of the Gatun Lake and Vicinities

SEDIMENTOLOGY

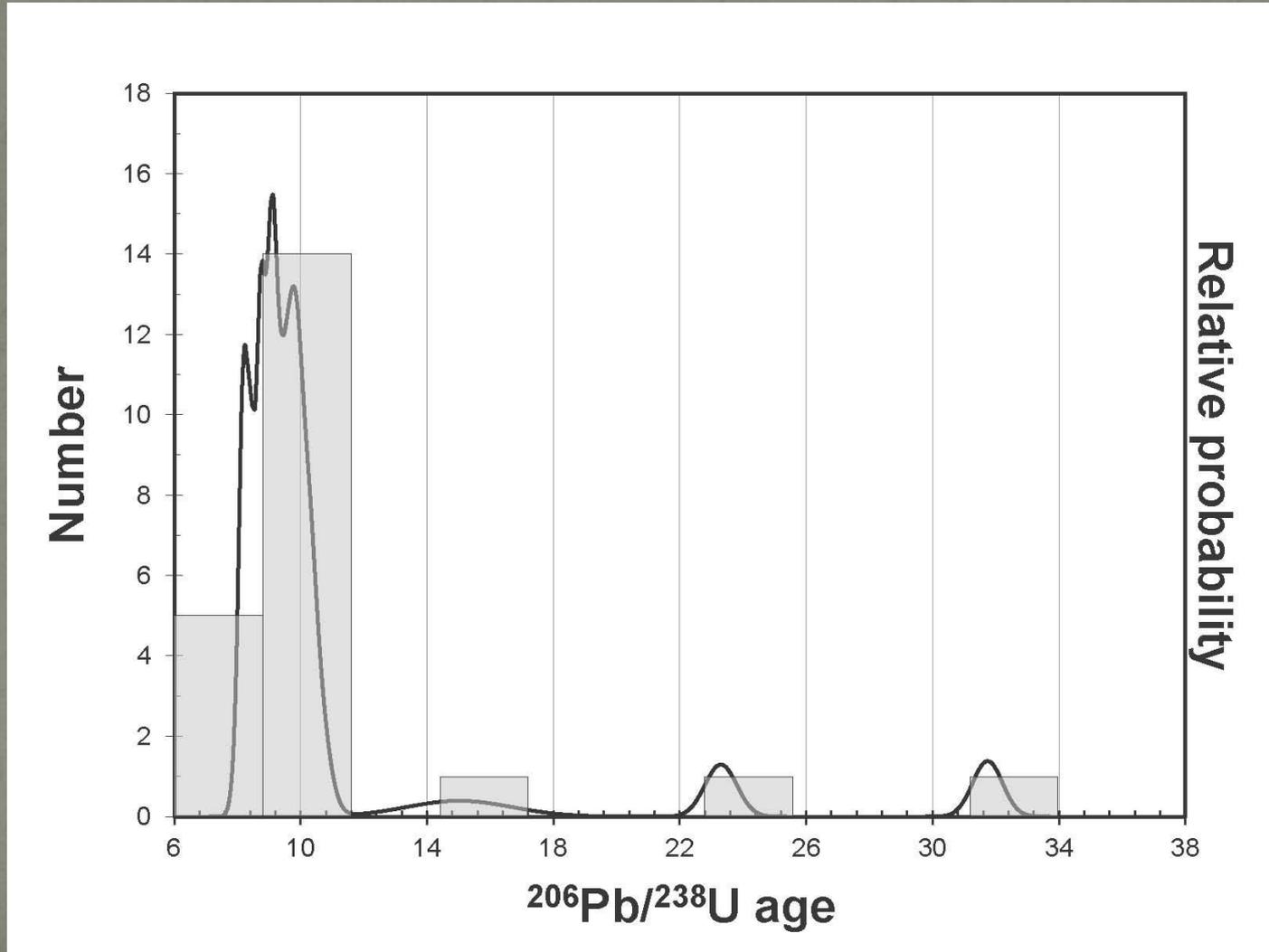


Sampling for analytical methods



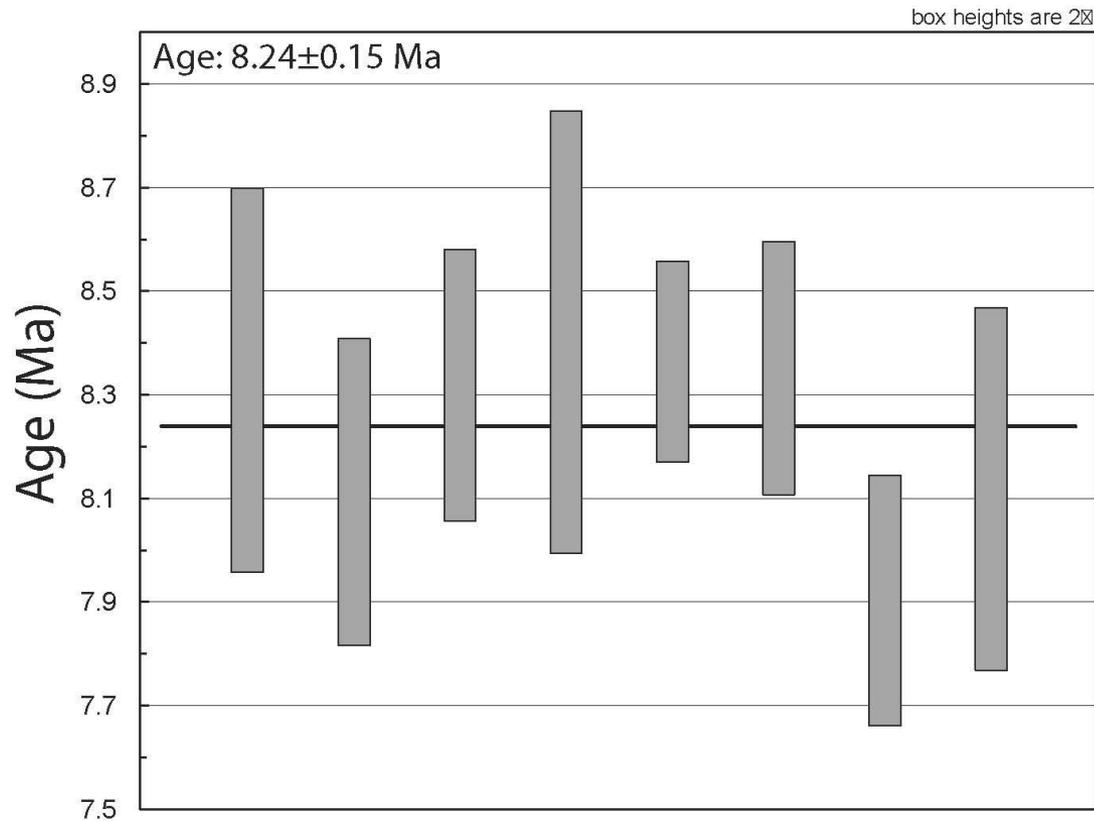
Geochronology U/Pb in zircons

Relative probability plot, main population around 8 Ma



Geochronology U/Pb in zircons

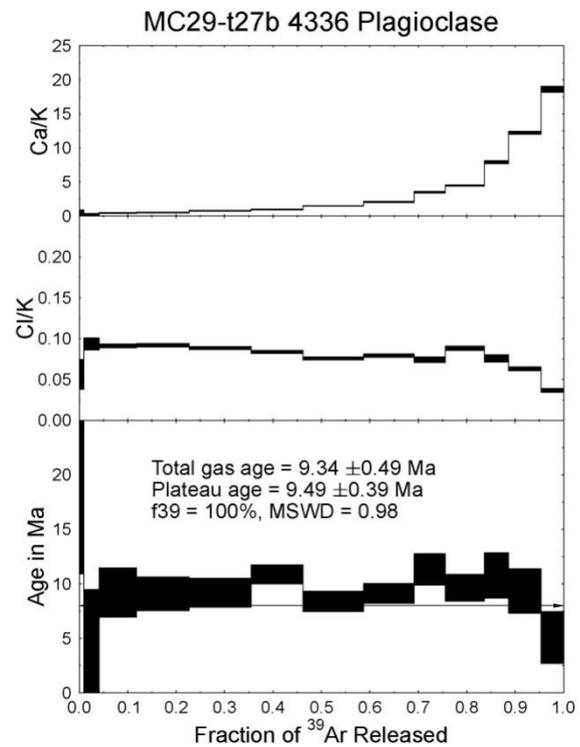
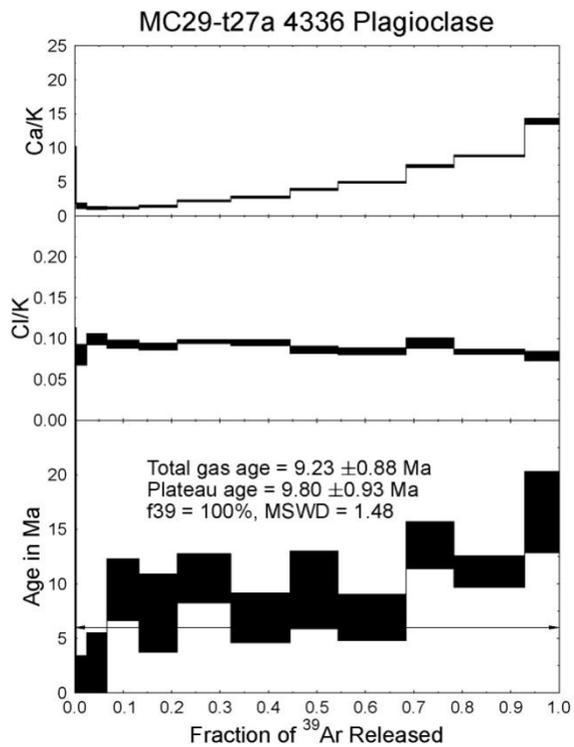
Magmatic young average age of 8.24 ± 0.15 Ma



- Collins et al, 1996, foraminifer's biostratigraphy : 8 Ma
- Defant et al, 1991; reports K/Ar ages from 5 to 10 Ma for the first activity of El Valle Volcano

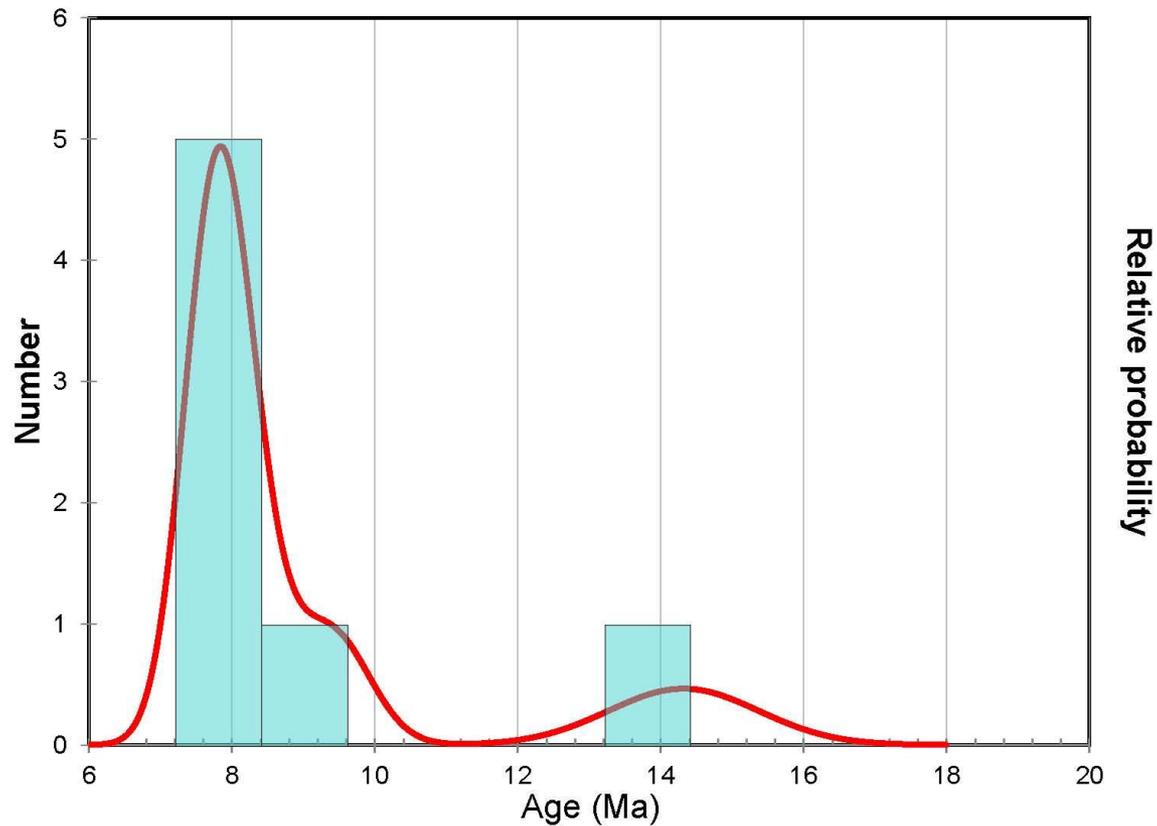
Geochronology Ar/Ar in feldspars

Spectra ages plot



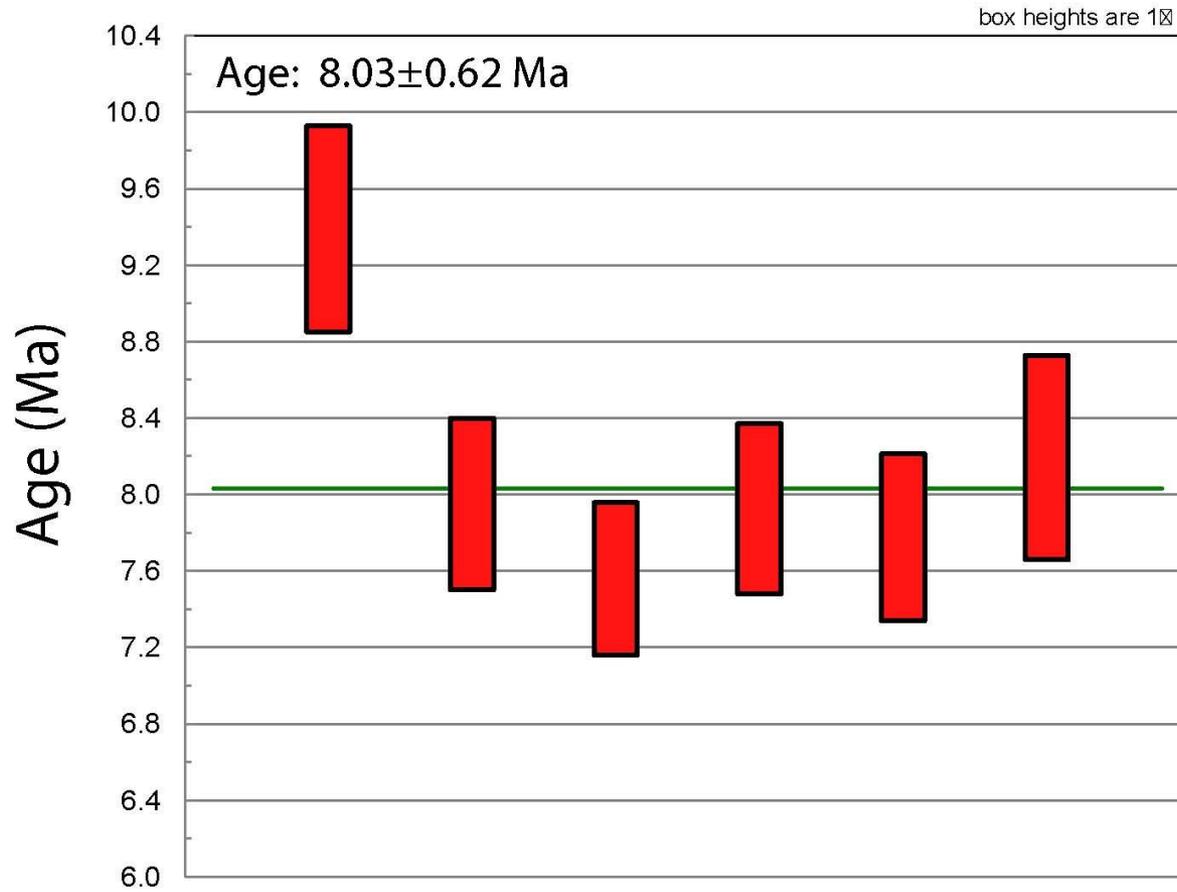
Thermochronology (U-Th)/He in apatites

Relative probability plot, main population around 8 Ma



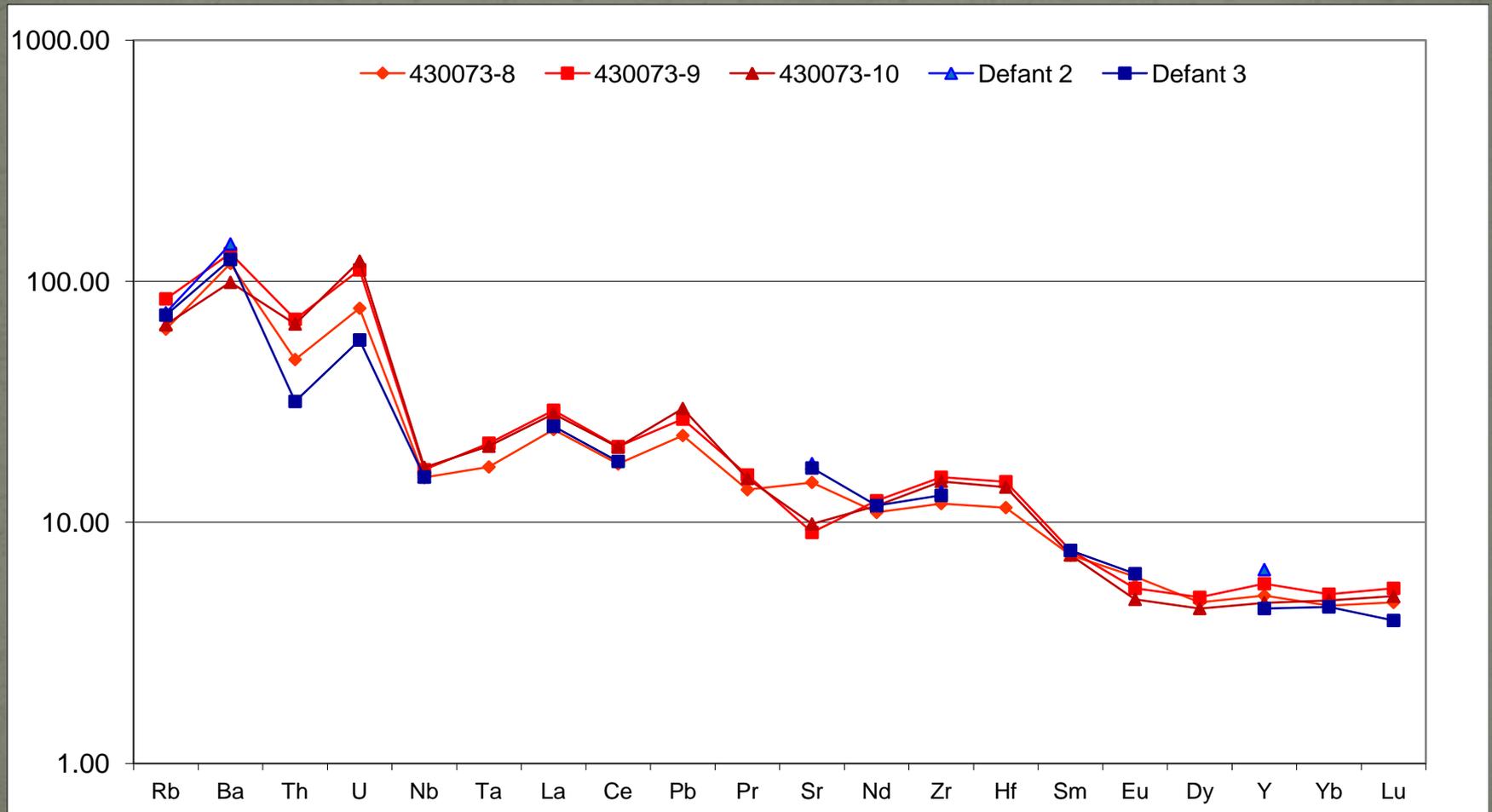
Thermochronology (U-Th)/He in apatites

Average age for the main population 8.03 ± 0.62 Ma



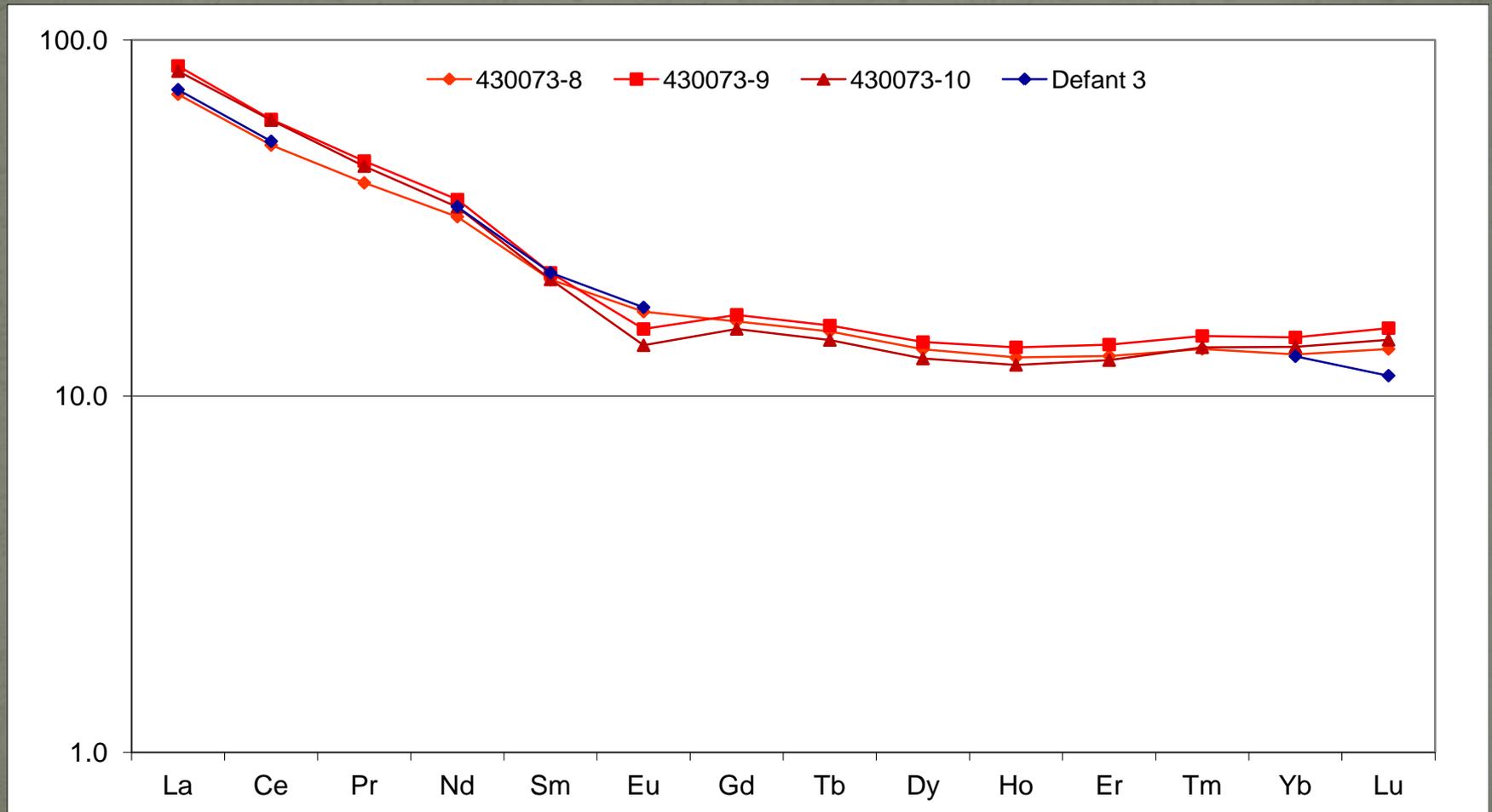
Trace Elements Geochemistry

Gatun Formation vs. El Valle Volcano Late Miocene Dacites



Rare Earth Elements Geochemistry

Gatun Formation vs. El Valle Volcano Late Miocene Dacites



CONCLUSIONS

- Sedimentological observations suggest a fluvial system draining volcanic material from any volcanic source in South Central Panama
- Geochronology show the affinity of the Gatun ages with the Late Miocene activity of the El Valle Volcano
- Geochemistry strongly constraints the source for Gatun Formation to the Guacamayo dacitic flow correspondent to the Late Miocene activity of the El Valle Volcano

PALEOGEOGRAPHIC SIGNIFICANCE

These results suggest the Late Miocene volcanic activity as the main trigger for the closure of the Central Panama Seaway



Acknowledgments

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