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Due: **Wednesday April 4, 2001**

Igneous Project, Part 2

Homework #8: Evolution of the Southern Andes

For this part of the Igneous Project, read the article by Singer et al. (1997) on the Tertiary tectonic evolution of the southern Andes. This entails a “field trip” to the library (I am inspired by Dr. Norm Lasca). The article provides a broad background on the tectonic and petrologic evolution of the Tatará San Pedro volcanic complex in Chilean Andes. Use the article as a starting point for the research for the Igneous Project. Consider the samples you observed in Lab#8 and the DDM map of the Tatará San Pedro volcanic complex – and also the new samples from the volcanic complex that have become available (listed below). You will turn in two proposed research ideas that you are interested to pursue for the Igneous Project. During lab time, you will discuss your ideas together with your group and then brainstorm to decide on the topic you would like to pursue together. Saif and I will be there, of course, for guidance to help you and your group devise a research plan.

The **Igneous Project** is comprised of -

- Part 1: Lab#8: Subduction-Related Igneous Activity: Continental Arcs
- Part 2: Hw#8: Evolution of the Southern Andes
- Part 3: Research Project

For the project it is important that you read and understand Chapters 16 and 17 in Winter (2001) on Subduction Related Igneous Activity, and refer to Chapters 8 and 9 on Chemical Petrology.

Singer et al., 1997, Volcanism and erosion during the past 930 k.y. at the Tatará-San Pedro complex, Chilean Andes, Geological Society of America Bulletin, v. 109, p. 127-142.

Additional Data Available:

You can find the data on the desktop “Petrology 302” folders on the 6 good Macs in the Mac lab (LAP 272)

Digital Dynamic Map (DDM) of the Tartara San Pedro Complex

- Condit (2000)
- Geologic map
- Field photographs
- Major, minor and trace elements
- K-Ar and Ar-Ar data for selected samples
- Paleomagnetic data for selected samples

Chemical data for the Holocene lavas from the Tatara-San Pedro complex

- Data from Singer, pers comm.
- File: Holocene.xls
- Major, minor and trace elements
- Sr, Nd and Pb isotopes for selected samples

Chemical data for the subvolcanic rocks of the Tatara-San Pedro region

- Data from Nelson et al., 1999
- PDF file or hardcopy in the Mac lab
- Major, minor and trace elements
- Sr, and Nd isotopes for selected samples

Chemical data for volcanic rocks of the Andes, NVZ, CVZ & SVZ (ca. 500 analyses)

- Data compiled by Winter, 2001
- File: AndesVolc.xls
- Major, minor and trace elements

Chemical data for plutonic rocks of the Andes, mainly Peruvian Andes (ca. 250 analyses)

- Data compiled by Winter, 2001
- File: AndesPlu.xls
- Major, minor and trace elements

References

- Condit, C., 2000, Dynamic digital maps: a Macintosh CD-ROM, Dept. Geosciences contribution No. 72, University of Massachusetts, Amherst, Massachusetts.
- Nelson, S., Davidson, J.P., Heizler, M. and Kowallis, B., 1999, Tertiary tectonic history of the southern Andes: The subvolcanic sequence to the Tatara-San Pedro volcanic Complex, lat 36° S, Geological Society of America Bulletin, v. 111, p. 1137-1404.
- Singer, B. and others, 1997, Volcanism and erosion during the past 930 k.y. at the Tatara-San Pedro complex, Chilean Andes 36° S, Geological Society of America Bulletin, v. 109, p. 127-142.
- Winter, J., 2001, An Introduction to Igneous and Metamorphic Petrology, Prentice Hall, 697 pp.

Samples (hand specimen and thin section) from the Tatara San Pedro Complex.
(includes new samples)

H-1 (Qlh)
H-7 (Qlh)
H-11 (Qlh)
H-16 (Qlh)
H-20 (Qlh)
H-23 (Qlh)
H-69-311b (pumice sample) (Qlh)
H-72 (Qlh)
H-73 (Qlh)

BP-1 (Qtd)

LV-4 (Qem)
LV-18 (Qem)

QH2-1
QTW 10-3 (Qqt)
QTW 11-3 (Qqt)
QTW 11-4 (Qqt)
QTW 11-12 (Qqt)
QTW 12-1 (Qqt)

Botagura granite (=Huemel granite, Tgh)

CV Cerro Volcan alkaline volcanics from the AVZ at 46° S - related to subduction of the Chile Rise