Deep Ocean Exploration Institute
Final Project Report

Project Title: *Thallium isotopes as tracers of the origin serpentinizing fluids in the Mariana Fore Arc*

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What were the primary questions you were trying to address with this research? (Or, if more appropriate, was there a hypothesis or theory that you were trying to prove or disprove?)

In this study we used thallium isotopes to trace the source of fluids that led to the hydration of mantle rocks (a process referred to as 'serpentinization') in the Mariana forearc.

What have you discovered or learned that you didn't know before you started this work?

We figured out that mantle rocks from the South Chamorro Serpentinite mud volcano were altered by fluids derived from compaction of subducted sediments.

What is the significance of your findings for others working in this field of inquiry and for the broader scientific community?

Before we started this project it was somewhat unclear whether fluids responsible for serpentinization of rocks expelled at the South Chamorro Mud Volcano are expelled during compaction/devolatilization of sediments overlying the basaltic crust or whether they are expelled by devolatilization of the altered basaltic crust or perhaps a combination of both.

What is the significance of this research for society?

This process has direct implications for the global water cycle as vast amounts of water are recycled back into the mantle. In order to understand this cycle, we need to identify and then quantify sources and sinks

What were the most unusual or unexpected results and opportunities in this investigation?

That thallium, a trace element in altered mantle rocks can be used to trace fluid pathways in subduction zones.

What were the greatest challenges and difficulties?

It was very challenging to completely dissolve the rocks in acid for subsequent thallium isotope analysis.

When and where was this investigation conducted? (For instance, did you conduct new field research, or was this a new analysis of existing data?)

The samples were collected during Ocean drilling Program Leg 195 Site 1200 in 2001 and the thallium isotope analyses were carried out in 2013 at WHOI.

What were the key tools or instruments you used to conduct this research?

Our key tool was an inductively coupled plasma mass spectrometry (ICP-MS) at the WHOI Plasma Mass Spectrometry Facility.

Is this research part of a larger project or program?

No, this was pilot project.

What are your next steps?

We will write up the results and publish them in a peer-reviewed journal.

Have you published findings or web pages related to this research? Please provide a citation, reprint, and web link (when available).

The findings of this study have not been published yet.

Please provide photographs, illustrations, tables/charts, and web links that can help illustrate your research.

http://www-odp.tamu.edu/publications/prelim/195_prel/195toc.html