Lawsonitology: *in-situ* LA-ICPMS Sr-Pb isotope analyses

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In order to better understand the geochemical contribution of subducting slab for the deep mantle, numerous geochemical considerations or interpretations for chemophysical processes occurring within the mantle throughout the Earth's history have been conducted based on the trace elements, stable isotope, and radiogenic isotope compositions of mantle-derived melt rocks. We have worked on a high-pressure mineral `lawsonite' that can be a proxy of Pb and Sr of a bulk subducting slab, especially of crustal lithologies. New trace-elements mass balance using a metabasaltic lawsonite eclogites confirmed the previous study that has suggested lawsonite can feature the bulk crust Pb-Sr isotope ratio due to its high concentration. Our new *in-situ* LA-ICP-MS Sr-Pb isotope analyses of lawsonite in Guatemalan lawsonite eclogites found that the preservation of original isotope signature in metabasalts and ancient seawater signature in a metachert. We also found isotope zoning in some lawsonite, indicating isotope modification by fluid-mediated metasomatism in the slab-mantle interface (or mantle wedge). We have also applied the same method to zoisite and clinozoisite and succeeded. Reconnaissance *in-situ* isotope analyses for hydrous Ca-Al silicate minerals have just begun. This method will bring new era for the studies of metamorphic rocks, consequently, convergent boundary and global scale mantle processes. Systematic isotope study of Ca-Al hydrous silicate minerals, including lawsonite, pumpellyite and epidote, have a great potential to understand Earth's secular change.

Keywords: lawsonite, in-situ Sr-Pb isotopes, LA-MC-ICPMS, secular change, external fluid, subduction zone

