The vulnerability of subsurface soil organic carbon to *in situ* warming and altered root inputs

MARGARET TORN, CAITLIN HICKS PRIES, BIAO ZHU, JANET JANSSON, EOIN BRODIE, PETER NICO, DON HERMAN, BRYAN CURTIS AND CRISTINA CASTANH[1]

[1]Lawrence Berkeley National Laboratory and UC Berkeley, One Cyclotron Rd, Berkeley, CA, (4720, USA; mstorn@lbl.gov

Subsurface soils (>30 cm) store more than half of global soil organic carbon (SOC) and the processes governing soil C turnover vary with depth. However, most SOC research has focused on surface soil and controls on subsoil dynamics are poorly understood. We are building a whole soil profile (to 1.5 m) warming experiment in an annual grassland to study the effects of warming and root inputs on SOC dynamics throughout the profile. This presentation will describe the experiment prototype and an initiative for an international consortium of replicated experiments. The soil is heated with resistance heaters inserted to heat the profile to 4°C above ambient while maintaining the natural temperature gradient. Highly ^{13}C-enriched *Avena fatua* grass root litter will be added within heated and unheated plots, in a factorial with addition of a DOC mixture to simulate root inputs. A comprehensive suite of measurements—instrumented *in situ* and in the laboratory—will be used to quantify the effect of warming and carbon inputs on soil C and N cycling. To improve predictive understanding and model skill, the experiment is focused on hypotheses concerning: (1) temperature sensitivity of native SOC and new (added root litter or DOC) carbon inputs with depth; (2) the effects of simulated root-input treatments with depth; and (3) interactions between warming and new C inputs. This study is one of the first to study responses of subsurface SOC to global change factors *in situ* and is designed to enhance our understanding of deep SOC stabilization mechanisms and improve predictions of the fate of soil carbon in a changing climate.

Polybaric differenciation within a clinopyroxenite body in the feeder-zone of an ocean island volcano (Fuerteventura, Canary Islands)

TORNARE E.[1] AND BUSSY F.[2]

[12] Institute of Earth Sciences, Anthropole, University of Lausanne, CH-1015 Lausanne, Switzerland 1evelyne.tornare@unil.ch, 2francois.bussy@unil.ch

It is now widely accepted that fractionation processes and magma differentiation or mixing occur during magma ascent to the surface. However, location of these processes remains a subject of controversy, as are the existence and size of shallow-level reservoirs. This question arises particularly in the case of ocean island volcanoes, which are not supported by a thick crust.

Fuerteventura allows access to the root-zone of an alkaline ocean island volcano. The PX1 pluton is a 22 Ma-old vertically layered mafic intrusion emplaced at shallow level. It consists in a heterogeneous clinopyroxenitic body intersected by dykes of various compositions, often gabbroic, and impregnated by more evolved melts. This clinopyroxenitic body does not show any vertical or horizontal layering. Contacts against the host rock are sharp without any development of a marginal facies. In some areas, the clinopyroxenite mass is modally and texturally highly heterogeneous with numerous enclaves and blobs of wehrlite, dunite and olivine-clinopyroxenite. Enclave outlines are often blurred with progressive transition to the matrix. These features are interpreted as evidence of repeated mingling episodes of crystallizing mushes. Other places are rather homogeneous with interstitial plagioclase occurence in olivine-clinopyroxenite. Polybaric crystallization within PX1 is inferred from mineralogical assemblages, typically varying from sp-bearing dunite with high mg# (e.g. ol mg#: 82.2 - 83.2 and cpx mg#: 84.1 - 87.3) to plg-ol-clinopyroxenites or krs-clinopyroxenites with lower mg# (cpx mg#: >75.4). Moreover, whole-rock geochemistry indicate a clear differentiation trend among all clinopyroxenite lithologies. In addition cpx frequently display growth zoning with core composition of Cr-diopside evolving towards Ti-augite rims.

We suggest that the PX1 clinopyroxenite body records at least three levels of crystallization/differentiation, i.e. an upper mantle to lower crustal stage at which formed the spinel-bearing dunitic enclaves, a mid-crustal level recorded by the Cr-diopside cpx cores and a shallow-level final crystallization stage during which residual melts were extracted from the system and erupted as subaerial basaltic flows.

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DOI:10.1180/minmag.2013.077.5.20