Request Information Request ID: 1040IODP
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Created: 2011-01-23 14:43:39.456
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Modified by: jrldeans21
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Addresses
Label:Home
ATTN:Jeremy Deans
Address:2610 32nd St
Address:
City:Lubbock
State:TX
Postal:79410
Country:USA

Label:Shipping Address
ATTN:Jeremy Deans
Address:Texas Tech University
Address:Department of Geosciences: MS 1053
City:Lubbock
State:TX
Postal:79409-1053
Country:USA
General Information Request type:Research
Existing or Future: Future
Project: 335 Superfast 4
Related Request Number:
Co-Requesters
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Research Task: Advisor

Project Objective

A significant part of the Superfast 4 drilling leg is understanding and testing the two models for crustal accretion at a fast spreading ridge. The gabbro glacier model predicts increasingly large strains with depth, whereas the sheeted sill model does not. However, there remains to be a method to adequately measure ¿strain¿ in partially molten materials. We propose to measure lattice preferred orientation (LPO) utilizing SEM-EBSD and combine these data with 3-D fabric ellipsoid measurements of crystal shape preferred orientations (SPO) to evaluate gradients in deformation mechanisms and planar and linear fabric orientation and intensity in the lower crust. Magmas undergo crystallization while fabrics (foliations/lineations) form; therefore, individual phases may change shape and orientation during the crystallization history of the magma. Therefore, it is not possible to quantify strain, sensu stricto (e.g. Means and Park, 1994).

However, SPO analysis provides information on the 3D shape of phases within a rock. Gradients in the fabric ellipsoid that define the 3D SPO may act as a proxy for variations in bulk shear strain and the type of strain (e.g. flattening/constriction) (e.g. Paterson and Yu, 1994). SEM-EBSD with EDS allows quantification of LPO as well as composition in igneous rocks. Comparison with SEM and microstructural observations will allow deformation mechanisms to be defined. For example, [100][010] slip in olivine is indicative of high T dislocation creep (e.g., Yoshinobu and Hirth, 2002). Correlating high-T creep in olivine, if present, with bulk rock SPO¿s down-section provides a test of the gabbro glacier model. These data can also provide proxies for the shape of the strain ellipsoid in partially molten rocks. Samples will be collected at closely-spaced intervals where magmatic foliations, evidence for hypersolidus dislocation creep in olivine is observed (e.g. Yoshinobu and Hirth, 2002) and gradients in orientation of fabrics are observed.

Description Filename Size

Sample Handling Instructions

Sample List

Group Sample List

Exp/Leg	Site	Hole	Sample Type	Parent Sample Type	Sample Volume (cm3)	Lithological Feature	Sampling Tool	Geological Age Young (Ma)	Geological Age Old (Ma)	Geological Age Interval (kyr)	Depth Type	Depth Interval Top (m)	Depth Interval Bottom (m)	Sampling Depth Interval (cm)	Other Resolution (e.g. 1 per core)	Shipping Address	Sample Location Flexibility (cm)	Observable Method Tool (OMT)

Specific Sample List

Exp/Leg	Site	Hole	Core	Section	Half (W/A)	Particular Sampling Position Top (cm)	Particular Sampling Position Bottom (cm)	Sample Location Flexibility (cm)	Piece Number	Sample Volume (cm3)	Sample Type	Parent Sample Type	Sampling Tool	Shipping Address	Observable Method Tool (OMT)

Estimated number of Samples: 0

IODP Onboard/Onshore Measurement Data Request Measurements

General Comments