IODP Proposal Cover Sheet

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JTRACK Observatory Redeployment

Received for: 2023-04-03

Title	JTRACK APL: Redeployment of a temperature sensor string in the JFAST observatory, C0019D
Proponents	Patrick Fulton, Jamie Kirkpatrick
Keywords	Earthquakes, Tsunami, Hydrogeology, Observatory
Area	Japan Trench

Proponent Information

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Abstract

This APL proposal to IODP Expedition 405: “JTRACK”, seeks to redeploy a temperature sensor string within the JFAST Japan Trench plate boundary fault observatory in hole C0019D. The redeployment of instrumentation into this hole will allow for us to take advantage of a rare opportunity to characterize large-scale fault zone permeability through a cross-borehole experiment, made possible by passively monitoring the hydrogeologic response to nearby drilling at this site.

This experiment builds upon the prior success of the JFAST project and its borehole observatory (IODP Exps. 343/343T), and a similar, remarkable, yet at the time unanticipated, cross-borehole experiment conducted in the Nankai Trough subduction zone as part of the IODP NantroSEIZE project (Kinoshita and Saffer, 2018).

This opportunity is expected to take less than 4 days of operations time before or during IODP Exp. 405, requires no new drilling, takes advantage of existing, otherwise unused IODP investments in sub-seafloor infrastructure, requires no additional science party expertise, utilizes the same technologies and deployment and recovery strategies already planned for a separate JTRACK observatory, and will provide unique insights that are directly beneficial to the overall expedition and JTRACK objectives.

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Scientific Objectives

The primary scientific objective of this APL is to redeploy a temperature sensor string within the JFAST observatory in hole C0019D. Although a host of exciting ancillary experiments are enabled by this redeployment, our primary motivation is to characterize the large-scale fault zone permeability through a cross-borehole experiment, which would be made possible by passively monitoring the hydrogeologic response to nearby drilling at this site.

Non-standard measurements technology needed to achieve the proposed scientific objectives

This APL would utilize a temperature sensor string, similar to those previously deployed in this and other IODP observatories. Although deployment of sensor strings through drillpipe has been done several times before, this APL would utilize a wellhead mating system, already planned for a separate primary JTRACK observatory, that would enable both deployment and recovery through drillpipe.

Have you contacted the appropriate IODP Science Operator about this proposal to discuss drilling platform capabilities, the feasibility of your proposed drilling plan and strategies, and the required overall timetable for transiting, drilling, coring, logging, and other downhole measurements?

yes

Science Communications Plain Language Summary

Using simple terms, describe in 500 words or less your proposed research and its broader impacts in a way that can be understood by a general audience.

This proposal seeks 4 days of time during IODP Expedition 405 to the Japan Trench in order to put temperature sensors back into an existing sub-seafloor borehole observatory that crosses the plate boundary fault. Measuring temperature in this hole while other new holes are drilled, will allow us to understand the how easy it is for water to flow through the cracks and fractures around this earthquake and tsunami generating fault. Temperatures in the observatory are expected to change when water flow driven by the drilling of the new nearby holes travels through the rocks and passes by the observatory. Understanding how easily water flows through rocks in fault zones is important for understanding how changes in water pressure can affect how easily the fault is able to slip.

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Proposed Sites (Total proposed sites: 1; pri: 1; alt: 0; N/S: 0)

Site Name	Position (Lat, Lon)	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
JTCT-01A (Primary)	37.9387 143.9133	6898	855	5	860	The sole operational objective is to redeploy a ~830 m - long temperature sensor string in the cased observatory hole C0019D.