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IODP Proposal Cover Sheet

618-Full3

☐ **New** ☒ **Revised** ☐ **Addendum**

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Title:	Dating Tibetan Uplift and Evolving River Drainage Patterns in East Asia using the Sedimentary Record of the Red and Mekong Rivers		
Proponent(s):	Peter D. Clift, Nguyen Trong Tin, Lars Henrik Nielsen, Yoshiki Saito, Vu Van Kinh, Nguyen Anh Duc, Gwang Hoon Lee, Le Dinh Thang, Steve Dorobek, Andrew Carter, Lars Ole Boldreel, Nguyen Van Dac, François Métivier, Yan Pin, Nguyen Huy Quy, Urs Schärer, Chi Cung Thuong, Ioannis Abatzis, Mike Bickle, Nicolas Chamot-Rooke, and Shouye Yang.		
Keywords: *(5 or less)*	Tectonics, Climate, Provenance, Erosion, Stratigraphy	Area:	SE Asia

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Permission to post abstract on IODP-MI Sapporo Web site: ☒ Yes ☐ No

Abstract: (*400 words or less)*

The rise of the Tibetan Plateau is understood to affect the intensity of the Asian monsoon. However, demonstrating the link between plateau uplift and the Asian monsoon has been hindered by a lack of information concerning the uplift history of Tibet preserved onland. Within the eastern Tibetan Plateau the great rivers of East Asia incise deep valleys whose excavation is linked to plateau uplift. This incision should correlate with an increase in clastic sediment supply to the adjacent Asian marginal seas. In addition, the uplift and eastward growth of the plateau has resulted in capture of headwater drainage from one river by another, especially close to the eastern Himalayan syntaxis, where the river courses lie close together. Such changes in drainage geometry should be recorded in the pattern of sediment dispersal from the mouths of these rivers and recorded in the thickness and distribution of sediment along the continental margin. Tibetan uplift is also linked to strengthening of the monsoon, which must have influenced erosion rates and weathering regimes in SE Asia. Thus recognition, documentation and dating of offshore sedimentation is the best avenue for dating the uplift of eastern Tibet, its spatial variability, and its relationship to the Asian monsoon. We propose to drill deep-penetrating riser wells in the shelf and offshore slope of the Mekong and Red Rivers and to sample the erosional flux from each river through the Cenozoic. Locating wells within the framework of a regional seismic stratigraphy will allow volumes of sediment to be defined and dated by magneto- and biostratigraphic methods to provide a high resolution sediment budget, which can be mass balanced with eroded volumes onshore. Core samples will be used to date times of drainage capture through application of bulk sediment and single grain isotopic provenance methods, which can identify loss or gain of distinct source terrains. Clay mineralogy and bulk sediment chemistry will be used to assess weathering regimes within each drainage, which might be expected to have evolved as the monsoon strengthened. The proposed drilling directly addresses issues of climate-tectonic interaction, highlighted for investigation by IODP and also contributes to IGCP projects 476, 475 and 430. Deriving reliable ages for Tibetan uplift also has significance for the continental tectonic community in that it bears on the process of continental deformation and how strain is accomodated following the India-Asia collision.

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Scientific Objectives: (*250 words or less*)

The proposed drilling in the Nam Con Son Basin, Song Hong Basin and Xisha Trough of the South China Sea is aimed at documenting the overall pattern of sedimentary flux from Tibet, as well as the changes in the sources and rates of erosion in each river basin during the Cenozoic. The erosional flux from the east Asian rivers is principally controlled by the strength of the monsoon, exhumation in the major shear zones of Indochina and the topographic elevation of Tibet. Sea-level variation has only a moderate effect of the erosional flux because of the buffering influence of the alluvial plains. Study of the East Asian marginal seas is necessary because erosional records in the Indian Ocean fans are dominated by the Himalayas and do not allow a Tibetan signal to be isolated easily. Because the strength of the Asian monsoon is apparently linked to the extent and elevation of Tibet, offshore drilling will allow testing of this tectonic-climate coupling hypothesis, through comparison of the source and volume of the erosional flux with records of paleoceanographic evolution in the Indian Ocean, with continental climate development and with radiometric dating of tectonic activity onshore. In addition, these data will constrain the continental climate and provide important information on the spatial distribution of uplift of the plateau. The history of plateau uplift can be used to understand how strain has been accomodated during the India-Asia collision, an outstanding issue in the field of continental tectonics.

Please describe below any non-standard measurements technology needed to achieve the proposed scientific objectives.

Proposed Sites:

Site Name	Position	Water Depth (m)	Penetration (m)			Brief Site-specific Objectives
			Sed	Bsm	Total	
VN-1	18°54'N 106°47'E	102	4900	10	4910	Sample erosional outflow from the Red River system and provide detailed age control to the regional seismic stratigraphy.
XI-1	17°11'N110°45'E	1564	3714	10	3724	As for VN-1 but providing additional age control for deeper water, more distal section, while allowing greater temporal penetration within a more condensed section.
VN-2	9°22'N 108°57'E	162	4982	10	4992	Sample erosional outflow from the Mekong River in order to date the onset of rapid sedimentation, as well as changes in provenance that would indicate drainage capture or loss in the headwaters
VN-3	8°38'N 109°43'E	1506	2800	10	2810	