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Arabian Night and Sea Story – Biomarkers from a Giant Mass Transport Deposit.

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The study of mass transport deposits (MTDs) is an important field of research due to the potential insights into catastrophic events in the past and modern geohazard threats (e.g. tsunamis). Submarine mass movements are very significant processes in sculpturing the structure of continental margins, particularly in their extent and magnitude that have consequences both in the modern day, as well as in the geological past. An understanding of the complex stratigraphy of a submarine mass transport deposit (MTD) might help in reconstructing the provenance and transport pathways of sedimentary material and thus give important insights into sedimentary dynamics and processes triggering specific events. Drilling operations during International Ocean Discovery Program (IODP) Expedition 355 Arabian Sea Monsoon, which took place during April and May, 2015 cored two sites in Laxmi Basin. Site U1456 was cored to 1109.4 m below seafloor (mbsf), with the oldest recovered rock dated to ∼13.5-17.7 Ma. Site U1457 was cored to 1108.6 mbsf, with the oldest rock dated to ∼62 Ma. At each site, we cored through ∼330 m and ∼190 m of MTD material. The MTD layers mainly consist of interbedded lithologies of dark grey claystone, light greenish calcarenite and calcilutite, and conglomerate/breccia, with ages based on calcareous nannofossil and foraminifer biostratigraphy ranging from the Eocene to early Miocene (Pandey et al., 2015). This MTD, known as Nataraja Slide, is the third largest MTD known from the geological record and the second largest on a passive margin. Calvés et al. (2015) identified a potential source area offshore Sourashstra on the Indian continental margin and invoked the single step mass movement model to explain the mechanism of emplacement. Initial shipboard work demonstrated the high variability in total organic carbon and total nitrogen levels in different layers within the MTD, which raises a number of questions related to the source and composition of the organic matter. Here we present the biomarker signature of the material based on gas chromatography-mass spectrometry (GC-MS) and high performance liquid chromatography-mass spectrometry (HPLC-MS) analyses. The purpose of this study is to understand the depositional and post-depositional processes of the sedimentary layers in the MTD. The unique opportunity of collaborative, multi-disciplinary data collection produced onboard the JOIDES Resolution, together with postcruise research, allows us to create a better understanding of the processes involved in creation of one of the largest known MTDs on Earth.

References:

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