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# Anisotropy of Magnetic Susceptibility, a promising technique for tsunami deposits deciphering

Patrick Wassmer (1), Christopher Gomez (2), Raphael Paris (3), Jean Roger (4), and Franck Lavigne (5)

(1) Laboratoire de Geographie Physique, UMR-CNRS 8591, Universite Pantheon-Sorbonne, Paris, France (wassmerpat@aol.com), (2) Department of Geography, University of Canterbury, College of Sciences, Christchurch, New Zealand (christopher.gomez@canterbury.ac.nz), (3) Geolab, UMR 6042 CNRS, Université Blaise PascalClermont-Ferrand, France (raparis@univ-bpclermont.fr), (4) Ecole normale supérieure, Laboratoire de Géologie, Paris, France (jeanrog@hotmail.com), (5) Laboratoire de Geographie Physique, UMR-CNRS 8591, Universite Pantheon-Sorbonne, Paris, France(lavigne@univ-paris1.fr)

The Indian Ocean tsunami (Boxing Day 2004) brought a unique opportunity to study and compare the sediment deposits with data (number of waves, directions, behaviour...) collected from eyewitnesses in the immediate aftermath of the event. On the very flat plain located East of the city of Bands Aceh, the sediment mass deposited by the waves varies from 2 cm to 80 cm and it is characterized by a landward increasing number of easily identified upward fining sequences. Up to 7 sequences have been locally identified, each of them attributed to the signature of a single wave within the tsunami wave train. A classical sedimentary analysis has been conducted on these deposits to retrieve the characteristics of the flow dynamic during sediment emplacement. Each sequence is made of medium-coarse beige sand at the base evolving to medium-fine grey sand at the top. The colour transition is sharp even if the contact is not erosional. The data provided by eyewitnesses conduct to consider the deposits as resulting exclusively from a settling during an uprush phase, even if no specific features were detected in the material to confirm this interpretation. This lack of specific features allowing distinction between uprush and backwash stage of the swash cycle is a recurrent problem in arenites emplaced by paleo-tsunamis with no possibilities to refer back to testimonies. As Anisotropy of Magnetic Susceptibility (AMS) parameters are diagnostic of the primary sedimentary fabric of natural sediments, we have used this technique as a proxy to retrieve the flow direction prevailing during sediment emplacement. This cheap and 'easy to carry out' technique has been applied to the Kajhu tsunami unconsolidated material. It has confirmed eyewitness's testimonies. Furthermore, it has also allowed the reconstruction of the hydrodynamics conditions during emplacement. Even if the technique has some limits mainly related to the sampling method (size of the sampling box, material cohesion...) it appears that AMS is a very promising proxy. The combination between classical sedimentologic approach, Passega's CM diagrams and the AMS allows a fine reconstruction of the flow characteristics during sediments emplacement. The main contributions of the AMS are (1) an evidence of the flow direction for each single wave as imprinted in the sedimentary signature, and (2) for each wave, the evolution of the flow direction from the front to the tail. This latter possibility is of high interest when working on old tsunami deposits. For the eastern coast of Banda Aceh, the wave direction determined by AMS have been compared with a model of the incidence angle of the waves, in order to better understand the wave direction variations during the whole event. This new approach should eventually lead to the precise localization of the tsunami source.