Microstructural mapping at the glaciotectonic Wissower Bach syncline (NE Rügen, Germany)

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Germany's largest island Rügen (SW-Baltic Sea) is famous for its long chalk-steep coast. The Wissower Bach syncline structure on the Jasmund peninsula (NE Rügen) is one focus area for our microstructural studies to understand the complex glaciotectonic environment in that area, comprising folds and thrust faults from the Weichselian pleniglacial.

At the southern limb of the syncline a SW-dipping thrust fault between Cretaceous chalk and the Pleistocene till below has been sampled. Beside micromorphological investigations the soft sediment thin sections were analysed with the help of a microstructural mapping method, where the long axes of clasts between 0.01 and 0.8 cm were classified into differently oriented microfabric domains (PHILLIPS et al. 2011).

Within the till bounding the fault, three different main fabrics were distinguished, from which the "S1" fabric (general dip to N as opposed to the fault) can be separated out into the sub-fabrics "S1a" (gently inclined) and "S1b" (steep). The "S2" domain is always oriented perpendicular to "S1". Furthermore, "S2" implies steeper and more gently inclined sub-domains, as well. The earlier formed "S1" fabric is dislocated (sinistral) by the younger "S2" fabric, implying a normal-fault movement to the south at the tectonic contact. The third fabric "S3" is nearly vertical. These domains could be interpreted as steeply inclined shears, on the one hand, or anastomosing sub-vertical foliation developed in response to dewatering of the till, on the other hand.

An overall sense of compressional movement to the north could be determined together with a south-directed extension, which could imply a late-stage reactivation and "gravitational sliding" at the southern limb of the syncline as the ice retreated.

A three-dimensional model of the microfabric system at the chalk-till contact has been constructed to visualise the orientation in relation to the macroscopically identified structures and the direction of thrusting.

References:

PHILLIPS, E.R., VAN DER MEER, J.J.M. & FERGUSON, A. (2011): A new 'microstructural mapping' methodology for the identification, analysis and interpretation of polyphase deformation within subglacial sediments. - Quaternary Science Reviews, **30**: 2570–2596.

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