

# Dynamic behaviour of late Quaternary East Antarctic Ice Sheet: Significance of subglacial deforming bed

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The changes in the volume of the East Antarctic Ice Sheet (EAIS) has been anticipated as the key role in the global climate changes and sea-level variations during the last glacial. The cause of stability of land-based EAIS ice sheet has been unknown. This is because of lacking of geological data of EAIS subglacial environment compared with West Antarctic Ice sheet (WAIS).

We have studied the Soya coast of Antarctica to reveal the cause of dynamic behaviour of EAIS. Distinct macro-scale subglacial geological features from a unlithified sediments were observed as follows: 1) It consists of more than 7 m thick compacted clay matrix with sub-angular and sub-rounded granules, pebbles and boulders. 2) Two types of crack develop into the sediment: low-angle cracks have a length of 10-30 cm and high angle cracks have a length of more than five meters. 3) Both cracks are consistent with the smooth shear planes indicating that the sediment was deformed in a brittle shear zone. 4) Low-angle cracks show a feature of P Shears which are coupled to each other and often intercalated gravels in a brittle shear zone. 5) High-angle cracks have a feature of Riedel Shears which continuously developed at regular intervals in the outcrop (Probably high-angle cracks converge on the lowermost part of sediment out of the outcrop). 6) Most of low-angle cracks tend to occur parallel to the ground surface in the upper part of outcrop, suggesting that the shear stress was imposed in the uppermost part of sediment. 7) Shear planes of high-angle cracks incline to the south-west direction, indicating that the shear stress was imposed from north-east to south-west. 8) Most of high-angle cracks develop in the whole of outcrop, suggesting that the deformation occurred in the whole of sediments simultaneously.

Above mentioned field evidences indicate that the subglacial bed deformation is one of the flow mechanisms which control the dynamic behaviour of the late Quaternary EAIS. The subglacial bed deformation is regarded as the major factor in causing the instability of EAIS as like as WAIS.