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Utilization of Quartz **Micro-textures** to Determine **Antarctic Ice-Sheet** Dynamics

Background

- Quartz are high in silica and not easily eroded, their features could be paramount for accurate rebuilding of past ice-cap levels.
- To gain further insight for paleoclimate estimations at Pleistocene sediment layers, the surface textures of quartz grains from the International Ocean Drilling Site U1537D were analyzed by the Scanning Electron Microscope (SEM).

Methods

- 18 samples were examined by the Scanning Electron Microscope
- 16 images were selected and coated with a thin layer of gold-palladium. To achieve high resolution images, they were created at 5kV with a 3.5mm distance using 100 magnification on the SEM instrument.
- The grains were sorted from both "high" and "low" IRD intervals using a microscope. From these samples 45 quartz grains were placed on an SEM plug, using sticky tape as an adhesive.

Results

Core 24-2-76-78: (Type - F,E,K,D) we found textures reflective of subaqueous current transport, glacial plucking and abrasive processes, and strong chemical alteration of sediment

Core 29-2-16-18: (Type - K,LB,K) we observed subangular to subrounded textures reflective of strong chemical weathering and abrasion of pre-existing sediments

Core 25-2-16-20: (Type - A,C,D,C) we observed subangular micro-textures reflective of immature sediments, and glacial plucking followed by current transport

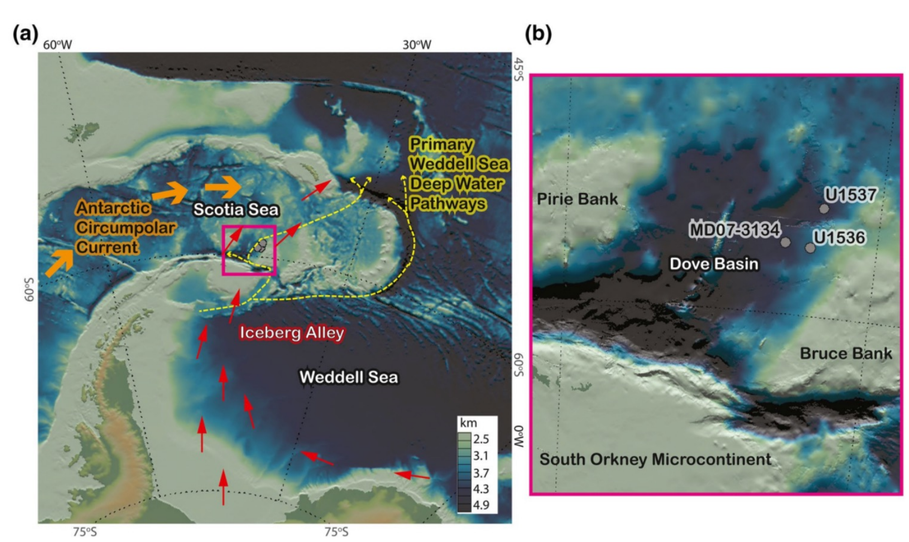

Figure 1: Map of Dove basin from area (a) and (b o)n site U1537D (T. Reilly et al. 2021)

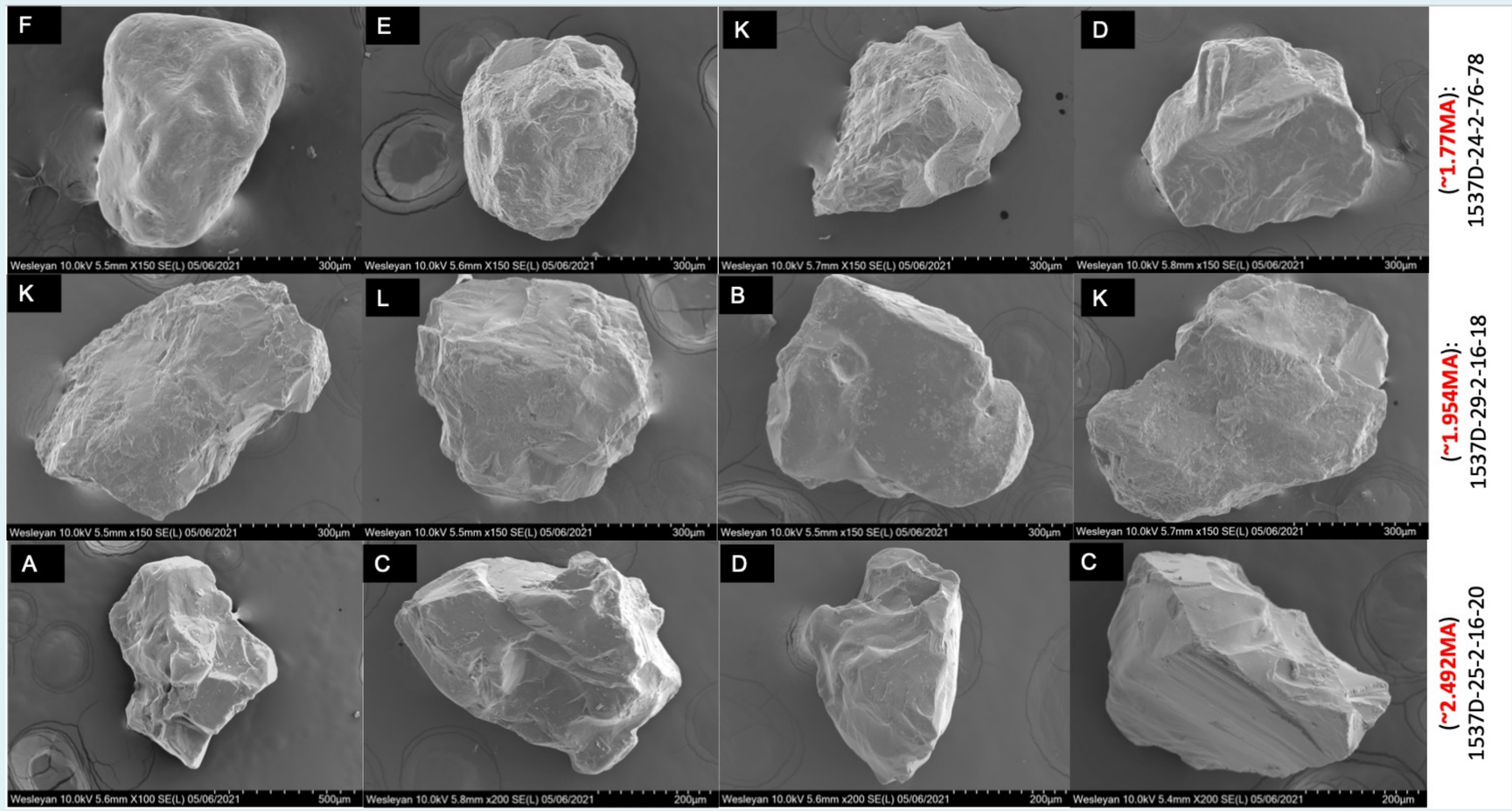

Figure 2: Quartz Micro-textures produced by the SEM instrument on 3 cores from separate sample sites

FUTURE WORK

- More quartz micro-textures must be examined to gain accurate representations of Pleistocene ice-cap history. Additional samples would be analyzed from transitioning IRD intervals to further establish precise paleoclimates.

References:
- https://doi.org/10.1029/2020PA003994
- **https://doi.org/10.1002/dep2.157**
- https://doi.org/10.1016/j.sedgeo.2016.01.021