



Using digital photogrammetry to constrain the segmentation of Paleocene volcanic marker horizons within the Nuussuaq basin

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Digital photogrammetry is used to map important volcanic marker horizons within the Nuussuaq Basin, West Greenland. We use a combination of oblique stereo images acquired from helicopter using handheld cameras and traditional aerial photographs. The oblique imagery consists of scanned stereo photographs acquired with analogue cameras in the 90'ties and newer digital images acquired with high resolution digital consumer cameras. Photogrammetric software packages SOCET SET and 3D Stereo Blend are used for controlling the seamless movement between stereo-models at different scales and viewing angles and the mapping is done stereoscopically using 3d monitors and the human stereopsis. The approach allows us to map in three dimensions three characteristic marker horizons (Tunoqqu, Kûgánguaq and Qordlortorssuaq Members) within the picritic Vaigat Formation. They formed toward the end of the same volcanic episode and are believed to be closely related in time. They formed an approximately coherent sub-horizontal surface, the Tunoqqu Surface that at the time of formation covered more than 3100 km² on Disko and Nuussuaq. Our mapping shows that the Tunoqqu Surface is now segmented into areas of different elevation and structural trend as a result of later tectonic deformation. This is most notable on Nuussuaq where the western part is elevated and in parts highly faulted. In western Nuussuaq the surface has been uplifted and faulted so that it now forms an asymmetric anticline.

The flanks of the anticline are coincident with two N-S oriented pre-Tunoqqu extensional faults. The deformation of the Tunoqqu surface could be explained by inversion of older extensional faults due to an overall E-W directed compressive regime in the late Paleocene.