



## **Sedimentary response to halfgraben dipslope faults evolution -Billefjorden Trough, Svalbard.**

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Fault growth and linkage into larger segments has profound effect on the sedimentary architecture of rift basins. The uplifted Billefjorden Through located in central Spitsbergen is an excellent example of half-graben basin development. Detailed sedimentological and structural investigations supported by helicopter and ground base lidar scans along with photogrammetry analysis have been used to improve our understanding of the sedimentary response to faulting and along strike variations in footwall uplift and hanging wall subsidence.

The early syn-rift basin fill, the Serpukhovian to Bashkirian Hultberget Formation and the Bashkirian Ebbaelven Member consists of fluvial to deltaic sandstones with minor marine incursions. During this early stage tens to hundred- meters-scale syn-tectonic faults disrupted the dipslope, and created local hanging wall depocentres where sediments were arrested. Changes in fluvial drainage pattern, development of small lacustrine basins along the faults, and the sharp based boundaries of some facies associations are interpreted as response to activity along these, mostly antithetic faults.

The basin fill of the late syn-rift stage is composed of shallow marine to tidal mixed evaporite -carbonate facies in the hanging wall i.e. the Bashkirian Trikolorfjellet Member and the Moscovian Minkenfjellet Formation. These sediments interfinger with thick alluvial fan deposits outpouring from relay ramps on the master fault i.e. drainage from the footwall. The carbonate-evaporite cycles deposited on the hanging wall responded to both the eustatic sea level variations and tectonic movements in the rift basin. Intra-basinal footwall uplift of the dipslope controlled development of an internal unconformity and resulted in dissolution of the gypsum to produce stratiform breccia. In contrast thick gypsum-rich subbasins are preserved locally in hanging wall positions where they were protected from the erosion.

The syn rift basin fill is capped by post rift carbonate ramp deposit of the Kasimovian to Asselian Wordiekammen Formation. This unit marks the final fill (and drowning) of the rift basin and covers both the hanging wall and footwall.

In this presentation our focus will be on details of the sedimentary architecture related to internal and local dipslope activity within the rift basin, particularly thickness and facies variations, and transport directions.