



Seismic studies along the western shelf of Spitsbergen and the adjacent area of West Spitsbergen Fold and Thrust Belt (Isfjorden).

M. Blinova (1), R. Mjelde (1), and Y.I. Faleide (2)

(1) University of Bergen, Norway, (2) University of Oslo, Norway

Spitsbergen is the largest island of the Svalbard archipelago that is located in the north-western corner of the Barents Sea. The island has a long history of sedimentation, structural deformation, vertical and horizontal movements. Geological studies of Spitsbergen and surrounding areas play a key role in the understanding of the geotectonic evolution of the Arctic region.

The area along the western coast of Spitsbergen is part of the mainly sheared western Barents Sea-Svalbard continental margin. This part of the margin is unique in the sense that the margin tectonics partly can be studied on exposed, virtually vegetation free, terrains located along the westernmost part of Spitsbergen.

Interpretation of multi-channel seismic reflection data acquired along the western shelf of Spitsbergen allowed identification of the main geological features of the area, including the Hornsund Fault Zone, and the Forlandsundet and Bellsund grabens. The Bellsund Graben represents the southward continuation of the Forlandsundet Graben initiated during the transpressional regime related to the evolution of the West Spitsbergen Fold and Thrust Belt. The final phase of graben formation took place during oblique extension from early Oligocene until final breakup and opening of the northern Norwegian-Greenland Sea (and the Fram Strait Gateway linking the NE Atlantic and Arctic) in Miocene time. The grabens are cut by strike-slip faults outside Isfjorden and Van Mijenfjorden, related to transfer faults evolving during breakup and opening of the Norwegian-Greenland Sea. The presence of flower-structure faults along the western major fault of the Bellsund Graben reflects transpressional and transtensional regimes during graben formation. The lowermost reflector that underlies Bellsund Graben has been interpreted as a detachment surface formed during Late Eocene?-Oligocene extension as reactivation of a thrust plane, which developed during formation of the West Spitsbergen Fold and Thrust Belt.

A dense grid of the acquired multi-channel seismic reflection lines in Isfjorden makes it possible to continue the study of the West Spitsbergen Fold and Thrust Belt farther east, within the fjord area. The seismic data allows defining fault geometries of the area and comparing it with published tectonic maps. As well, seismic interpretation permits us to analyse the relationships between the sea-bottom relief and sub-bottom fold and thrust structures.