



## **Glacial isostasy – possible tilting of petroleum reservoirs**

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Scandinavia has experienced major uplift after the last ice age. The rate of uplift along the coasts is so high that its effects have been observed within one generation. Glaciers, sediments and erosion act as loads on the Earth's surface – positive or negative. When a load is applied to the lithosphere covering the asthenosphere, part of the applied load will be supported by the elastic stiffness of the lithosphere, and part by the buoyant forces of the asthenosphere. This process is called isostasy, and the rebound over the last thousands of years has revealed how the Earth reacts to loads.

Prior to the last glaciation, northern Europe has experienced more than 30 glaciations. Glacial erosion and repeated ice loading over the last millions of years has significantly influenced the temperature history of sedimentary basins, and associated hydrocarbon maturation in potential source rocks. In addition, repeated loading of glaciers leads to an isostatic response of the lithosphere, which may cause tilting of potential reservoirs, and possible remigration of hydrocarbons. The effects of glaciations are assumed to have caused parts of the accumulation in the Johan Sverdrup field (Utsira High) due to changed migration pathways.

Glacial isostasy will lead to tilting of potential reservoirs on the entire Norwegian Continental Shelf. In the western Barents Sea and offshore mid Norway the tilts could exceed 4 m/km, dipping towards east during the glaciations.