

# Crustal deformation in the Kárahnjúkar area: GPS network measurements in 2005

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## Abstract

A major water reservoir, Háslón, will be formed as a part of the Kárahnjúkar hydroelectric project in NE-Iceland. When full, it will hold 2.4km<sup>3</sup> of water and be the largest man-made load on the Icelandic crust. In order to measure crustal deformation in the area an extensive GPS network was established by the Institute of Earth Sciences in the Kárahnjúkar area in 2005. A total of 35 benchmarks were measured within 20 km distance from Kárahnjúkar. Background deformation processes include contribution from plate spreading and the glacio-isostasy response to thinning of Vatnajökull ice cap. Effect of the Kárahnjúkar hydroelectric project include filling of Háslón reservoir and long term crustal deformation induced by increased weight on the crust. Eventual deformation due to reservoir formation may include crustal subsidence, triggered seismic activity and opening of fractures. Fault systems are located under the future reservoir, hence increased pore pressure can lead to triggered seismic activity on them. The increased pore pressure can also lead to aseismic widening of existing fissures. It is predicted that the weight of the 2.4km<sup>3</sup> reservoir may cause crustal subsidence of up to 30 cm. Due to thinning of Vatnajökull ice cap, it is important to have an estimate of uplift velocity field due to glacio-isostasy in the area. Six of the benchmarks measured in the area in 2005, are also part of the ISNET GPS network (last measured in 2004). Results indicate uplift rate of about 20 mm/yr in the area north of the ice cap.