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Decoupling of the strain at the surface and at seismogenic depth due to glacial isostatic adjustment

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We investigate the influence of the glacial isostatic adjustment (GIA) on the strain rates at the surface and at seismogenic depths in Fennoscandia. The surface strain rate field, derived from geodetic data, clearly shows the effect of GIA with a broad signal of extension in most of mainland Fennoscandia, surrounded by a radial pattern of shortening. The seismic strain rate field derived from earthquake focal mechanisms, on the other hand, mainly shows NW-SE shortening consistent with the mid-Atlantic ridge push, with a tendency towards extension on mainland Fennoscandia. The flexural stresses due to GIA depend on the previous history of ice loading/unloading and mantle relaxation, and may not be large enough to considerably alter the tectonic stress field, even if the surface strain rate field is dominated by GIA. Thus a decoupling of the strain rates at the surface and at seismogenic depths may occur. In mainland Fennoscandia, the GIA seems to influence seismicity by modifying the strain rates at seismogenic depths from the general NW-SE shortening to a more varied strain rate field with a considerable component of extension. This, however, does not change the conception that the ridge push is the main source of Fennoscandian seismicity. Other sources, such as topography and sediment redistribution, may locally influence the strain rate and stress fields in parts of Norway, which will be the focus of our future investigations.