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Fennoscandian strain rates and seismicity

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The seismicity in Fennoscandia and its surroundings is rather high given that this is within a so-called stable continental region. The nature of the seismic activity and of the underlying deformation mechanisms has been a matter of debate for many years. A factor which for good reasons has been expected to influence the seismicity of Norway is the Holocene deglaciation of Fennoscandia and the related and still ongoing isostatic rebound. However, different types of stress indicators show a nearly constant NW–SE maximum horizontal principal-stress direction for the most parts of Fennoscandia, pointing towards plate-scale forces as primary driving mechanisms for the Fennoscandian stress field and the associated seismicity, even if regional and local forces are also contributing.
In this work a thin-shell modeling technique is employed to estimate the contribution to the regional deformation field in Norway by plate-scale forces like Mid Oceanic Ridge opening, gravitational collapse of topography and the lithosphere-astenosphere interactions.
Our model predicts the highest values of compressional strain-rate to be present along the (seismically active) passive continental margin of the Norwegian Sea, while the extensional strain-rate peak is localized along the main axis of the Caledonian mountain chain, related to the still weakly active gravitational collapse of topography. The correlation between deformation and seismicity pattern supports the idea of long-term tectonic forces playing an important role in the active deformation style of Scandinavia.