

Interactive comment on “Review of some significant claimed irregularities in Scandinavian postglacial uplift in time scales from tens to thousands of years: earthquakes?” by S. Gregersen

Anonymous Referee #2

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Manuscript Review Journal: Solid Earth (SE) - EGU Title: Review of some significant claimed irregularities in Scandinavian postglacial uplift in time scales from tens to thousands of years. Earthquakes? Author(s): S. Gregersen Manuscript No.: se-2013-24 Manuscript Type: Research Article Special Issue: Lithosphere-cryosphere interactions

General:

The manuscript addresses an important and yet unresolved scientific problem, namely, understanding the deformational process in the crust in intraplate (or Stable Continental Regions) tectonic setting. The author further addresses critically the previous

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claims of large earthquakes (or irregularities in the geodetic record) in Scandinavia, with a specifically in SW-Sweden and Denmark. In addition, the author does mention the individual studies conducted in other areas of Scandinavia (i.e. Northern Norway, Northern Sweden and Finland), concerning the post-glacial earthquakes, however, without going into the details of these. In general, conclusions drawn in these latter studies in other areas of Scandinavia are accepted by the author. This implies that the author accepts the significant crustal deformation observed in these areas in the form of post-glacial earthquakes, as a response to the rapid melting of the ice-cap over Scandinavia after the last ice-age approximately 9000 years BP. Although most of the conclusions drawn in the current manuscript regarding the previous claims of significant irregularities in the Scandinavian post-glacial uplift in various time scales are plausible and compelling, the author unfortunately fails to provide clear evidence for his re-interpretations on the claimed case studies. As such the manuscript highlights the need for further studies in this direction which may provide more conclusive evidence for the alternative interpretations presented by the author.

Specific comments and technical corrections:

Pg.1 Abstract. Line 1: First and second sentence can be joined, allowing the avoid the sentence to start with “And”. Pg.1 Abstract. Line 5. It would be desirable to put the approximate timing of the last glacial. Pg.3, Line 5: please add “ . . . 10 000 years BP”. Later in the following sentence please add “and is” after Fig.1. Pg.3, Line 10: The sentence claiming that the uplift rate changed drastically from a very fast rate immediately after the deglaciation and then slowed down, deserves to be elaborated more. In case there are numerical modeling studies that can predict such behavior in the response of the lithosphere to deglaciation process, these need to be mentioned here. I believe, this issue is one of the core assumptions of the current understanding of the deformational processes in Scandinavia and as such has also very important implications in terms of the predicted deformational processes in the future with regard to the plausibility of significant earthquakes. Pg.3, Line 20: Please add “it” after the “in several

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papers, ...". Pg.3, Line 21: Please avoid using uncommon terms such as "earthquake geography". It is difficult to understand what the author means by this term. Does the author mean "observed surface ruptures of the post-glacial faults"? Pg.5, Line 24: Here it would be appropriate to refer to Hicks et al., (2000a, and b). Pg.7, Line 25: referring to the previous comments above, I would recommend avoiding conclusive statements such as "... fault is not active.". It would be better to state "There is no reason to believe that the Carlsberg Fault is active based on the presented observations, as these can easily be explained by alternative phenomena.". Pg.9, Line 9: 14-15 year old studies cannot be considered recent anymore. Pg.10, Line 6: Please rephrase the sentence "When, ..". A more appropriate formulation would be "in addition, when the physical circumstances of ocean currents and stormy weather influence the slopes, these observations in Fig.5". Pg.13, Conclusions: Maximum probable earthquake discussion is not warranted here based on what is presented in the manuscript. The author provides alternative interpretations to the observations made in the previous claims and as such there is no further discussion on the underlying processes of deformation in the Scandinavian lithosphere. We should bear in mind the recent occurrence of a magnitude 6.1 earthquake at Storfjorden offshore Spitsbergen (Pirli et al., 2010). This event is a manifestation of the size of earthquakes that are plausible and should be considered in intraplate settings in this area.

Interactive comment on Solid Earth Discuss., 5, 1615, 2013.