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## ***Interactive comment on “New zircon data supporting models of short-lived igneous activity at 1.89 Ga in the western Skellefte District, central Fennoscandian Shield” by P. Skyttä et al.***

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Our response to reviewer #1 comments may be found below; the page and line numbers refer to those in the “Discussion Paper” published on the Solid Earth web page.

It was suspected that the  $1907 \pm 13$  Ma age for the Viterliden intrusion is incorrect. For this reason, we modified the related section (p. 357 end to p. 358 start) to specify the problems with the previous dating, and provided a related reference:

“The latter is especially important because of the relatively old published age of the Viterliden intrusion with respect to the other early-orogenic intrusive units in the district (Wilson et al., 1987; Weihed and Schöberg, 1991; Lundström et al., 1997; Bergström et

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al., 1999; Weihed et al., 2002; Gonzàles Roldán, 2010). The  $1907 \pm 13$  Ma igneous zircon crystallisation age of the Viterliden intrusion presented by Bergström et al. (1999) was, however, constrained from regression of highly discordant, large multi-grain zircon fractions. The intercept age is defined with a high MSWD of 7.6 and a high lower intercept at about 400 Ma, factors indicative of an unconformable data set and a possibly unreliable age (cf. Mezger and Krogstad, 1997).”

The “missing samples”: We indicated the samples that did not produce enough/any zircon to allow SIMS dating on p. 363, line 20. These include the “mine porphyry”, therefore explaining why this important unit was not dated. Some text has been added to clarify this. The focus of the paper was in constraining the volcanic-intrusive relationship in the vicinity of the Kristineberg mine (p. 357, lines 25-26 “. . . dating several intrusive units from a geographically small area. . .”). For this reason, we did not sample the granite member of the intrusion.

Rewriting of chapter 2.3.: We slightly shortened the “Geological setting” as required by reviewer #2. However, we consider the reference to Fig. 4 as sufficient. Consequently, we do not include a more detailed description of the dated samples in this section as suggested.

We agree that there were some inconsistencies between Fig 1 and the manuscript text. We modified Fig. 1 according to the suggested corrections and in order to better honour the classification by Kathol and Weihed (2005). We corrected the related parts in the text.

The reverse discordia of zircon was considered to be an analytical artifact caused by too close position of the sample puck with respect to the sample holder. For this reason, sample IV was re-analyzed. The new results are of significantly better analytical quality, and most importantly, do not show reverse discordia of zircon. Consequently, the new results were used instead of the problematic old ones for sample IV. However, the actual age constraint for sample IV remains approximately the same, thus requiring no

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further changes in the paper content.

“Svecokarelian orogeny” is used instead of “Svecofennian orogeny” as the previous is generally used when working with the Swedish part of this Palaeoproterozoic domain, see e.g. Kathol and Weihed (2005); also a common practice by the Geological Survey of Sweden (M.B. Stephens, personal communication). We also corrected the minor technical details pointed out by the reviewer in the last part of the review notes. Reference to Figs. 2 & 3: Fig. 2 is actually cited for the first time already on page 360; no changes done accordingly.

We agree that the division between the Skellefte and Arvidsjaur Group volcanic rocks is beyond the scope of the paper. For this reason, it is not discussed here either.

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