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Interactive comment on "Semi-Lagrangian transport of oxygen isotopes in polythermal ice sheets: implementation and first results" *by* T. Goelles et al.

F. Parrenin (Referee)

parrenin@ujf-grenoble.fr

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This manuscript deals with a new tracers transport scheme included in the SICOPOLIS ice sheet model.

The manuscript is very clearly written. First the tracer transport scheme is described, then some applications to the EISMINT, Greenland and Antarctica ice sheets are presented.

The code is made available under the same open-source licence than the SICOPOLIS model.

The manuscript perfectly fits into the scope of GMD.

The tracers transport scheme is a semi-lagrangian one, like in the original work of Clarke and Marshal. But this time a higher (second) order scheme is used, which makes the scheme more accurate. The only thing I missed in the current manuscript is a comparison of this second order scheme with the scheme used by Clarke and Marshall on some experiments where the difference could be visible.

For the Vostok ice core, a possible explanation for the difference between the modeled and observed stratigraphy is the bedrock elevation upstream of the core site. Indeed, Parrenin et al. (JGR, 2004) have shown that the bedrock elevation has a strong influence on the vertical thinning function and therefore on the stratigraphy.

Some technical corrections:
- p. 1150, l. 2: "where defined" -> "were defined"
- p. 1150, l. 6: "side" -> "size"
- p. 1152, l. 16: "hight" -> "height"
- p. 1153, l. 13: "yeas" -> "years"
- p. 1154, l. 10: "when when coupling" -> "when coupling"
- p. 1154, l. 24: "and and changes" -> "and changes"

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