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Geoscientific Model Development Discussions
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Interactive comment on "ICON-ART 2.1 – A flexible tracer framework and its application for composition studies in numerical weather forecasting and climate simulations" *by* Jennifer Schröter et al.

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The comment was uploaded in the form of a supplement:
https://www.geosci-model-dev-discuss.net/gmd-2017-286/gmd-2017-286-RC2-supplement.pdf

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Discussion paper

This manuscript describes a novel framework for the implementation of reactive tracers into the ICON model. The framework takes advantage of the commonly used KPP software and implements it into the ICON model in a way that allows for the run-time implementation of complex chemical mechanisms. The presented work significantly enhances the current ICON-ART system. The implementation of additional state variables and associated chemical reactions into the ICON model requires a high level of programming expertise and poses an obstacle to its usage that should not be underestimated. The presented model development is an elegant solution that will allow a wide user range to implement different chemical reactions into the model.

Besides the description of the technical enhancements, the authors present a wide range of sample applications ranging from short term NWP calculations with a simple ozone chemistry to long term climate runs with life time bases chemical reactions. I have to say that although the manuscript is quite long I enjoyed reading it and can support publication in GMD.

However, there are several, mostly minor issues that need to be addressed:

1) My main complaint is that most of the evaluation is based on qualitative comparison. I am missing quantitative measures (e.g. bias, error). Especially in section 5.2 it would make sense to give the model bias for alternative model runs.

2) Make sure to explain all abbreviations, even those that might seem trivial.

P1 L10: AMPI

P2 L13: Here you need to introduce the abbreviation NWP. And it would also make sense to give the ECHAM abbreviation here.

P10 Figure 2: SSO

P18 Table 2: SST/SIC

3) Thoroughly check that all values are given with a unit

4) I suggest to combine Figures 8 & 9 as well as Figures 10 & 11.

5) Minor issues:

P2 L5: … the same dynamical core ….

As you know (and state later in the text) this is not the case for ICON (and I am not sure which other model has actually reached that ideal).

P2 L22: Here you should mention that the development is based on COSMO-ART. Maybe I am wrong but people do know COSMO-ART. In this case add a few sentences to clarify any differences between the ART in COSMO-ART and ICON-ART

Fig. 1.