Reviewer 1:
The authors have made the requested revisions based on the previous round of review. I have no further substantive comments here. I therefore recommend that this paper be accepted.

We appreciate that the reviewer has found our revised manuscript acceptable for publication.

Reviewer 2:
The authors have answered all points to my satisfaction except for one.
This point is about the internal variability.
While I understand that it is difficult to completely assess the role of internal variability due to missing ensemble members, I still think it is important to use the information that is available on internal variability to potentially strengthen the conclusions on potential impact of the high-resolution models versus internal variability. As long as the difference between a high-resolution model version and its lower-resolution comparison is in the range of internal variability of two members from the same model version, the conclusions are not robust.
To use 3 ensemble members is thus already substantially better than only using 1 member.
Second, even for one member (or for the three), one could apply any kind of appropriate significant test to strengthen the conclusions – or to come to the conclusion that more ensemble members would be needed in the future. Also, this could be an important finding for the high-resolution model community.
The supplementary figure on the 6 ECMWF-model members provides interesting results. It shows that there is a very large variability in the sea ice trends. And while I agree with the authors that for the ECMWF model, the resolution has a robust impact on sea ice and its trends, we have to have in mind that the ECMWF model shows by far the largest effect of high resolution. Differences between high and low resolution for the other models are much smaller and for most models smaller than the spread across the ECMWF-LR or HR members. This means that we cannot be really sure that the difference is due to the change in resolution. Thus, I suggest to add at least a similar table as S1 for the 3 members of the other two models with 3 members.
At the very least, a proper discussion of internal variability and its potential impacts on the results and the uncertainty connected to it is should be added to the Discussion or Conclusion section.

We thank the reviewer for raising this important issue. The role of internal variability in climate change has been documented in many studies, with a significant impact on Arctic ice decline (e.g. Ding et al., 2019) and also the timing of an ice-free Arctic (e.g. Wettstein and Deser, 2014). Large ensembles of multidecadal simulations are needed to adequately sample internal climate variability and identify model deficiencies and strengths. We acknowledge that these are computationally expensive and may only be sometimes available.
The role of internal variability in Arctic projections might be comparable to the effect of grid resolution enhancement in sea ice representation.

Only few HighResMIP models provide a small number of members, others only one simulation. ECMWF-IFR LR, MR, and HR have 8, 3, and 6 ensemble members, respectively; CNRM and EC-Earth3P have 3 ensemble members for both the LR and HR systems. To address the reviewer's concerns, we provided additional analysis in the supplementary material and a new paragraph in section 4.

The potential effect of small ensembles on the differences between low and high-resolution model versions is shown by the SIA and SIV variability on seasonal (Figures S1, S3, and S5) and interannual (Figures S2, S4 and S6) timescales, and linear SIA and SIV trends (Table S1, S2 and S3) from 1979 to 2014 for ensemble members of LR and HR configurations. From seasonal variability, the differences between the ensemble members are very small and the effect of spatial resolution does not depend on the choice of the ensemble member. The impact of internal variability is larger on trends, but the variability between single members does not surpass the effect of horizontal resolution on the Arctic sea ice representation, and the ensemble means are generally comparable with the first-member trends shown in the manuscript. Multidecadal internal variability is very difficult to quantify from single simulation or small ensemble size. Accounting for fluctuations due to internal variability requires much larger ensembles that are yet not available within the HighResMIP framework. We think that our analysis provides some insight into the limited benefit of atmospheric and oceanic spatial resolutions, and explores the model fidelity in representing present and future sea ice state in the Arctic, while it also underlines the need for large ensembles of multidecadal simulations to strengthen our efforts towards developing more realistic climate models.

Ding, Q., Schweiger, A., L'Heureux, M. *et al.* Fingerprints of internal drivers of Arctic sea ice loss in observations and model simulations. *Nature Geosci* 12, 28–33 (2019). https://doi.org/10.1038/s41561-018-0256-8

Wettstein, J. J., and C. Deser, 2014: Internal Variability in Projections of Twenty-First-Century Arctic Sea Ice Loss: Role of the Large-Scale Atmospheric Circulation. J. Climate, 27, 527–550, https://doi.org/10.1175/JCLI-D-12-00839.1.