

Review of manuscript “NorESM2–DIAM: A coupled model for investigating global and regional climate-economy interactions” by Jenny Bjordal, Anthony A. Smith, Jr., Henri Cornec, and Trude Storelvmo

Bjordal et al., 2025 have coupled an Earth System Model, NorESM2, with an Integrated Assessment Model, DIAM, to create a new coupled model, NorESM2-DIAM. The two models are coupled in a continuous fashion and exchange information bidirectionally. Information exchange between the two models occurs at an annual time scale and a regional level and includes annual carbon emissions being passed from DIAM to NorESM2 and temperature values passed from NorESM2 to DIAM. The coupled model is used to study the economic impact of climate change. The manuscript is well written, and the development of this new coupled model addresses the critical need for models that incorporate human-Earth feedbacks. The manuscript should be published after addressing the following comments.

The authors have mentioned, “*To our knowledge, it is the first framework to fully couple an ESM with a high-resolution IAM*”. This is incorrect. The Energy Exascale Earth System Model (E3SM) was coupled with GCAM, an Integrated Assessment Model, in a bidirectional synchronous fashion a few years ago (Thornton et al., 2017; Calvin et al., 2019), and earlier this year, a manuscript documenting a newer version of the coupled E3SM-GCAM model was published (Di Vittorio et al., 2025). These manuscripts should be cited, and comparison should be performed of the similarities and differences in the coupling framework and the impact of two-way coupling on the human and Earth system using the two different coupled models.

Minor Comment:

Addition of a schematic figure that shows the coupling between NorESM2 and DIAM will enhance the readability of the manuscript.

References:

- Thornton, P. E., Calvin, K., Jones, A. D., Di Vittorio, A. V., Bond-Lamberty, B., Chini, L., et al. (2017). Biospheric feedback effects in a synchronously coupled model of human and Earth systems. *Nature Climate Change*, 7, 496–500.
<https://doi.org/10.1038/nclimate3310>
- Calvin, K., Bond-Lamberty, B., Jones, A., Shi, X., Di Vittorio, A., & Thornton, P. (2019). Characteristics of human-climate feedbacks differ at different radiative forcing levels. *Global and Planetary Change*, 180, 126–135.
<https://doi.org/10.1016/j.gloplacha.2019.06.003>
- Di Vittorio, A. V., Sinha, E., Hao, D., Singh, B., Calvin, K. V., Shippert, T., et al. (2025). E3SM-GCAM: A synchronously coupled human component in the E3SM Earth system model enables novel human-Earth feedback research. *Journal of Advances in Modeling Earth Systems*, 17, e2024MS004806.
<https://doi.org/10.1029/2024MS004806>