

Interactive comment on “Anthropogenic aerosol forcing of the AMOC and the associated mechanisms in CMIP6 models” by Taufiq Hassan et al.

Anonymous Referee #1

Received and published: 28 October 2020

General comments: this manuscript examines the multi-decadal variability of the AMOC and a number of atmospheric variables in the North Atlantic in the historical observations and simulations in the CMIP6 models. The main finding is the implication of anthropogenic aerosols in strengthening the AMOC during the period 1950-1990, while a reduction in aerosols afterwards lead to GHGs having a larger effect and weakening the AMOC. I think the methods and results are reasonable, and I particularly appreciated the well-balanced considerations on the roles of the anthropogenic drivers in the AMOC, the possible errors in the models, and the discussion of observational evidence, including AMOC proxies derived from other ocean variables (e.g., SST) and radiation estimates of aerosol forcing. I recommend acceptance pending minor revisions.

C1

sions.

Specific comments: - In fig. 1 please add the correlation coefficient of all the panels with panel a (AMOC) in the figures (maybe upper right?). Since in the text it is repeatedly discussed how these timeseries are related, it is important to have a quantitative reference. I am aware that this information is present in fig. 2, but it would improve the readability of the text until we get to fig. 2. - Throughout the manuscript it is unclear to me what is the role of SW radiation since it is related to a number of factors: clouds, aerosols, sea ice. Please elaborate on what you are looking at when you discuss SW, and consider using regressions (or kernels) to be more specific about the radiative contribution of each variable you are interested in examining.

Technical comments: L50: should be 'remains' L230: should be 'significant'

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-769>, 2020.

C2