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## Mid-20th Century Atlantic Circulation informed by Modern Observations and Models

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The Atlantic Meridional Overturning Circulation (AMOC) is a driving force in the redistribution of heat on our planet and has a particularly large impact on the climate of the Northern Hemisphere and Europe. Reliability of coupled model projections has been questioned due to a body of evidence that the multi-model mean of climate models disagree with observational proxies for the AMOC, in particular in the mid-20th century. In turn, the reliability of these observational proxies has been questioned as they are not direct observations of the AMOC.

In order to study the variations of AMOC during the 20th century, we have developed layered models based on a limited number of time series: Ekman transport and the Florida Strait, as well as the density time series of the Thermocline, Antarctic Intermediate Waters (AAIW), Upper North Atlantic and Lower North Atlantic Deep Waters (UNADW, LNADW). These models, using the deep AMOC branches, are trained with modern RAPID measurements at 26N and compared to each other.

We use these models to predict, from hydrographic profiles, an estimate of the strength of the AMOC during the (mid) 20th century. Locations where EN4 profiles may be relevant to the reconstruction are identified using ocean model data that correlate temperature and salinity with the location of the RAPID measurement. The linear contribution of wind stress is also removed from the density time series using simple linear regression. Our aim is to provide, in the light of modern direct observations, an answer on the reliability of AMOC reconstructions and historical climate simulations during the mid-20th century.