

The Value Of the RAPID array for climate predictions (VALOR)

Jon Robson¹, Rowan Sutton¹, Keith Haines², Leon Hermanson³, Magdalena Balmaseda⁴, Adam Blaker⁵, Joël Hirschi⁵, Alan Iwi⁶, Irene Polo¹, Bablu Sinha⁵, Doug Smith³, Vladimir Stepanov², Yongming Tang⁴

1NCAS-Climate, University of Reading; 2 NCEO, University of Reading; 3 UK Met Office, Exeter; 4 ECMWF, Reading; 5 NOC, Southampton; 6 RAL, Oxford.

The Value Of the RAPID array for climate predictions (VALOR) project has focused on utilizing the RAPID array observations with the aim of improving our ability to predict the Atlantic Meridional Overturning Circulation (AMOC) and its climate impact. Work has focused on three areas. i) Understanding and Improving data assimilations, either by validating them against RAPID observations or by improving assimilation methods so that RAPID observations can be included in ocean state estimation. ii) Understanding the mechanisms that govern AMOC variability in models to understand the AMOC's potential predictability. iii) Understanding the role of the AMOC in current-generation decadal predictions, and its impact on surface climate.

An overview of key results from VALOR will be presented. In particular, the development of methods for assimilating the RAPID array observations into the NEMO and HadCM3 model, which improves the simulation of AMOC transports in the assimilation. VALOR has also worked to quantify the role of internal ocean processes - such as eddies and Rossby waves - as a limit on AMOC predictability, contributed to understanding heat and salt fluxes at 26N, and has provided persuasive evidence that the AMOC likely played an important role in changes in North Atlantic climate in the past. However, the problem of initialising the AMOC in predictions remains a challenge, and evidence is still lacking as to whether assimilating the RAPID array observations improves decadal predictions. Ideas for further advancement in the areas of constraining and initialising the AMOC in climate predictions will be discussed.