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The Impact of Zonal Jets on the Atlantic Oxygen Minimum Zones

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Oxygen is an essential component of the ocean biogeochemistry. Relatively small variations in its content may have a significant impact on ocean productivity, biodiversity and fisheries and thus affect ocean health and ecosystem services. Over the last decade, several studies have shown that regions with low oxygen concentrations are expanding over the world's oceans, a phenomenon which has been termed ocean deoxygenation. These changes are driven by a combination of anthropogenic climate change and the natural variability of the ocean. As climate change warms the upper ocean it reduces oxygen solubility, increases upper ocean stratification and thus reduces oxygen mixing as well as induces changes in respiration rates. Disentangling the natural and anthropogenically-induced oxygen variability requires the use of models as prognostic or diagnostic tools, as they can be forced with different conditions which may or may not include the effects of climate change and allow a detailed examination of specific processes. In this work, we compare two basin-scale coupled physical-biogeochemical simulations of the Tropical Atlantic ocean at different horizontal resolutions and show that more robust zonal jets at intermediate depths in the higher resolution simulation have a major impact on the overall structure of the North and South Atlantic OMZs by limiting their westward extent and supplying oxygen to the OMZ core regions between 300 m and 500 m.