

Seasonal Variation of the Java Upwelling System Represented in CMIP5 Models

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An upwelling system off the coast of Java is believed to be a key process for local, regional, and global climate, as well as biological and ecological conditions, and their variability by bringing relatively cooler and nutrient rich water from subsurface to surface layer. However, how well this upwelling system is represented in global climate models such as the CMIP5 models is not investigated yet. This paper tries to evaluate the seasonal variation of the Java coastal upwelling in the 12 CMIP5 model outputs, focusing on sea surface temperature, temperature at 50 m depth, and wind stress along the coast of Java. The 12 models are split into four groups, depending on the main factors influencing the representation of the upwelling system in each model. We conclude that balance between upper-ocean responses to local and remote zonal wind stresses and mean depth of the thermocline are some of the major factors determining differences between models. However, further analysis on larger-scale processes, such as surface heat flux, the Indonesian throughflow, and wind field over Indo-Pacific sector, is needed in order to explain some particular results.

Keywords: Java coastal upwelling, CMIP5 model comparison