

Linking Southern Ocean Water Masses and Australian Rainfall Variability

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Rainfall in Australia and indices developed to monitor climate variability exhibit distinct pattern of multi-decadal variability. It is possible that physical mechanisms operating in the Southern Ocean are a driver of this behaviour. In particular, the formation of water masses within defined geographical regions links the global ocean and the atmosphere. In the Southern Ocean, two large volumes of water are Subantarctic Mode Water (SAMW) and Antarctic Intermediate Water (AAIW), which are created by exchanges of heat and freshwater with the atmosphere and interior oceanic mixing. These sink below the surface of the Southern Ocean and move northward at depth of about 300-800 m. In this presentation, I present some arguments and evidence in support of possible linkages between Australian rainfall and Southern Ocean water mass formation processes via the equatorial ocean. It is the formation of the global scale water masses that is potentially the most important process the ocean employs to control global climate. This has been highlight by research investigation the global thermohaline circulation focusing upon the deep water mass formation process. However, the upper ocean branch composed of AAIW and SAMW plays a similar significant role.