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Investigating the regime of the South-West Indian Ocean Currents through a numerical model.

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The very complex South-West Indian Ocean (SWIO) consists of the Agulhas Current and its three main source regions, whose variability is known to influence the timing of ring formation at the Agulhas Retroflection, and ultimately the strength and stability of the Atlantic overturning circulation due to the leakage of water from the Indian Ocean into the Atlantic Ocean. The East Madagascar Current, being the focus of this study, endures transport changes, mostly influenced by large scale climate phenomena, and the high eddy kinetic energy (EKE) band observed at 25°S, travelling from Australia to Madagascar. Also occurring in the vicinity is the shallow eastward South Indian Ocean Countercurrent (SICC) flow and one of the largest dendroid phytoplankton blooms in the world, the South-east Madagascar Bloom.

This unique system, where variability of the termination regime of the EMC, associated with complex mechanisms of the SICC and mesoscale eddies, is being investigated using a high resolution regional physical model. The mesoscale eddies' characteristics in the high EKE band will be discussed, with a section on its seasonality and longitudinal changes as they approach and interact with the western boundary. The eddy-current interaction influences the EMC variability, which in turn induces changes into its termination regime, south of Madagascar. Cross-correlation confirms a 1-month and 2.5 months lag between the EMC transport, and anti-cyclonic circulation and cyclonic circulation respectively, when the current rounds the southern tip of Madagascar. Furthermore, a small section will be dedicated to the possibility of nutrients being advected in the bloom area by the mesoscale eddies, and the complex mechanisms which cause the phytoplankton cells to use these nutrients, hence triggering the bloom at various spots simultaneously.