The late Miocene to Pliocene constriction of the Indonesian Gateway and its impact on ocean circulation and climate

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The Indonesian Throughflow as part of the global thermohaline circulation acts as a primary link between the major ocean basins by transferring warm and fresh waters from the Pacific into the Indian Ocean. Our studies focus on the Miocene to Pliocene closure of the Indonesian Gateway and its impact on ocean circulation and climate.

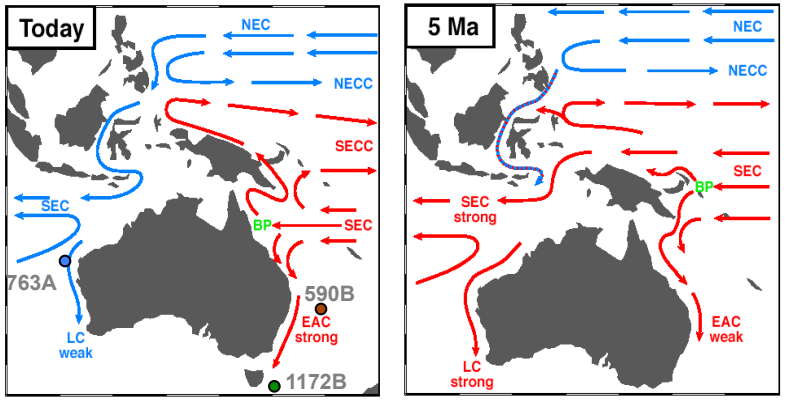

Fig. 1 Schematic pattern of surface currents for today and 5 Ma, showing the change in the source of water masses entering the Indian Ocean via the Indonesian Gateway . NEC = North Equatorial Current, NECC = North Equatorial Countercurrent, SECC = South Equatorial Countercurrent, SEC = Equatorial Current, BP = Bifurcation Point of SEC. Core sites to be studied are indicated.

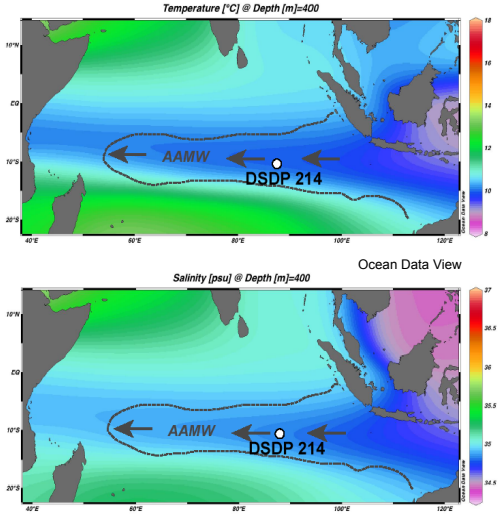

Fig. 2. Temperature and salinity distribution pattern at 400 m water depth showing the westward throughflow of cool and low-saline Australasian Mediterranean Water (AAMW). DSDP Site 214, which is studied within this project, is indicated.

Main objectives:

- **to test** the hypothesis of Cane and Molnar (2001), which suggests that the constriction of the Indonesian Gateway from 5 to 3 Ma led to a major change in tropical oceanic heat transfer and global cooling.
- **to reconstruct** closure-related changes in Indian Ocean (sub)surface water signatures, in particular the cooling and freshening associated with the development of the modern Australasian Mediterranean Water tongue.
- **to determine** changes in the (sub)surface water signatures of the Leeuwin Current, which has been considered to weaken in response to a reduced Indonesian Throughflow.
- **to reconstruct** changes in the southward heat transfer by the East Australian Current into the Southern Ocean, which has been suggested to increase with the reduction of the Indonesian Througflow.

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