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# The Cenozoic tectonic evolution of the Scotia Sea area

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The breakup of the southern edge of Gondwanaland resulted in the formation of the Scotia Plate and the opening of Drake Passage throughout the Cenozoic. During the same period, the Tasman Seaway opened, although the timing of this opening is much better constrained. Rapid cooling of the Antarctic continent followed the openings of Drake Passage and the Tasman Seaway. The opening of Drake Passage or the Tasman seaway allowed the onset of the Antarctic Circumpolar Current, which is held responsible for the late Miocene global cooling, but discussions about the most important opening are still ongoing.

The opening of Drake Passage and the development of the Scotia plate have been studied in multitude, but paleogeographic reconstructions show many differences and inconsistencies in both timing of opening Drake Passage as well as paleo-locations of crustal segments. The paleogeographic or tectonic reconstructions of the opening of Drake Passage and the formation of the Scotia plate are hard to compare, because differences in shapes of crustal segments, geographic projections and relative movements of segments chosen by previous authors make it difficult to observe similarities and differences between the different reconstructions.

We present a thorough analysis of the previously published paleogeographic reconstructions with the aim to identify agreements and inconsistencies between these reconstructions. We re-defined the crustal segments that formed after the break-up of Gondwanaland by re-interpreting the bathymetry and magnetic anomalies of the study area. We re-modelled and compared georeferenced reconstructions from earlier studies in GPlates plate reconstruction software using our own defined crustal segments.

This comparison shows that the different reconstructions agree quite well along the South Scotia Ridge, but that the North Scotia Ridge shows significant variations between different reconstructions or is not even considered in the reconstructions. Also, the nature and age of the crust of the Central Scotia Sea is heavily discussed, resulting in different opening scenarios. We argue that the tectonic evolution of the North Scotia Ridge and Central Scotia Sea is a crucial factor in identifying the timing of the development of an ocean gateway. We made a new tectonic reconstruction of the North Scotia Ridge crustal segments with less overlaps and gaps between the reconstructed crustal segments.

The next step would be to compare the global sea-level changes and paleo-bathymetry with the different opening scenarios. Because we standardized all scenarios with the same crustal

segments, we will then be able to provide opening ages of Drake Passage for the different scenarios that can be compared in a quantitative way.