

Strong regional sea-level rise during the onset of Antarctic glaciation

April 22 2013, by Roy Meijer

An international team of scientists discovered a surprisingly strong regional sea-level rise which occurred during the onset of Antarctic glaciation about 34 million years ago, while the global sea-level on average lowered. In an article, published today in *Nature Geoscience*, scientists of the Royal Netherlands Institute for Sea Research (NIOZ), Utrecht University and TU Delft explain why.

'We already knew gravity has an important role by sea-level changes due to [glaciation](#) or deglaciation. But this is stunning,' said Paolo Stocchi (NIOZ), leader of the international team of researchers of the article published today.

About 34 million years ago the [climate](#) at Antarctica changed from temperate without much ice to a polar climate. The ice-sheet grew geologically fast. Worldwide the sea-level dropped by 60-80 meters, since the water was extracted from the oceans, forming the first large ice-sheet on Antarctica. The researchers were surprised to find that the sea-level around Antarctica didn't drop, but rose with about 150 meters.

This regional sea-level rise can be explained by combining several geophysical models. The weight of the growing ice-sheet lowered the Antarctic crust which in turn caused the uplift of the immediate surroundings, under water. But even more important is that the enormous mass of ice has a huge attraction (gravity) to the [seawater](#). Mass attracts mass. Even today, there are immense regional differences in sea-level. It's impossible to speak of a worldwide uniform sea-level rise or -fall.

Consequences for climate research

This finding can have large consequences for [climate research](#) in the geological past. And thereby also for future climate-scenarios. This study demonstrates that ice models and [ocean currents](#) that are based on worldwide uniform sea-level changes will be different from those based on regional-variable models. It marks the end of the often accepted assumption of uniform 'eustatic' sea-level changes in paleo-research.

This research is based on analyses of sediment cores near the coast of Antarctica during IODP-expedition 318 in 2010 with the Joides Resolution.

More information: Stocchi, P. et al. Relative sea-level rise around East Antarctic during Oligocene glaciation, *Nature Geoscience*, 21 April 2013.

Provided by Delft University of Technology

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