

Understanding Sea Level Change by Diving into the Past

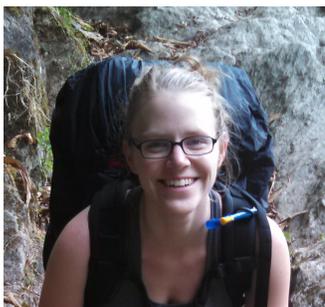


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Introduction

Why does sea level change? Everyone knows that sea level rise is a threat to coastal cities, but the mechanisms of why the change happens are less often talked about. In my talk I will explain why sea level is changing, why it is changing at different rates around the globe, how we can use the measured sea level rise to find out which ice sheets are melting and how we can make predictions for a warmer world. A lot of the answers to these questions lie in the past: Climate varies over thousands of years and therefore we need to dive into the past if we want to understand the present and predict the future. I will take you on a journey through the climatic past, to times when big ice sheets covered the Earth during the last ice age and beyond.

About the speaker



Jacqueline Austermann is a fourth-year PhD student in the Earth and Planetary Science Department. She is interested in reconstructing and understanding sea level and ice volume variations over the past thousands and millions of years. Her research mainly evolves around writing and using computer models to simulate Earth deformation and sea level changes. She sometimes also gets a chance to go in the field and search for fossilized corals and other indicators that provide insight into past sea level variations. Growing up on the foothills of the German alps made her an avid hiker and passionate traveller.

Glossary of Important Terms

Local sea level: Difference between the ocean surface and the solid surface. Local sea level changes if one of these surfaces changes, which can for example happen due to local subsidence.

Eustatic sea level: Average local sea level over oceans. Eustatic sea level only changes if the volume of water changes (for example when glaciers melt and add water to the oceans). It also changes due to shoreline migration, which will be neglected in this talk.

Thermal expansion: The tendency of matter to change its volume (e.g. expand) in response to changes in temperature (e.g. heating).

Postglacial Rebound: Rebound of a formerly glaciated region that leads to local sea level fall. In a wider sense this also includes uplift and subsidence associated with changes in the ice and ocean load further away from the ice sheet. This broader definition is sometimes referred to as glacial isostatic adjustment.

Ice age cycle: Long term (100 000 year) variations in the Earth's climate driven by changes in the Earth's position in and shape of its orbit. During the ice age the Earth cycles through warm periods (**interglacials**) and cold periods (**glacial maxima**).

IPCC: The IPCC (Intergovernmental Panel on Climate Change) is a panel of scientists that summarize the current state of what we know about climate change in a report. This report is targeted at politicians, who are encouraged to use this information in their policy decisions.

Resources to learn more

This website provides informative short articles and videos on past, present and future sea level variations:
<http://www.sealevelstudy.org>

The IPCC (Intergovernmental Panel on Climate Change) report on sea level change:
www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter13_FINAL.pdf

Want to know how much sea level is changing around the world? This interactive map will tell you:
<http://tidesandcurrents.noaa.gov/sltrends/sltrends.html>

Great video clip explaining postglacial rebound:
<https://www.youtube.com/watch?v=V7HP1jsoisE>

Harvard Gazette Article on a recent Nature paper on 20th century sea level rise:
<http://news.harvard.edu/gazette/story/2015/01/sea-level-correction/>
Citation for the original article: Carling C. Hay, E. Morrow, R.E. Kopp, J.X. Mitrovica, 2015. Probabilistic reanalysis of twentieth-century sea-level rise. Nature 517, p. 481-484.

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