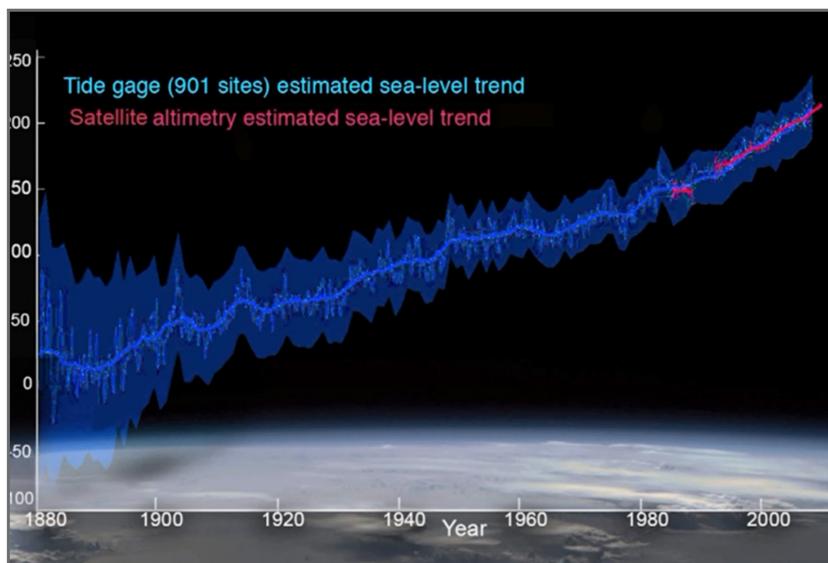


Sea Level Rise Response Plan

Sea Level Rise Basic Science

Sea level rise (SLR) is occurring globally and regionally and is expected to accelerate in the coming decades. The annual rate of SLR will vary from year to year and can be affected over a period of years by natural variability. Global sea level rose about 8 inches in the last century. The rate in the last two decades, however, is nearly double that of the last century.



Source IPCC (2013) Fifth Assessment Report (AR5).

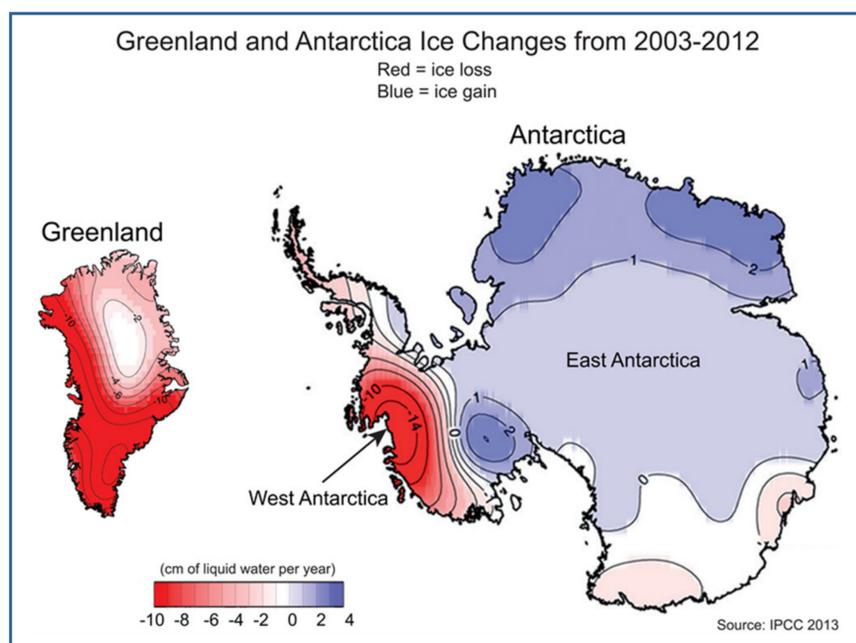
There are two main mechanisms that contribute to observed sea level rise:

Thermal Expansion

More than 90 percent of the Earth's trapped heat is being absorbed by the oceans. As ocean temperatures increase, the water expands as it warms. Thermal expansion of seawater can also be the product of regional phenomena, such as El Niño, the periodic warming of the eastern tropical Pacific.

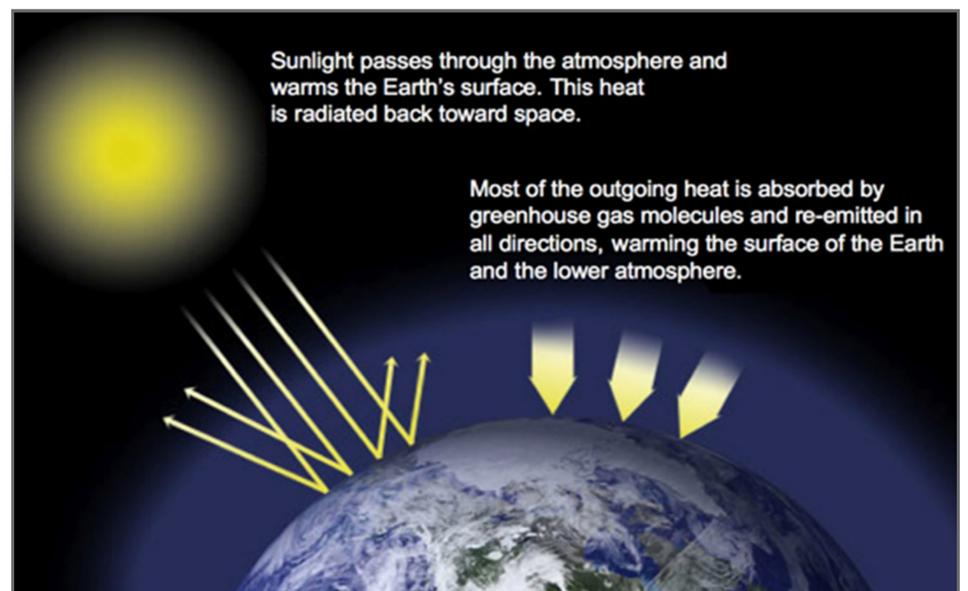
Land Ice (melting of ice sheets and glaciers)

Ice loss near the poles is one of the most critical changes pushing sea levels higher, a conclusion supported by data of increasing weight and accuracy. The figure below shows changes in the Greenland and Antarctic sheets from 2003 to 2012.



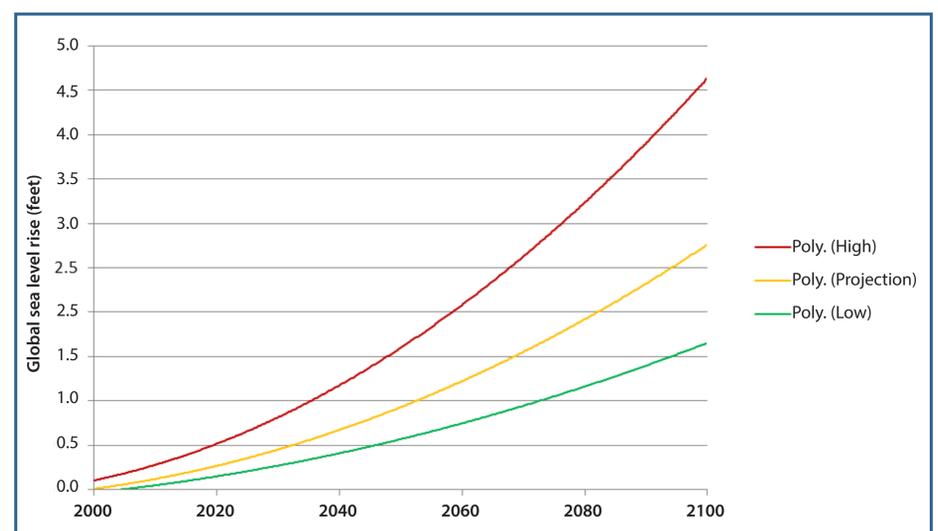
Source: IPCC 2013

Sea level rise is a direct result of a changing climate. The earth is absorbing more energy than it is releasing. On Earth, human activities are changing the natural greenhouse. Over the last century the burning of fossil fuels like coal and oil has increased the concentration of atmospheric carbon dioxide (CO₂). This happens because the coal or oil burning process combines carbon with oxygen in the air to make CO₂. To a lesser extent, the clearing of land for agriculture, industry, and other human activities has increased concentrations of greenhouse gases.



Projections indicate that a 4.5 foot rise by the end of this century is possible.

The current "official" SLR projection for Washington at the latitude of Seattle is +24 inches (range: +4 to +56 inches) by the year 2100 (relative to 2000). This estimate is based on the assumption that land is uplifting at a rate of about +0.4 (±0.6) inch/decade (a middle estimate for the region). As a result, relative SLR at locations where the land is subsiding may be slightly higher than the current range. The rate of SLR will be highly dependent upon 21st century greenhouse gas emissions. Most projections extend only through 2100, however, even if temperatures stabilize, sea levels will continue to rise for centuries to come.



Source: NRC (2012) sea level rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future

NASA satellites monitor sea level rise. To track NASA's observations, visit:

climate.nasa.gov/vital-signs/sea-level/

olympiawa.gov/sealevelrise

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