

Sea Level Rise: Causes and Consequences

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Sea level is one of the best indicators of climate change. It is routinely monitored since more than 25 years at global and regional scales by a series of high-precision altimetry missions. Satellite altimetry has shown that the global mean sea level is rising at a mean rate of 3.1 ± 0.3 mm/yr since January 1993 in response to ocean warming and land ice melt. A clear sea level rise acceleration has also been detected. Independent estimates of thermal expansion and ocean mass change due to glaciers and ice sheet mass loss show that over the GRACE and Argo time span (since 2005) the global mean sea level budget is almost closed. Satellite altimetry has also revealed strong regional variability in the rates of sea level change mostly driven by internal climate variability. While it is obviously highly important to ensure sustained and ever more accurate observations of global and regional sea level variations from space, new scientific questions are now emerging that deserve new research investments. Among these, accurate monitoring from space of sea level changes in coastal regions, under-sampled by tide gauges, must be given top priority. Indeed, sea level rise at the coast remains poorly known globally, although it is a major concern for populations living in low-lying coastal regions. New altimetry technology appear particularly promising to monitor sea level changes in coastal zones, in particular those already threatened by many other complex phenomena due to natural processes and/or anthropogenic forcing factors.