Climate change will raise the sea level in the Gulf of Finland

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Credit: Eija Vallinheimo

The Finnish Meteorological Institute has updated its estimates concerning the impact of rising sea levels on the Finnish coast.

Post-glacial rebound and changes in the Earth's gravity field protect the Finnish coast against rising sea levels, especially in the Gulf of Bothnia. In the Gulf of Finland, the sea level is starting to rise.

The rise in ocean levels varies regionally

Global warming raises ocean levels at an accelerating pace, currently on average about three millimetres per year. The reasons for this are the thermal expansion of sea water and the melting of glaciers. It is estimated that by the end of this century, ocean levels will rise at least about 20 centimetres. The highest estimates are nearly two metres.

There is, however, great regional variation in the rise, for reasons such as the uneven warming of seas, changes in the Earth's gravity field, and changes in the circulation of seas. The Finnish Meteorological Institute has used the latest scientific publications to estimate the impact of these regional factors on the Finnish coast.

As glaciers melt, mass will shift from continents into seas. In consequence, the Earth's gravity field and the height of the Earth's crust will be altered. The mass of continental glaciers will no longer attract sea water as strongly as before. In addition, the Earth's crust will rise under the lighter glacier. For this reason, the rise in the sea level will be minor near the melting glacier, whereas the rise will be felt more acutely further away from the glacier.In consequence, the melting of the continental glacier in Greenland will have a fairly small impact on the Finnish coast. The regional rise in Finland will remain below the global average.

The characteristics of the Baltic Sea affect the Finnish coast

In addition to the regional rise in ocean levels, local events in the Baltic Sea affect the sea level changes on the Finnish coast. In Finland, the uplift of the land after the last glacial period is still 4–10 millimetres per year. Moreover, climate models predict stronger western winds, which will push water into the Baltic Sea through the Danish straits and water will accumulate against the Finnish coast.

So far, post-glacial rebound has offset the rise in sea level in Finland, but the situation is gradually changing on the southern coast. It is estimated that the sea level will start to rise in the Gulf of Finland. In the Gulf of Bothnia, the uplift is still likely to even out the sea level rise in the coming decades.

If the highest projections come to pass, the sea level will rise everywhere on the Finnish coast: by as much as 90 centimetres in the Gulf of Finland by the end of the century, by 65 cm in the Bothnian Sea and by about 30 cm in the Bay of Bothnia.

The current estimate concerns the change in the average sea level in the long term. In addition, the impact of waves and other changes in the short-term variation of the sea level must be taken into account in building and other activities on the coast. In the near future, the Finnish Meteorological Institute will update its estimates of the lowest recommended building heights, where these factors will also be considered.

Provided by Finnish Meteorological Institute