Press release

Orléans (France), 13th September 2024

A first assessment of coastal land subsidence in Europe

A study conducted by the French Geological Survey (BRGM) and European partners presents the first European assessments of contemporary coastal subsidence. Rising sea levels are a consequence of global warming. Locally, the ground can sink (i.e. subside), amplifying this phenomenon and the risk of coastal flooding. The study yielded a detailed map of coastal subsidence along the entire European coastline using the Copernicus European Ground Motion Service (EGMS) observation system.

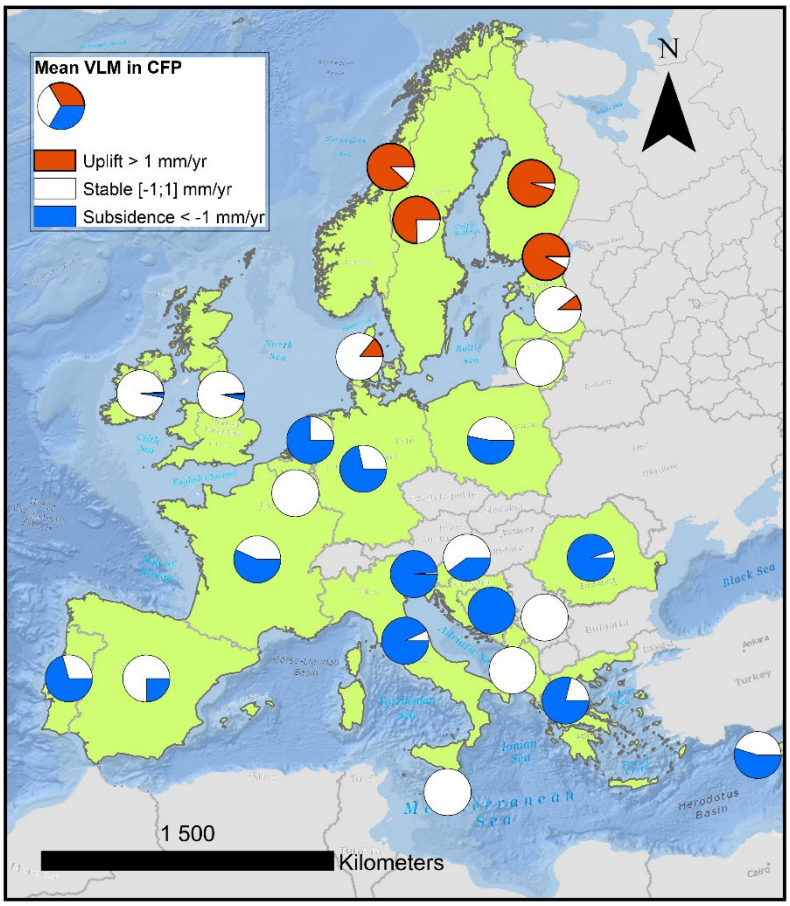
Rising and accelerating sea levels are already threatening populations and infrastructures in low-lying coastal areas. Global sea level measured by satellite since 1993 show a rise of 3.6 mm/year over the last 30 years. The causes of this rise are well understood and quantified: thermal expansion of the oceans, and the melting of land ice in response to global warming. Locally, climate-induced sea-level rise may be amplified by land subsidence. This is what this new study by BRGM and its collaborators has quantified on a European scale.

Nearly half of Europe's low-lying coastal areas affected by coastal subsidence

Mapping vertical ground movements on a supra-regional scale has long been hampered by a lack of suitable data and services. To overcome this obstacle, a consortium of European researchers combined radar interferometry (InSAR) and the Global Navigation Satellite System (GNSS) and developed the Copernicus EGMS service. This new study is based on the EGMS Ortho product, which provides high-resolution estimates of land motion velocity at a sub-millimeter accuracy over the recent period from 2016 to 2021.

The results show that **almost half of Europe's low-lying coastal areas are currently subsiding at a rate faster than 1 mm/yr on average**. Coastal subsidence is higher on average in areas hosting more people, urban centers and critical infrastructure. Port areas, for example, record an average **1.5 mm/year subsidence**. The study also identifies **coastal hotspots where subsidence can be severe** (**larger than 5 mm/year**) such as areas in e.g. the North Italian coastal plain or the Netherlands. The mapping tool is accessible from the Copernicus European Ground Motion Service (EGMS) website.

This study raises concerns that coastal subsidence, and hence relative sea-level rise, tends to be underestimated in Europe and probably in many other parts of the world. The study was carried out as part of European projects CoCliCo and GSEU.



The distribution of in the coastal flood plain (CFP) per European coastal country. The red, white and blue areas indicate the proportion per country of CFP area that are, on average, uplifting (>1 mm/yr), stable (between −1 mm/yr and 1 mm/yr) and subsiding (<−1 mm/yr).
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About BRGM

BRGM, the French geological survey, is France's leading public institution for Earth Science applications for the management of surface and sub-surface resources with a view to sustainable development.

Under partnerships with numerous public and private stakeholders, BRGM focuses on scientific research, expertise and innovation. Its activity meets 4 objectives:

- *understanding geological phenomena and related risks,*
- *developing new techniques and methodologies,*
- *producing and distributing data for surface, subsurface and resource management,*
- *providing the tools required to manage the surface, subsurface and resources, prevent risks and pollution, and manage policies in response to climate change.*

Pour further information : https://www.brgm.fr/fr et @BRGM

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