Press release – 8 April 2019

First pan-European shoreline-migration map since 2004

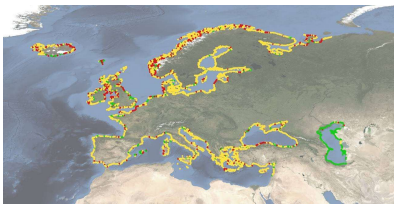
The shoreline is a highly dynamic land-sea interface that provides important services such as ecology, flood protection and recreation. It is constantly modified by wind, waves and tides, and impacted by human activity. Hence, the decadal change of shorelines reflect natural processes as well as human influence, whether positive or negative. Climatic-driven changes such as sea level rise, higher waves and changes in wind direction put increasing pressure on many of Europe's shorelines.

Knowing how, and at what rate, our coasts are changing is the first step to successfully managing them. The new EMODnet Geology shoreline-migration map, released today, allows users to visualise pan-European coastal behaviour for 2007-2017 at different spatial scales. A built-in search and zoom functionality allows online users to distinguish areas of landward migration (erosion or submergence), stability, and seaward migration (accretion or emergence). The underlying, downloadable satellite-based dataset offers additional information on annual values and uncertainty.

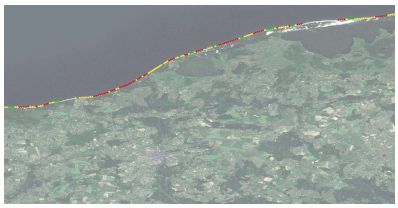
With the new map, international policy makers can determine large-scale coastal vulnerability while national and regional coastal managers are able to fill existing gaps in field-monitoring data and to identify potential areas of rapid change. The map also provides the general public with a useful insight into one of Europe's most obvious climate-change effects. Most importantly, scientists may explain spatial patterns and provide feedback on methodological advantages as well as shortcomings, thus helping to optimise the big-data methodology used.

Henry Vallius, coordinator of EMODnet Geology, stated: "By visualising pan-European shoreline behavior for 2007-2017, EMODnet Geology is proud to provide the first open map of this kind since 2004 (last update). The map and dataset are available free of charge for viewing, downloading, processing and usage from the EMODnet Geology portal (http://www.emodnet-geology.eu)."

"This new map captures the recent evolution of all European coastlines over a 10 year time period – the added value of this satellite-based view compared to traditional maps showing fragmentary field observations is completeness and uniformity", complemented Sytze Van Heteren from the Geological Survey of the Netherlands.



Pan-European overview map of shoreline migration (red = landward; yellow = stable; green = seaward)



Coastal erosion in response to sea level rise (Polish coast)

Accreting shoreline resulting from extensive sand nourishment (western Netherlands)

Background information

Thanks to the public availability of satellite data (optical imagery of ESA Sentinel 2 and NASA Landsat 5, 7 & 8 with pixel resolutions of 10-30 metres and a revisit time of 1 to 2 weeks) and new analytical tools for processing big data (such as the Google Earth Engine), the EMODnet Geology team in collaboration with Deltares and TNO (Geological Survey of the Netherlands) were able to quantify shoreline migration in a new way. Scripts for automated detection of the land-water boundary were used to separate land from water in annual image composites for the period 2007-2017. During this process, shorelines positions were determined for half a million transects every 500 metres along the European shoreline. These positions were then averaged by year and analysed for a decadal period.

Visualising pan-European shoreline change means making choices, like defining when a shoreline is classified as stable. Using zero change or a small range of values is more appropriate for hard rocky coasts, while a larger range of values is preferable for naturally dynamic sandy barrier islands.

The spatial resolution of the method depends on the pixel resolution of the individual satellite images, which is currently about 10 metres. Validations of abovementioned method have been carried out for sandy coasts but not yet for bluffs, cliffs and muddy coasts. EMODnet Geology hopes that by releasing the satellite-based dataset now, coastal experts and other end users will be able to discover and communicate possibilities and limitations of automated methods for the extraction of shoreline position and quantification of annual to decadal change. To help in this process, a companion map showing shoreline migration on the basis of field data and expert knowledge is also made available, thereby facilitating a first-order comparison.

Other upcoming data products from EMODnet Geology, expected in Spring 2019, include a multiscale seabed substrate map, sea-floor geology, coastline migration, new mineral data sets and submerged landscapes.

To access the shoreline-migration map, visit the EMODnet Geology portal:
www.emodnet-geology.eu

Source and information:

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