

The 21 July 2017, **Kos-Bodrum Tsunami** intensity mapping: Applying the integrated Tsunami Intensity Scale (ITIS₂₀₁₂)

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ABSTRACT

On July 21, 2017 (22:31 UTC), a Mw 6.6 earthquake occurred off-shore the Kos Island, Greece. The epicenter is located in the marine area between Kos Island and Turkey's coasts in Gokova Bay. Shortly after the earthquake, tsunami waves hit the south-east coast of Kos and the coast of Mugla province in the Gokova Bay area.

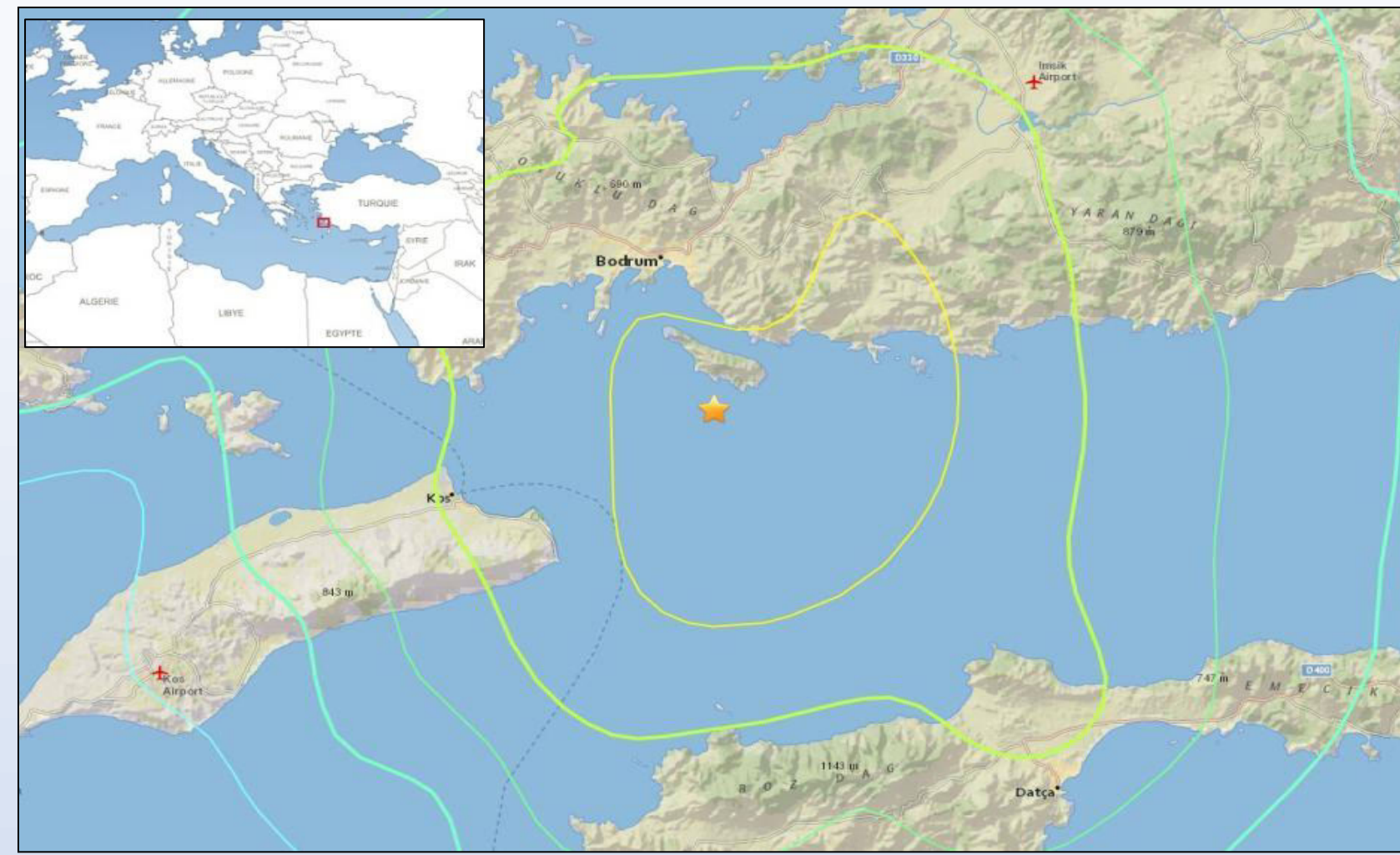
In order to assess the tsunami intensity, data regarding the tsunami impact and gathered from multiple sources on both the coastal zone of Kos and the eastern coast of Turkey, have been recorded, assigned against the ITIS₂₀₁₂, and mapped using ArcGIS. Interpolation methods have been used in order to display the impact zoning in the inundated areas.

The results show limited, yet notable impact on each one of the ITIS₂₀₁₂ categories, escalating among the middle grades of the Scale, and classifying the event as a middle-intensity tsunami. Applying the ITIS Scale to a middle-intensity event for the first time, showed that the individual ITIS₂₀₁₂ criteria successfully complemented each other creating an excellent map.

METHODS

Primarily collected data (autopsy, photo material, drone recordings, witnesses testimonials) along with the web published data and preliminary scientific reports have been mapped and evaluated against ITIS₂₀₁₂ (categories: phenomenon quantities, impact on human, displaced objects, infrastructure, environment, structures).

Data collected from 48 different points around the tsunami affected area, have been used as input in ArcGIS and exported Tsunami Intensity Maps for its category and a maximum Tsunami Intensity Map for this event.



RESULTS

The results show limited, yet notable impact on each one of the ITIS₂₀₁₂ categories, escalating among the middle grades of the Scale, and classifying the event as a middle-intensity tsunami.

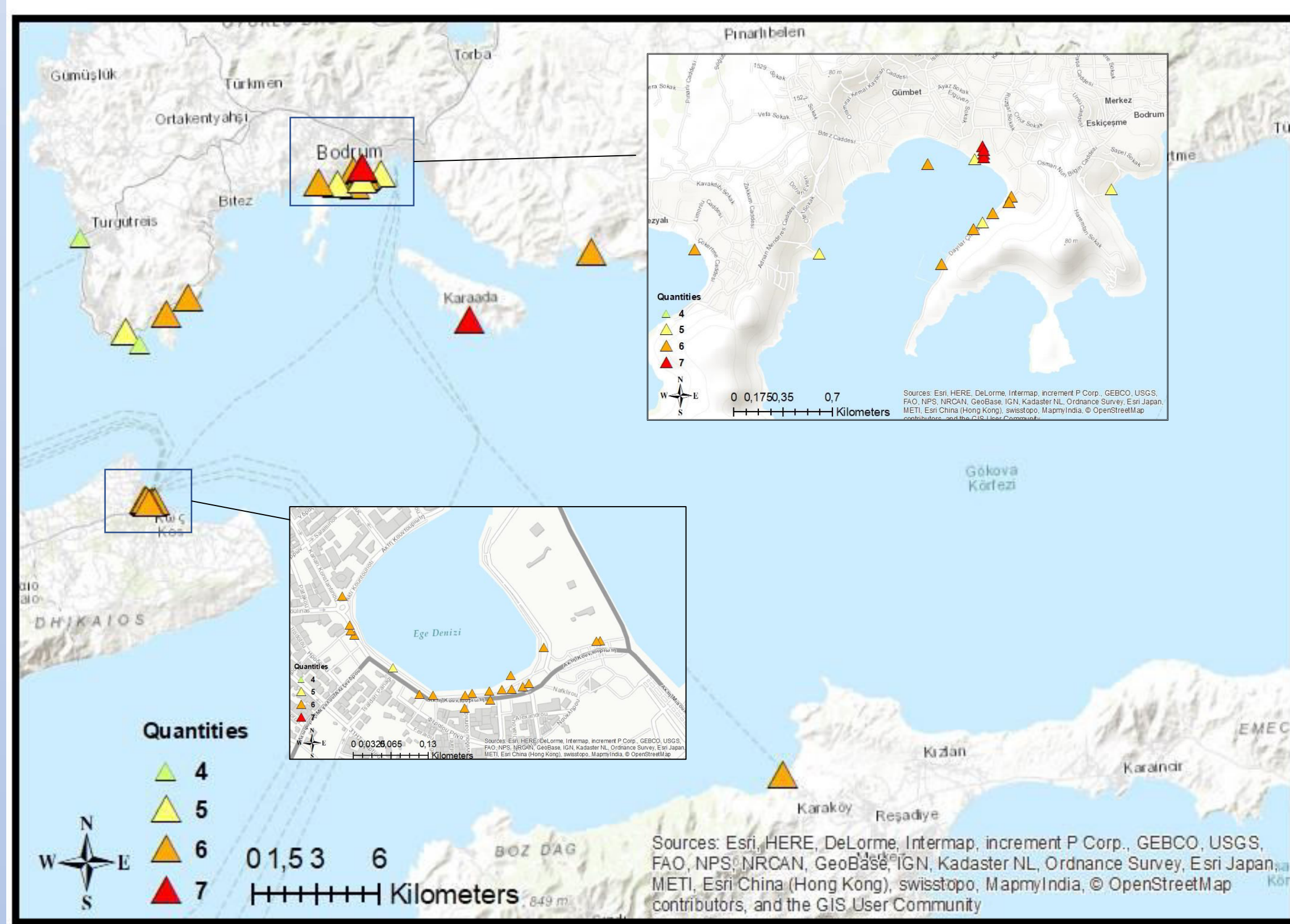
The max intensity for Bodrum area in Turkey is estimated at VII/XII grade as for the same tsunami the max intensity for Kos area in Greece is estimated at VI/XII grade. This can be attributed to different morphology, possible different distance, different wave direction or coastal land use.

Watch video

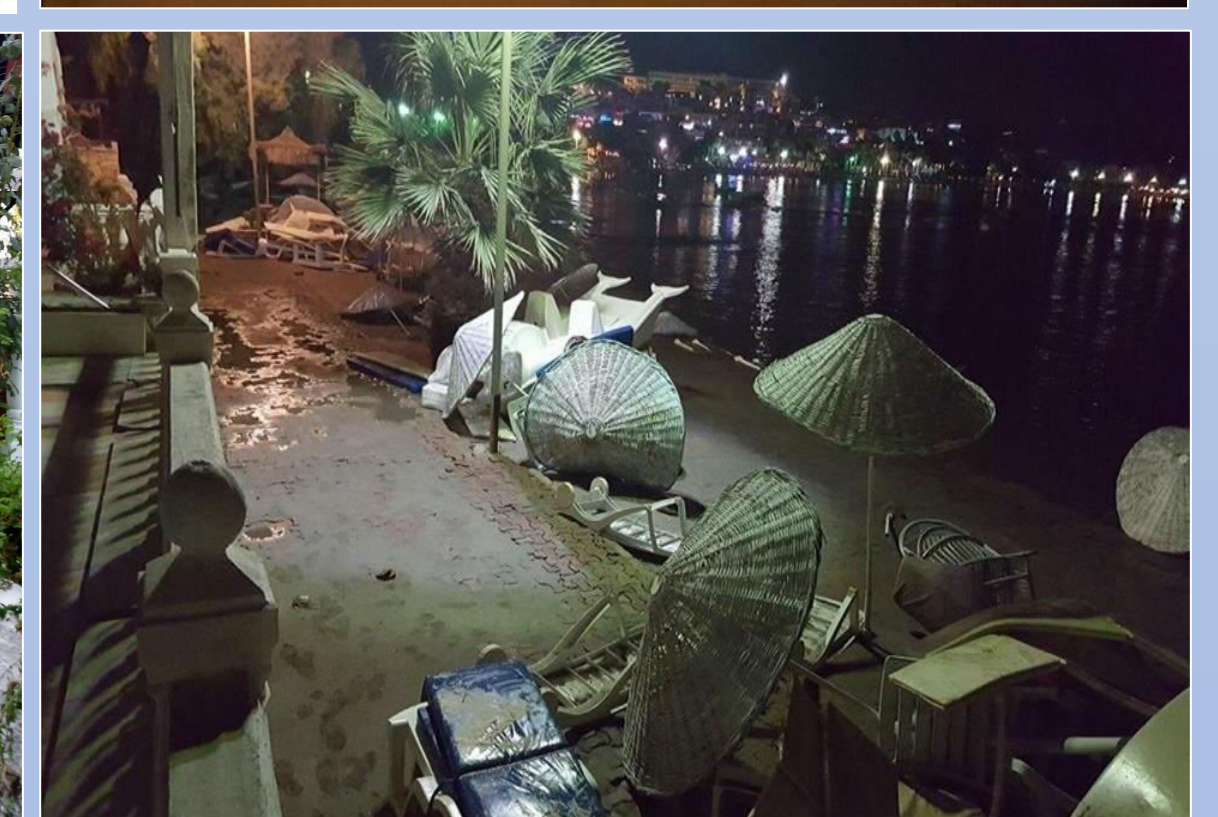
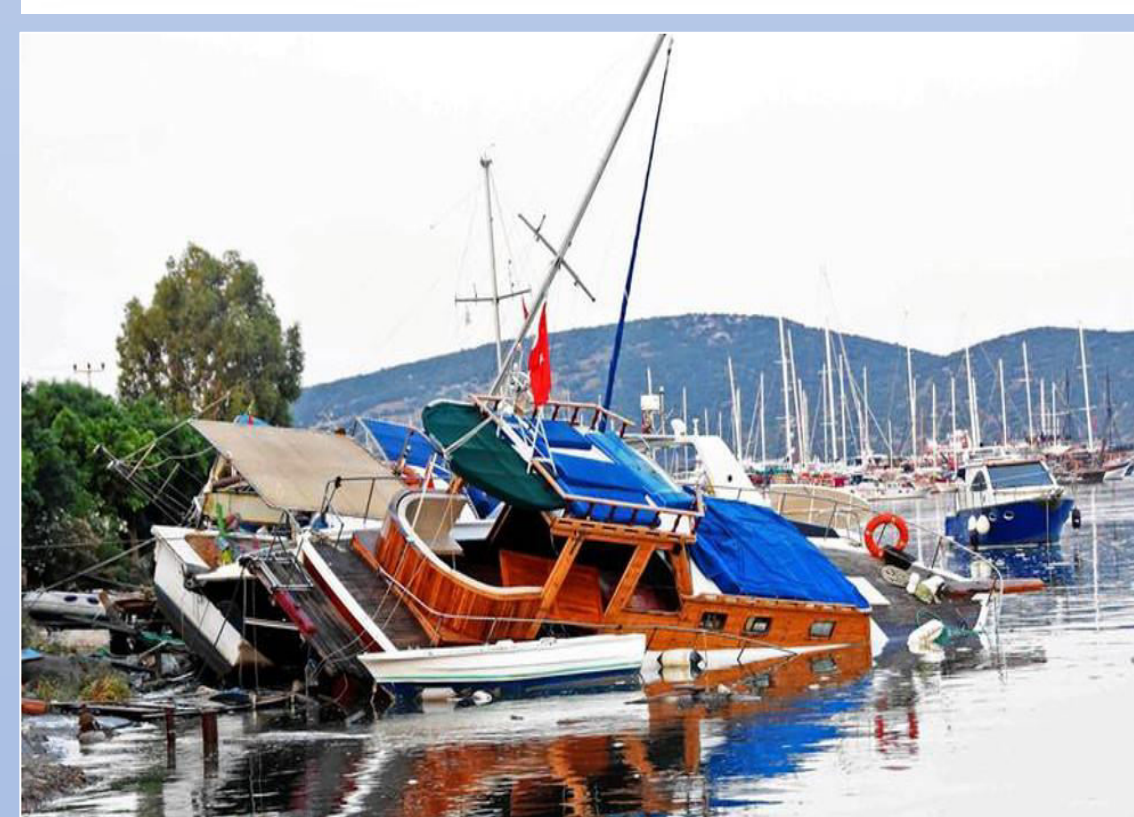
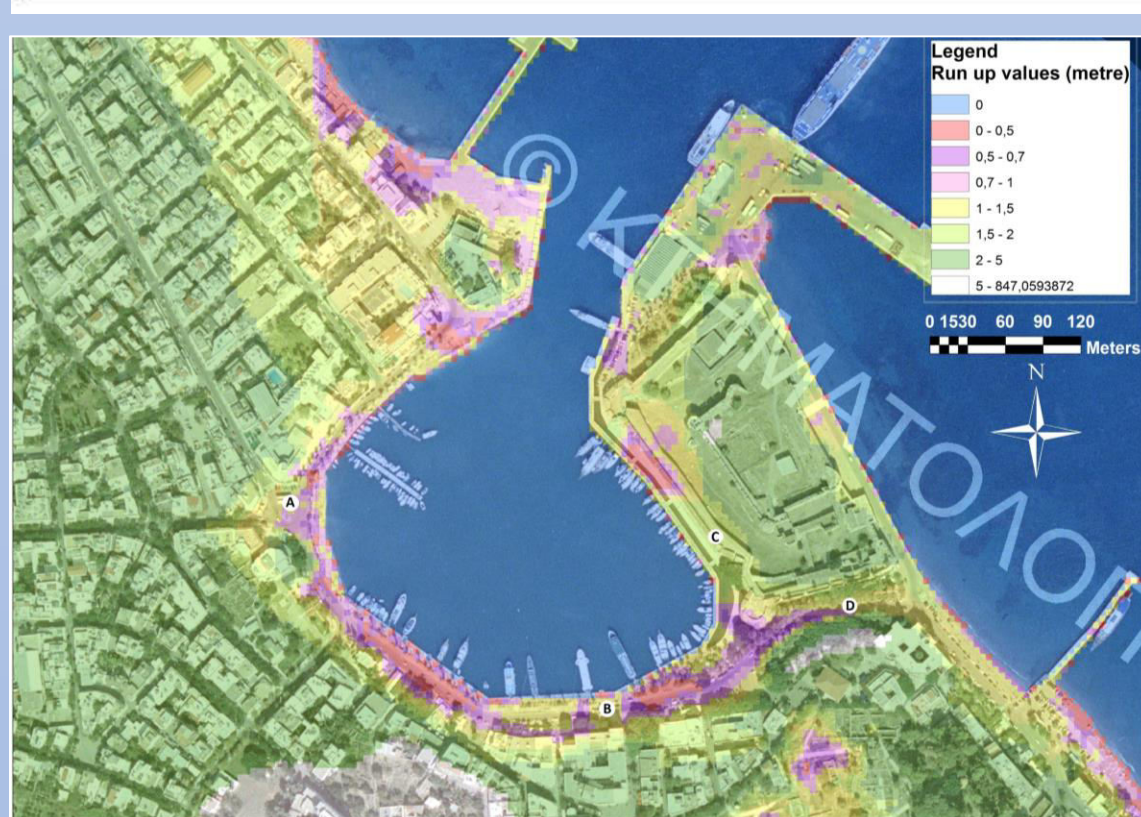
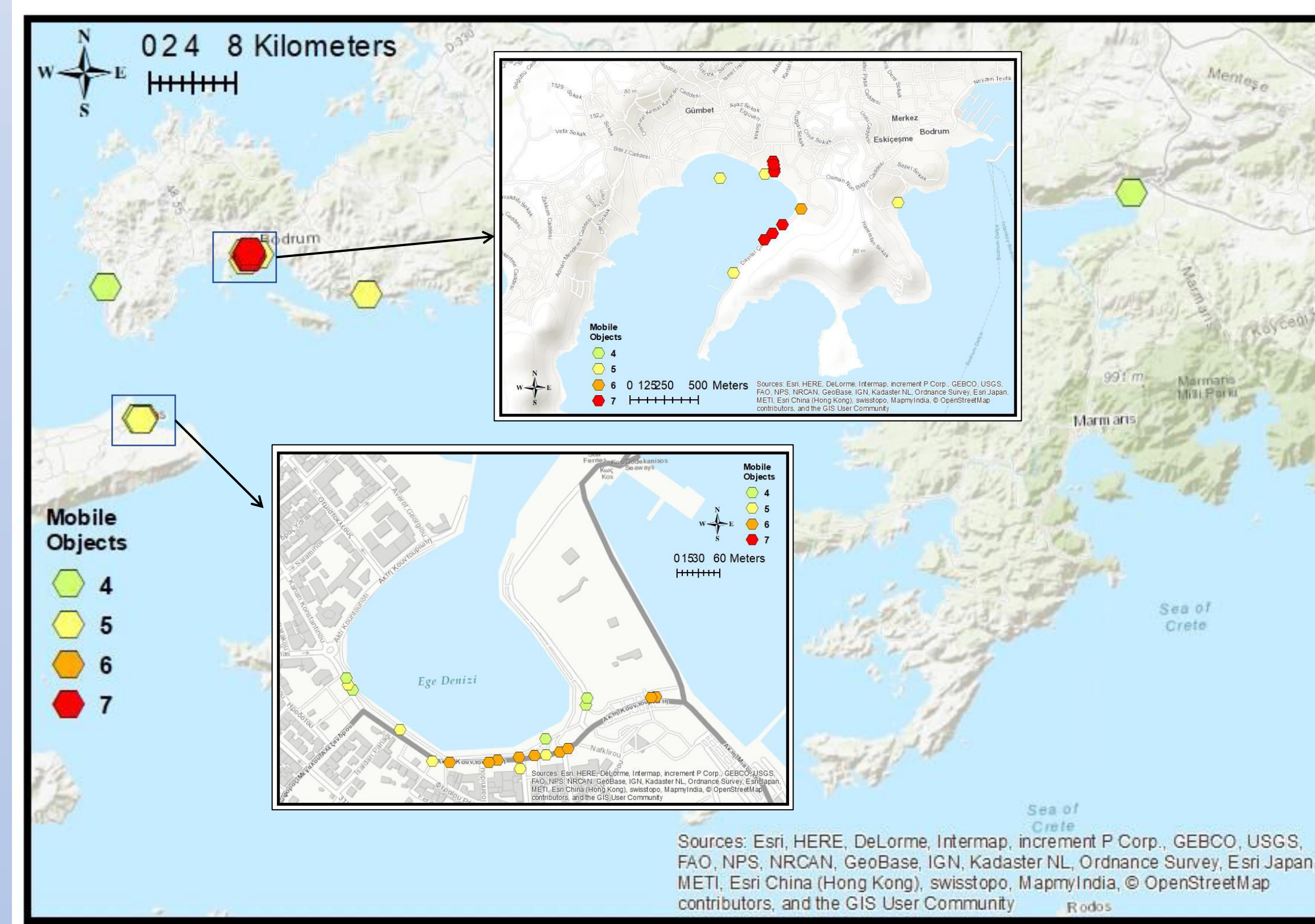


Tsunami waves at Kos port

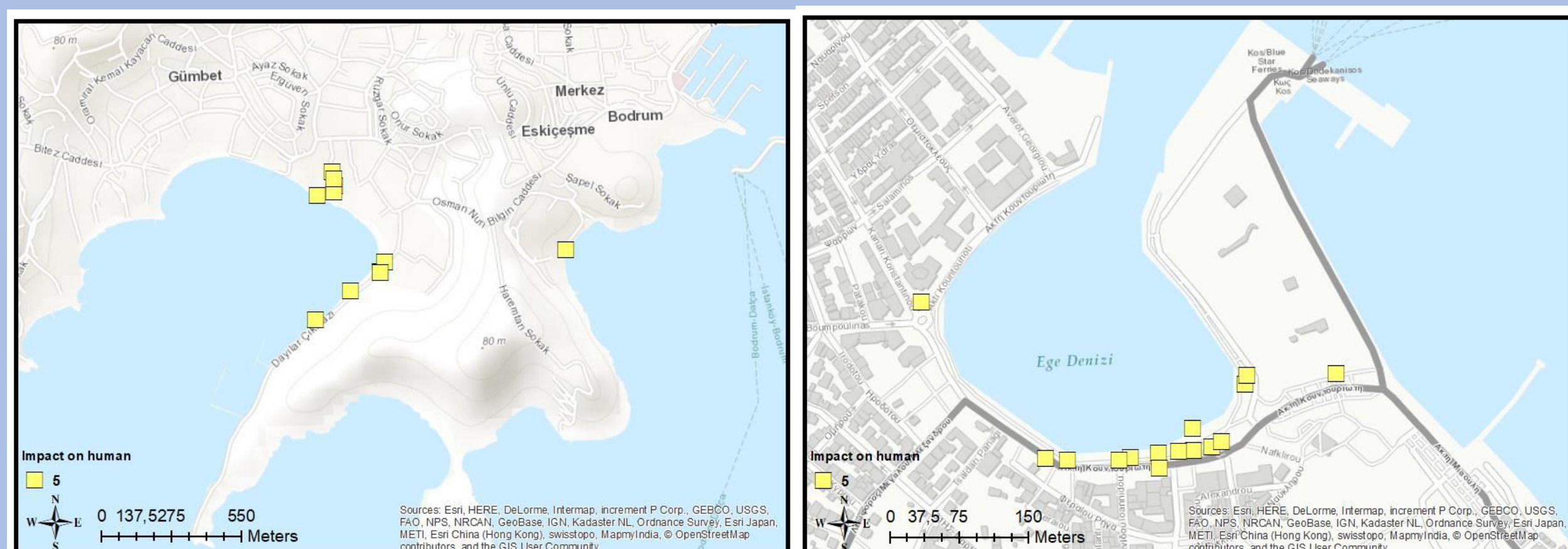
Phenomenon quantities



Displaced objects

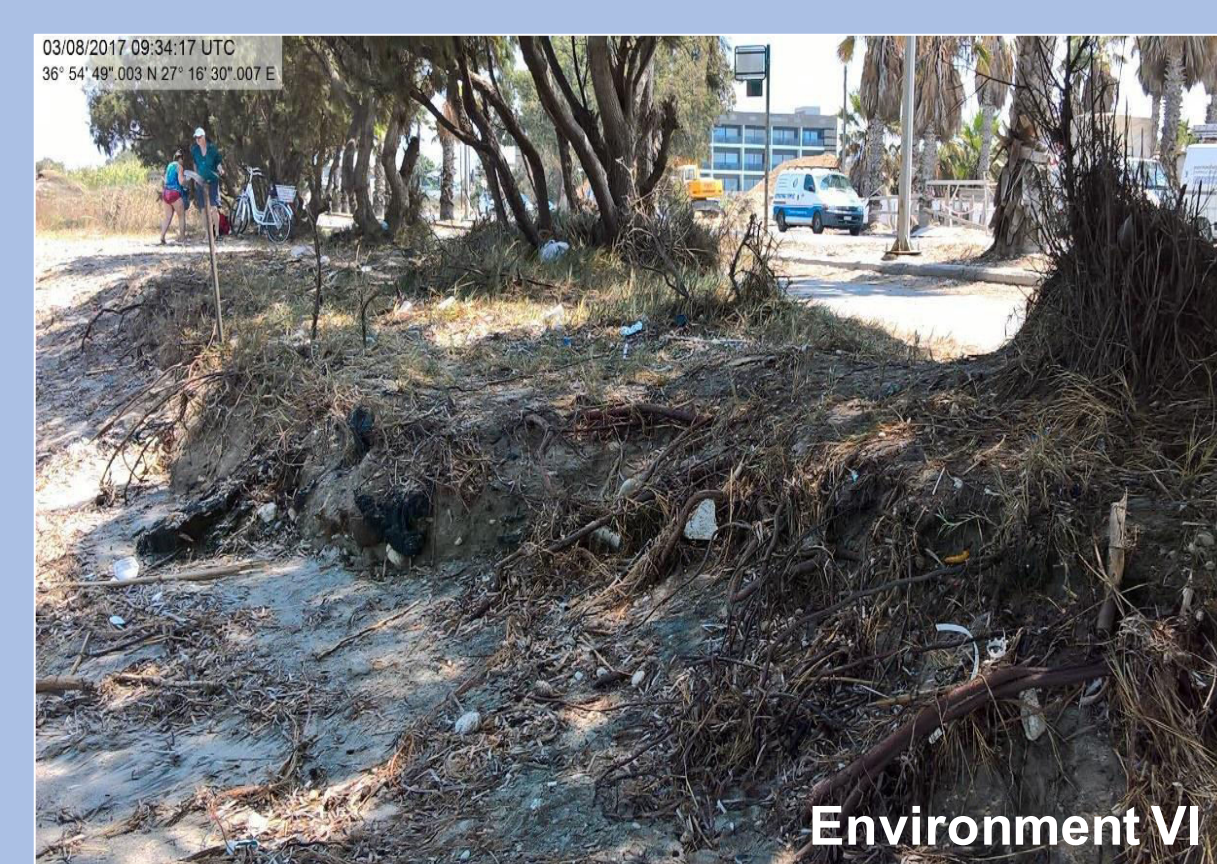


Impact on human



Sensible to everyone in large boats and by those who are in coast. Some people panic and run on higher, mostly in Bodrum area. (grade in ITIS₂₀₁₂: V)

Environment / Infrastructure / Structures

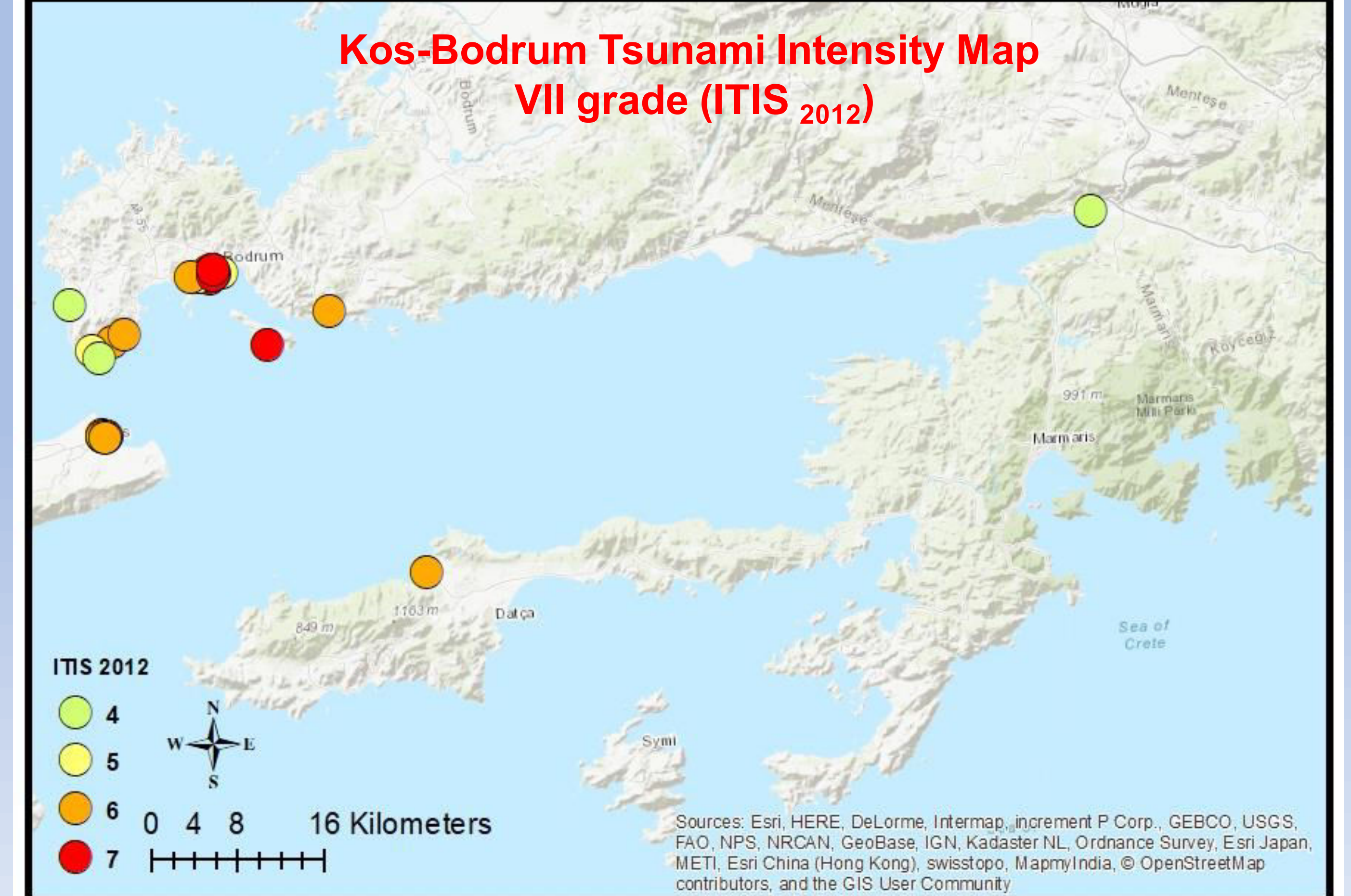


Environment VI



Infrastructure VII

Kos-Bodrum Tsunami Intensity Map VII grade (ITIS₂₀₁₂)



REFERENCES

Lekkas, E., Emmanouel Andreadakis, E., Irene Kostaki, I., Kapourani, E. 2013. A Proposal for a New Integrated Tsunami Intensity Scale (ITIS-2012). Bulletin of the Seismological Society of America, Vol. 103, No. 2B, pp. 1493–1502.
Yalciner, A.C., Annunziato, A., Papadopoulos, G., Dogana, G.G., Gulera, H.G., Cakird, T.E., Soznilere, C.O., Ulutas, E., Arkanawag, T., Suzen, L., Kanoglu, U., Gulera, I., Probst, P., Synolakis, C. 2017. The 20th July 2017 (22:31 utc) Bodrum/Kos earthquake and tsunami.
Dimova, L., Raykov, R. 2018. Numerical simulations of the earthquake-induced tsunami of July 20, 2017 (Mw=6.6) in Bodrum-Kos, Aegean Sea. Review of the Bulgarian geological society, vol. 79, part 1, 2018, p. xx–xx.
Heidarzadeh, M., Necmioglu, O., Ishibe, T., Yalciner, A.C. 2017. Bodrum–Kos (Turkey–Greece) Mw 6.6 earthquake and tsunami of 20 July 2017: a test for the Mediterranean tsunami warning system. Geoscience Letters, Official Journal of the Asia Oceania Geosciences Society (AOGS) 4:31.
Katsetsiadou, A.N. 2014. Applying the Integrated Tsunami Intensity Scale (ITIS₂₀₁₂) on Ishinomaki Bay Coast after 2011 Tohoku, Japan mega-event. MSc Thesis, University of Athens

CONCLUTIONS

Earthquake activity in Aegean Sea can easily generate tsunami waves and affect humans and human's activity in coastal zone.

Applying the ITIS Scale to a middle-intensity event for the first time, showed that the individual ITIS₂₀₁₂ criteria successfully complemented each other creating an excellent zoned or point map. The main criteria categories that mostly defined a medium-

impact tsunami are: a) Quantities, b) Impact on human & c) mobile objects.