1

Le tsunami d'Amorgos

The Amorgos tsunami

Quelle est l'origine du plus grand tsunami de Méditerranée des deux derniers siècles ?

What was the cause of the largest tsunami in Mediterranean history in the last two centuries?

Le 9 juillet 1956, un séisme de magnitude ~7.5 a eu lieu tôt le matin entre Santorin et Amorgos, en Grèce.

Treize minutes plus tard, un second séisme de magnitude ~7.2 ébranle de nouveau la zone.

Un tsunami fait suite au premier séisme, avec des hauteurs de vagues atteignant 10 et 20 m minimum dans la zone.

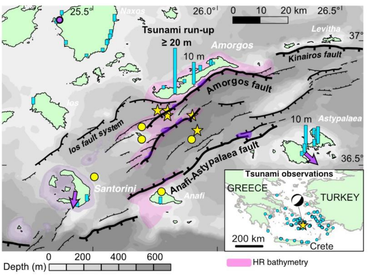
On 9 July 1956, an earthquake with a magnitude of ~7.5 occurred early in the morning between Santorini and Amorgos.

Thirteen minutes later, a second earthquake with a magnitude of ~7.2 shook the area again.

A tsunami followed the first earthquake, with wave heights reaching at least 10 and 20 meters in the area.

Map showing the location of the Amorgos earthquake (yellow stars), the second earthquake (yellow circles), wave heights (blue bars), submarine faults (black lines) and submarine landslides (purple).

According to Leclerc et al. (2024)



At that time, the seismological network was not very developed and did not allow these earthquakes to be accurately located.

The pink areas correspond to the high-resolution bathymetric surveys carried out during the AMORGOS campaigns along the faults.

Que s'est-il passé ?

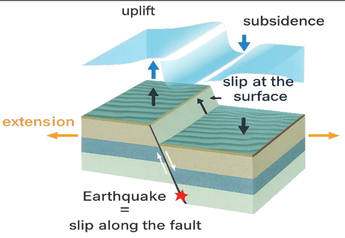
L'origine du tsunami reste un mystère :
liée au séisme ? ou liée à des glissements sous- marins déclenchés par le séisme ? Mais à l'époque, on ne connait pas l'existence des failles en mer.
L'hypothèse du glissement est favorisée.

Caractériser ce qu'il s'est passé sous la mer permet de mieux comprendre comment, et pourquoi ce tsunami s'est formé et a pu atteindre de telle hauteur.

What happened?

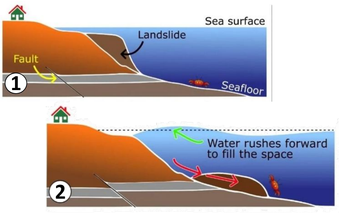
The origin of the tsunami remains a mystery: was the tsunami linked to the earthquake? Or was it linked to underwater landslides triggered by the earthquake? But at the time, the existence of faults in the sea was unknown. The landslide hypothesis was favoured.

Characterising what happened under the sea provides a better understanding of how and why this tsunami formed, and was able to reach such heights.



3D models of an underwater fault that ruptures during an earthquake and an underwater landslide.

The two phenomena rapidly displace the water masses above the seabed, triggering a tsunami.

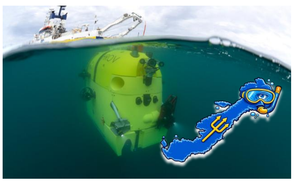


Pour y répondre ? ...
... plonger au fond de la mer

Plusieurs campagnes en mer ont eu lieu, avec le navire 'Europe' de la Flotte Océanographique Française.

To answer these questions ...
... diving to the seafloor

Several expeditions at sea were carried out using the 'Europe', a vessel belonging to the French Oceanographic Fleet.



Launch of the HROV Ariane, equipped with a camera and articulated arms for working on the seabed.

The HROV Ariane
(Hybrid Remotely Operated Vehicle)
is the underwater robot
that was designed and developed by Ifremer in 2015.
© Ifremer / Olivier Dugornay

Pour voir les failles, et les ruptures, les données acquises en surface sur le navire océanographique ne suffisent pas.

L'utilisation de robots sous-marins permet d'obtenir une cartographie très précise du fond marin et des failles sous-marines.

To identify faults and fractures, the data collected at the surface by the research vessel is not sufficient.

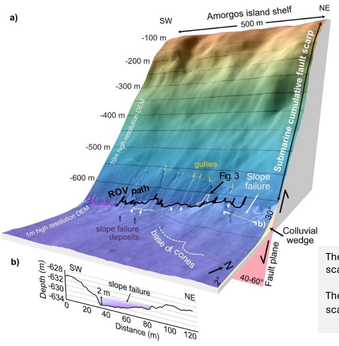
The deployment of underwater robots (HROV) enables the mapping of the seabed and underwater faults with a high degree of accuracy.

Ariane a filmé les escarpements de la faille d'Amorgos qui montre un décalage de plus de 9 m du fond de la mer, probablement lié au séisme d'Amorgos.

Il est donc possible que les plus hautes vagues de tsunami se soient formées à cause du séisme.

Cette nouvelle hypothèse, s'appuyant sur ces observations géologiques sous-marines nécessite d'être testée.

De nombreuses questions demeurent.



3D reconstruction of a section the Amorgos fault plane, at a depth of 750 m.
The fault shows striations and sedimentary deposits that were originally on the seabed but have now been uplifted to a height of over 9 m.
© Frédérique Leclerc

HROV 'Ariane' recorded footage of the Amorgos fault escarpments, which show a displacement of more than 9 meters from the sea floor, likely linked to the Amorgos earthquake.
It is therefore possible that the highest tsunami waves were formed as a result of the earthquake.

This new hypothesis, based on these underwater geological observations, needs to be tested.

Many questions remain!

The HROV Ariane surveyed the base of the scarp.

The video shows the footage of the fault scarp at ~700 m below sea level.
> https://youtu.be/BlPxGHiClmU

Le projet de recherche AMORGOS (2025-2028) a pour but d'y répondre.
Des équipes de chercheurs se mobilisent pour étudier la géologie de l'île, pour explorer ses fonds marins, pour analyser ses archives historiques ...
et ainsi mieux comprendre l'évènement géologique de 1956 !

The AMORGOS research project (2025–2028) aims to answer these questions.

Teams of researchers are working to study the island's geology, explore its seabed, and analyse its historical archives ...
in order to better understand the geological event of 1956!

more on AMORGOS PROJECT > https://edumed.unice.fr/amorgos

More than 40 Scientists, Engineers & Students involved