

# Mediterranean Sea

## Overview

The Mediterranean Sea is a semi-enclosed sea that separates Europe from Africa (Figure 1). It is connected at its western end to the Atlantic Ocean via the Strait of Gibraltar that provides a major inflow of water. The region is oceanographically diverse with a number of distinct sub-seas. The region has local areas of upwelling and wind-driven currents [LME 2004].

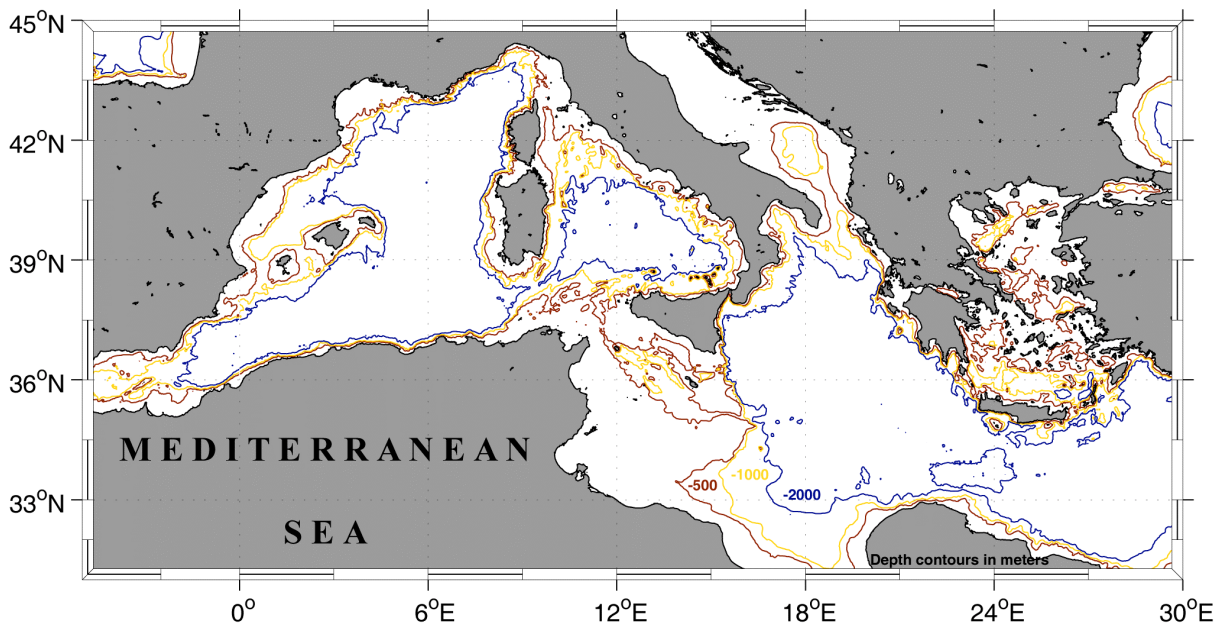


Figure 1. Bathymetry of the Mediterranean Sea [Smith and Sandwell, 1997].

## Observations

There has been some scientific research into internal waves in the Mediterranean Sea. Wave occurrences have been noted in the Gulf of Lyons, the Adriatic Sea, in the Strait of Messina, around the island of Pantelleria in the Strait of Sicily, and among the Cretan Arc Straits. Additionally, satellite imagery shows internal waves signatures in the Malta Channel and along the east coast of Spain.

Table 1 - Months when internal waves have been observed in satellite imagery in the Mediterranean Sea  
 (Numbers indicate unique dates in that month when waves have been noted)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
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## References

- A.F. Velegrakis, A.F. E. Oikonomou, A. Theocharis, M.B. Collins, H. Kontoyiannis, V. Papadopoulos, G. Voulgaris, T. Wells E. Balopoulos; 1999, Internal waves revealed by Synthetic Aperture Radar (SAR) imagery in the vicinity of the eastern Cretan Arc Straits (Eastern Mediterranean), *Progress in Oceanography* 44, 553–572
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<http://na.nefsc.noaa.gov/lme/text/lme26.htm>
- Smith, W. H. F., and D. T. Sandwell, Global seafloor topography from satellite altimetry and ship depth soundings, *Science*, v. 277, p. 1957-1962, 26 Sept., 1997.  
[http://topex.ucsd.edu/marine\\_topo/mar\\_topo.html](http://topex.ucsd.edu/marine_topo/mar_topo.html)

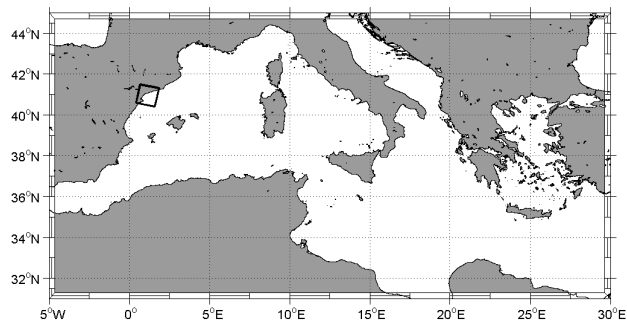
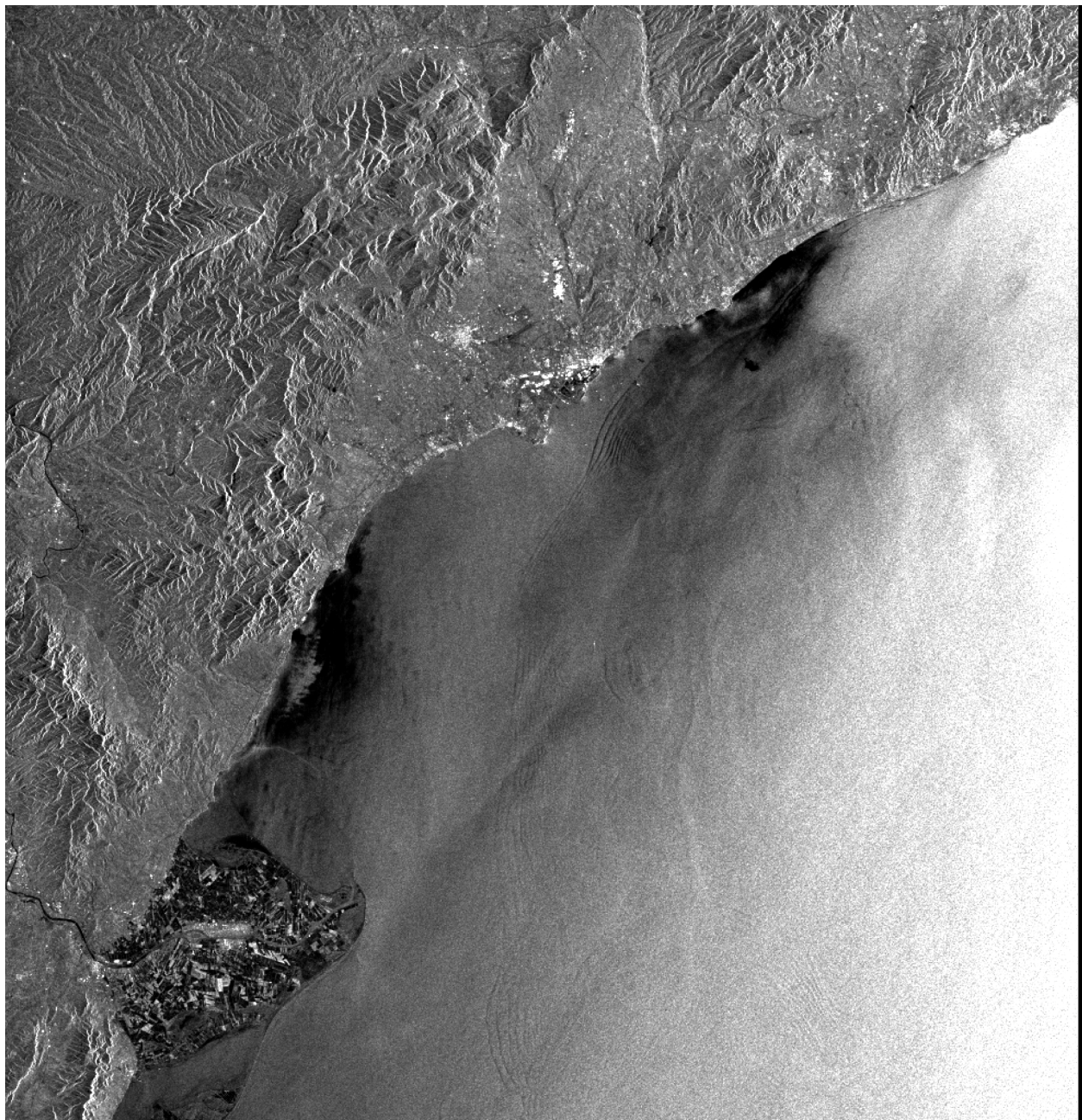


Figure 2. ERS-2 (C-band, VV) SAR image along the Spanish coast of the Balearic Sea acquired on 3 June 1998 at 1041 UTC (orbit 16309, frame 2781). Internal wave signatures are visible along the coast. This region along the coast of Spain has a wide continental shelf. Imaged area is 100 km x 100 km. ©ESA 1998. [Image courtesy of Werner Alpers, University of Hamburg, Hamburg, Germany.]





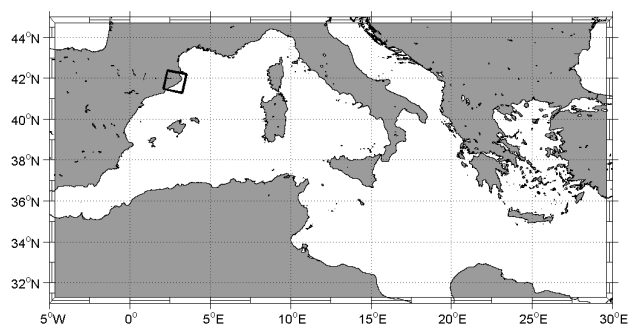
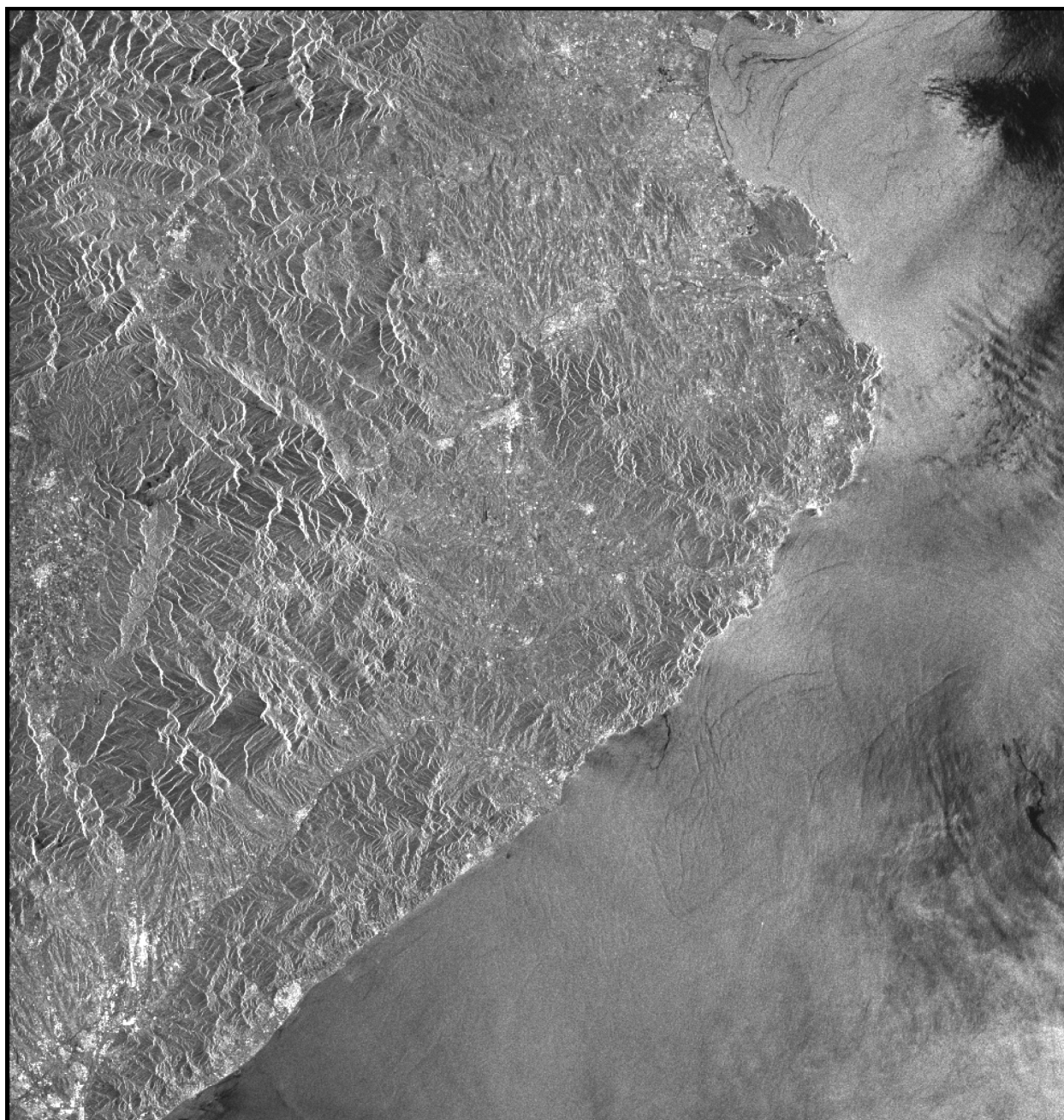


Figure 3. ERS-2 (C-band, VV) SAR image of the Coasta Brava area of the Mediterranean Sea acquired on 31 May 1998 at 1035 UTC (orbit 16266, frame 2763). Oceanic internal wave signatures are visible near the coast where a wide continental shelf exists. The linear wave pattern visible in the upper part of the image most likely an atmospheric internal wave signature. Imaged area is 100 km x 100 km ©ESA, 1998. [Image courtesy of Werner Alpers, University of Hamburg, Hamburg, Germany.]





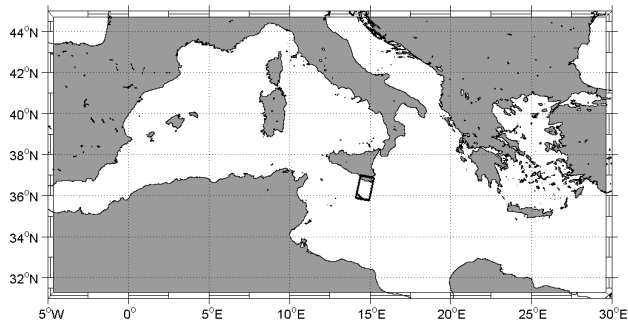
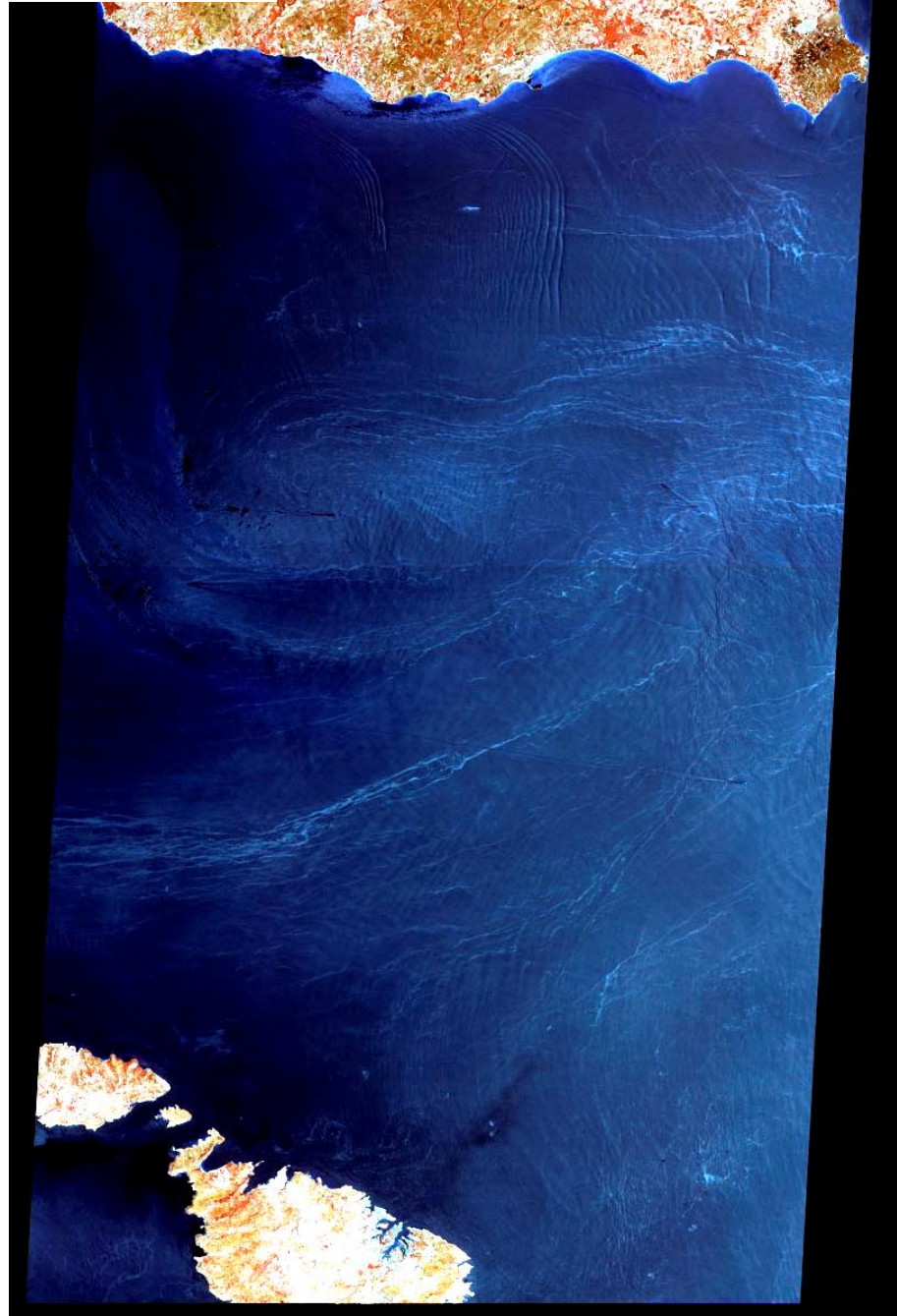


Figure 4. ASTER false-color VNIR image over the Malta Channel acquired on 7 July 2002 at 1001 UTC. The image shows the signatures of three well-defined packets along the southern coast of Sicily propagating eastward. A faint signature is also visible in the bottom half of the image of a possible internal wave packet propagating westward.





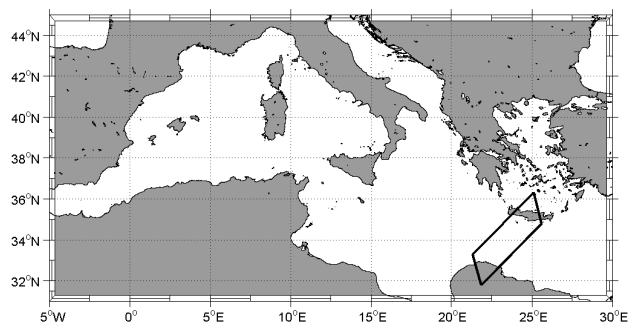
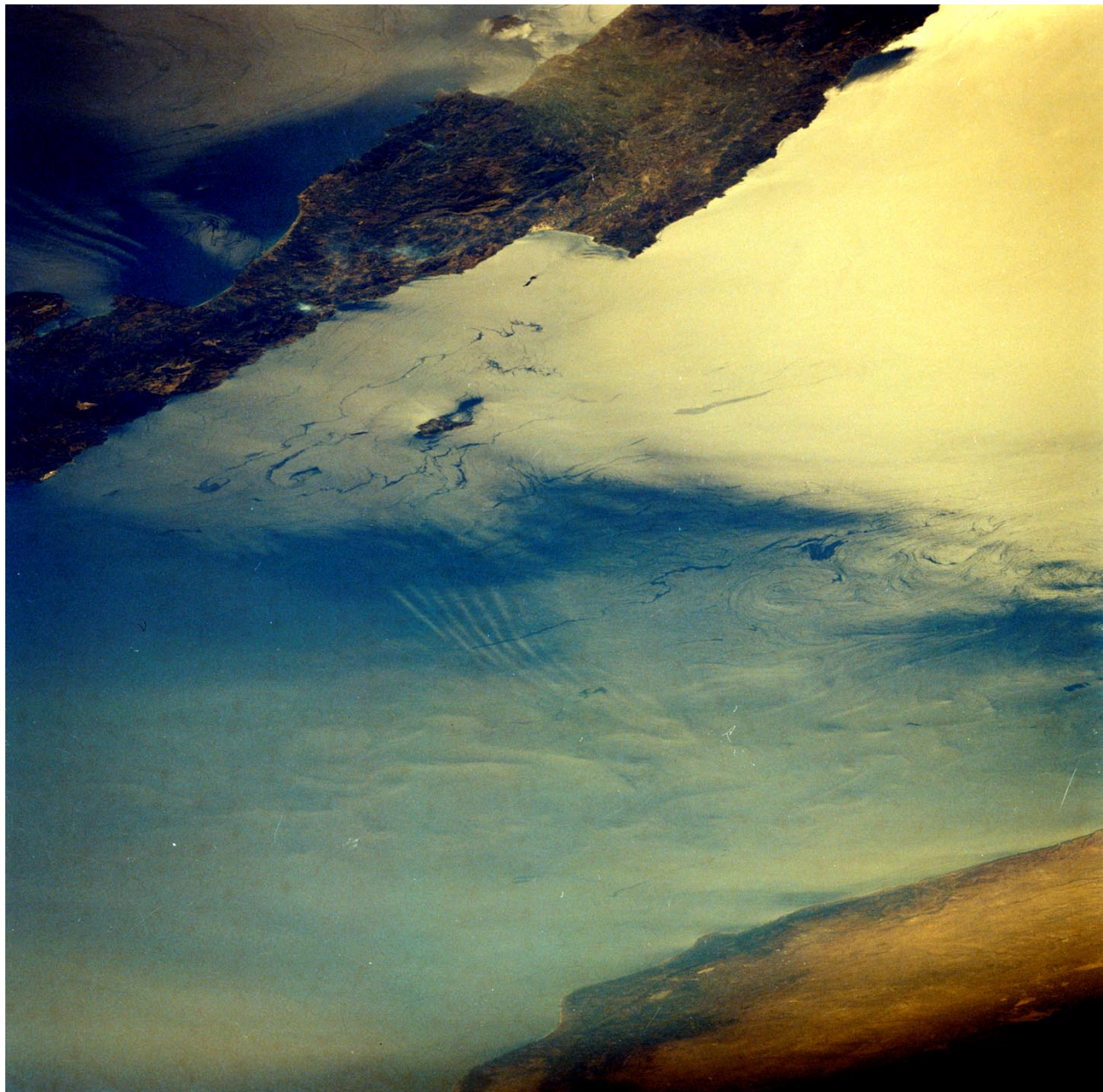


Figure 5. Astronaut photograph (STS41G-36-23) acquired on 6 October 1984 at 1157 UTC. The image shows internal wave signatures along the coast of Crete. The signatures are most likely not oceanic but atmospheric in origin. Imaged area is approximately 425 km x 135 km. [Image Courtesy of Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center (<http://eol.jsc.nasa.gov>)]





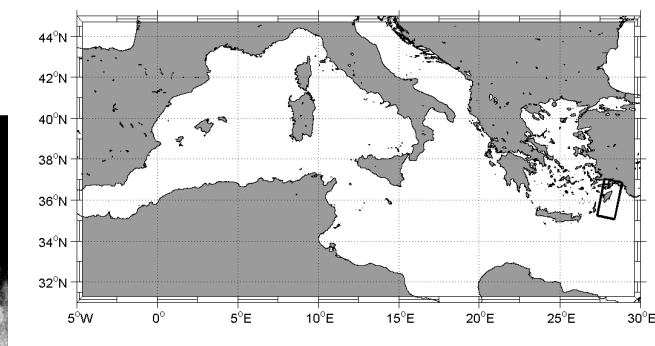
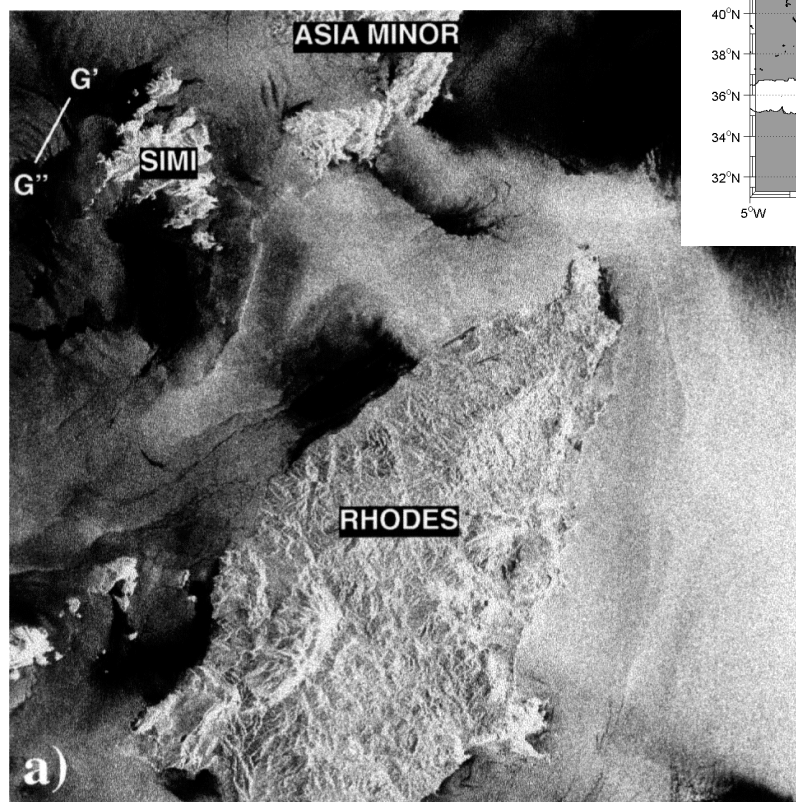
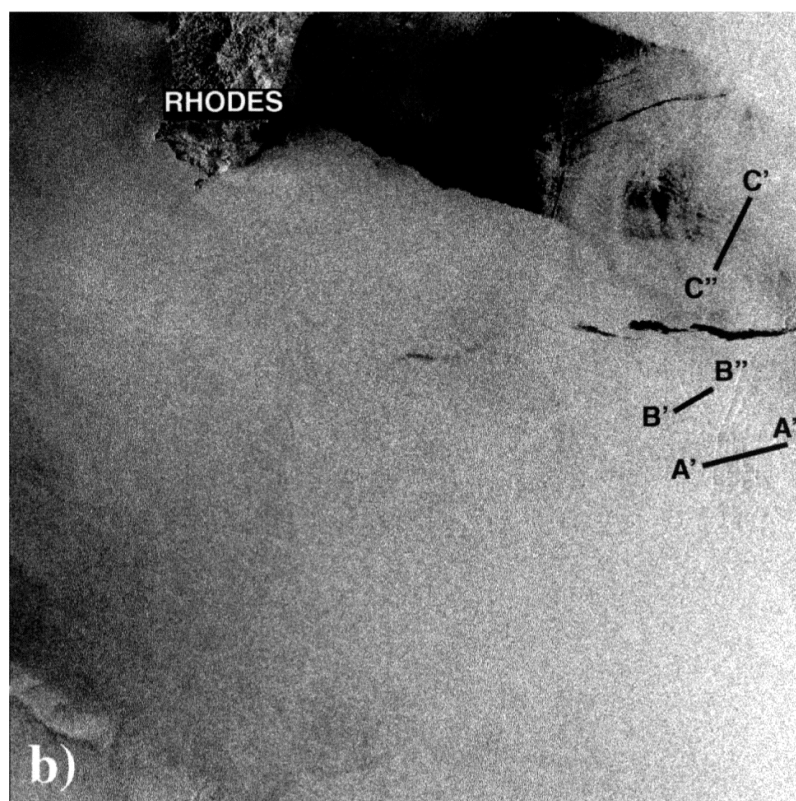


Figure 6. ERS-1 (C-band, VV) SAR image of the Cretan Arc Straits acquired on 7 September 1994 at 0849 UTC (orbit 16449, frames 2871, 2889). Velegrakis et al. [1999] identified 4 internal wave packets (A,B,C,G) in the region around the island of Rhodes. Coincident in situ measurements showed a strong seasonal thermocline at 10 to 20 meter depth both east and south of the island. The region is characterized by both a complex water circulation pattern and complex bathymetry [After Velegrakis et al. 1999]



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