

Northeast Africa

Overview

Northeast Africa covers approximately 2200 km of coast from Kenya to the tip of Somalia (approximately 39° E, 4° S to 51°E, 12°N)(Figure 1). Internal wave activity has been observed in the area the near Kenya and the northeast coast of Somalia, where the continental shelf broadens compared to the other parts of the coastline.

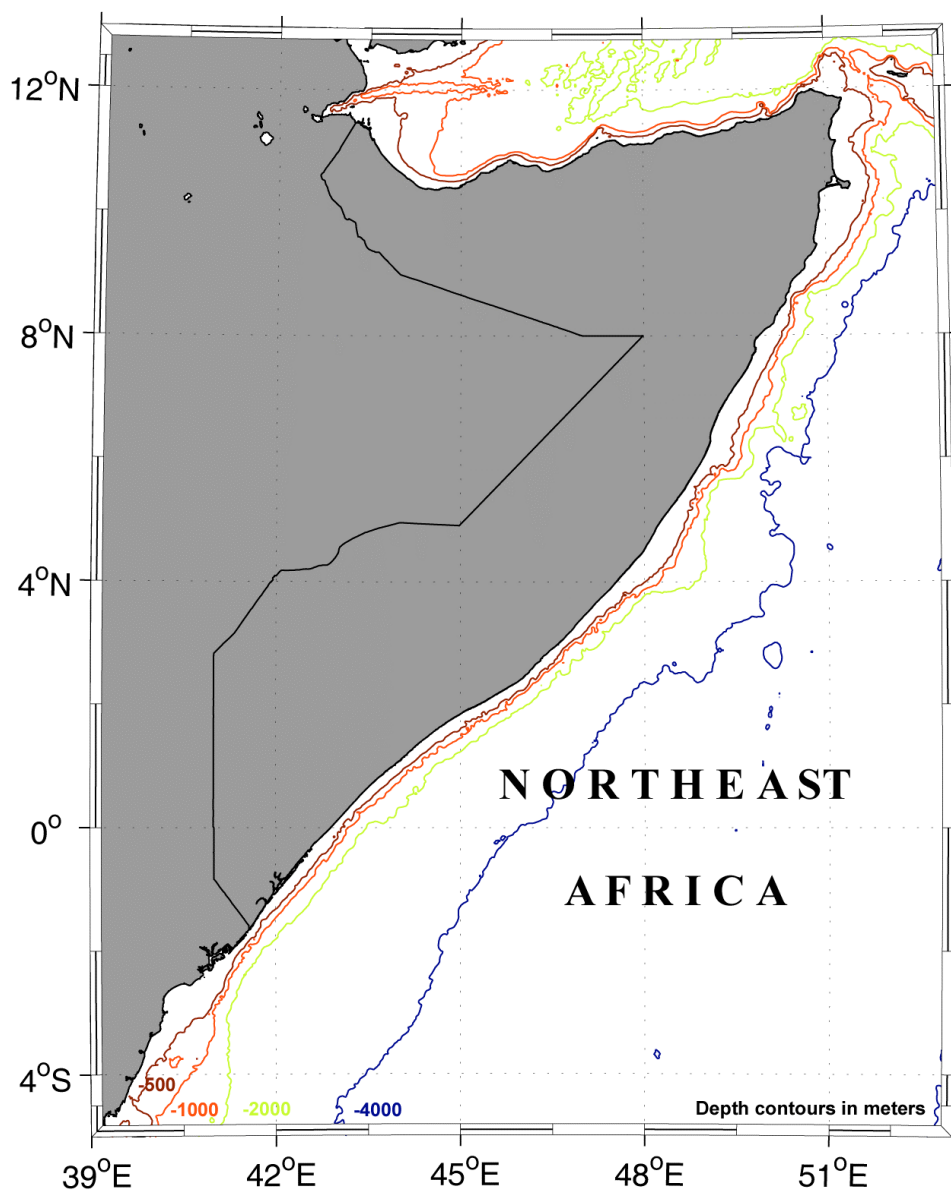


Figure 1. Bathymetry of the Northeast Africa. [Smith and Sandwell, 1997]

Observations

There has been some study made of internal waves around Somalia using astronaut photography. Wang [1997] performed an in-depth analysis of three astronaut photographs off the coast of Somalia acquired 1 October 1988 (STS026-042-015, STS026-042-016, STS026-038-073) (Figures 2-4). Wang concluded that the waves were tidally generated from a tidal flow from the northeast. Soliton wavelengths ranged from 2.8 km to 0.1 km with most around 0.6 km. Using a model Wang also estimated a maximum amplitude of 18 m and characteristic phase speed of 0.87 m/s for the waves in this area.

Table 1 shows the months of the year during when internal wave imagery has been observed.

Table 1 - Months when internal waves have been observed along the coast of Northeast Africa.
 (Numbers indicate unique dates in that month when waves have been noted)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1			2					1	1		3

References

- Smith, W. H. F., and D. T. Sandwell, 1997; Global seafloor topography from satellite altimetry and ship depth soundings, *Science*, v. **277**, 1957-1962
http://topex.ucsd.edu/marine_topo/mar_topo.html
 Wang, Zongming, 1997; A Study of Ocean Internal Waves Using Space Shuttle Data, PhD Thesis University of Delaware.

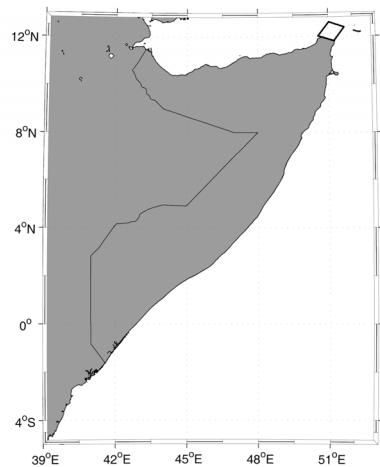


Figure 2. Astronaut photograph (STS026-042-015) acquired on 1 October 1988 at 1015 UTC showing internal wave signatures off the coast of Somalia. The image shows the effect of bathymetry on the wave front (see Figure 3). Imaged area is approximately 75 km x 75 km. [Image Courtesy of the Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center (<http://eol.jsc.nasa.gov>)].



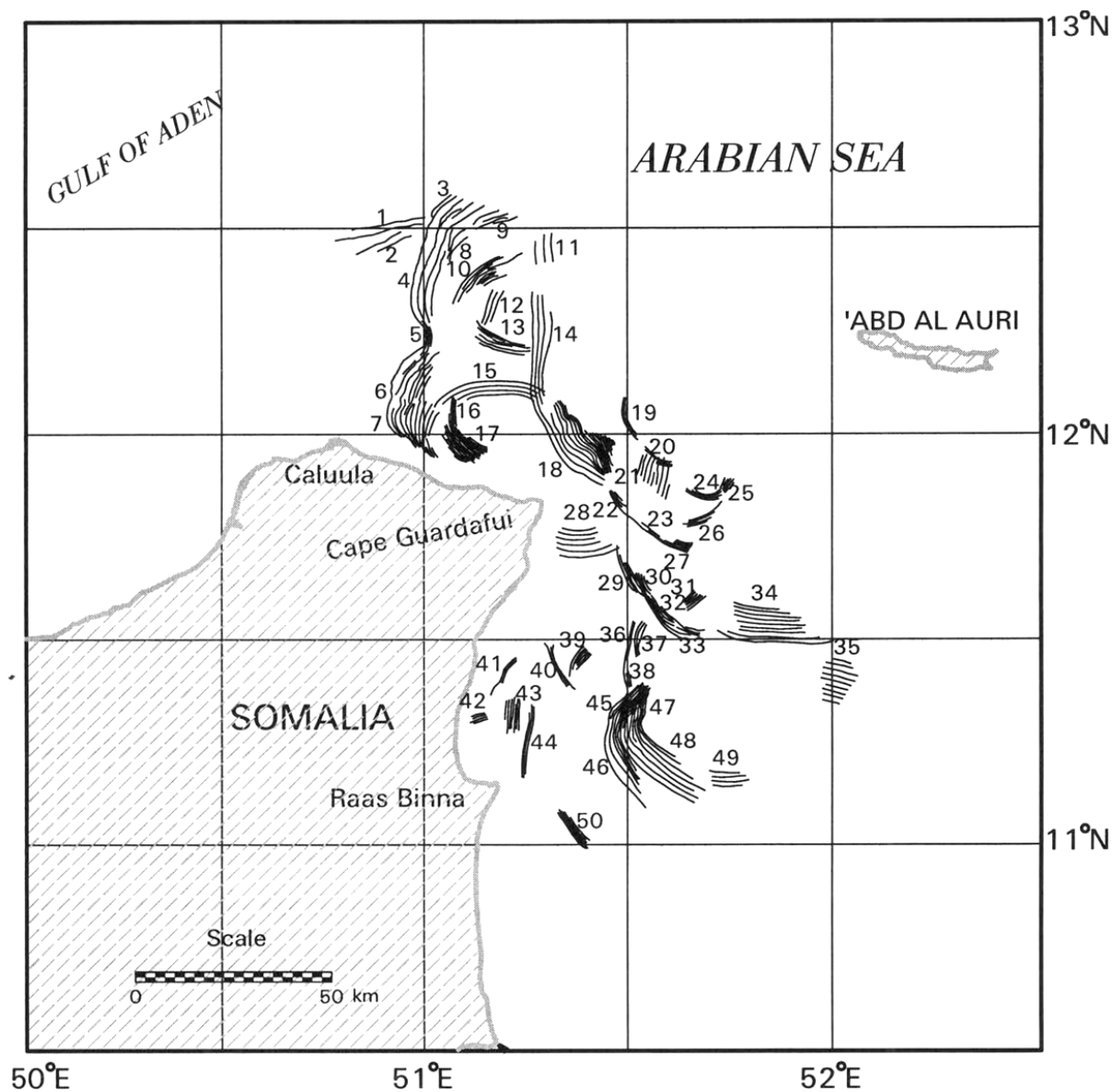


Figure 3. Interpretation map of astronaut photographs STS026-042-015, STS026-042-016 and STS026-038-073. The solid curved lines represent the various internal wave signatures visible in the imagery. The numbers represent Wang's coding system [After Wang, 1997].

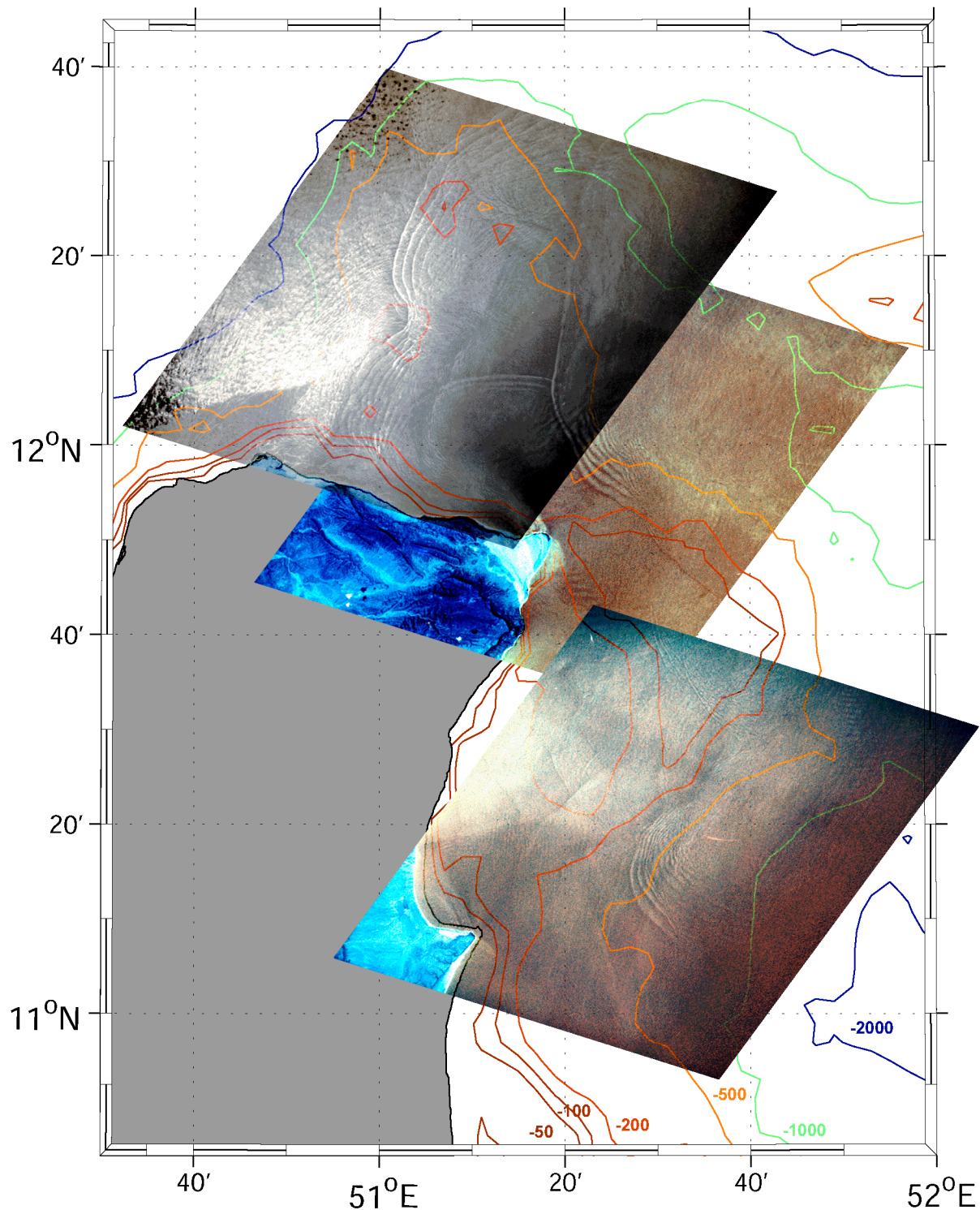


Figure 4. Composite of Astronaut photographs (STS026-042-015 (top), (STS026-042-016 (middle), STS026-038-073 (bottom) acquired on 1 October 1988. The local bathymetric map helps to show why certain wavefront distortions exist in the signatures. [Images courtesy the Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center (<http://eol.jsc.nasa.gov>)]

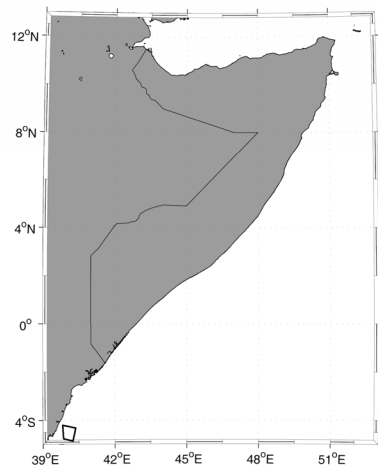


Figure 5. Astronaut photograph (STS032-91-BX) acquired in January 1990 showing internal wave signatures north east of Penba Island off the coast of Kenya. Imaged area is approximately 75 km x 75 km. [Image Courtesy of the Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center (<http://eol.jsc.nasa.gov>)]



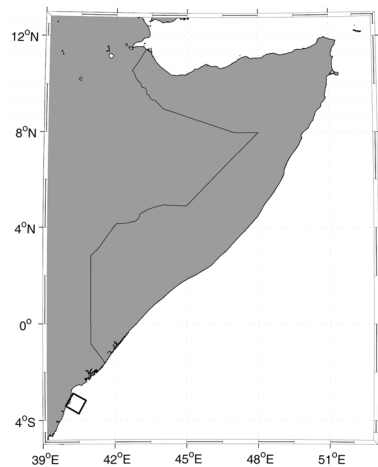
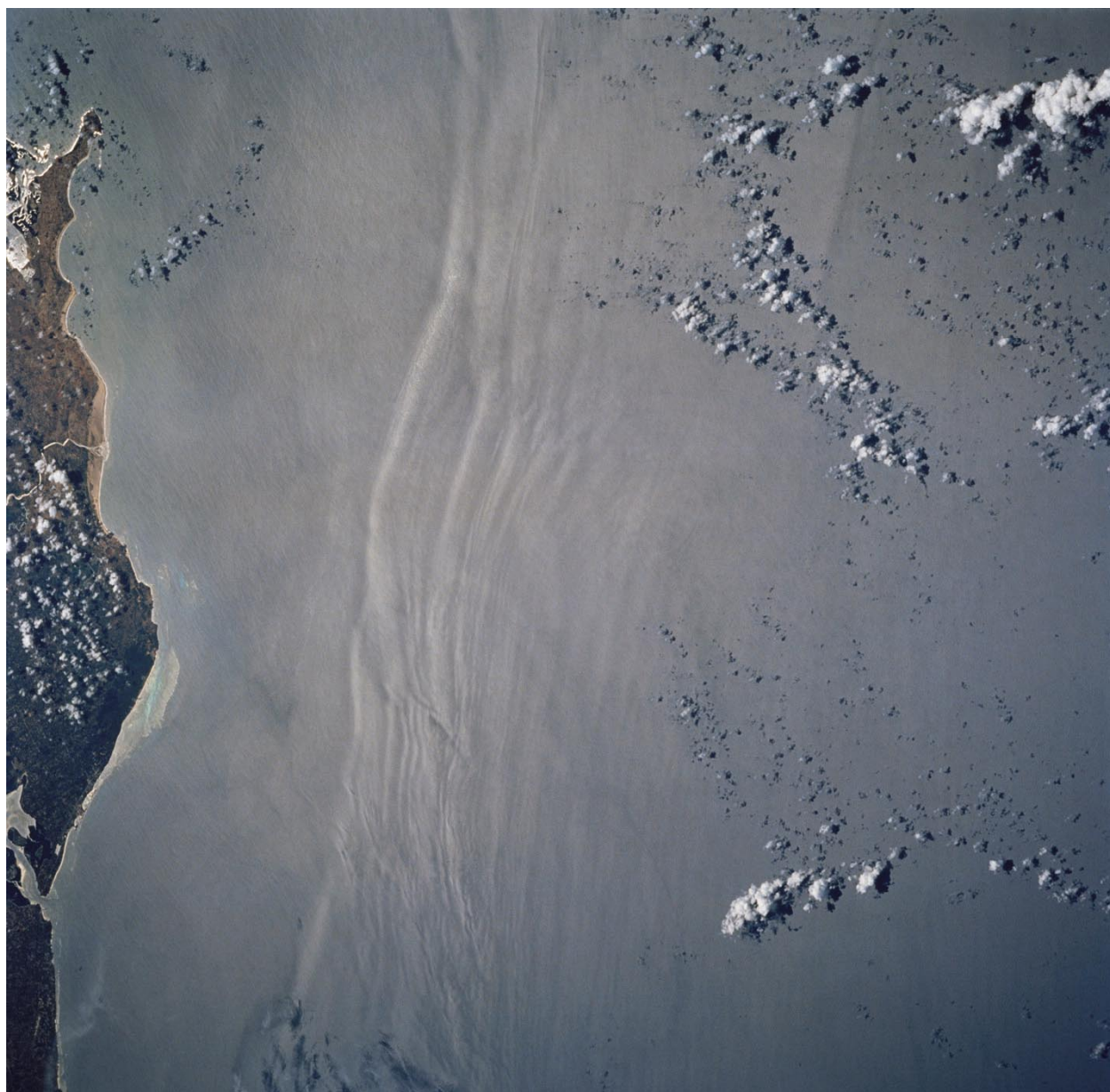


Figure 6. Astronaut photograph (STS088-738-81) acquired on 30 April 1993 at 1040 UTC showing linear striations of internal wave signatures propagating toward the coast of Kenya. Imaged area is approximately 75 km x 75 km. [Image Courtesy of the Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center (<http://eol.jsc.nasa.gov>)].



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