Florida - Atlantic Coast

Overview

Internal wave activity was observed by Seasat along the Florida Atlantic coast, (between approximately 27.5^{o} and 29.5^{o} N. latitude and 79.5^{o} and 80.5^{o} W. longitude) [Fu and Holt, 1982]. Figure 1 is an L-Band Seasat image taken on 25 July 1978 off the Florida Coast near Cape Canaveral. The image shows a number of internal wave signatures across the upper half of the image. Two collections of waves are visible, one in the top left quadrant (propagating shoreward) the other in the top right quadrant (propagating seaward). Roughening of the ocean surface by the wind can been seen to enhance the internal wave signatures.

The internal waves in the top left quadrant show a complex surface pattern resulting from the "loop" in the 50-meter isobath. This "loop" allows the waves to be generated at two locations in relatively close proximity (8 km) along the shelf break (Figure 2). While these waves can be classified as continental shelf solitons because of there generation location and propagation direction, the signatures show several important differences that distinguish them from other solitons observed in the NY Bight, New England Shelf and other regions. The waves appear to from inside the 50-meter isobath, and not the 200 to 500 meter regions and have maximum wavelengths around 0.6 km and not the 1 to 1.5 km traditionally observed.

On possible reason for the difference in the internal wave characteristics is the presence of the Gulf Stream. The Gulf Stream in this area flows close to the 200-meter isobath with a speed of up 2.2 m/s. The Gulf Stream's signature can be seen as linear striation in the bottom left of figure 1. Apel [1999] has suggested that solitary waves, propagating approximately normal to the mean direction of flow may be launched from such boundary currents near their turning points.

A second collection of internal waves is visible in figure 1 propagating away from shore in the right-center, and more faintly in darker region adjacent to right center. The source of these internal waves is unknown.

Variable wind conditions most likely account for the light and dark variation across the image. The image also contains a number of other features including; ships and ship wakes (center), and atmospheric signatures (bottom - middle).

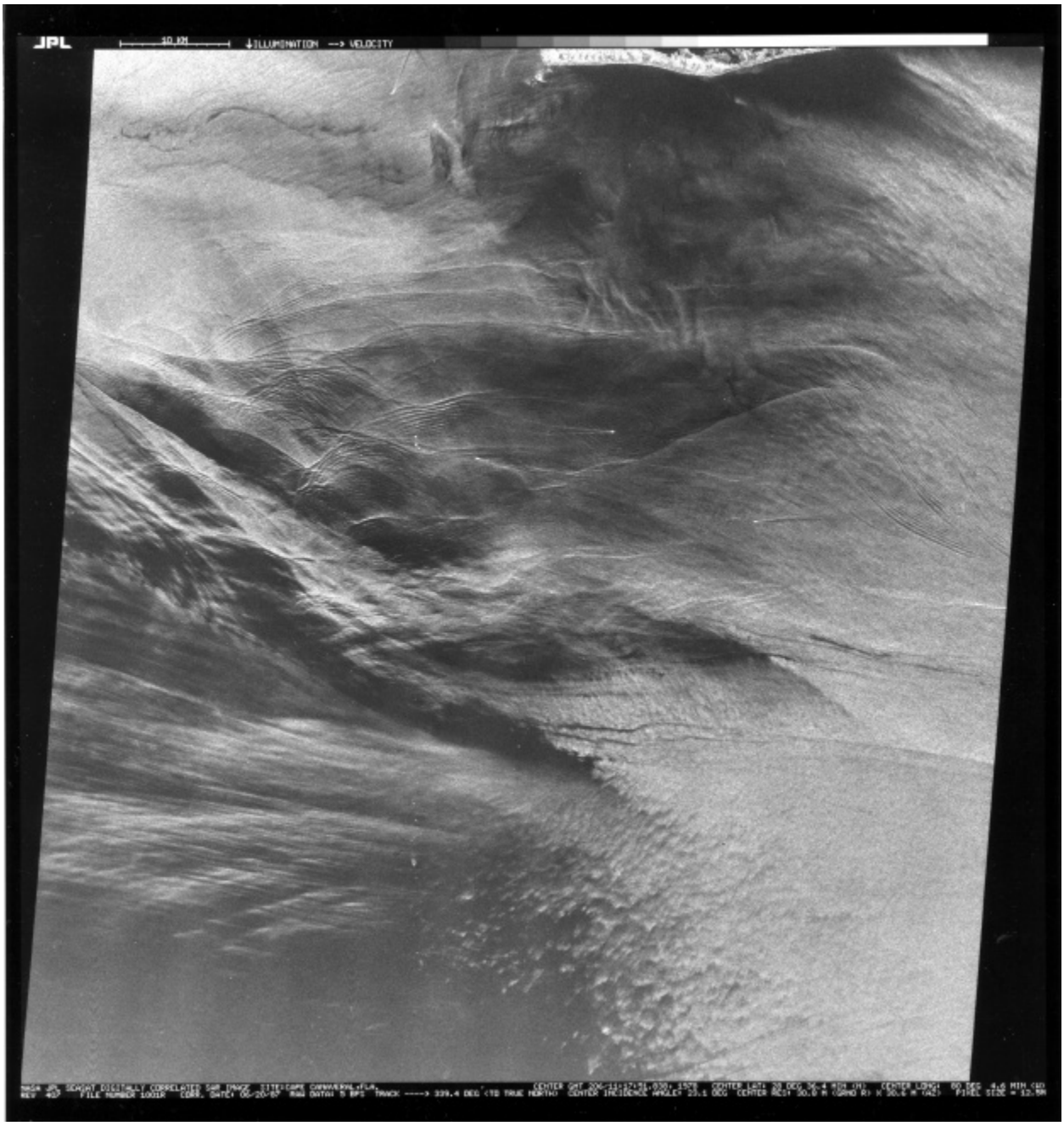

Figure 1. Seasat L-Band SAR image of internal waves off Cape Canaveral, Florida. Image was acquired July 25, 1978. Image dimensions are 100 x 100 km centered at 38°36.4' N, 80°4.6'W. Image courtesy of NASA, JPL.

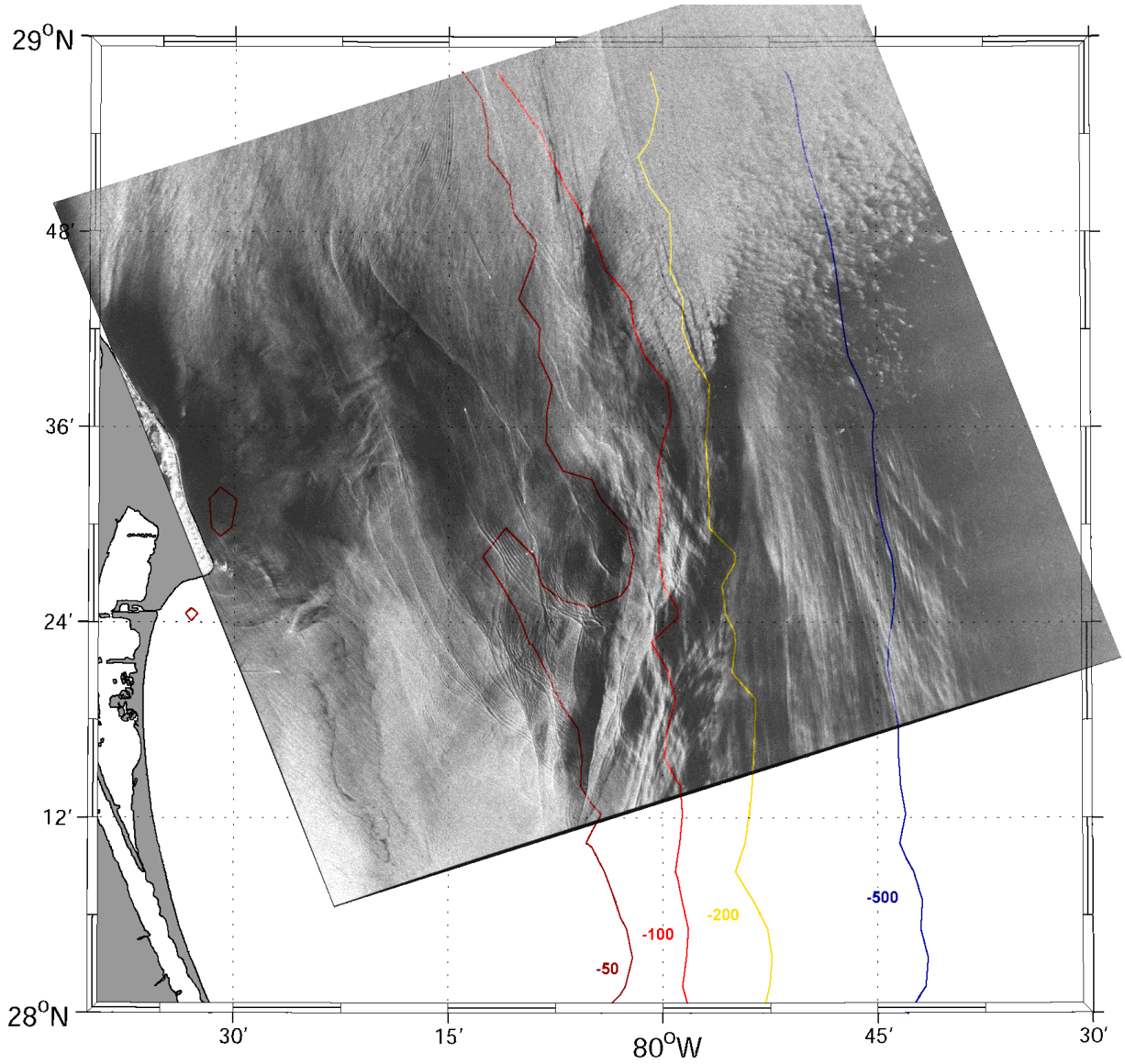

Figure 2. Seasat image overlaid with local bathymetry (derived from Smith and Sandwell version 8.2). Internal waves can be seen well aligned with 50-m isobath.

References

Apel, J.R., 1999, "Are Strongly Sheared Baroclinic Currents Sources for Internal Solitons?" IOS/WHOI/ONR, 1998: Internal Solitary Wave Workshop Papers. *Woods Hole Oceanographic Institution Technical Report* **WHOI-99-0**7, Edited by T. Duda and D. Farmer. http://www.whoi.edu/science/AOPE/people/tduda/isww/text/index.html.

Fu, L.L., and B. Holt, 1982, Seasat Views Oceans and Sea Ice with Synthetic Aperture Radar, JPL Publication 81-120

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