# United States (California) Pacific Coast

## Overview

The United States Pacific Coast runs approximately 1200 km along California from Mexico (31°N, 116°W) to Oregon (42°N, 124°W) (Figure 1). A roughly 100 km wide continental shelf exists above 34°N with more diverse bathymetry among the Channel Islands in the south. The region is influenced by the California Current and strong wind driven upwelling.

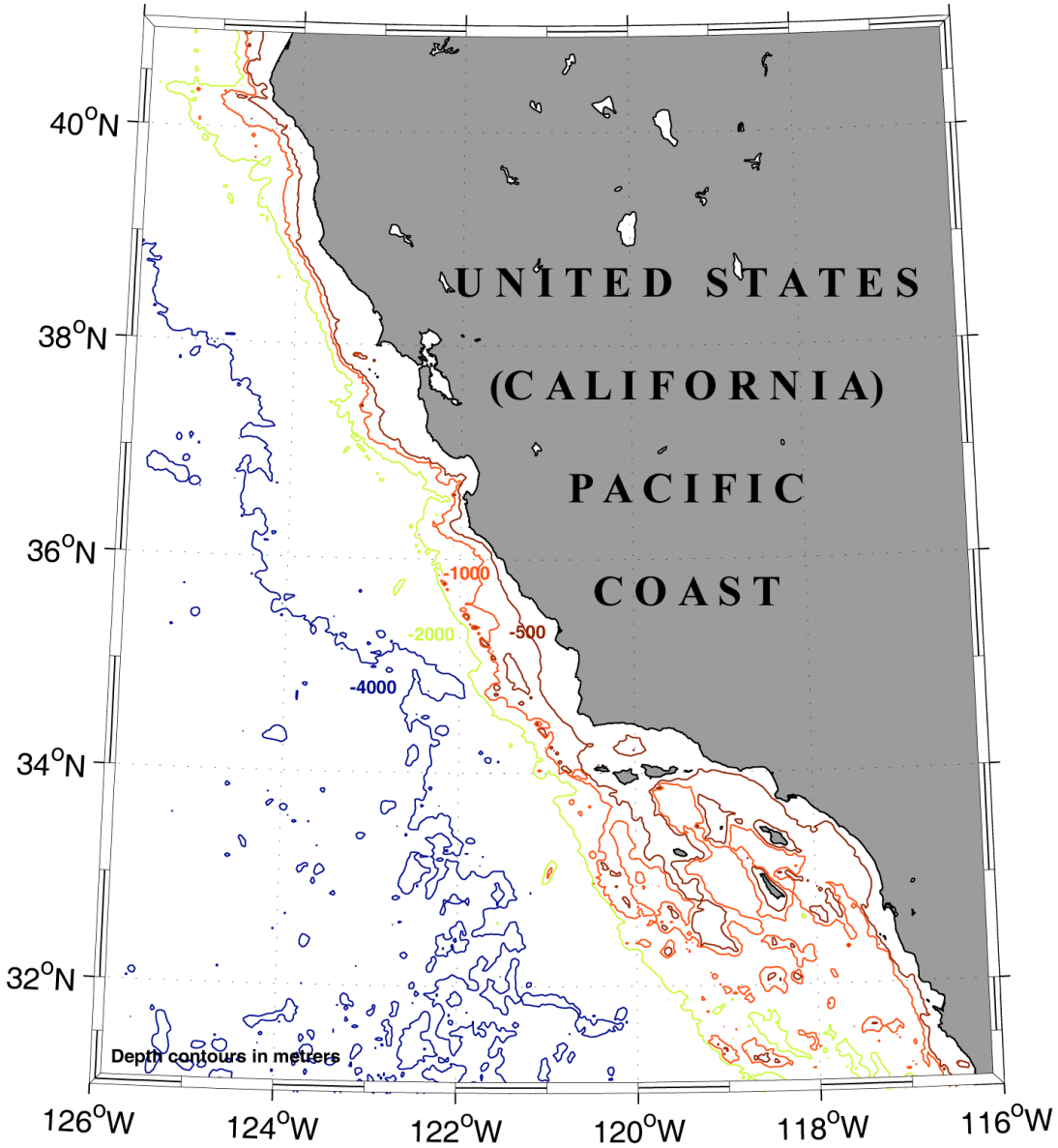



Figure 1. Bathymetry of the Pacific coast of California [Smith and Sandwell, 1997].

## Observations

There has been some scientific studies of internal waves along California's Pacific coast, primarily in the south of the Channel Islands (Santa Monica Bay, Palos Verdes, Huntington Beach [Howell and Brown, 1985; Lerczak et al. 1999]. ONR funded the Internal Waves on the Continental Margin (IWAVES) field experiment conducted in 1996 and 1997 off of Mission Beach (Figure 2). SEASAT imagery acquired during the summer of 1978 contains the signature of internal waves and packets near San Francisco and along the coast from San Diego to San Nicolas Island. Table 1 shows the months of the year when internal wave observations have been made.

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

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3 | | | 4 | 3 | | 3 | | |

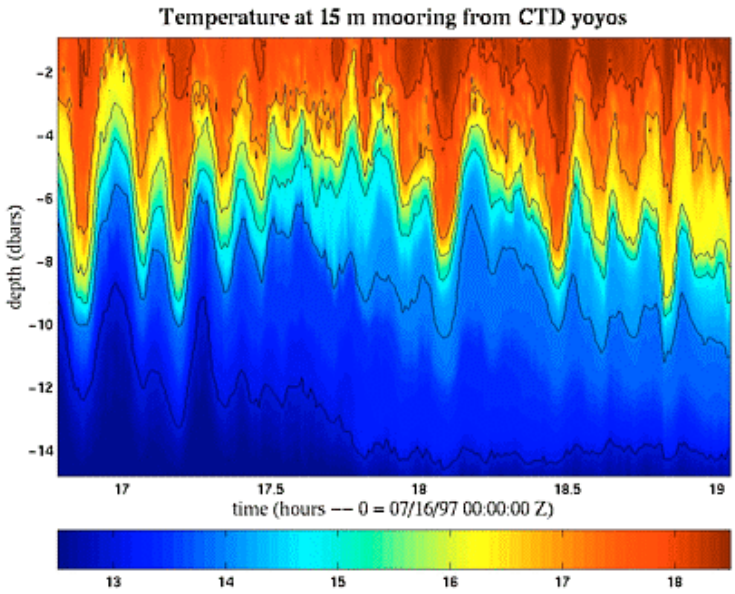



Figure 2. Temperature profile of internal wave acquired 16 July 1997 as part of the IWAVES Experiment.

## References

Howell, T.L., and W.S. Brown, 1985: Nonlinear internal waves on the California continental shelf. *J. Geophys. Re*s., **90 (C4)**, 7256-7264.

Lerczak, J.A., M.C. Hendershott, and C.D. Winant, 1999: Observations of the internal tide on the Southern California Shelf. *Dynamics of Oceanic Internal Gravity Waves II: Proc. of the Aha Hulikoa Hawaiian Winter Worksho*p, SOEST, University of Hawaii, 9-20.

Lerczak, J. A., M. C. Hendershott, and C. D. Winant, Observations and modeling of coastal internal waves driven by a diurnal seabreeze, *J. Geophys. Res.,* accepted.

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

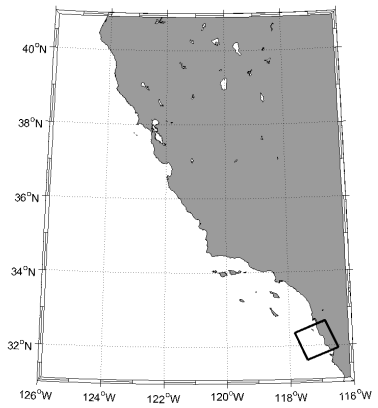
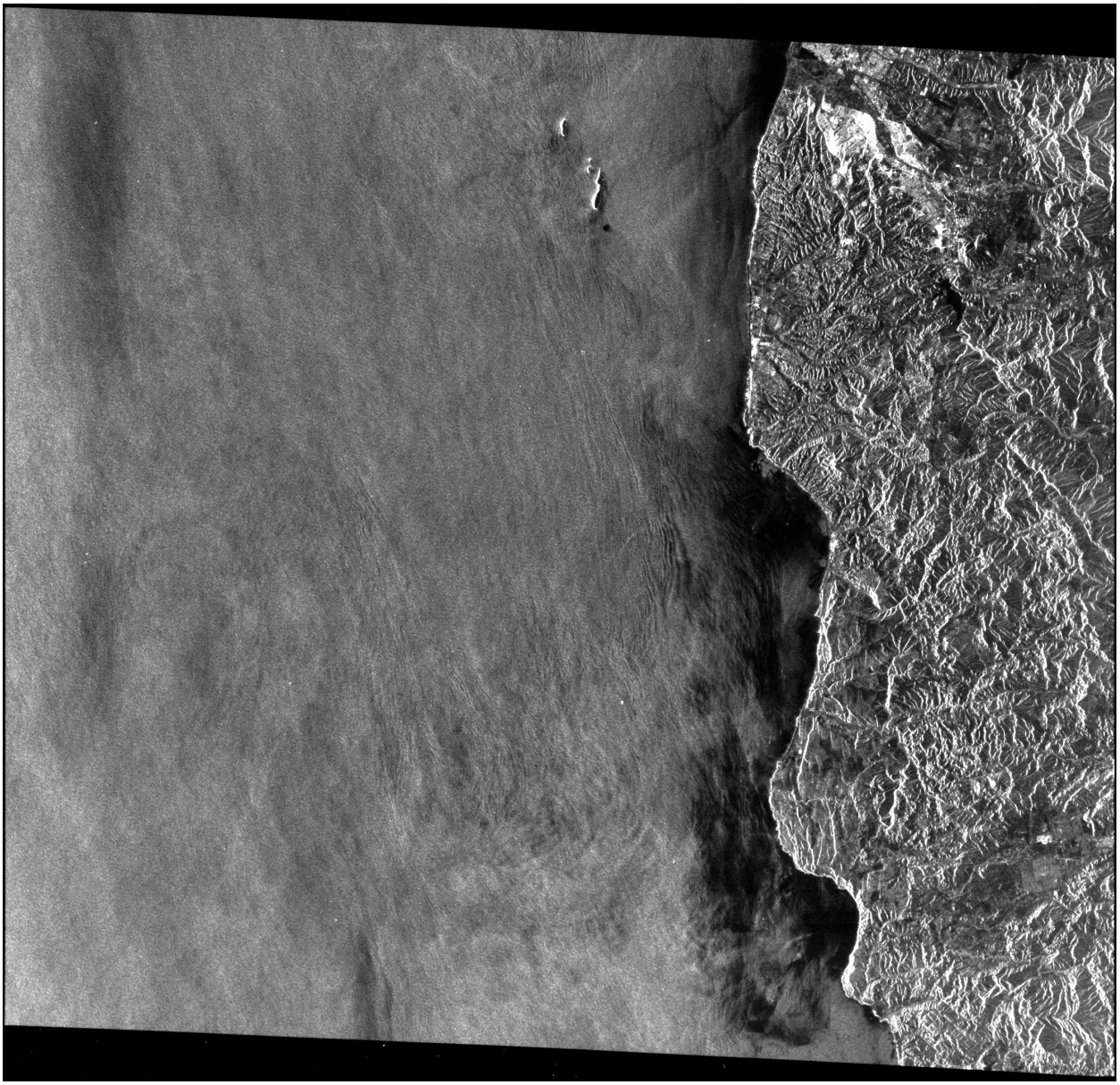



Figure 3. SEASAT (L-band, HH) SAR image near San Diego California acquired on 21 July 1978 at 1324 UTC (Rev 351). Imaged area is approximately 100 km x 100 km. [Image courtesy of NASA JPL]



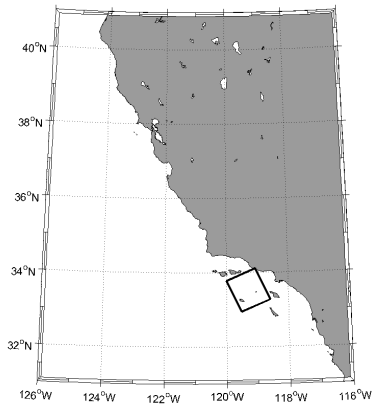
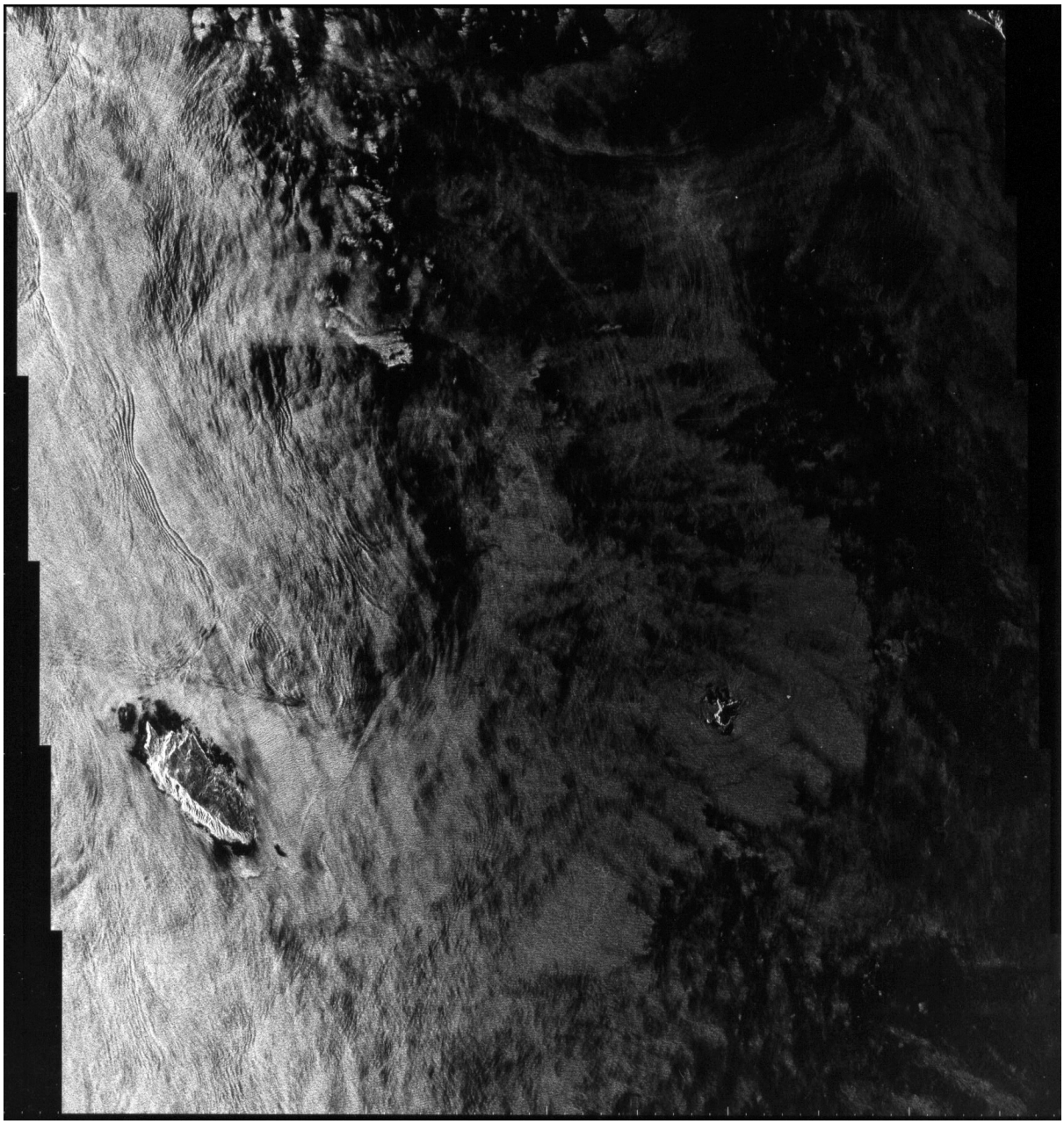



Figure 4. SEASAT (L-band, HH) SAR image of San Nicholas Island off the California coast acquired on 18 July 1978 at 1317 UTC (Rev 308). Imaged area is approximately 100 km x 100 km. [Image courtesy of NASA JPL]



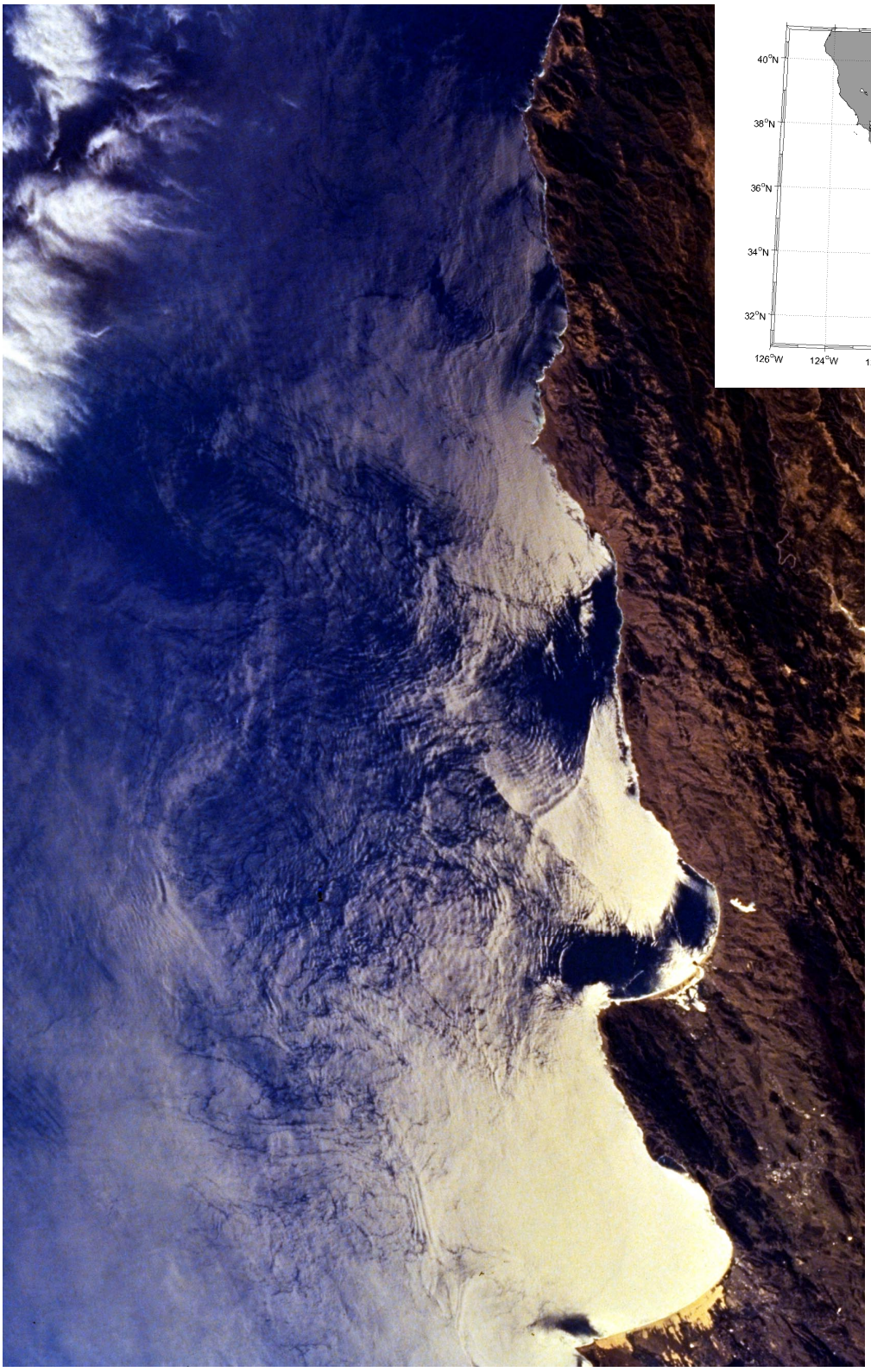



Figure 5. Astronaut photograph (STS068-249-49) acquired on 9 October 1994 at 1905 UTC. The image shows internal waves in the sunglint region of San Luis Obispo and Estero Bay along the central California Coast. Imaged area is approximately 75 km x 130 km. [Image Courtesy of Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center (http://eol.jsc.nasa.gov)].

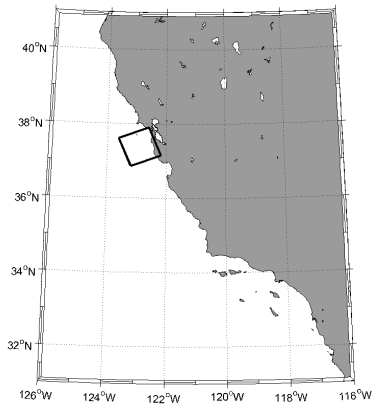
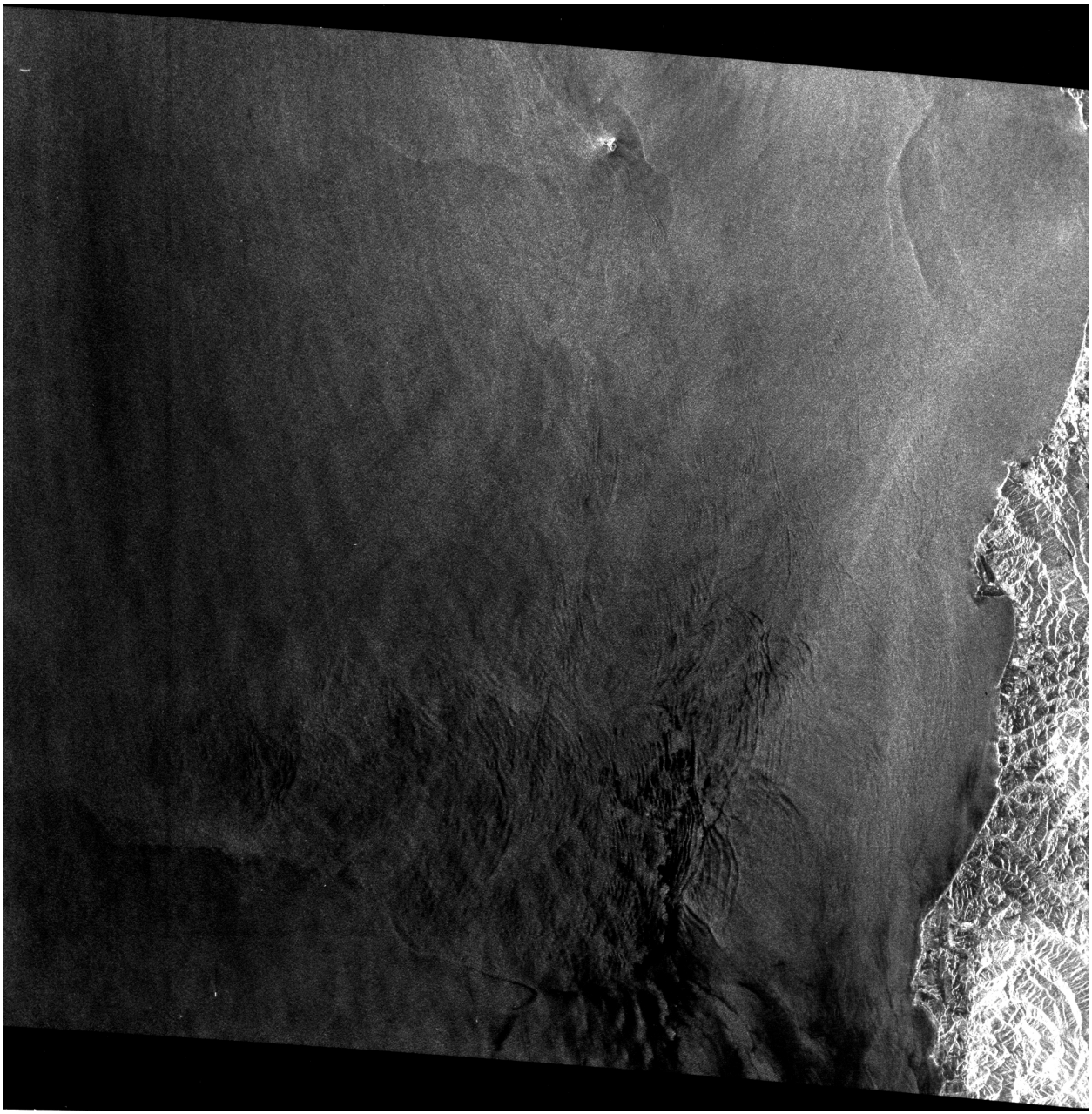



Figure 6. SEASAT (L-band, HH) SAR image of the California coast south of San Francisco acquired on 1 August 1978 at 1424 UTC (Rev 509). Imaged area is approximately 100 km x 100 km. [Image courtesy of NASA JPL]



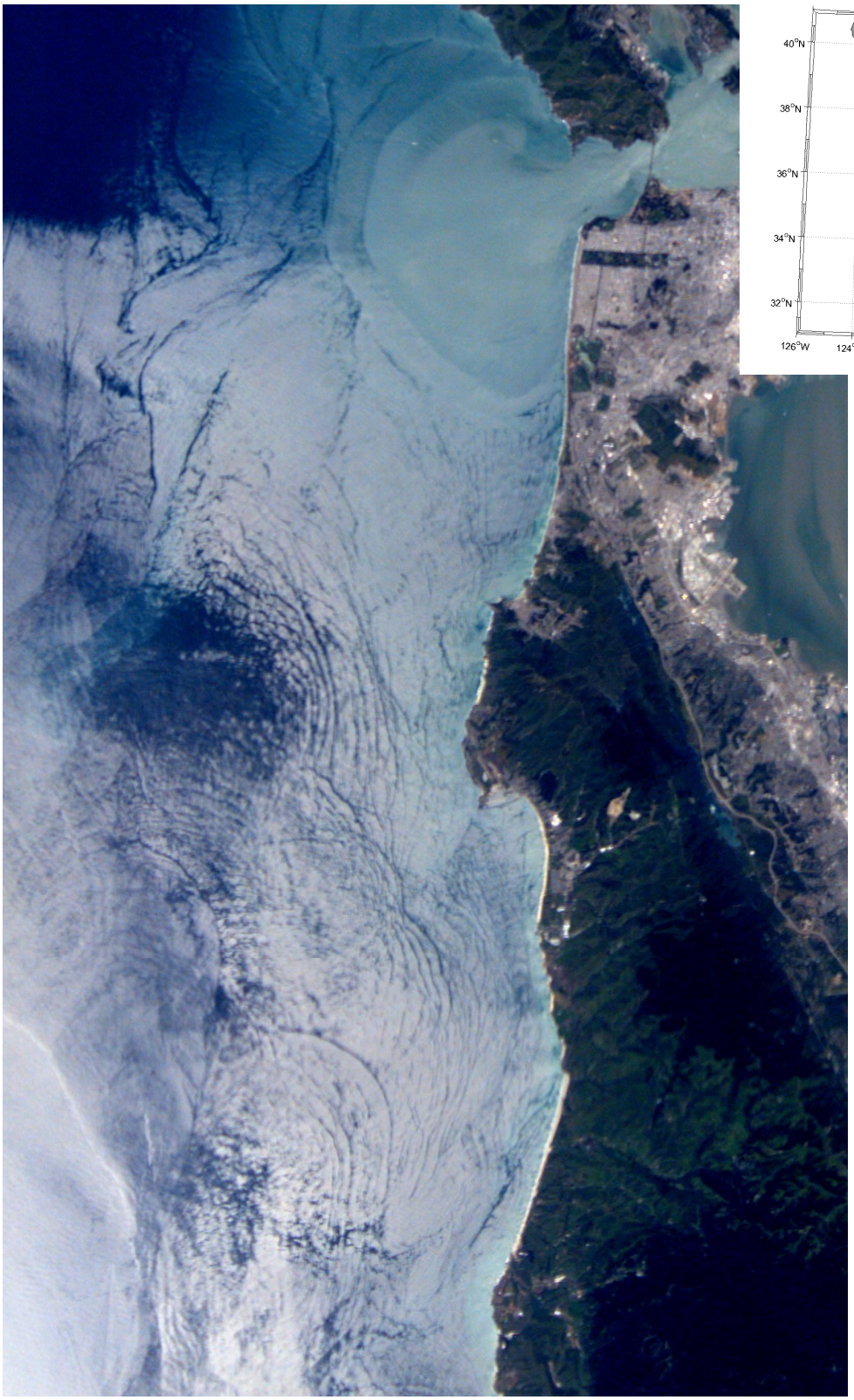



Figure 7. Astronaut photograph (ISS004-E-10288) acquired on 21 April 2002 at 1925 UTC. The image shows continental shelf internal waves in the sunglint region south of San Francisco Bay. Imaged area is approximately 50 km x 85 km. [Image Courtesy of Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center (http://eol.jsc.nasa.gov)].


Figure 8. Astronaut photograph (STS068-260-3) acquired on 10 October 1994 at 1842 UTC. The image shows continental shelf internal waves in the sunglint region near Point Arena California. Imaged area is approximately 45 km x 80 km. [Image Courtesy of Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center (http://eol.jsc.nasa.gov)].