

EASTERN REGION TECHNICAL ATTACHMENT

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SATELLITE DETECTION OF FOG DEVELOPMENT ALONG THE
SOUTH COAST OF NEW ENGLAND

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The America's Cup Race on September 13, 1974 was due to begin at 12:10 p.m. (all times EDT). Early indications were that fog would not be a problem in the race area, located just to the south of Newport, Rhode Island. Events that occurred just prior to the starting time of the race provide an excellent example of the use of satellite pictures.

The surface analysis for 8:00 a.m. depicted weak southwesterly flow of moist unstable air over the south coast of New England, ahead of a cold front advancing eastward through the eastern Great Lakes. Dewpoints across southern New England ranged from 68 to 70 degrees and dewpoint depressions ranged from 3 to 5 degrees.

The 8:30 a.m. GOES (SMS-1) satellite picture (not illustrated here) indicated a 20-mile wide band of fog over the ocean, with the northern edge of the fog located about 20 miles south of eastern Long Island. No fog was apparent to the east of this band for a distance of 70 miles, beyond which a much more extensive fog bank covered thousands of square miles well east of Cape Cod.

A sea surface temperature chart showed a cold current of water extending westward along 41 degrees latitude, just south of New England. A strong sea surface thermal gradient was evident along the southern side of this current -- as much as four degrees centigrade in 30 miles. Relatively cold water extended north of the current to the coast.

Weather observations at Block Island* showed clear skies but with visibilities reduced to one to two miles in fog. The surface winds were from the southwest at 10 to 15 knots through 10:00 a.m. These winds were blowing obliquely across the sea surface isotherms, from warm to cold.

At 9:30 a.m., the half-mile resolution satellite picture (Figure 1, top) showed the northern edge of the fog bank to be well south of the race area. Little movement from that shown on previous pictures was indicated. However, the 10:30 a.m. picture clearly showed the fog bank expanding and the northern border advancing northward toward the Rhode Island coast, to within 10 miles of the race area. This event coincided with a backing of the winds at Block Island from 210 degrees to 180 degrees. It would appear that the fog expanded in response to this backing of the wind, however slight, which resulted in a wind flow more normal to the sea surface temperature isotherms.

*Block Island is 15 miles southwest of the race area.

At 11:30 a.m., the fog bank was just south of Block Island and the race area. At Block Island the visibility at noon dropped to one-quarter of a mile with the sky becoming obscured. The race was delayed at about noon. The race committee, through the Coast Guard, called the Boston National Weather Service Forecast Office (where race forecasts were being issued). The committee had to decide whether the race should be delayed further or cancelled. The National Weather Service briefing indicated that the fog area was expanding and that fog would likely remain over the race area throughout the afternoon. As a result, the race was cancelled. The 2:00 p.m. satellite picture (Figure 1, bottom) shows the fog bank persisting over the race area.

The half-mile resolution satellite pictures received every half hour through the morning clearly showed the fog development and change in area coverage. This information enabled the Boston National Weather Service Forecast Office to correctly revise the earlier forecasts for the race as well as other coastal forecasts, and to issue a timely aviation forecast for Nantucket.

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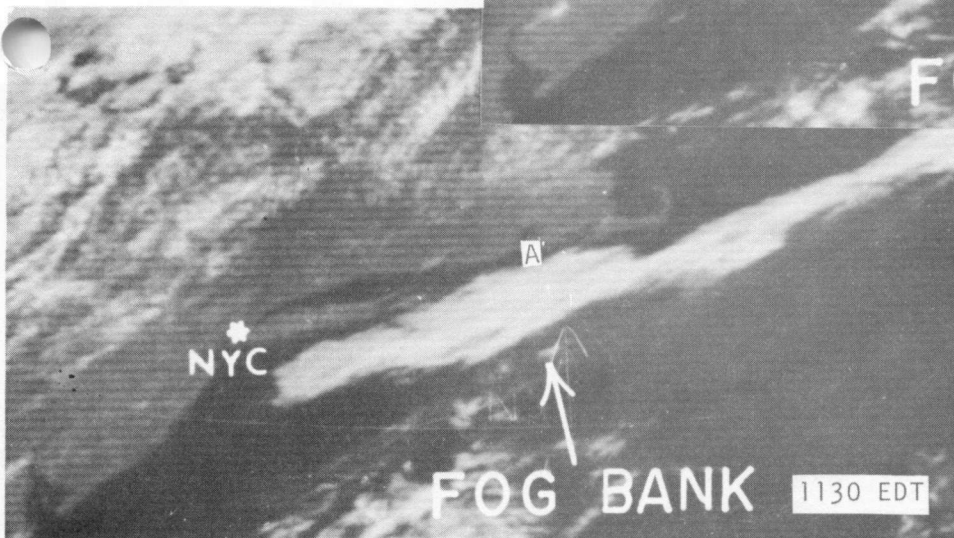
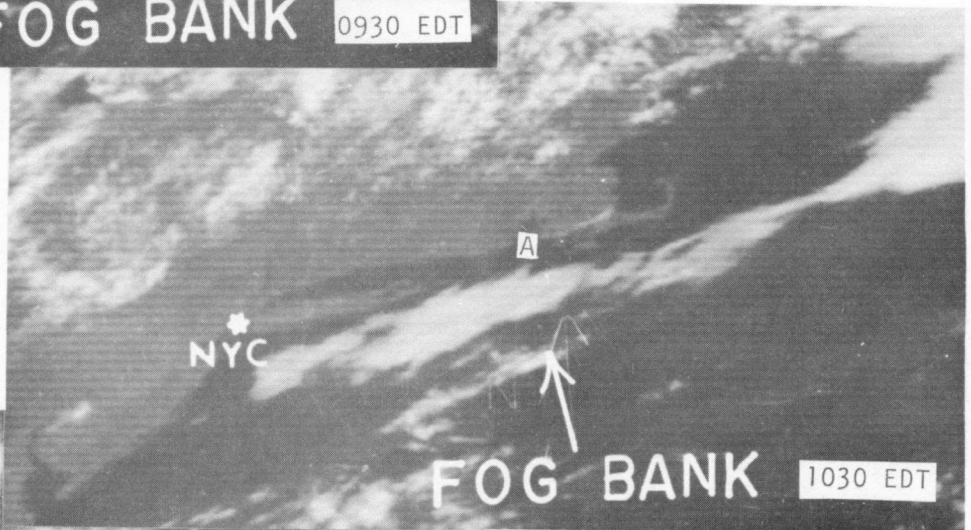
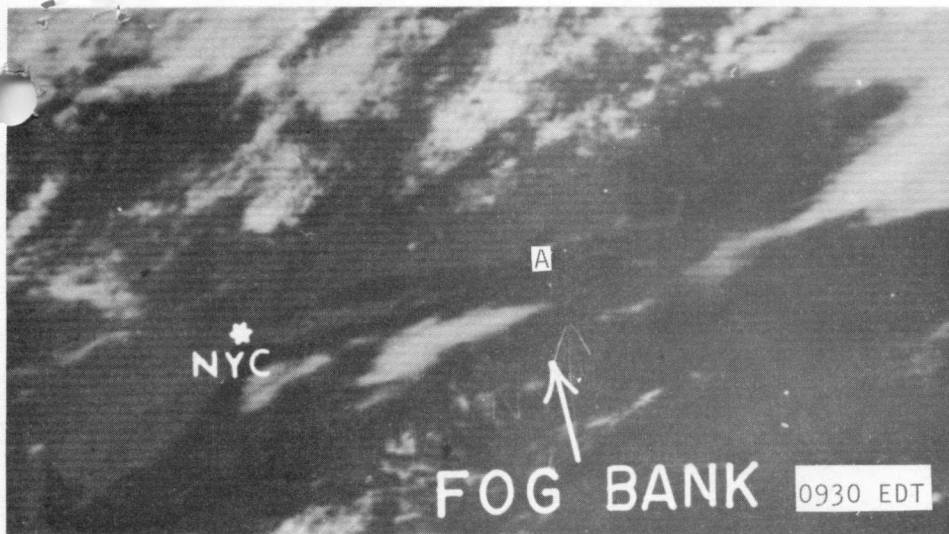


Figure 1. September 13, 1974
GOES (SMS-1) visible half-mile
resolution pictures of North-
east United States and adja-
cent coastal area. Letter "A"
depicts America's Cup Race
area.

