ANTARCTICA

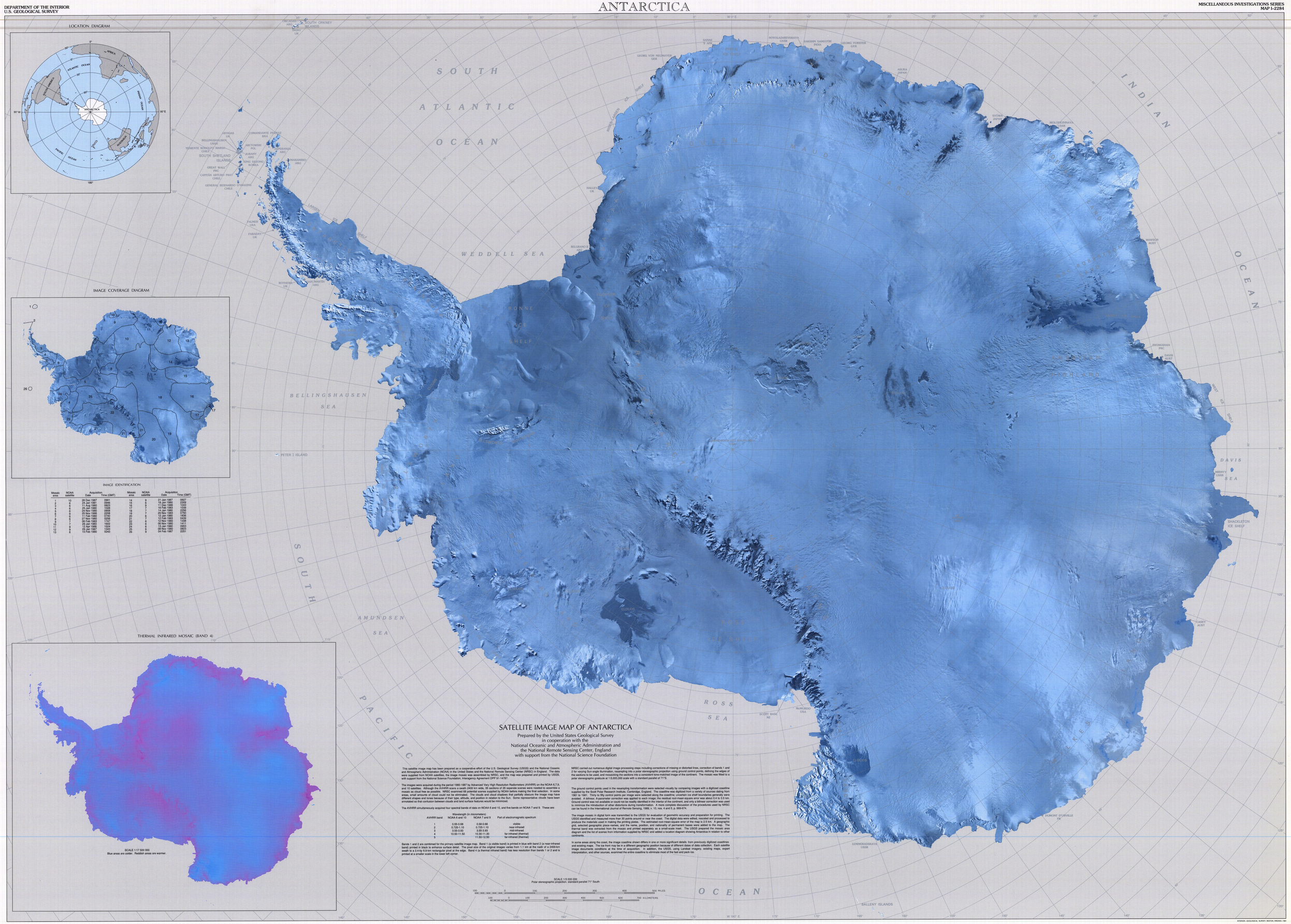

IMAGE IDENTIFICATION

Mosaic area	NOAA satellite	Acquisition Date	Acquisition Time (GMT)	Mosaic area	NOAA satellite	Acquisition Date	Acquisition Time (GMT)
1	10	28 Dec 1987	0901	14	9	21 Jan 1987	0827
2	6	24 Jan 1981	0946	15	6	18 Jan 1980	2309
3	6	11 Aug 1980	0823	16	9	11 Dec 1986	1043
4	6	11 Aug 1980	0958	17	9	11 Dec 1986	1229
5	6	24 Nov 1980	0908	18	7	14 Jan 1980	2206
6	9	25 Nov 1986	2208	19	7	29 Nov 1983	0750
7	9	27 Nov 1986	0101	20	7	29 Nov 1983	0932
8	6	27 Nov 1980	0258	21	7	12 Feb 1983	0439
9	7	06 Feb 1983	1747	22	6	12 Nov 1980	1338
10	7	26 Jan 1983	1602	23	6	10 Jan 1980	0911
11	9	12 Apr 1987	1545	24	6	10 Jan 1980	0953
12	9	03 Dec 1986	1345	25	6	08 Nov 1980	0823
13	6	15 Feb 1980	0243	26	9	04 Feb 1987	2251

This satellite image map has been prepared as a cooperative effort of the U.S. Geological Survey (USGS) and the National Oceanic and Atmospheric Administration (NOAA) in the United States and the National Remote Sensing Center (NRSC) in England. The data were supplied from NOAA satellites, the image mosaic was assembled by NRSC, and the map was prepared and printed by USGS, with support from the National Science Foundation, Interagency Agreement DPP 91-14787.

The images were acquired during the period 1980-1987 by Advanced Very High Resolution Radiometers (AVHRR) on the NOAA 6,7,9, and 10 satellites. Although the AVHRR scans a swath 2400 km wide, 35 sections of 26 separate scenes were needed to assemble a mosaic as cloud free as possible. NRSC examined 68 potential scenes supplied by NOAA before making the final selection. In some areas, small amounts of cloud could not be eliminated. The clouds and cloud shadows that partially obscure the image may have different shapes and tones because of their low altitude, as compared with features on the Sun. Some representative clouds have been annotated so that confusion between clouds and land surface features would be minimized.

The AVHRR simultaneously acquired four spectral bands of data on NOAA 6 and 10, and five bands on NOAA 7 and 9. These are:

AVHRR band	Wavelength (in micrometers) NOAA 6 and 10	NOAA 7 and 9	Part of electromagnetic spectrum
1	0.58-0.68	0.58-0.68	visible
2	0.725-1.10	0.725-1.00	near-infrared
3	3.55-3.93	3.55-3.93	mid-infrared
4	10.30-11.50	10.30-11.30	far-infrared (thermal)
5		11.50-12.50	far-infrared (thermal)

Bands 1 and 2 are combined for the primary satellite image map. Band 1 (a visible band) is printed in blue with band 2 (a near-infrared band) printed in black to enhance surface detail. The pixel size of the original images varies from 1.1 km at the nadir of a 2400-km swath to a 2.4-by 6.9-km rectangular pixel at the edge. Band 4 (a thermal infrared band) has less resolution than bands 1 or 2 and is printed at a smaller scale in the lower left corner.

NRSC carried out numerous digital image processing steps including corrections of missing or distorted lines, correction of bands 1 and 2 for varying Sun angle illumination, resampling into a polar stereographic projection using ground control points, defining the edges of the sections to be used, and mosaicking the sections into a consistent tone-matched image of the continent. The mosaic was fitted to a polar stereographic gratitude at 1:5,000,000 scale with a standard parallel of 71°S.

The ground control points used in the resampling transformation were selected visually by comparing images with a digitized coastline supplied by the Scott Polar Research Institute, Cambridge, England. The coastline was digitized from a variety of sources dating from 1961 to 1981. Thirty to fifty control points per image were selected along the coastline; uncertain ice shelf boundaries generally were avoided. A bilinear, 8-parameter correction was applied to each image. The resulting root-mean-square error was about 0.4 to 0.5 km. Ground control was not available or could not be readily identified in the interior of the continent and only a bilinear correction was used to minimize the effects of planar distortions in the mosaic. A more complete discussion of the procedures used by NRSC can be found in the International Journal of Remote Sensing, 1988, v. 10, nos. 4 and 5, p. 669-674.

The image mosaic in digital form was transmitted to the USGS for evaluation of geometric accuracy and preparation for printing. The USGS identified and measured more than 30 points around or near the coast. The digital data were edited, rescaled and processed to produce the materials used in making the printing plates. The estimated root-mean-square error of the map is 2.5 km. A geographic grid, selected geographic place-names, and the name, position, and nationality of permanent bases were added to the map. The thermal band was extracted from the mosaic and printed separately as a small-scale inset. The USGS prepared the mosaic area diagram and the list of scenes from information supplied by NRSC and added a location diagram showing Antarctica in relation to other continents.

In some areas along the coast, the image coastline shown differs in one or more significant details from previously digitized coastlines and existing maps. The ice front may be in a different geographic position because of different dates of data collection. Each satellite image documents conditions at the time of acquisition. In addition, the USGS, using Landsat imagery, existing maps, expert interpretation, and other sources, examined the entire coastline to eliminate most of the fast and pack ice.

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1991

For sale by U.S. Geological Survey,
Denver, Colorado 80225 or Reston, Virginia 22092