

USER'S GUIDE

AMBOY CRATER, CALIFORNIA - DIGITAL IMAGE ARCHIVE OF SCANNED PHOTOGRAPHS

ABSTRACT

This digital archive is a collection of images compiled from the scanning of hard copy photographs. There are 266 images in the collection, some black & white, others in color, and were scanned at 600 or 1200 dots per inch. The photographs are currently housed at the Ronald Greeley Center for Planetary Studies (RGCPs), at the Arizona State University (ASU) Regional Planetary Information Facility (RPIF).

The photographs were taken in Feb. 1976 by Drs. Ronald Greeley and James Iversen during field research at Amboy Crater in the Mojave Desert of southeastern California. The photographs were acquired using hand-held cameras, taken at low altitude from a fixed-wing aircraft, on the ground near volcanic outcrops, and of flows from close up.

Amboy Crater is an extinct cinder cone, located in the Mojave Desert of eastern San Bernardino County, California (34.545°N, 115.791°W) (Figures 1 and 2). The structure is about 76 m (250') high and sits at 290 m (250') above sea level. It formed during the Late Pleistocene, approximately 80,000 years ago, and last erupted about 10,000 years ago. Surrounding Amboy Crater are vesicular pahoehoe flows. The flows are heavily eroded, with numerous sand-filled depressions, although there are a few plateau-like structures within the extent of the flows. Along the margins of these plateaus are arcuate rifts or fractures, and on their surfaces are small pressure domes and circular craters. The craters could be collapse depressions or lava-rise pits. Superposing the flows is a dark (sediment deprived) wind streak, which trends to the southeast.

The purpose of the research was to depict volcanic features on the Earth that "may be analogous to some of the small volcanic surface features observed on the Moon and Mars. In addition, it has an overprint of aeolian features, including large scale "streaks", sand drifts, and ventifacts" (Greeley, et al., 1978). The streaks also served as an analog to ubiquitous bright/dark crater streaks on Mars that form downwind of craters.

At this same location, a two-month field experiment involving several 50-foot meteorology towers was performed at this site by Greeley, Iversen, and their associates for aeolian processes related to the Mars-like aeolian crater streak. Some of the towers can be seen in images such as 001, 010, 011, 014, 015, and, 116. Wind speed and direction measurements were recorded at these towers (and are included in the scanned notes found in this collection).

It is because of the unique and historic aspect of the photographs that they have been digitized so that they may be preserved digitally and made available to the research community at large. In addition, the scanned images will be archived in the NASA Planetary Data System, following the PDS4 standard. The Amboy Crater Image Archive will be just one of several PDS4 bundles of digital image scans of unique photographs taken by Dr. R. Greeley during his years of field research.

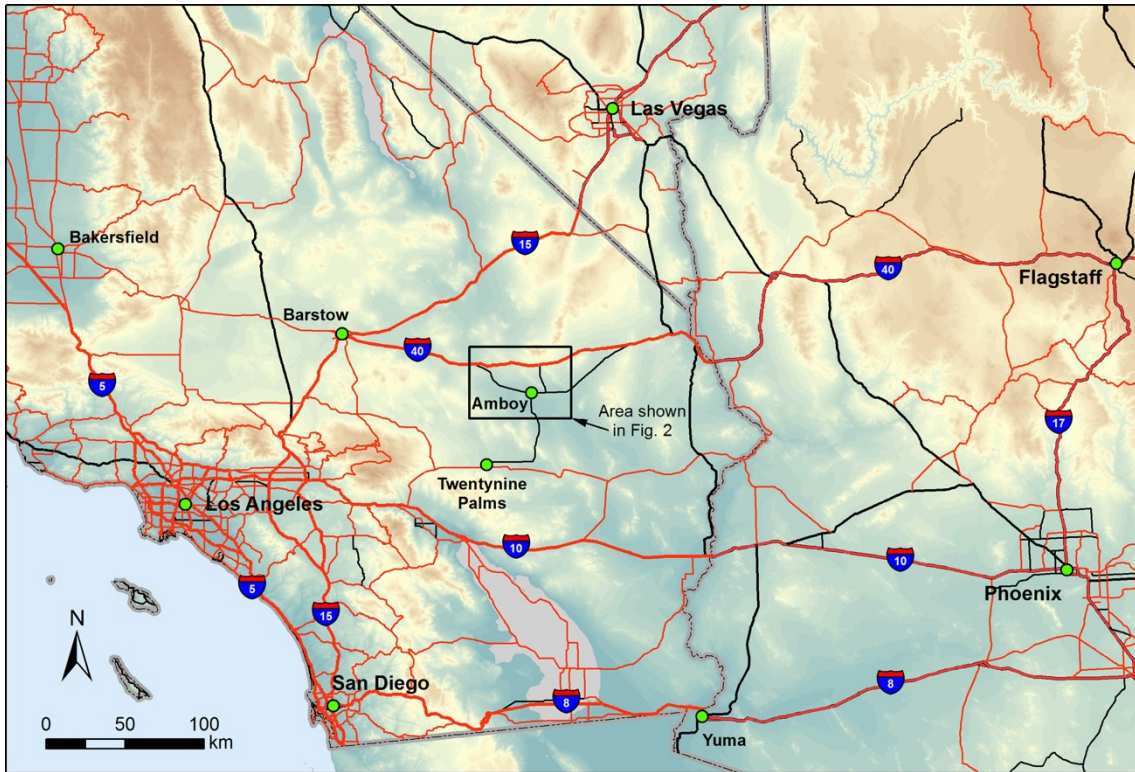


Figure 1. Location of Amboy Crater in the Mojave Desert of eastern San Bernardino County, California.



Figure 2. Detail view of Amboy Crater and its surrounding environment.

DIGITAL IMAGE ARCHIVE OVERVIEW

Part 1 - The Photographs

1) Hard copy photographs

There are three different photograph formats in this archive.

- Black and white, 8" x 10", glossy card stock. There are no annotations in the images other than a hand-written reference number (which are not included in the scanned image). The reference numbers correspond to the frame and roll numbers of the in-house negatives at the RGCPS. There are 69 photographs that were scanned for the digital archive. An additional 43 photographs were scanned but not submitted to the PDS archives as they were deemed redundant or not relevant to the subject (including pictures of people, highways, clouds, etc.). These images were taken by Dr. R. Greeley.

- Black and white, 3 1/2" x 5", matte-finish card stock. There are sixty-two (62) photographs in the collection that were taken by Dr. J. Iversen. The photographs have a heavy white border, and on each is a hand-written annotation listed from 1-0 to 1-20, 2-1 to 2-21 (2-7 is missing), and 3-0 to 3-20. All of these images were taken from low-altitude aircraft.

- Color images, 3 3/8" x 5", printed on textured, borderless photographic paper. All 135 photographs were taken by Dr. J. Iversen. Unfortunately, the texture is visible on the image scans as a faint but perceptible raised pattern. The colors tend to be washed out in most of these images due to the age of the paper. There are no markings on the front or back of the images.

2) Organization of Photographs

The photographs in this archive are organized into three (3) volumes. Each volume is contained in a black, 2" ring binder. All photographs are protected by a plastic sleeve. Smaller images are mounted on white card stock paper.

- Volume 1 contains six different sets of photographs, divided by photograph type and subject matter. The main subject matter is the cinder cone, the associated dark windstreak, and the surrounding flows.

Set 1: (8) 8" x 10", b/w - Ground view, cinder cone and volcanic flows

Set 2: (13) 3 3/8" x 5", color - Ground view, cinder cone and volcanic flows

Set 3: (6) 8" x 10", b/w - Low altitude oblique aerial view, cinder cone, volcanic flow, and wind streak

Set 4: (31) 3 3/8" x 5", color - Low altitude oblique aerial view, cinder cone, volcanic flow, and wind streak

Set 5: (62) 3 1/2" x 5", b/w - Low altitude oblique aerial view, cinder cone, wind streak, volcanic flows, collapse pits, pressure dome

Set 6: (40) 3 3/8" x 5", color - Low altitude oblique aerial view, cinder cone & streak, lava flows

- Volume 2 contains five sets of photographs, the focus of which are the extensive eroded volcanic flows.

Set 1: (16) 8" x 10", b/w - Low altitude oblique aerial view, volcanic flows

Set 2: (13) 8" x 10", b/w - Low altitude oblique aerial view, volcanic flows, arcuate fractures, circular craters, pressure dome

Set 3: (36) 3 3/8" x 5", color - Low altitude oblique aerial view, volcanic plateau, circular craters, pressure dome, arcuate fractures

Set 4: (9) 8" x 10", b/w - Low altitude oblique aerial view, volcanic flows including "tongue" shaped feature, arcuate fractures, pressure ridge
Set 5: (15) 3 3/8" x 5", color - Low altitude oblique aerial view, volcanic flows including "tongue" shaped feature, arcuate fractures, pressure ridge

- Volume 3 holds the only set of close up views of volcanic outcrops, including large blocks of scoria.

Set 1: (17) Ground view, volcanic outcrops, and blocks of scoria

Total number of photographs scanned for the PDS archive: 266

3) Photographers

The photographs in this archive were acquired during a field study in Feb. 1976, undertaken by Drs. Ronald Greely (then at NASA Ames Research Center) and James D. Iversen (from Iowa State University). There are sparse field notes associated with this study, written by C. Wilbur, who accompanied the researchers to Amboy Crater. The 45 pages of notes refer primarily to wind measurements and some location stops (referred to as "Stations"). Only a few words give any clue about the specific location or subject of the photographs.

4) Cameras

There is no information regarding the cameras used to take the photographs acquired for this archive. They are assumed to be of professional to semi-professional quality, of a kind consistent for use during a professional field study.

Part II - Digital Image Archive

1) Photograph Digitization Specifications

All images were scanned on an EPSON Expression 11000XL (Model J331A) large format, 14" x 17" flatbed scanner.

All 8" x 10" images were scanned at 600 dots per inch (dpi) and 8-bit pixel depth. The small color and B/W images were scanned at 1200 dpi and 24-bit depth (RGB, 8 bit/band).

During scanning, no calibration or image enhancement was performed.

All images were saved in the Portable Network Graphics (PNG) format.

2) Image Labels

The naming convention that encompasses the entire collection was developed by conjoining the subject and site information with a sequential number. For example:

fcau_ac_001.png

The first character is used to identify image class type (e.g., field photographs, aerial photographs, etc.), where:
f = field

Characters two, three, and four represent the state and country code. This abbreviation is taken from the Library of Congress MARC Standard (http://www.loc.gov/marc/countries/countries_code.html):
ca = California
u = United States

The fifth character is an underscore "_" to separate the region code from subject matter.

Characters six and seven are an abbreviation of the feature and/or site of the subject matter:
ac = Amboy Crater

The eighth character is an underscore "_" to separate subject matter from image number.

The final three numbers taken together are the incremental sequence number of the image within the collection. The images were numbered without reference to image size or bit depth (number of bands or color), beginning with image 001 through to the end of the collection. Volume 1 includes images 001 to 160, Volume 2 continues with image numbers 161 to 249, and Volume 3 concludes with images 250 to 266.

Each image label is appended with the file format extension .png.

3) Image Collection Correspondence to Photographic Archive

The Amboy Crater image archive consists of a single collection with 266 images labeled in sequence. The labeled images correspond to the photograph archive sets as indicated below:

- Set 1: fcau_ac_001-008 = Volume 1, Set 1
- Set 2: fcau_ac_009-021 = Volume 1, Set 2
- Set 3: fcau_ac_022-027 = Volume 1, Set 3
- Set 4: fcau_ac_028-058 = Volume 1, Set 4
- Set 5: fcau_ac_059-120 = Volume 1, Set 5
- Set 6: fcau_ac_121-160 = Volume 1, Set 6
- Set 7: fcau_ac_161-176 = Volume 2, Set 1
- Set 8: fcau_ac_177-189 = Volume 2, Set 2
- Set 9: fcau_ac_190-225 = Volume 2, Set 3
- Set 10: fcau_ac_226-234 = Volume 2, Set 4
- Set 11: fcau_ac_235-249 = Volume 2, Set 5
- Set 12: fcau_ac_250-266 = Volume 3, Set 1

4) Geographic Reference

There was no attempt to correlate the individual images geographically to specific ground features, to locate the site of photograph acquisition on a map, or tie ground coordinates to the site. All images are oblique with respect to the ground surface and cannot be reasonably reprojected to a geodetic system.

ADDITIONAL MATERIALS

Included with the digital image archive are Portable Data Format (PDF) documents of government publications that are relevant to the past research performed in this area. The oldest of these documents is the 1963 Special Report by the California Division of Mines and Geology, Recent Volcanism at Amboy Crater by Parker. Also included is the 1978 Greeley et al., Aeolian Features of Southern California, which provides the results of a comprehensive geologic study of Amboy Crater, volcanic flows, ventifacts, and the dark wind streaks. The 1978 Iversen and Greeley report, Atmospheric and Wind Tunnel Experiments of the Amboy Crater Sand-covered Lava Flow, is provided to describe the results of the meteorology experiment. Finally, the scanned field notes taken by C. Wilbur, which (sparsely) documented the Feb. 1976 field research by Greeley & Iversen, are included as a PDF document.

REFERENCES:

Greeley, R., and J. D. Iversen (1985). Wind as a geological process: on Earth, Mars, Venus, and Titan. Cambridge University Press, pp. 333.

Greeley, R., Womer, M.B., Papson, R.P., and Spudis, P.D. (1978). Aeolian Features of Southern California: A Comparative Planetary Geology Guidebook. NASA report, pp. 264.

Iversen, J. D., and R. Greeley (1978). Atmospheric and Wind Tunnel Experiments of the Amboy Crater Sand-covered Lava Flow. Iowa State University Engineering Research Institute Report, ERI-78235, pp. 79.

Parker, R.B. (1963). Recent Volcanism at Amboy Crater, San Bernardino County, California. Special Report 76, California Division of Mines and Geology, pp. 24.

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