GEOLOGIC REMOTE SENSING WITH RADAR

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GEOLOGIC REMOTE SENSING WITH RADAR

ONGOING STUDIES CONCENTRATE ON:

- **WEATHERING PROCESSES:** EOLIAN TRANSPORT AND DEPOSITION, DESERT PAVEMENT DEVELOPMENT
- **VOLCANIC PROCESSES:** ERUPTION HISTORY, SIZE, AND TYPE; ATMOSPHERIC EFFECTS, OTHER PLANETS
- **LAND DEGRADATION:** HUMAN EFFECTS ON VEGETATION, SOIL ARABILITY
- **TECTONIC PROCESSES:** HISTORY OF FAULTING, FAULT LOCATION
- **SURFACE AND SUBSURFACE MAPPING:** LANDFORMS, PALEODRAINAGES

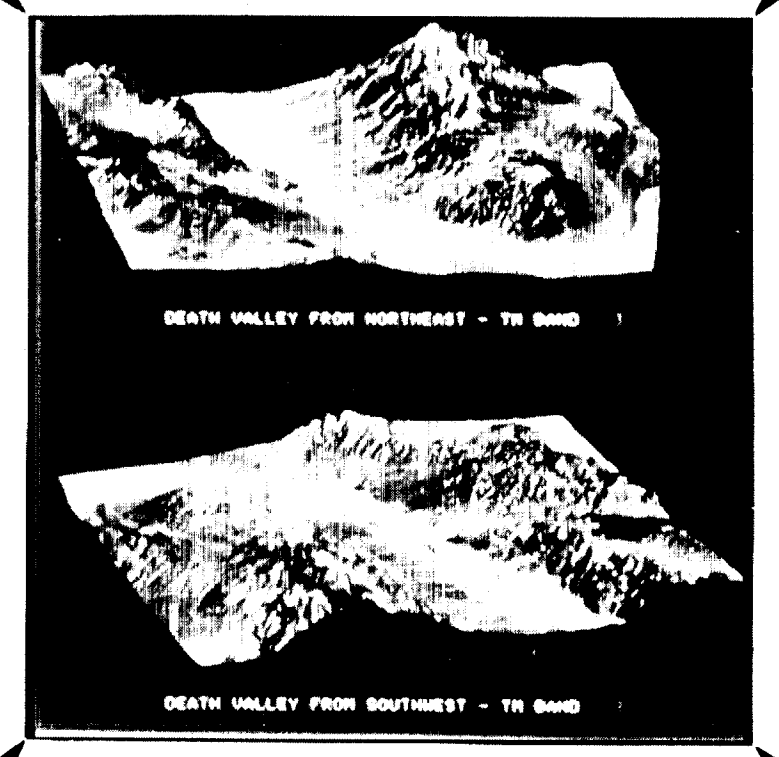
LAND SURFACE AND COVER PROPERTIES
(HIGH RESOLUTION OBSERVATIONS)

IMAGING RADARS

PHYSICAL/
ELECTRICAL
PROPERTIES

VISIBLE/NEAR IR
IMAGING SPECTROMETERS

CHEMICAL
COMPOSITION



TOPOGRAPHY

RADAR INTERFEROMETRY/
LASER ALTIMETERS/STEREO

CHEMICAL
COMPOSITION/
THERMAL
PROPERTIES

THERMAL IR
IMAGING SPECTROMETERS

RADAR-AERODYNAMIC ROUGHNESS PROJECT (RARP)

Goal

To derive a technique to assess potential sand and dust movement over large areas

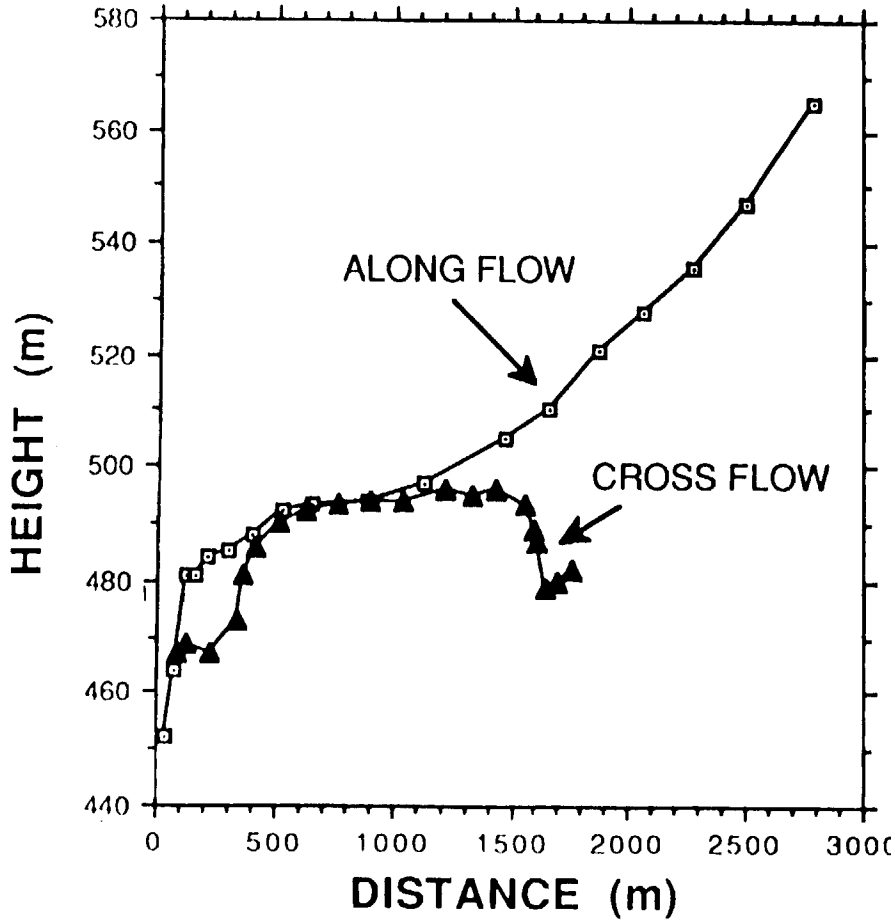
Rationale

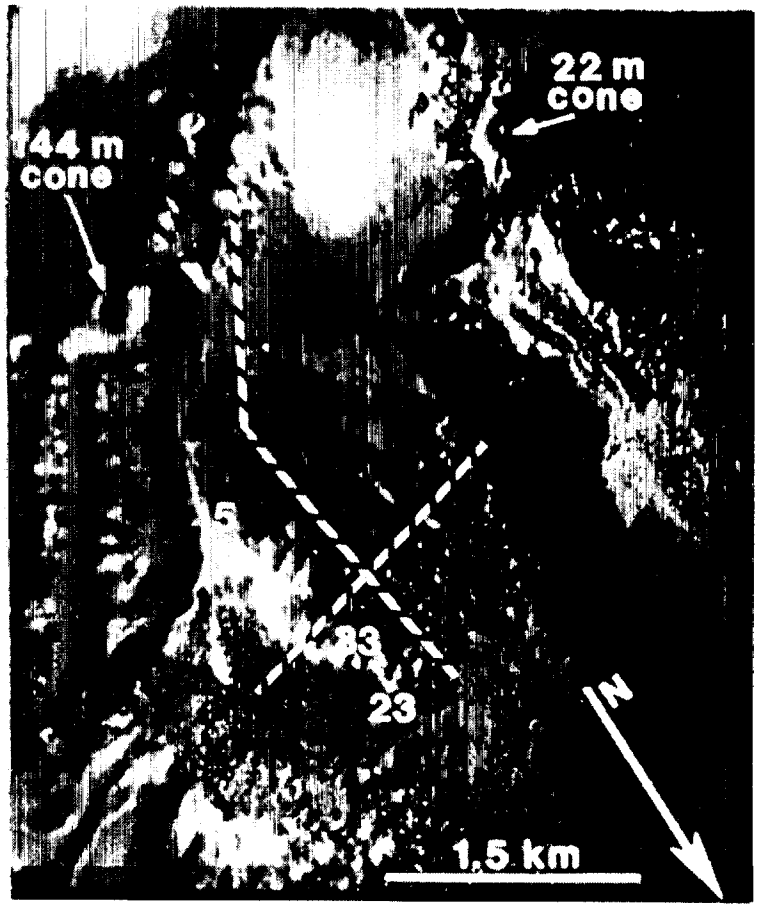
- Eolian activity (e.g., "threshold" and flux) is governed partly by surface roughness
- Aerodynamic roughness (z_0) is the relevant parameter, but is derived from *in situ* field measurements of limited areas
- Radar backscatter (σ°) is also governed partly by surface roughness
- If z_0 and σ° correlate, then there is potential to predict eolian activity using airborne or orbital radar data

Approach

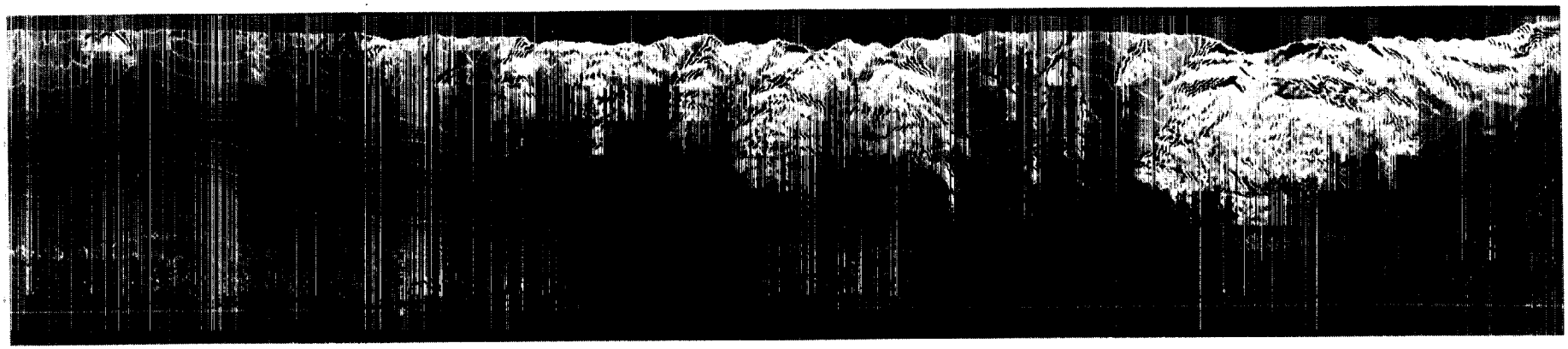
Develop and test the correlation via field experiments by analyzing wind data (z_0), radar data (σ°), and roughness data

TOPSAR: HEKLA LAVA FLOW



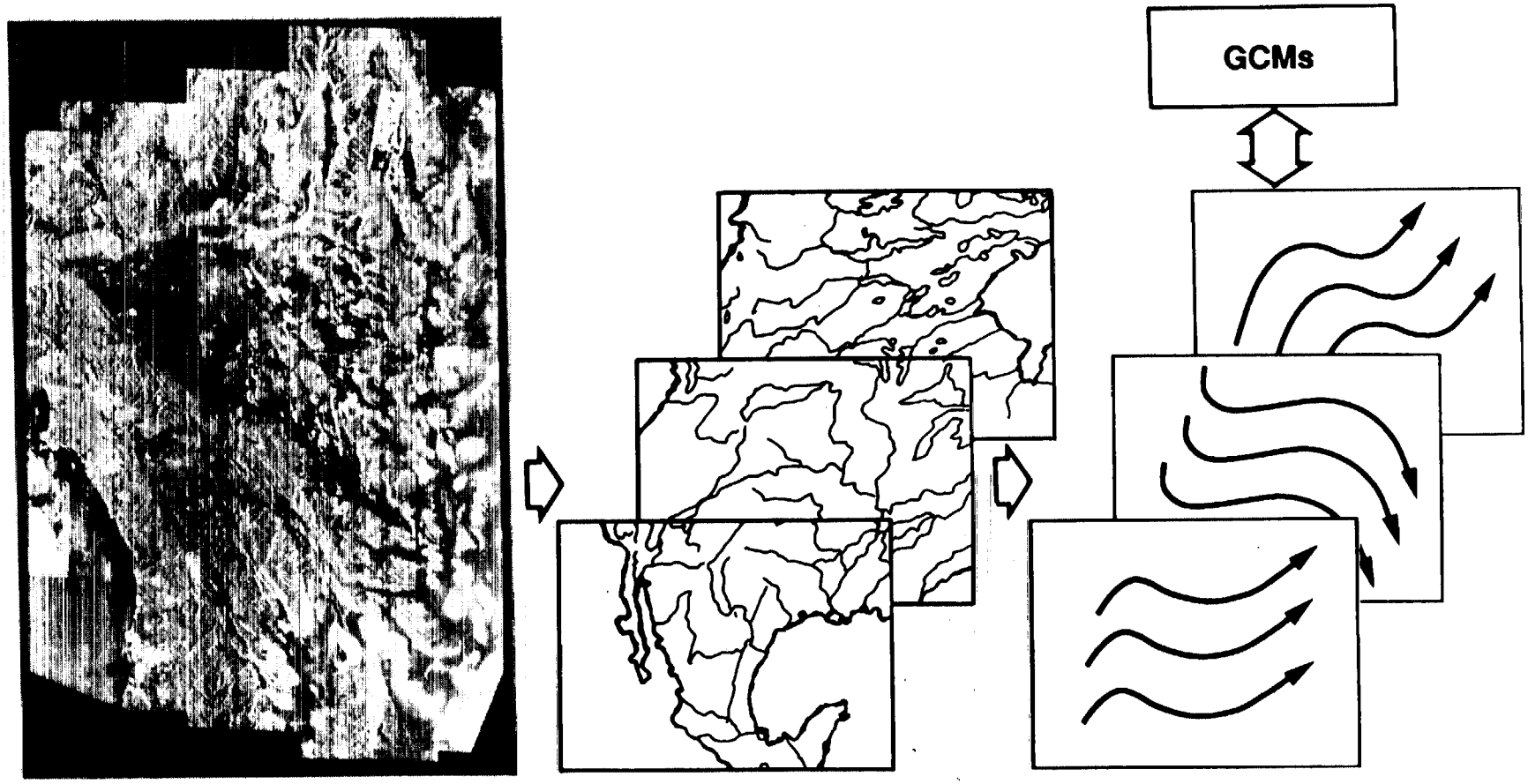


TOPSAR topographic data of the west side of Death Valley, CA. A shaded-relief image has been generated from the data and contours overlain. Image is oriented with north approximately up and is about 10 km wide.



ERS-1 image of eastern Libya showing ancient drainages, some of which may be buried, as evidenced by the bright linear sand dunes trending NW-SE over the dark drainages. North is approximately up and the image is about 100 km wide.

THE CLIMATE RECORD: HOW GLOBAL CHANGES IN CLIMATE ARE MANIFESTED LOCALLY



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SUMMARY OF REQUIREMENTS

- **WEATHERING PROCESSES**: MULTIFREQUENCY DUAL-POL. TOPOGRAPHY
- **VOLCANIC PROCESSES**: MULTIFREQUENCY POLARIMETRY TOPOGRAPHY
- **LAND DEGRADATION**: MULTIFREQUENCY POLARIMETRY
- **TECTONIC PROCESSES**: MULTIFREQUENCY DUAL-POL. TOPOGRAPHY
- **SURFACE AND SUBSURFACE MAPPING**:

  MULTIFREQUENCY DUAL-POL. TOPOGRAPHY COVERAGE