

GEOLOGIC REMOTE SENSING WITH RADAR

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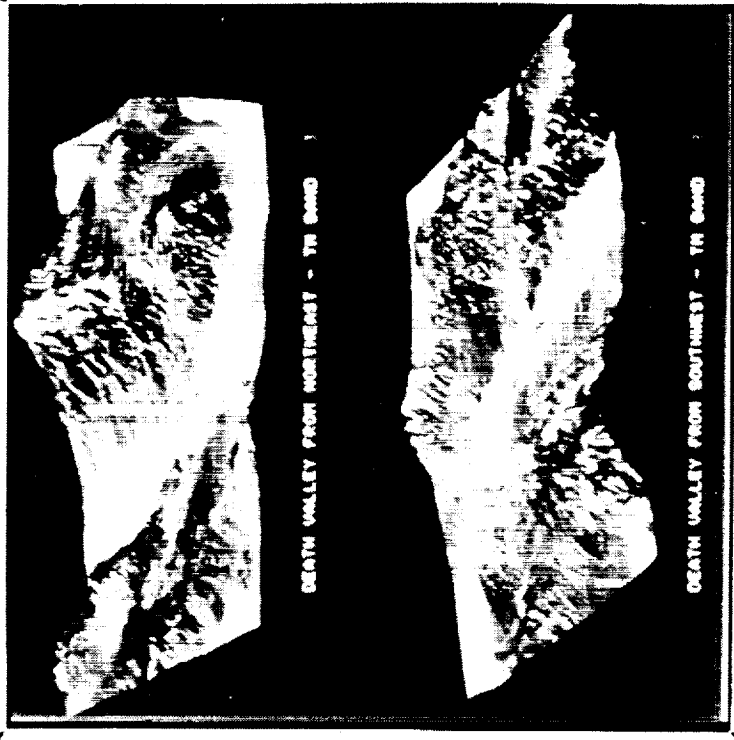
GEOLOGIC REMOTE SENSING WITH RADAR

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)

VISIBLE/NEAR IR
IMAGING SPECTROMETERS
CHEMICAL
COMPOSITION



CHEMICAL
COMPOSITION/
THERMAL
PROPERTIES
THERMAL IR
IMAGING SPECTROMETERS

IMAGING RADARS
PHYSICAL/
ELECTRICAL
PROPERTIES

TOPOGRAPHY
RADAR INTERFEROMETRY/
LASER ALTIMETERS/STEREO

RADAR-AERODYNAMIC ROUGHNESS PROJECT (RARP)

Goal

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

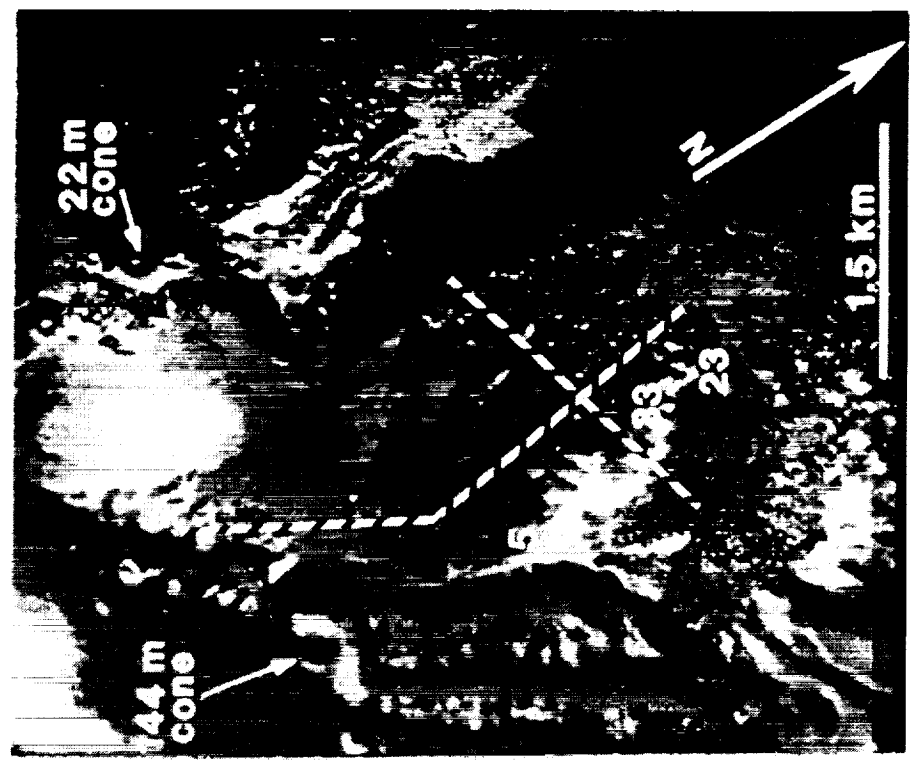
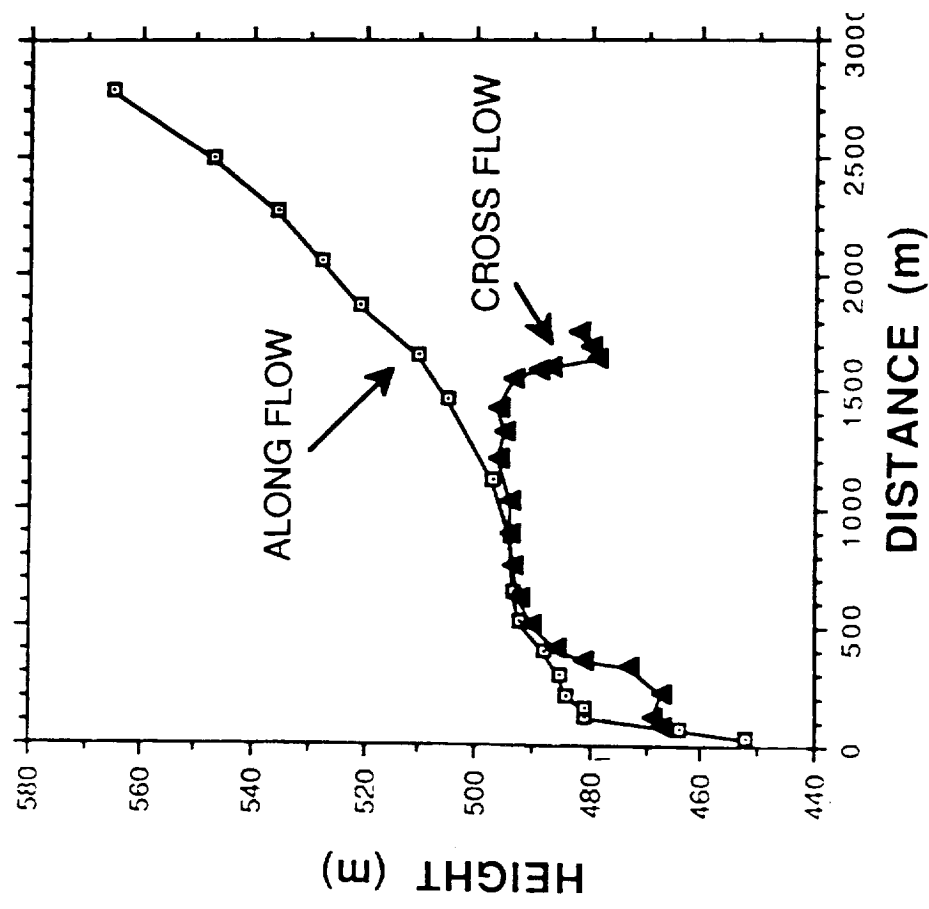
Rationale

- 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^0) is also governed partly by surface roughness
- If z_0 and σ^0 correlate, then there is potential to predict eolian activity using airborne or orbital radar data

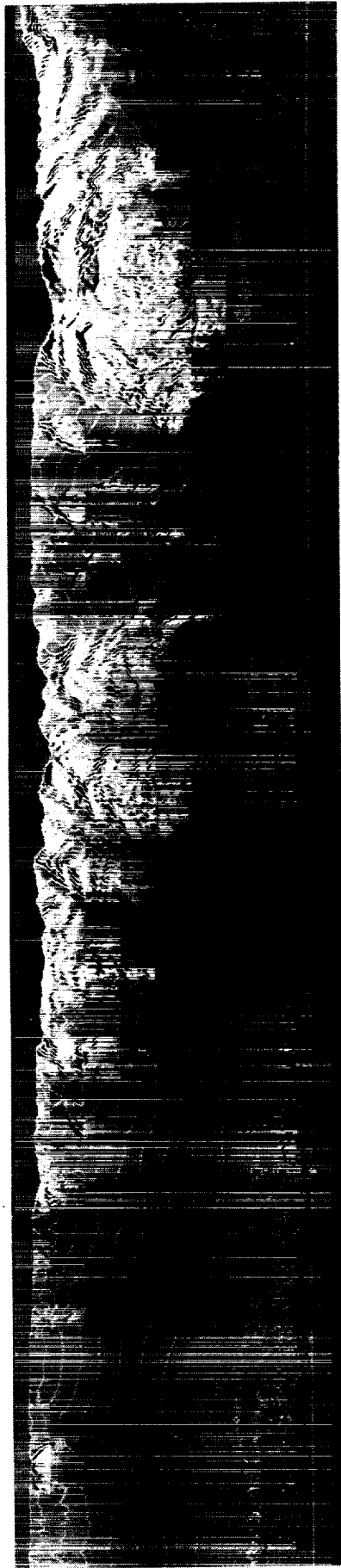
Approach

Develop and test the correlation via field experiments by analyzing wind data (z_0), radar data (σ^0), and roughness data

TOPSAR: HEKLA LAVA FLOW



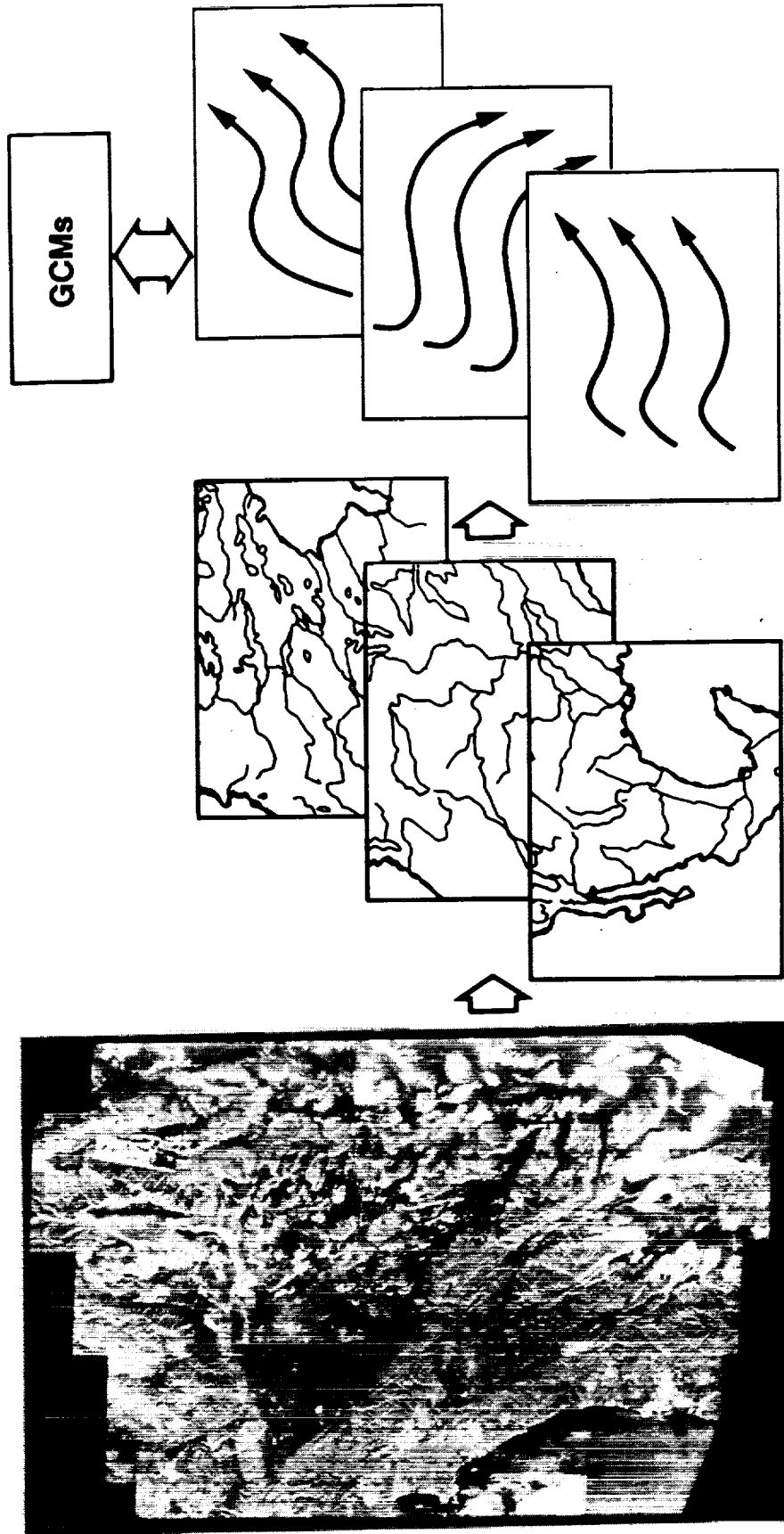
TOPSAR topographic data of the west side of Death Valley, CA. A shaded-relief image has been generated from the data and contours overlain. Image is oriented with north approximately up and is about 10 km wide.



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



REGIONAL ATMOSPHERIC CIRCULATION THROUGH TIME

CHANGES IN THE LAND SURFACE THROUGH TIME

REGIONAL CORRELATIONS

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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

