

# **Eos Chasma: Potential MER Landing Site**

---

---

**Part 1:** David M. Nelson, Ron Greeley,  
Jack Farmer,  
Ruslan Kuzmin (Vernadsky Inst.)

**Part 2:** Vicki Hamilton

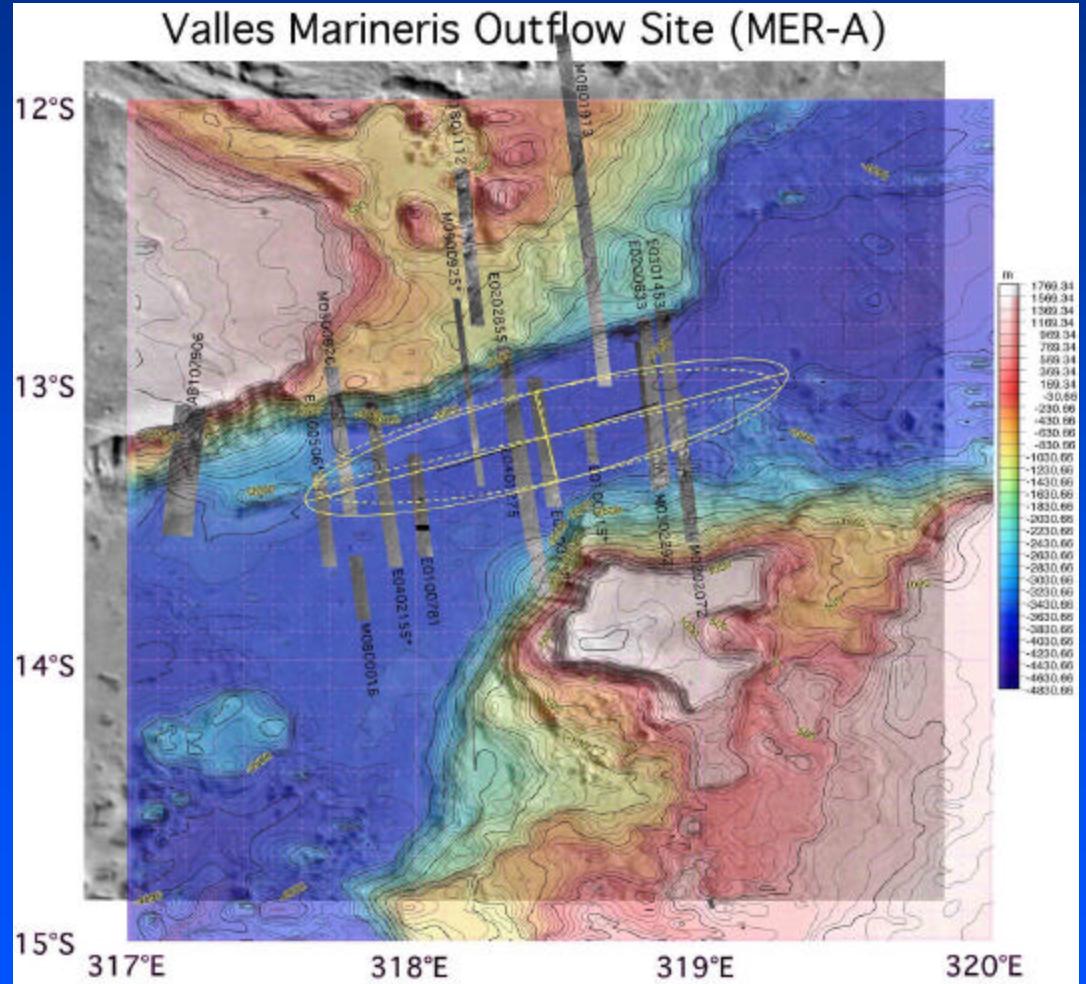
**Part 3:** Jim Rice

**Arizona State University**

# Site Characteristics

## *Eos Chasma: Site VM41A2*

- Location
  - MDIM2:  $13.34^{\circ}\text{S}$ ,  $41.39^{\circ}\text{W}$**
  - MOLA:  $13.20^{\circ}\text{S}$ ,  $318.46^{\circ}\text{E}$**
- Elevation
  - MOLA: -3.85 km**
- Ellipse Size
  - 98 km x 19 km**
- Ellipse Orientation
  - $76^{\circ}$  (from North)**



*Image: T. Parker*

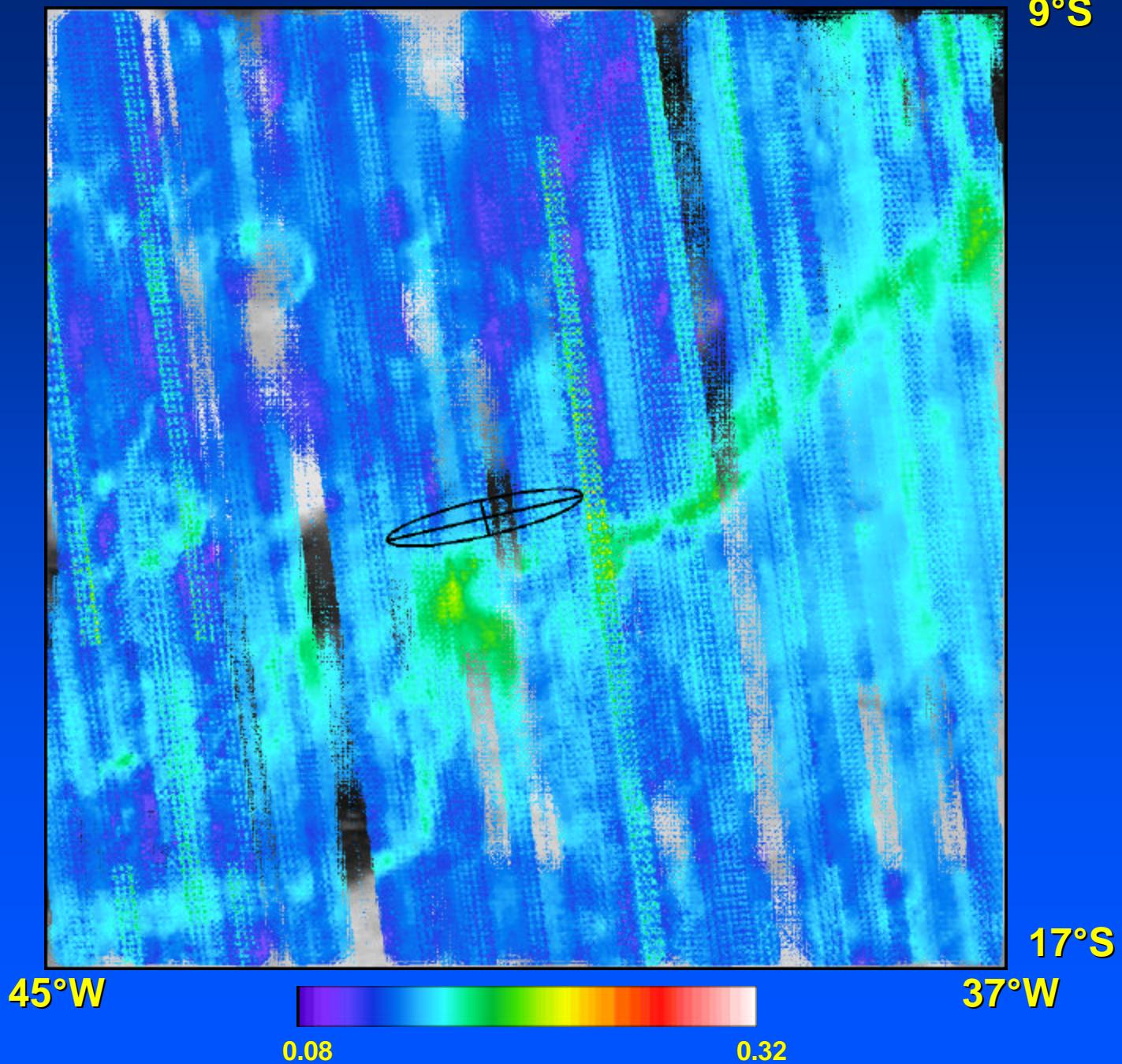
# Engineering Considerations

---

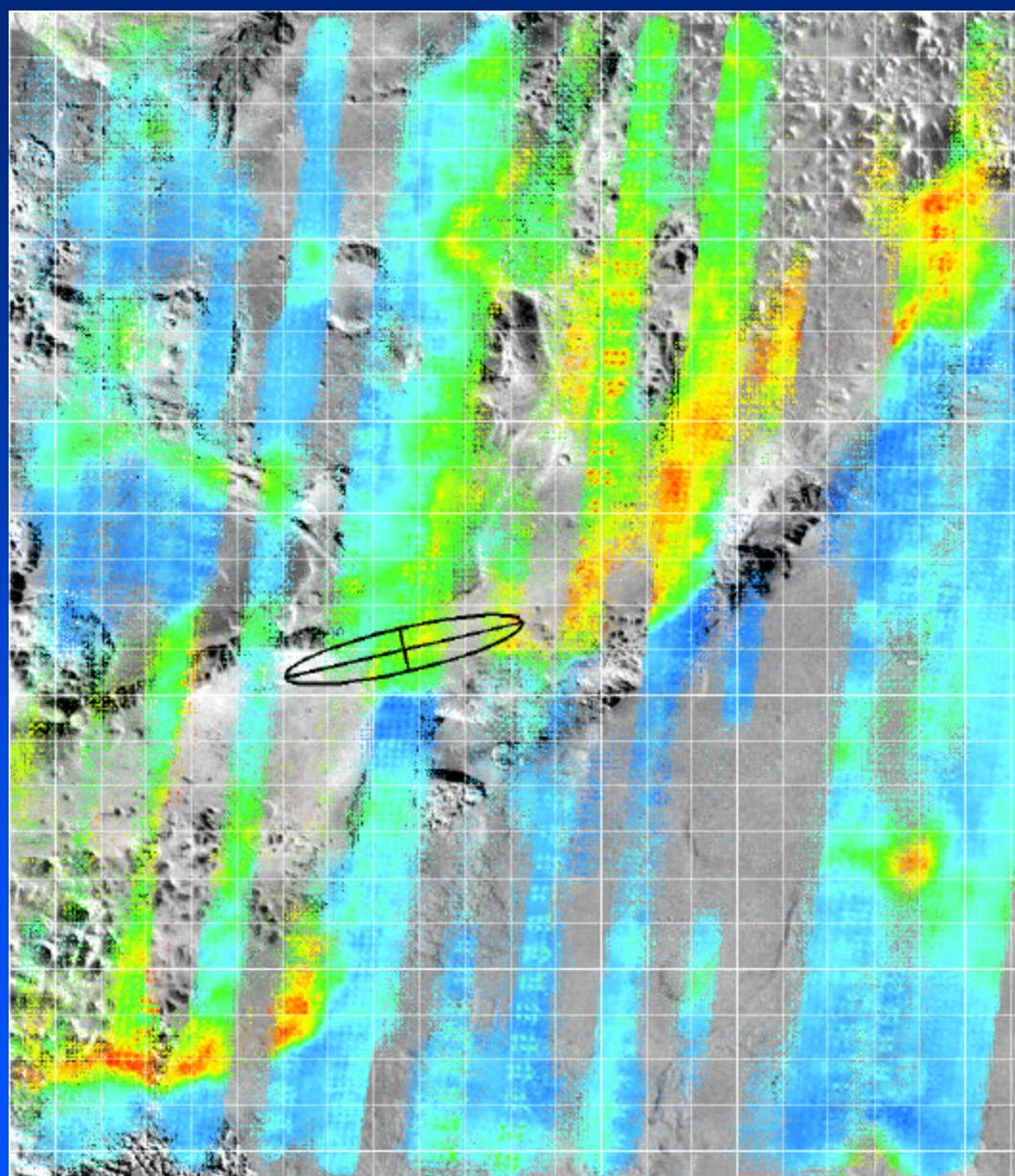
---

|   | <i>Required</i>  | <i>Eos Chasma</i>                               |
|---|------------------|---|
| MER-A Latitude  | 15°S to 5°N      | 13.34°S   |
| Elevation   | <1.3 km          | -3.85 km  |
| Low-Altitude Winds  | <20 m/s          | ?   |
| Surface Slopes  | <15°             | <4°   |
| Surface Images  | Hazard Free      | Fewer craters than MPF                          |
| Total Rock Coverage   | <20%             | 17%   |
| Rocks > 0.5m  | <1%              | ?   |
| Radar Reflectivity  | >0.05            | 0.05-0.08                                       |
| Fine-Component Thermal Inertia<br>$10^{-3} \text{ cal cm}^{-2} \text{ cm}^{-1/2} \text{ K}^{-1}$<br>$J \text{ m}^{-2} \text{ cm}^{-1/2} \text{ K}^{-1}$ | >3-4<br>>125-165 | 7-12<br>300-500<br>(particle sizes 350-1000 mm) |

# TES Albedo



# TES Thermal Inertia (Ls 0-180)



9°S

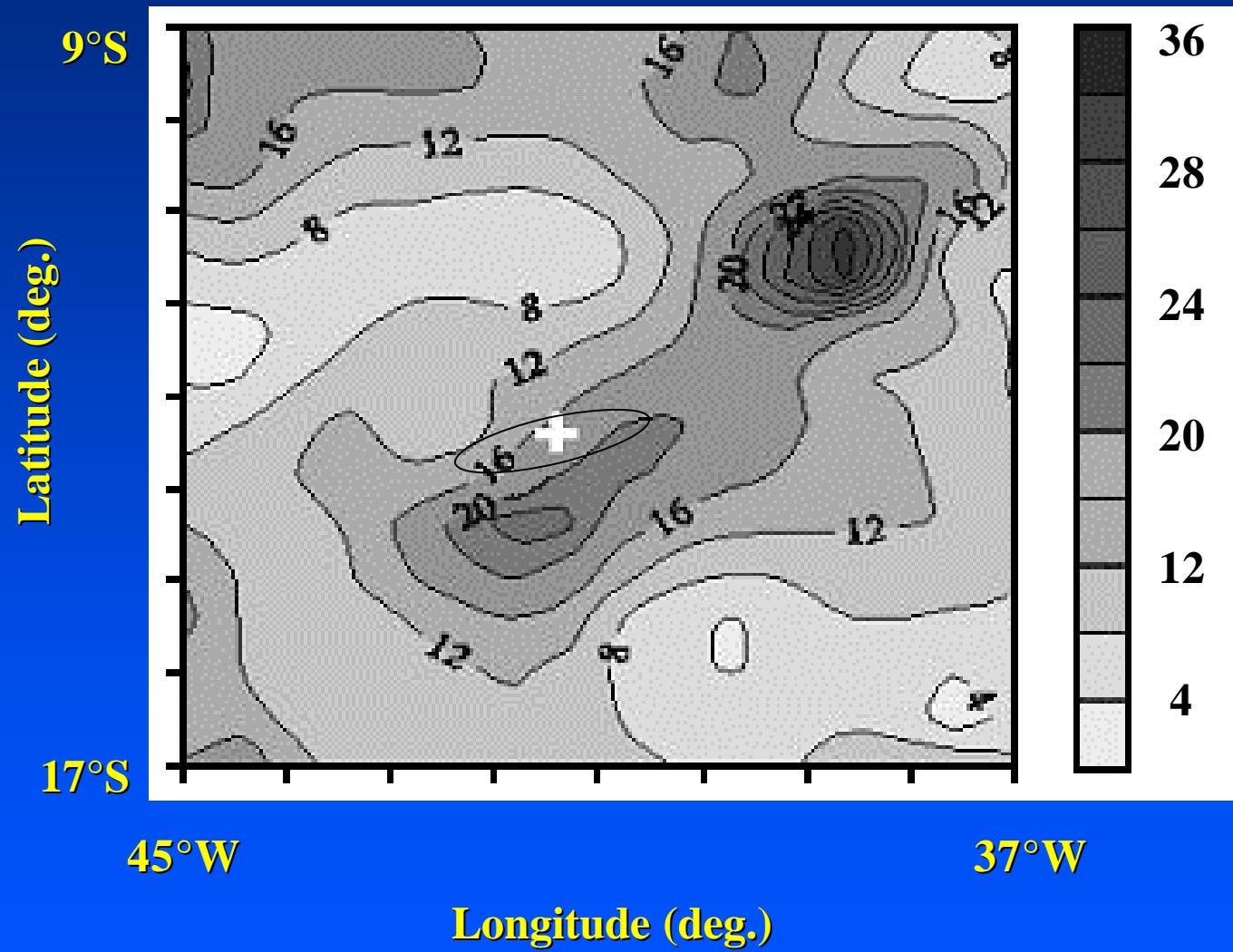
17°S

37°W

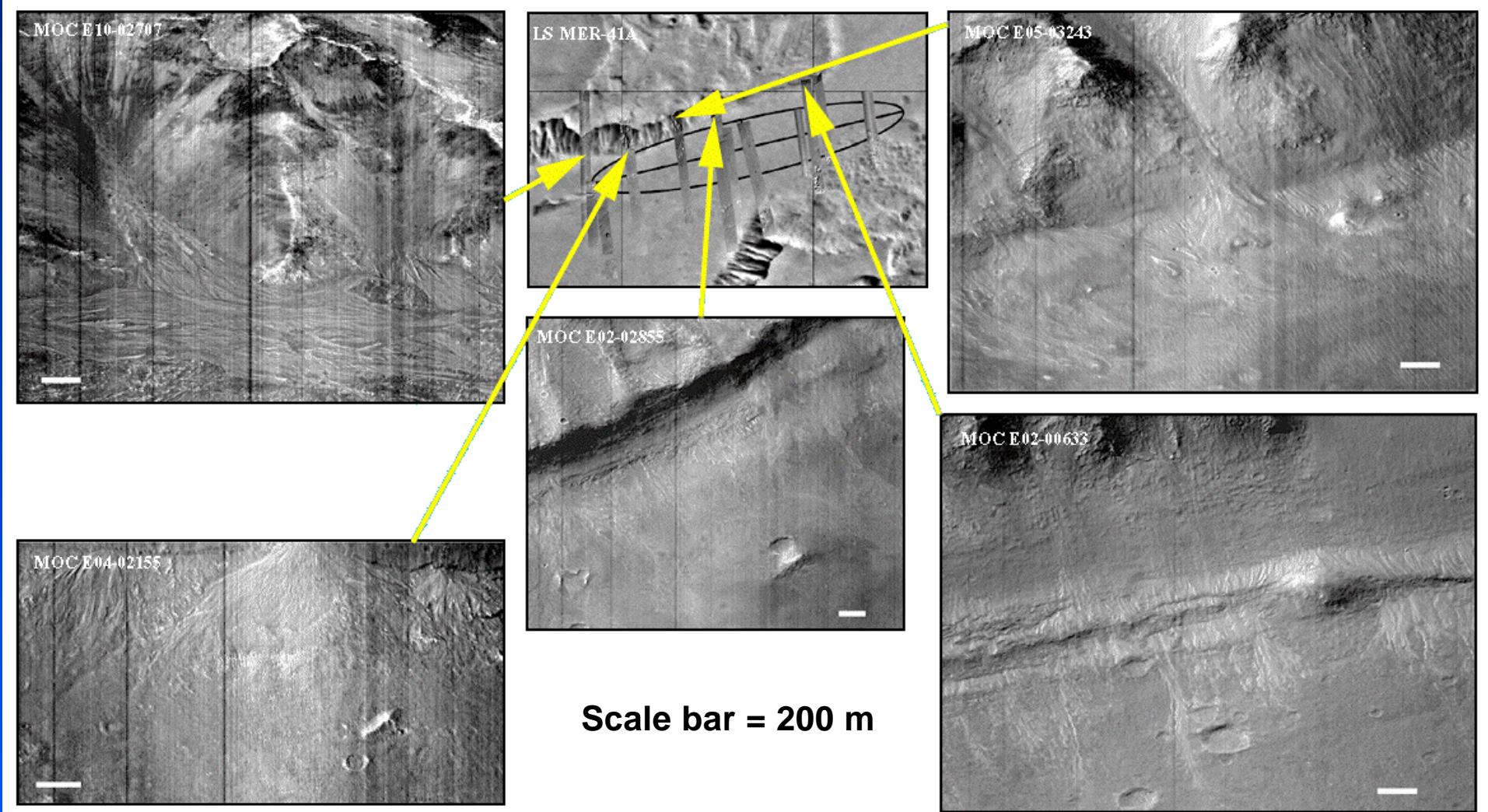
44°W

24       $J \text{ m}^{-2} \text{ cm}^{-1/2} \text{ K}^{-1}$       800

# Rock Abundance (%) Based on Viking IRTM data



# Eos Chasma: Debris Flows



Scale bar = 200 m

# Science Rationale

---

## *Geology*

### Fluvial Site

- Long-term hydrologic processes
- Ground water release from tectonic activity  
(Eos Chaos, Valles Marineris)
- Multiple erosion levels

### Mapping

- Flooding from Valles Marineris, Ganges Chasma, Capri Chasmata
- Erosion excavated 3-5 km into crust
- Crater count indicates Late Hesperian age (Early Amazonian?)

### Inferences

- Hydrothermal activity resulting from magmatic sources
- Astrobiologic potential

# Science Rationale

---

---

## *Potential MER Observations*

### Materials In Ellipse

#### 1. Surface materials

- groundwater materials; rock from chaos
- fluvial deposits
- windblown materials

### Science

Chemistry of hydrologically altered minerals

Rock textures (igneous, sedimentary) from Valles Marineris & Eos Chaos

Comparison with MPF materials

#### 2. Basement materials

- bedrock
- brecciated rock

Chemistry of ancient rock

# Science Rationale

---

---

## *Potential MER Observations (cont.)*

### Materials In Ellipse

### Science

#### 3. Cliff wall materials

- debris flows
- imaging canyon walls

Measure chemistry of crustal materials

PanCam obs. canyon walls >100 m/p

#### 4. Evaporite materials

- sed. in depressions

Chemistry of minerals found in small quantities

#### 5. Astrobiology signatures

Structures, minerals, chemistry

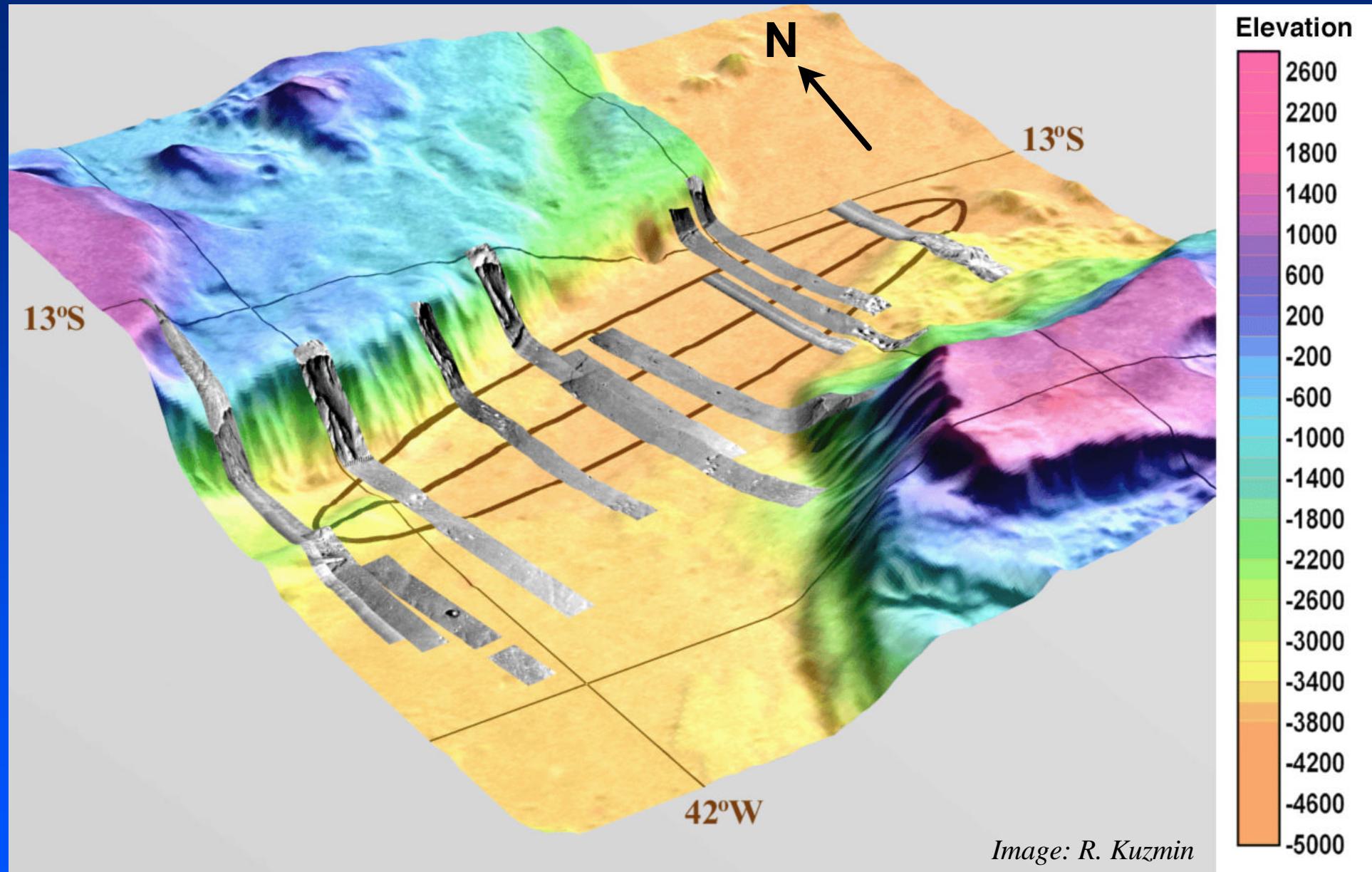
# Conclusions

---

---

- Site meets engineering constraints
- Excellent potential for science return:
  - ? Observations and measurements at ancient ground water (?) site
  - ? Chemistry of ancient surface rocks
  - ? Detecting hydrologically-altered minerals and possible evaporite materials
  - ? Identification of possible astrobiologic structures and minerals
- Visually interesting (public appeal)

# Eos Chasma: Perspective views



# Eos Chasma: Perspective views

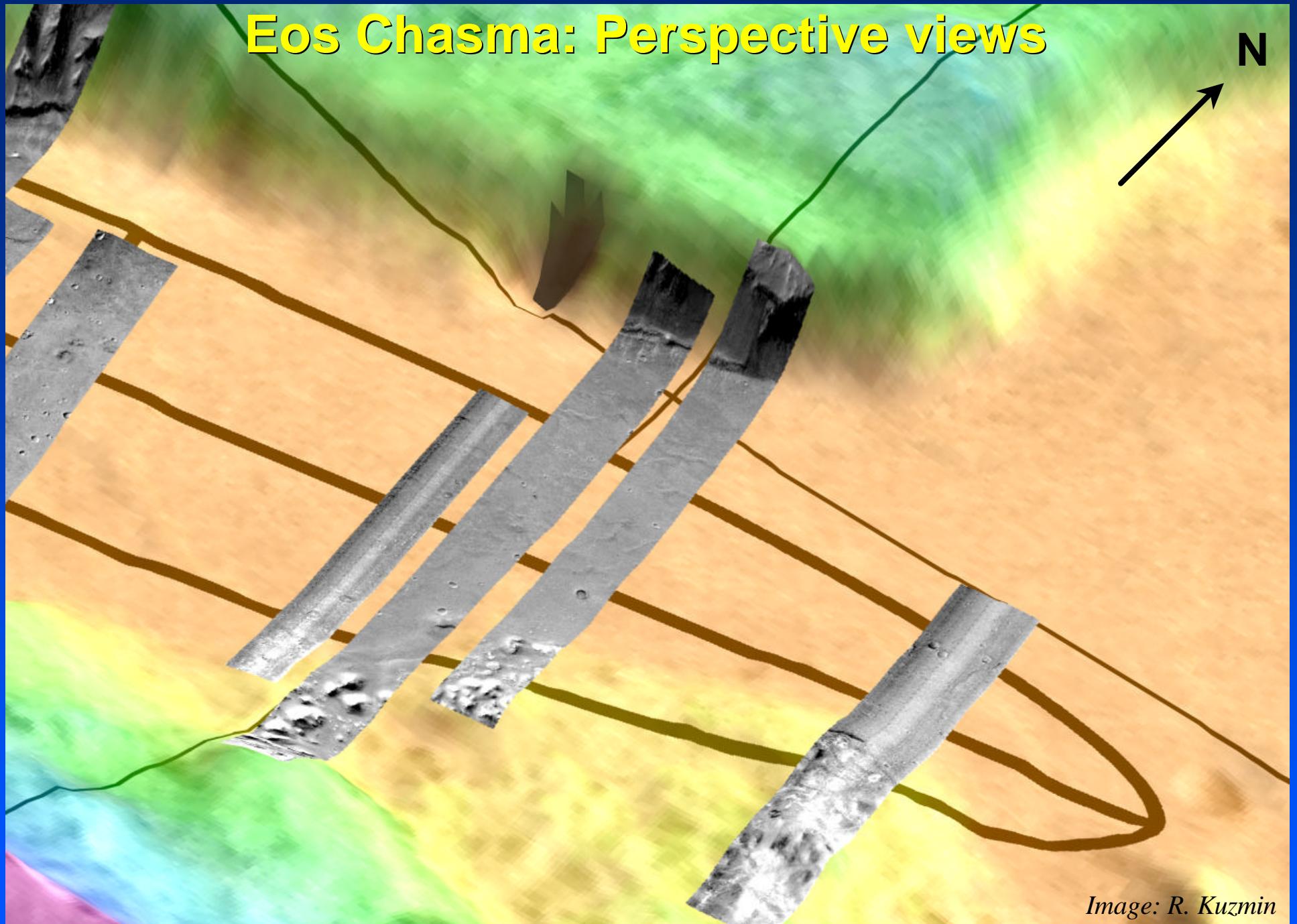


Image: R. Kuzmin

# Eos Chasma: Perspective views

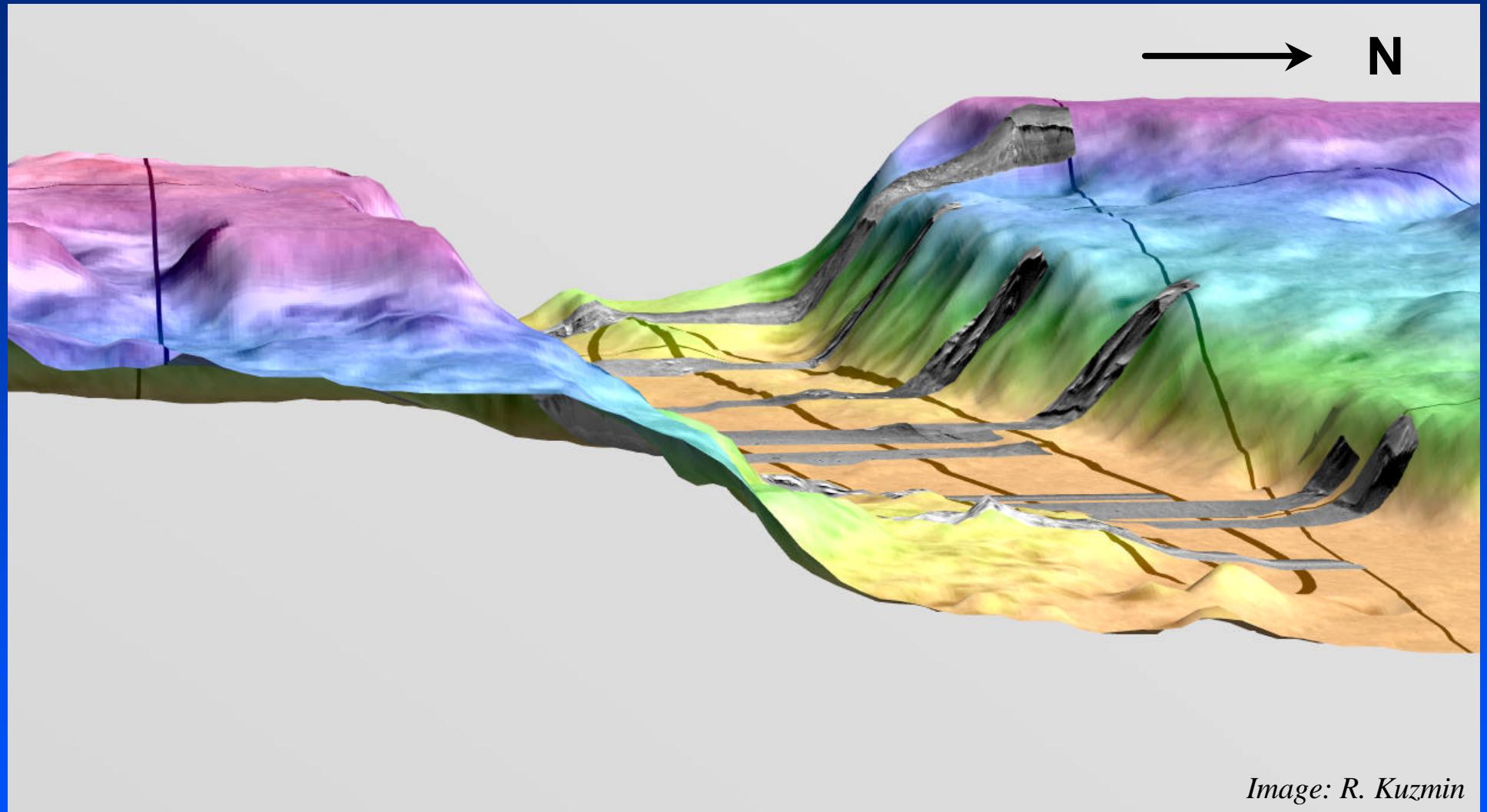


Image: R. Kuzmin