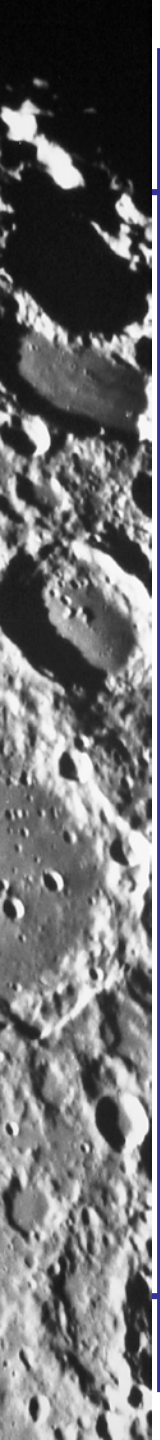
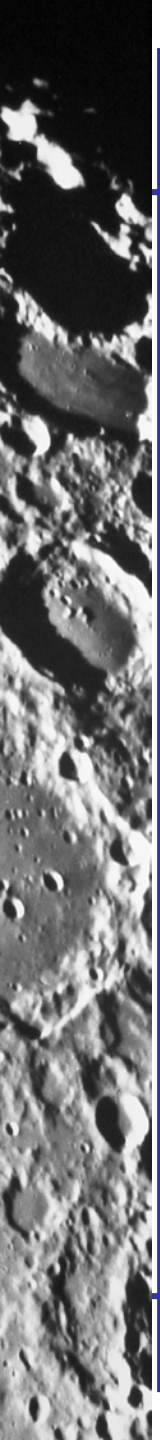


Lunar Exploration Initiative

Briefing Topic:

Colton Crater, Arizona: A Lunar Analogue Training Site

David A. Kring

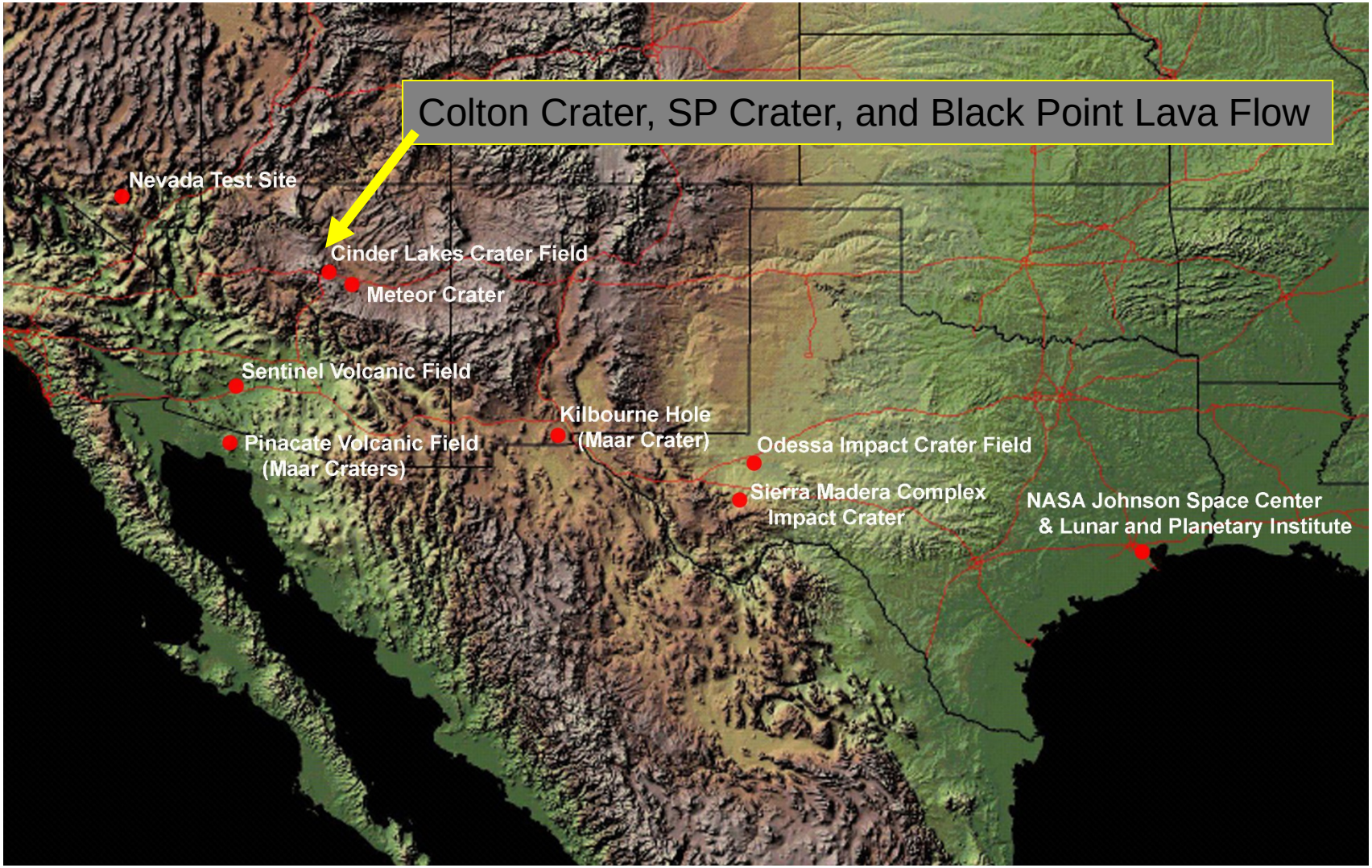


Lunar Exploration Initiative

Contents:

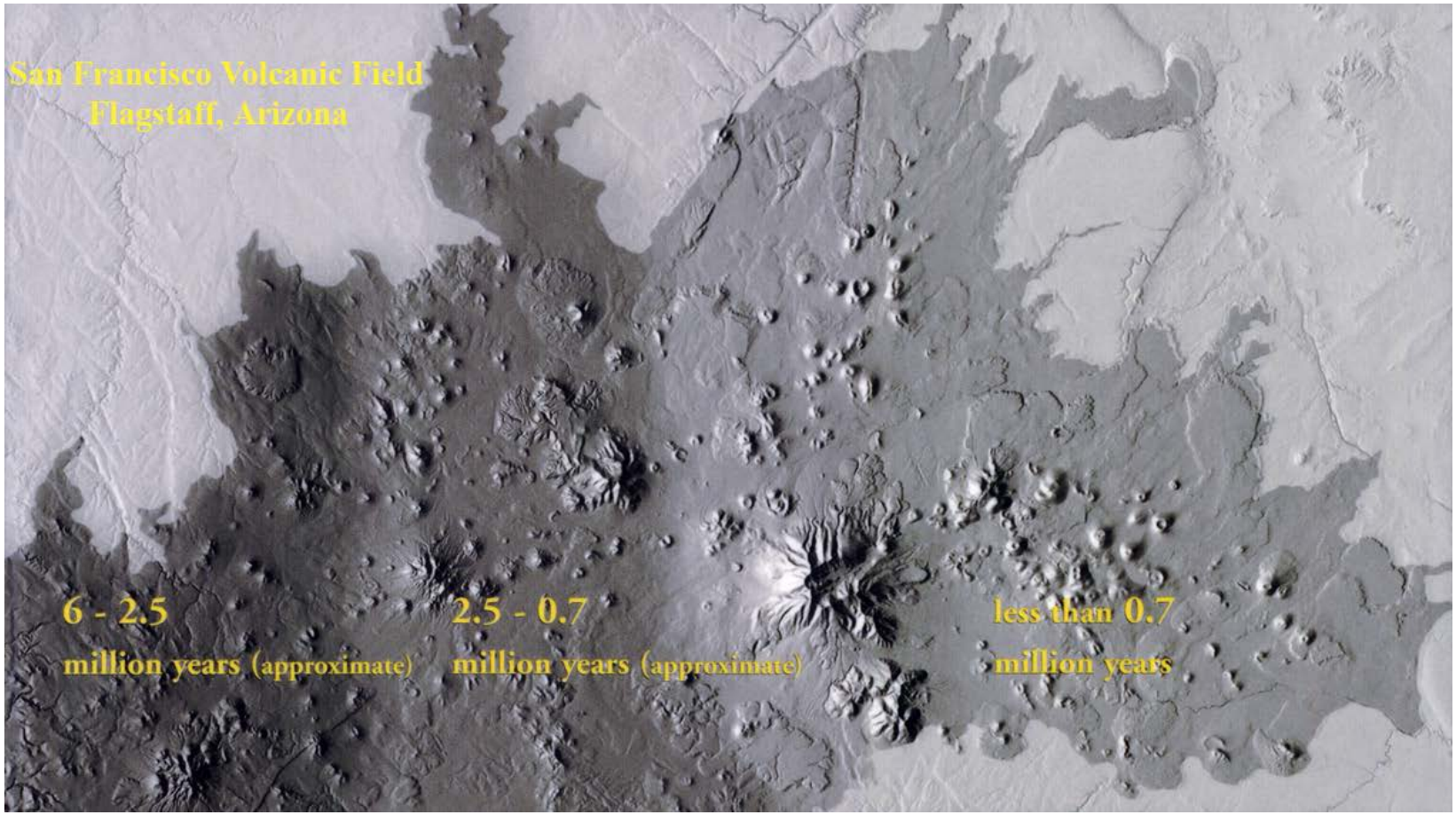
- Regional geologic context
- Views of Colton Crater
- Geology of Colton Crater

Lunar Analogue Training Sites



Regional Geologic Context

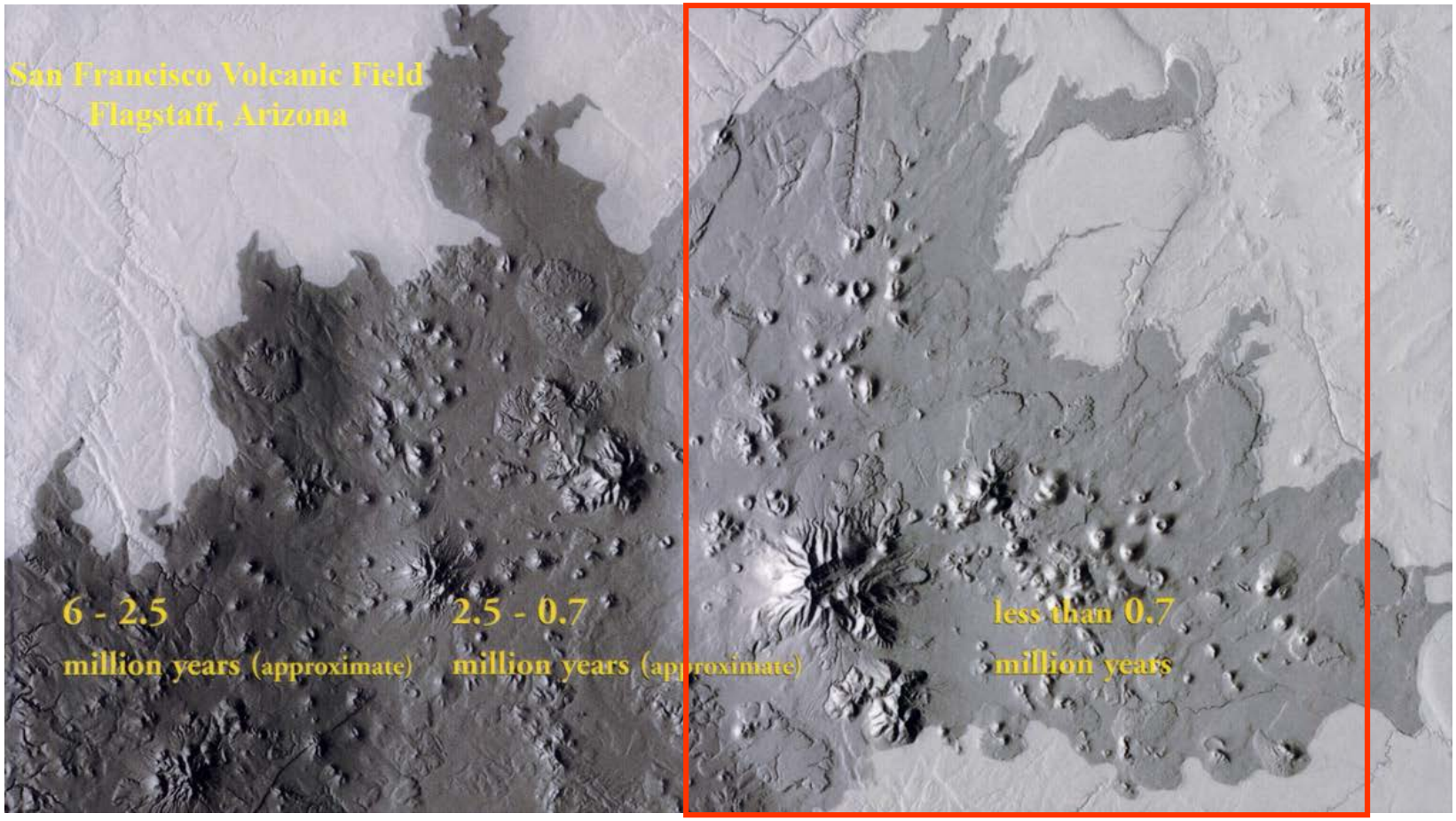
Outline of volcanic field that is visible in remote sensing images



USGS DEM

Regional Geologic Context

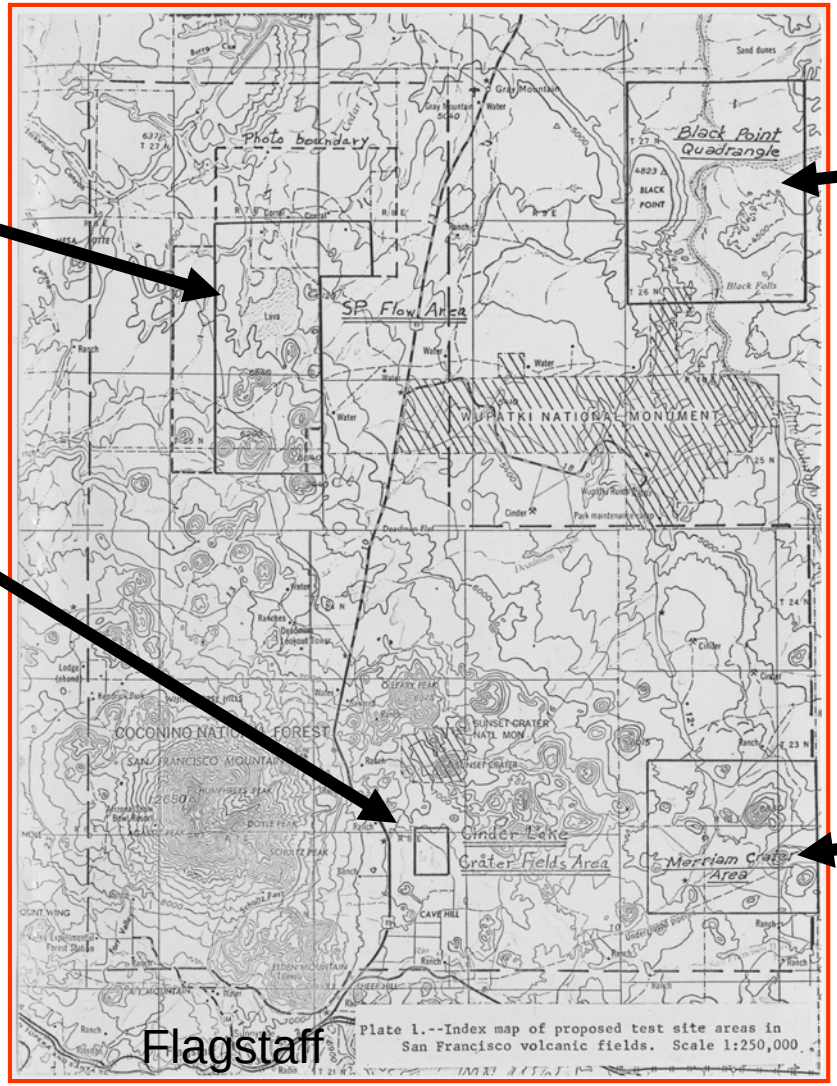
Outline of volcanic field that is visible in remote sensing images



Proposed Flagstaff-area Test Sites (1969)

SP Crater
& Lava Flow
(including
Colton Crater,
then known as
Crater 160)

Cinder Lakes
(& Crater Field)



Black Point
Lava Flow

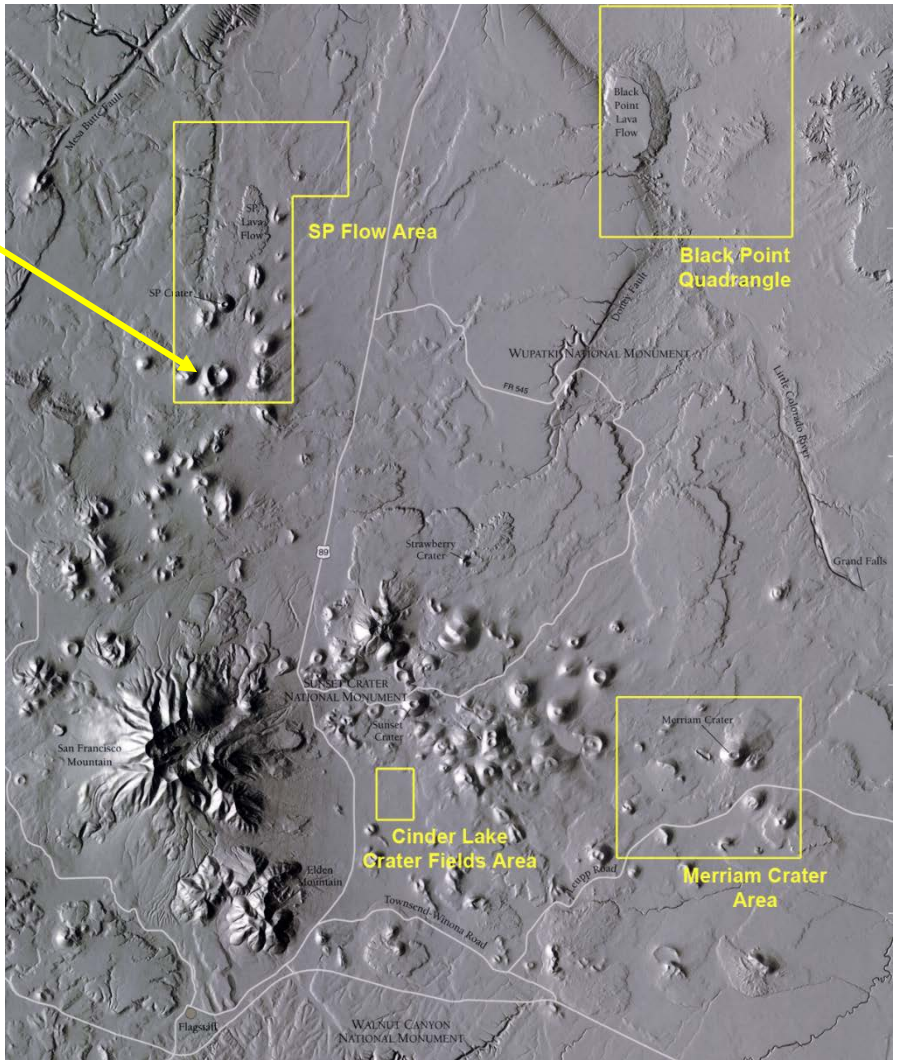
This is the map in the original 1969 test site proposal.

Merriam Crater

USGS 1969

Proposed Flagstaff-area Test Sites (1969)

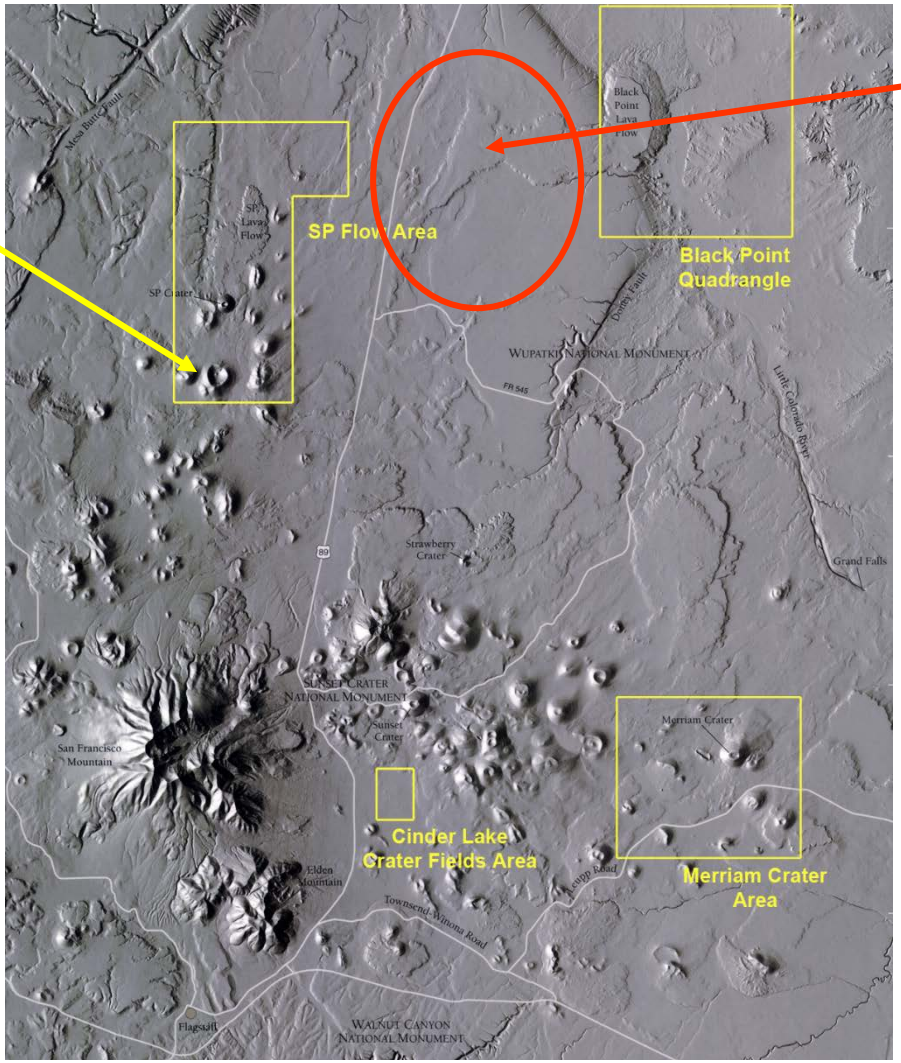
Colton Crater



Modern DEM of the northeastern portion of The San Francisco Volcanic Field.

Proposed Flagstaff-area Test Sites (1969)

Colton Crater



Black Point Lava Flow area used to test four lunar surface mission scenarios, October 2008.

Modern DEM of the northeastern portion of The San Francisco Volcanic Field.

Crater 160 (now Colton Crater)

View from the northwest to southeast.
Mid-October.

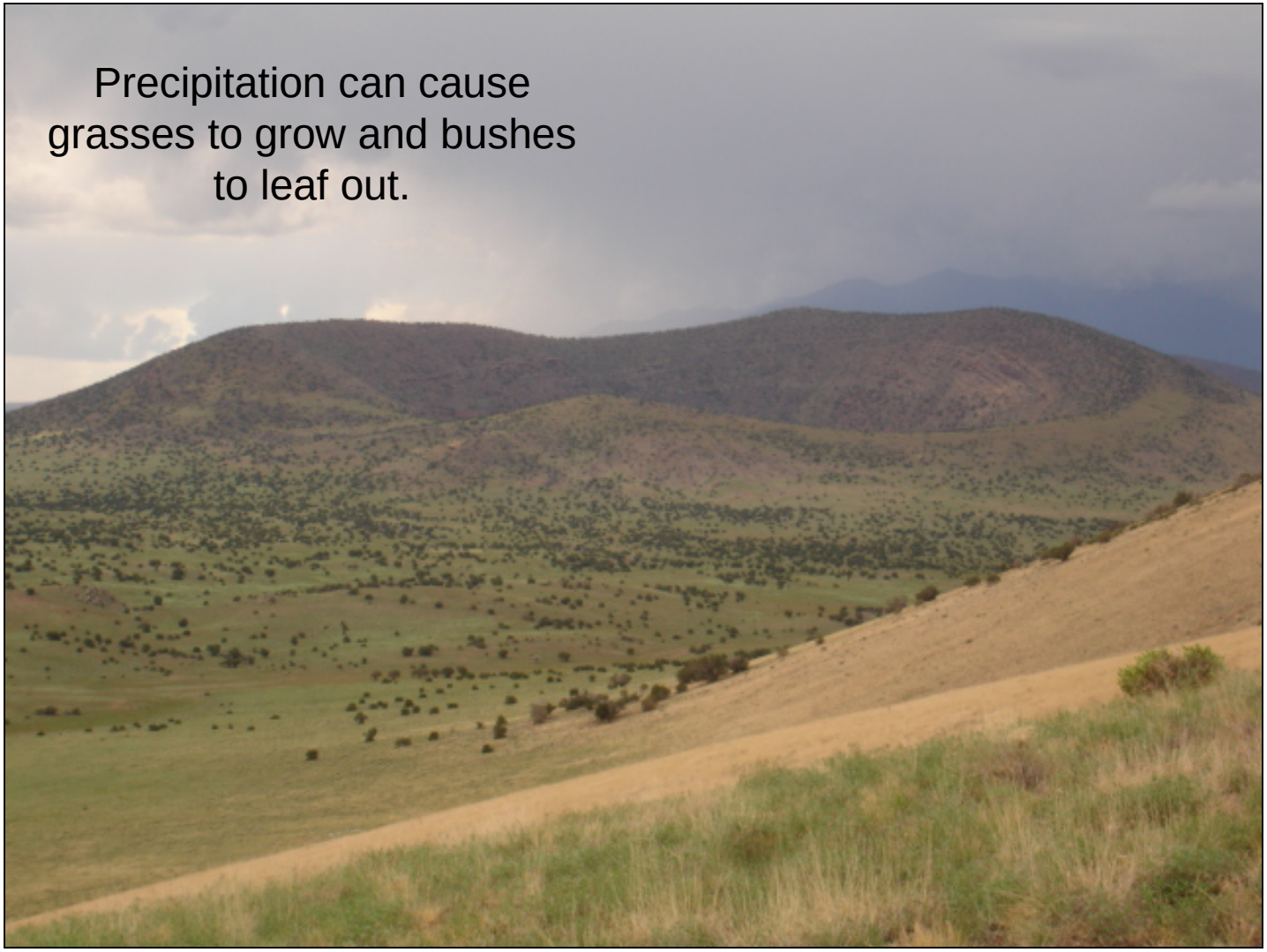
Colton Crater

- A tuff ring or cone, related to explosive maar craters
- Rim diameter is 1.2 km
- The highest portion of the crater rim is ~450 m above surrounding landscape
- The crater floor is 80 m below the surrounding landscape
- The crater walls contain mantle and crustal xenoliths

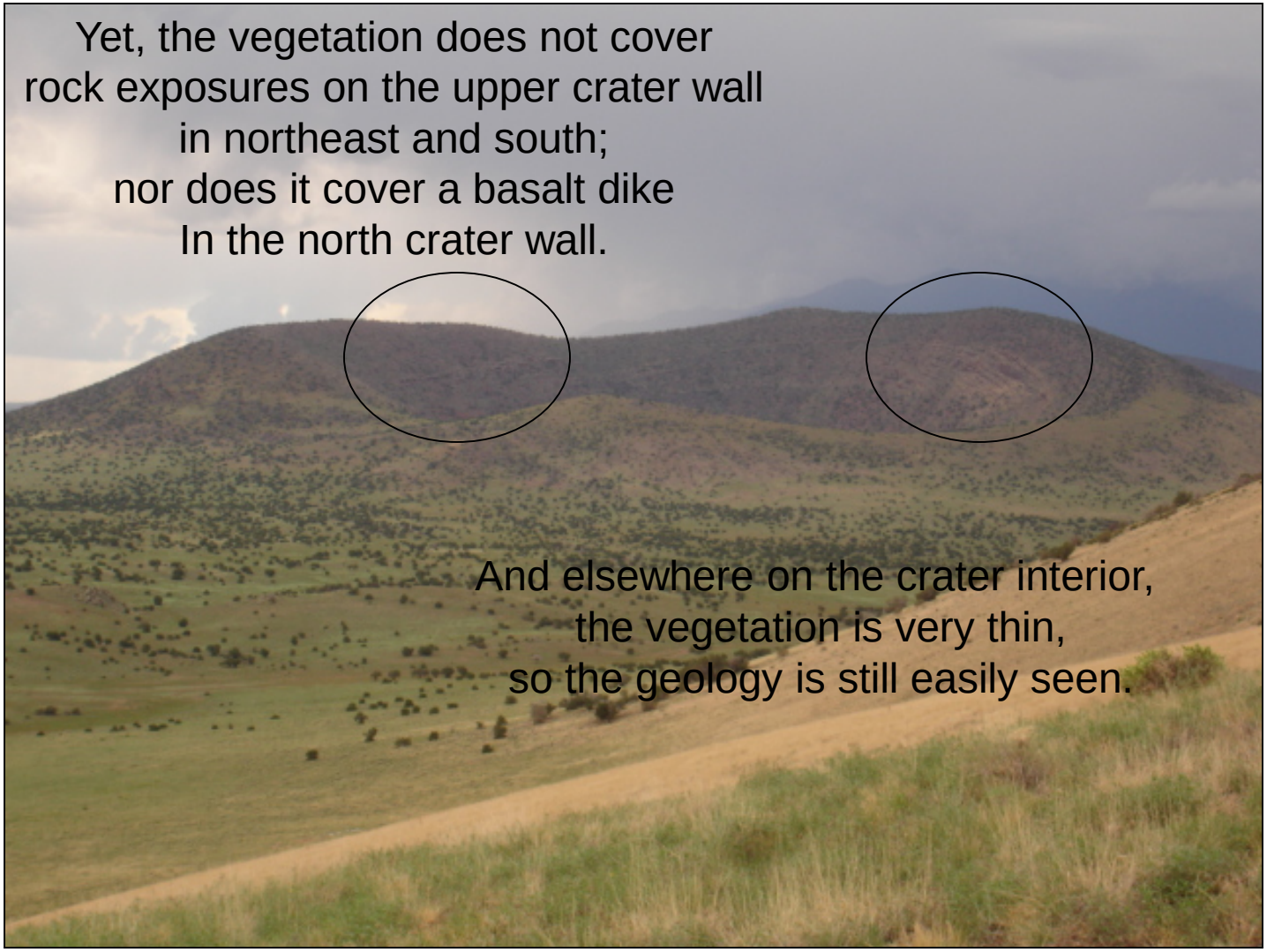
Colton Crater

Colton Crater

Colton Crater



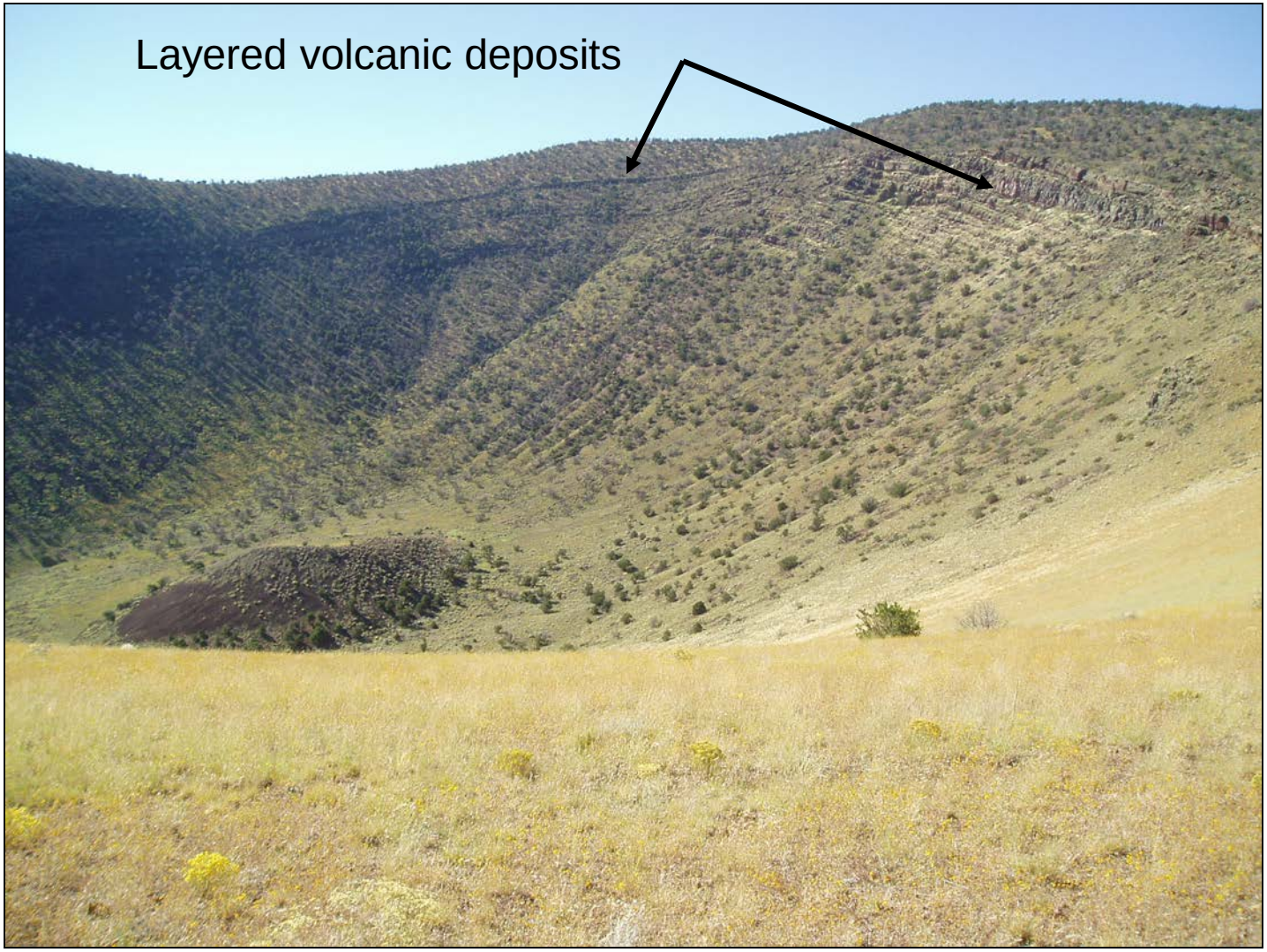
Colton Crater



Colton Crater

Colton Crater

Colton Crater



Colton Crater

15 m tuff

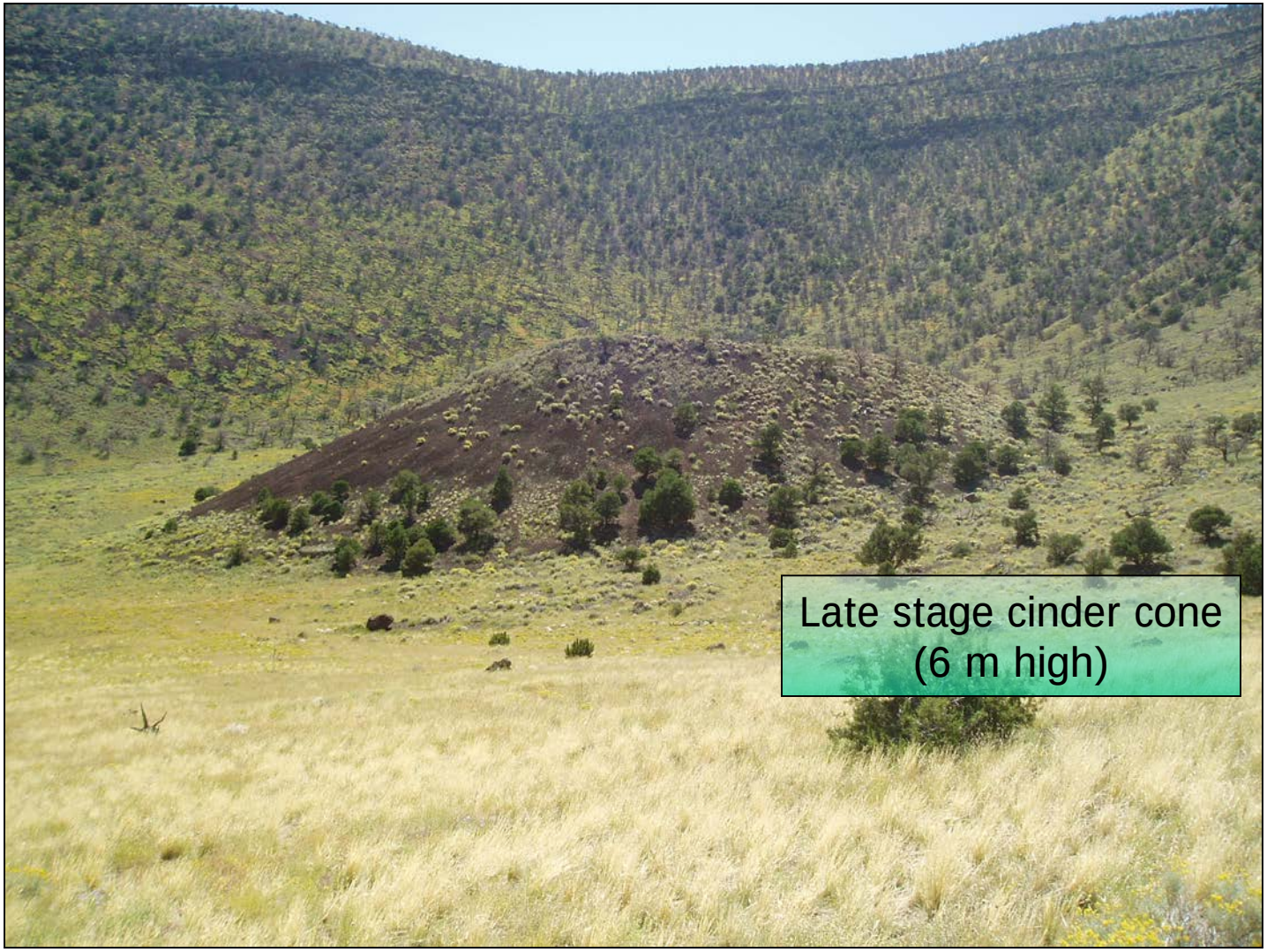
25 m cinders

7.5 m basalt flow

27.5 m cinders

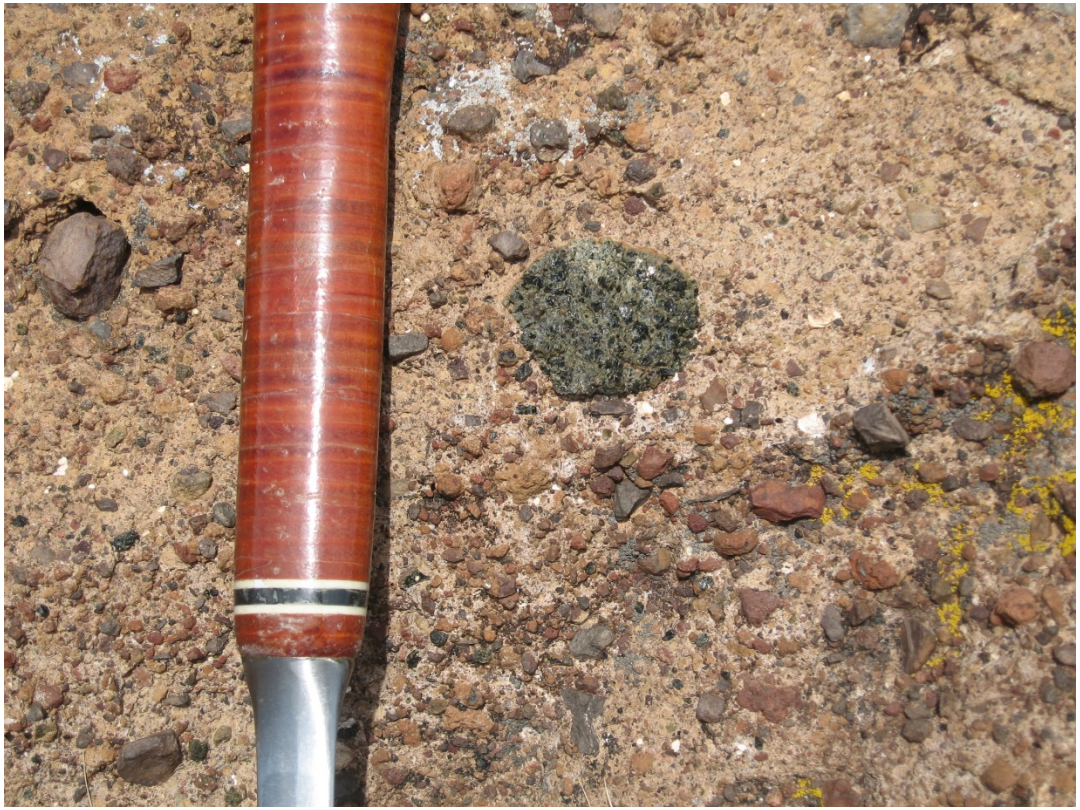
75 m of total section measured by Cummings (1972)

Colton Crater



Xenoliths within Colton Crater

Xenoliths within Colton Crater



Xenoliths

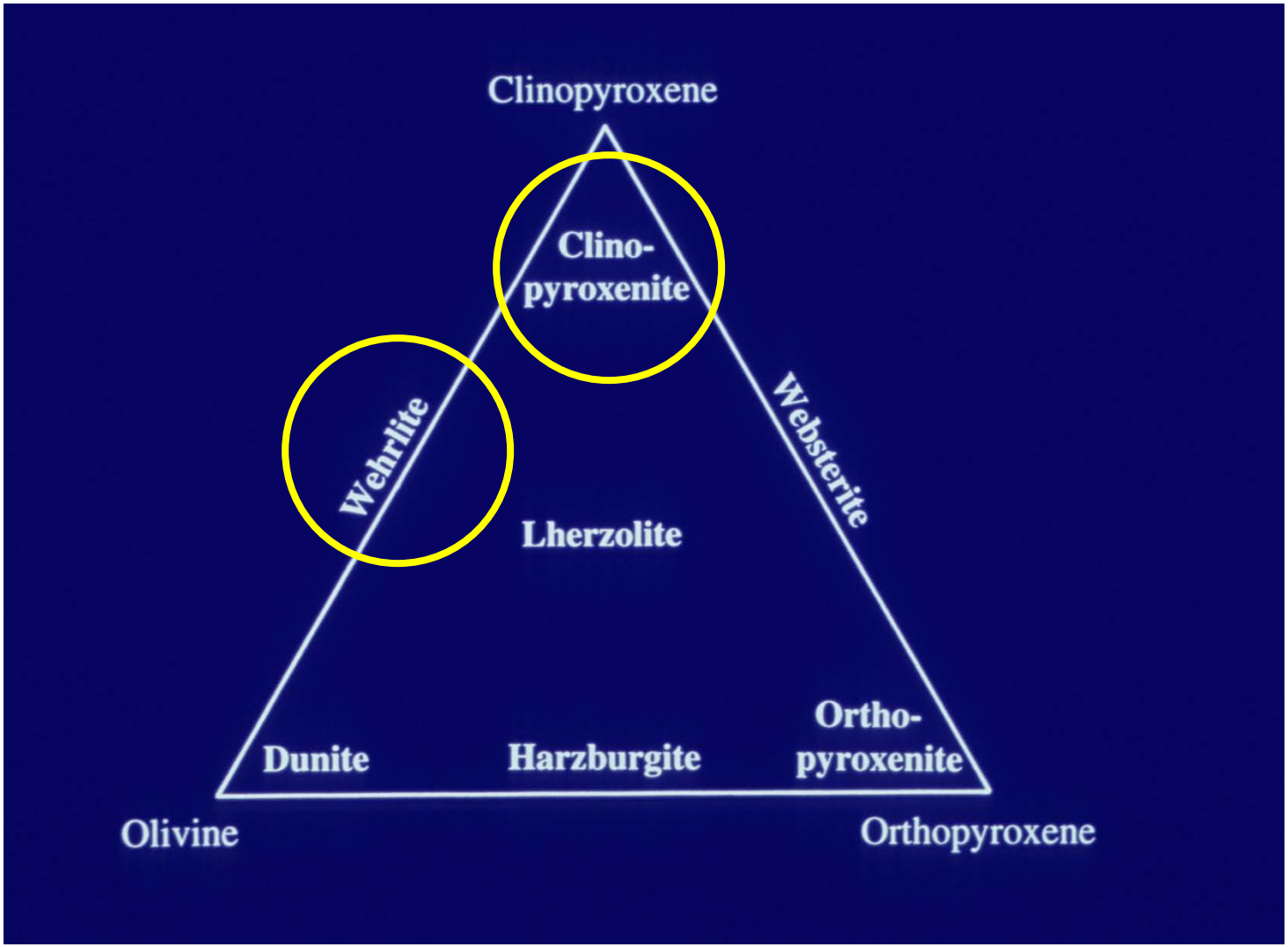
Most abundant varieties

- Clinopyroxenite
- Wehrlite

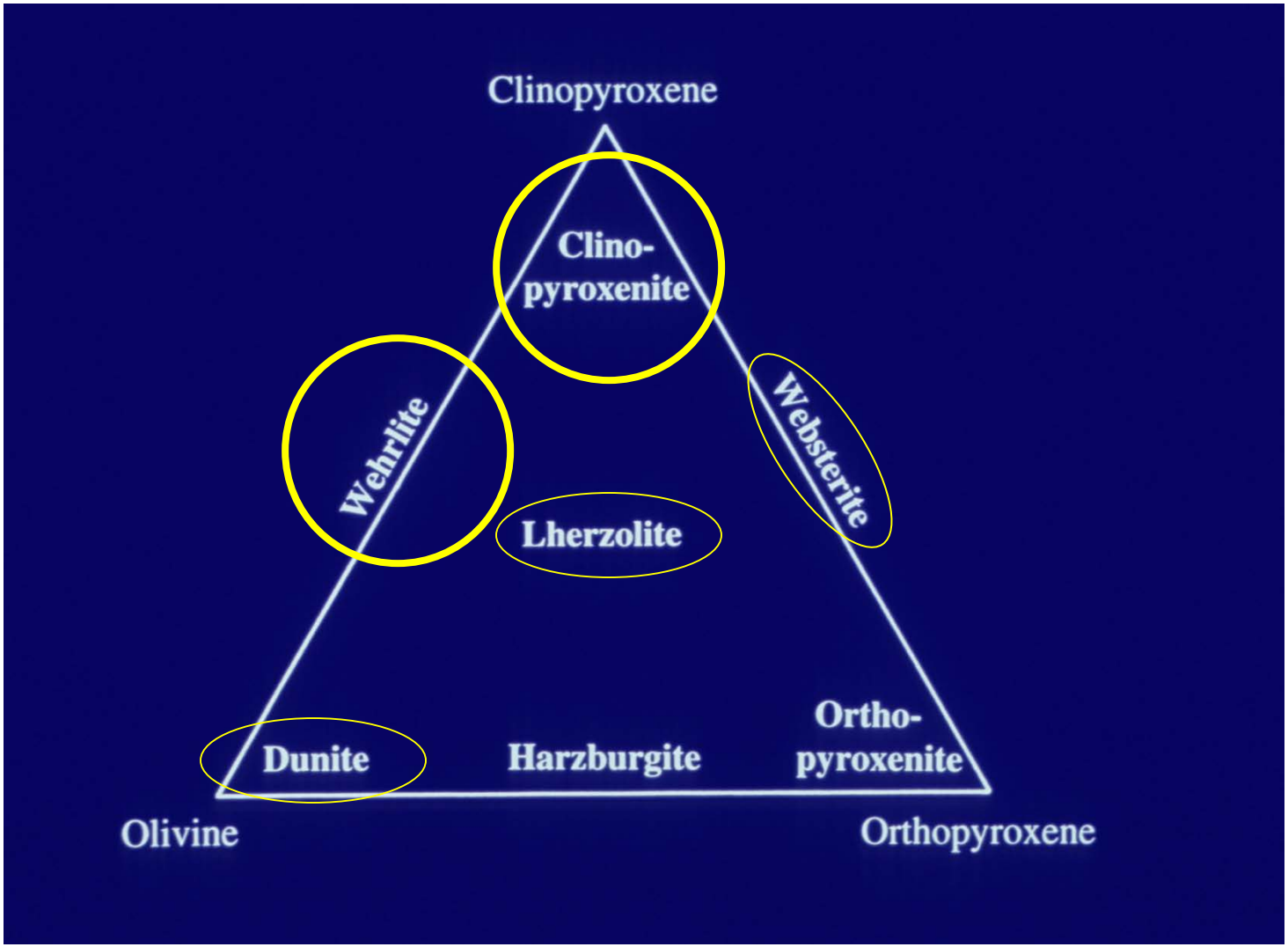
Also present

- Dunite
- Lherzolite
- Websterite
- Gabbro
- Norite
- Anorthosite
- Granite
- Granulite
- Paleozoic sedimentary rocks

Ultramafic (Mantle) Lithologies

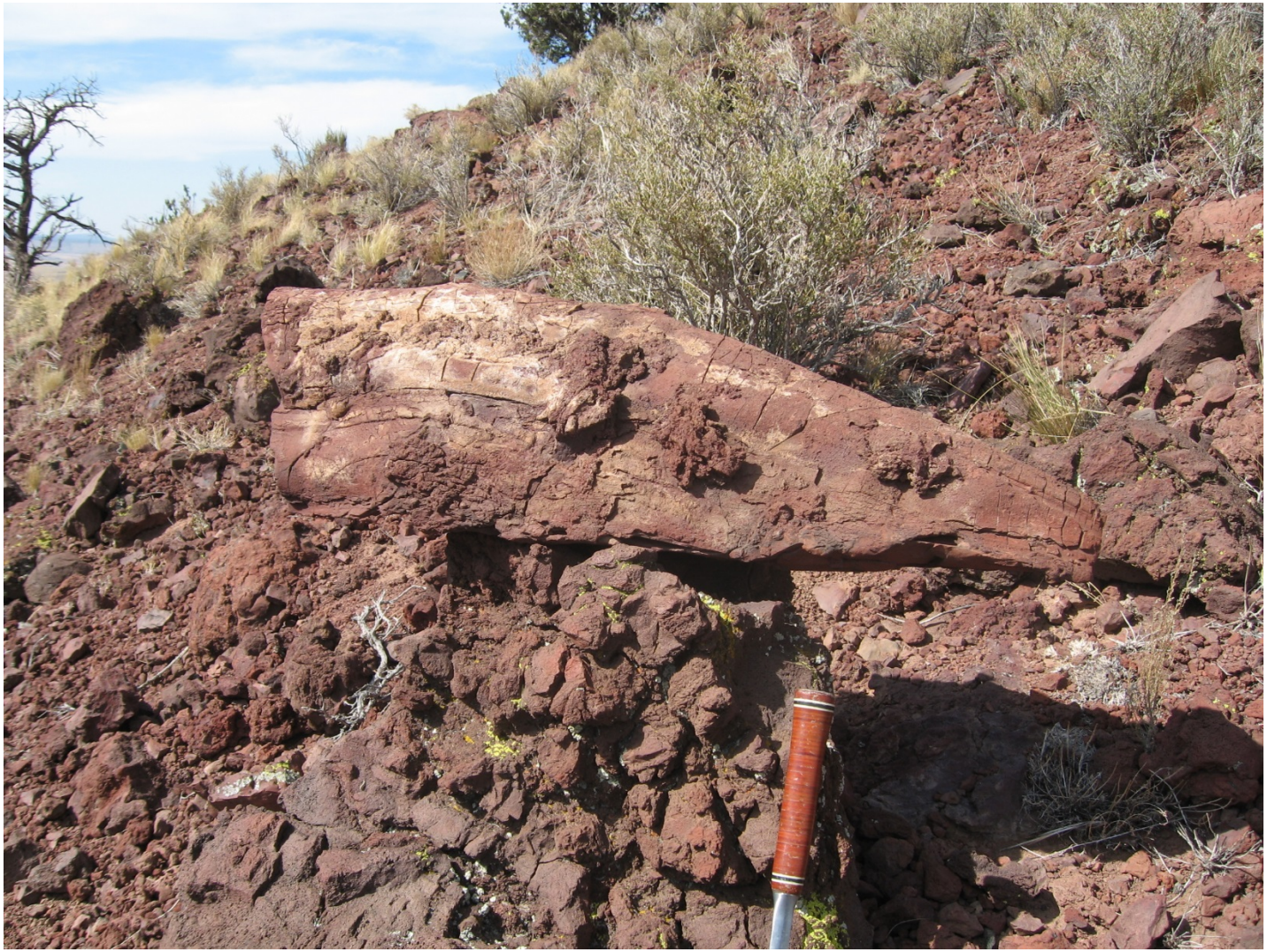


Ultramafic (Mantle) Lithologies

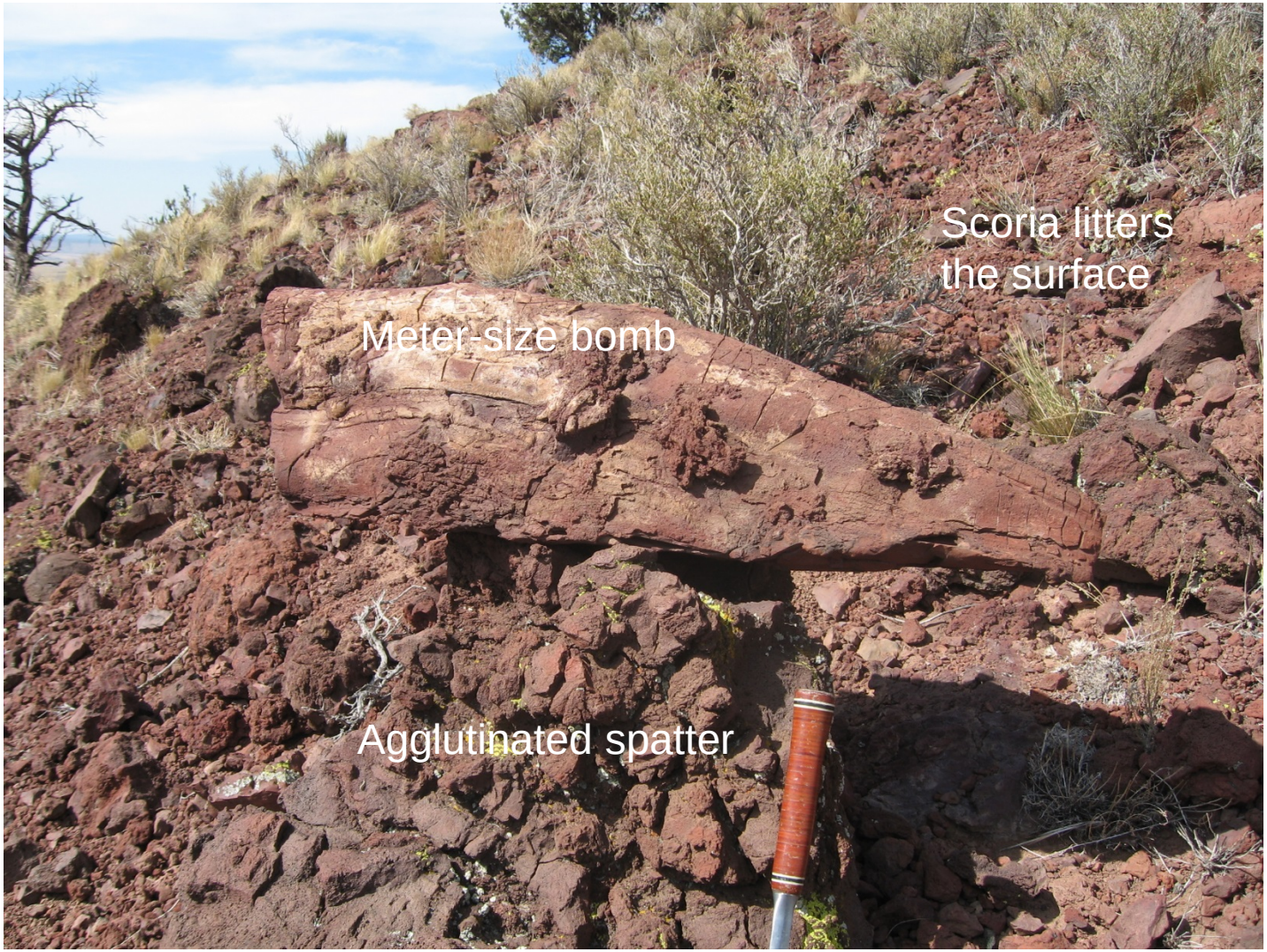


Basaltic Pyroclastic Bombs

Basaltic Pyroclastic Bombs



Basaltic Pyroclastic Bombs



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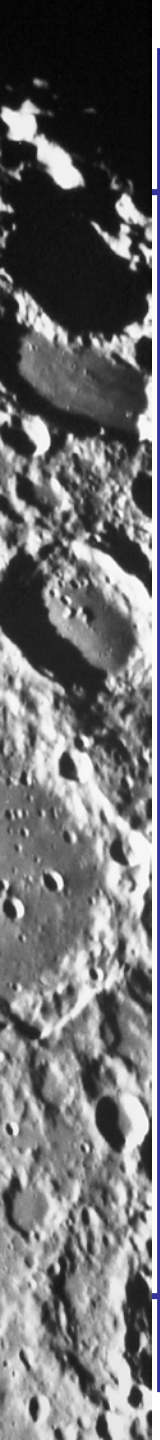

Colton Crater

Additional Images

Xenoliths within Colton Crater

Regional Geologic Context

Final eruptive phase

A 6 m high cinder cone grew on the crater floor.

Regional Geologic Context

Regional Geologic Context

Regional Geologic Context

Regional Geologic Context

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