

# Are there mineralogical/compositional trends that correlate with changes in geomorphology in unvegetated meandering stream basins?

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## Introduction

**Earth-surface processes and landforms can be used to interpret geomorphological features on Mars. This is because Mars has traditionally been recognized as a dry, red planet with geomorphic processes that may be similar to Earth.**

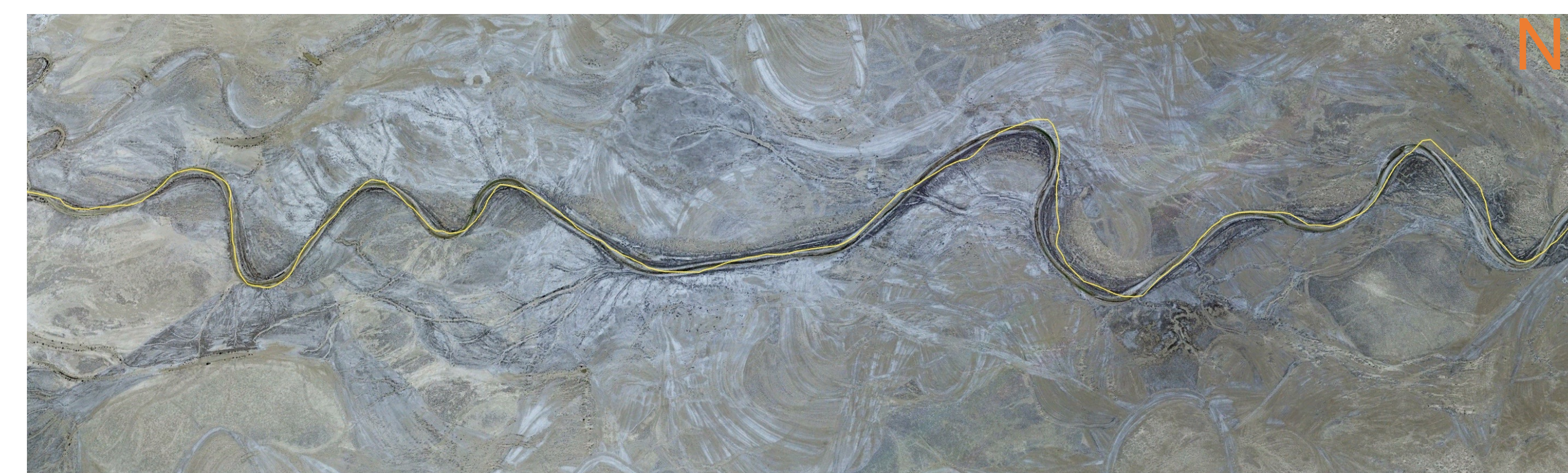
- ❖ On Earth, meandering rivers commonly form in highly vegetated areas. The two field sites are unvegetated which relates them to river systems on Mars.
- ❖ This project uses Environment for Visualizing Images (ENVI), an imaging software, to extract important information from various forms of data in geospatial imagery, with focus on the Amargosa and Quinn Rivers.
- ❖ If vegetated meandering systems use roots to bind soil and prevent bank degradation, then what aspects of non-vegetated systems can be correlated between Mars and Earth.
- ❖ We seek to assess the contribution of mineral phases to soil cohesion to address this question.
- ❖ ENVI provides information about visible and near-visible wavelengths that correspond to geomorphic features.
- ❖ This may provide a better understanding of arid streams on Earth.

## Methods

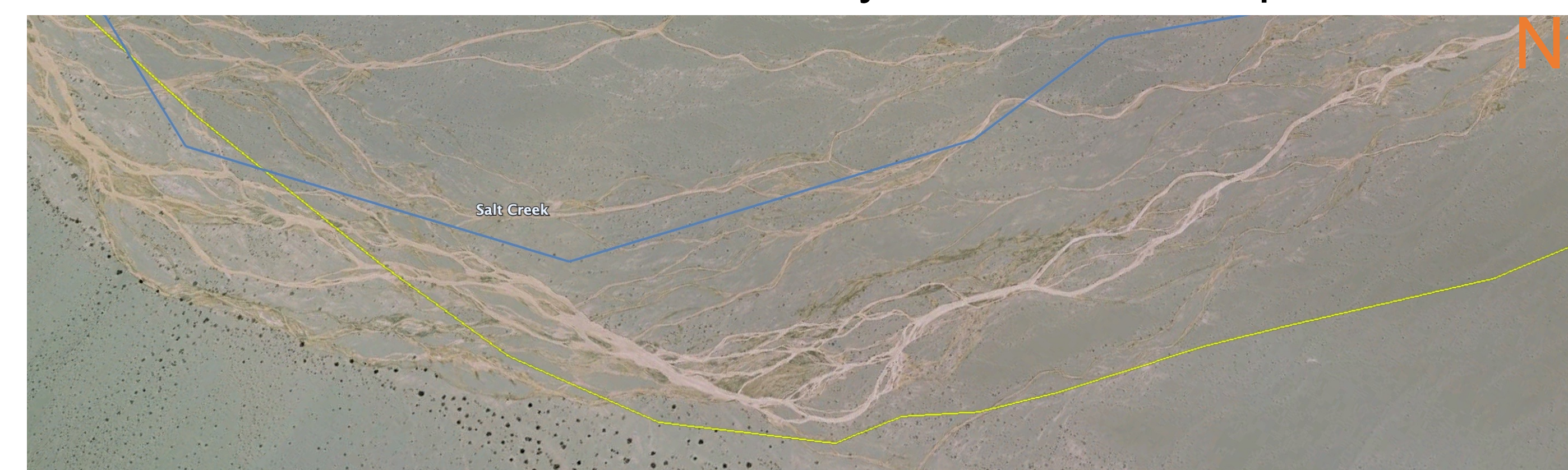
Use Google Earth Pro to map out the Quinn and Amargosa Rivers

- ❖ Highlighting key aspects during different seasons and time periods
- ❖ Use ENVI to load and overlay data of the geomorphic regions onto a multispectral image
- ❖ Make observations about spectral image color and geomorphic regions
- ❖ Extract spectra from regions of interest and graph the spectra as well as compare trends
- ❖ Summary write-up about observations, mineral composition and spectral shapes vs geomorphic regions

## Where are we?



**Quinn River, Nevada.** October 2016. Fall was chosen for this image due to a drier river. There is no surrounding vegetation, white marks around scroll bars may indicate salt deposition.



**Amargosa River, Death Valley, California.** October 2016. Fall was chosen for this image due to a drier river. Surrounding vegetation is dry shrubs, though there is no vegetation following the meander banks.

## Why is this Important?

By comparing rivers here on Earth to Mars, there is a greater insight gained to what geomorphology and composition/ mineralogy have in common.

- ❖ Using remote sensing and spectroscopy is one way to determine certain trends here on Earth.
- ❖ Mars has meandering stream channels, these channels are unvegetated.
- ❖ Commonly, meandering rivers form around surrounding vegetation.
- ❖ Unvegetated rivers were chosen on Earth in order to compare that to Mars.
- ❖ By knowing how these unvegetated meanders formed here on Earth we can use that new data to compare that to extraterrestrial worlds.

## Next Steps

- ❖ This project is set to continue in the Fall of 2022, funded by NAU/NASA Space Grant
- ❖ Use SWIR, Landsat, and/or ASTER data for remote sensing over the google earth pro regions that have been previously analyzed
- ❖ Applying image processing to highlight spectral changes over the landscape and making observations
- ❖ Field work will begin at the field sites, onsite data will be collected using a remote sensing spectrometer.

## Acknowledgements

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