Evaluating the history of eolian and interdune fluid-sediment interactions and mass transfer in an acid and redox influence diagenetic system

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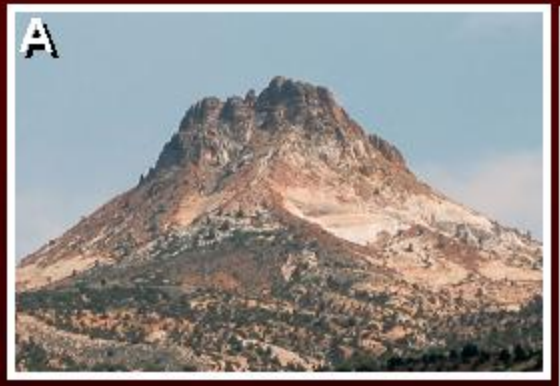
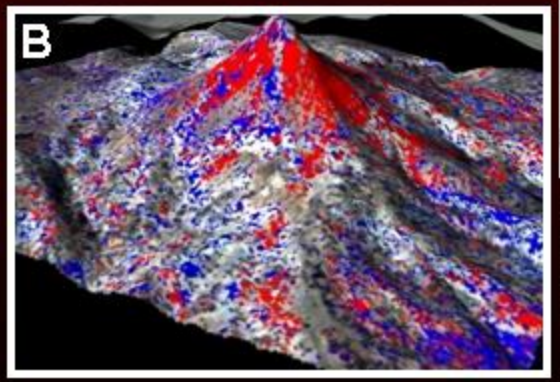
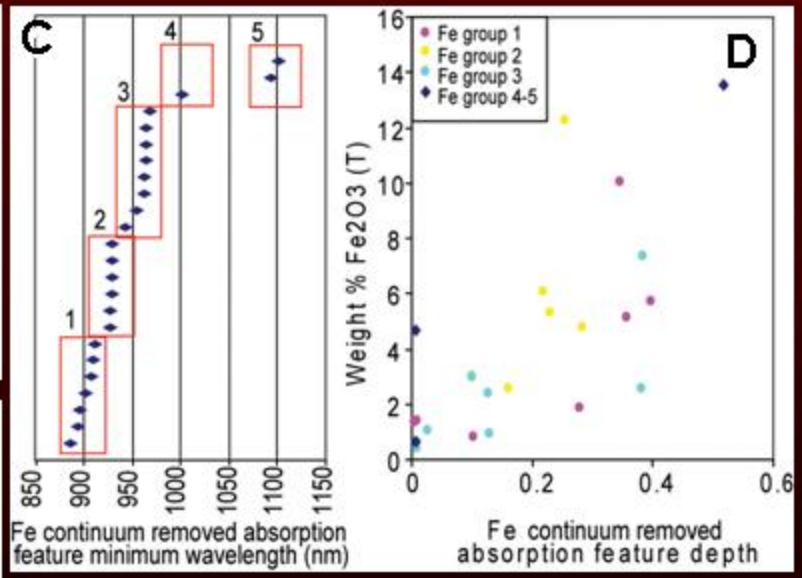
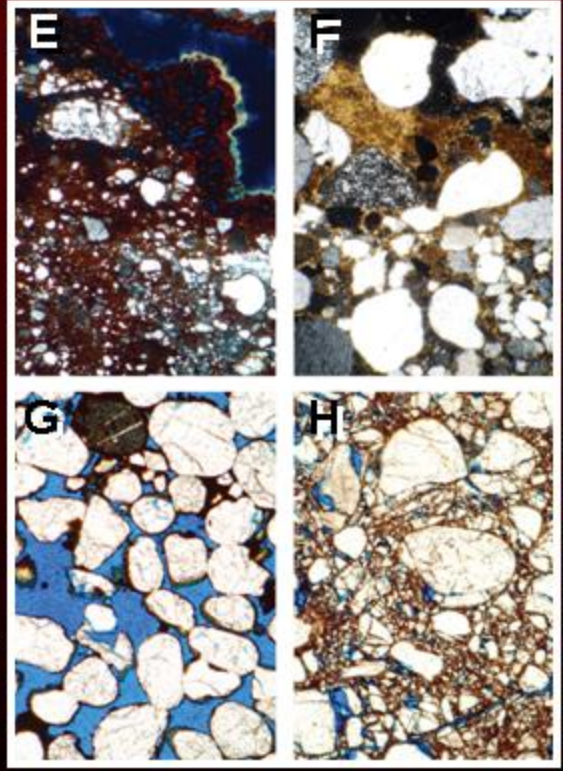
The Jurassic Navajo Sandstone in southern Utah provides an example of an exhumed eolian reservoir that has undergone a complex history of fluid flow. Using a combination of imaging spectroscopy, field mapping, geochemistry, and petrography, we are unraveling the history of multiple phases of fluid-related alteration spanning a range of chemistries at Mollies Nipple, Grand Staircase-Escalante National Monument. The cement mineralogy and geochemistry at this site are anomalous compared to typical Navajo Sandstone diagenesis and include periods of reducing, oxidizing, acidic, and potentially hydrothermal fluids.









A) Field photo of MN butte; B) Spectral classification of Fe-rich (red) versus poor (blue) zones draped over DEM; C) Fe-bearing mineralogy groups based on spectral features; D) Comparing spectral data to whole rock geochemistry; E-H) Micrographs of MN sandstone (1.5 mm across) showing examples of E) fracture-fill, F) jarosite cement, G) cement dissolution (blue=porosity), and H) brittle deformation.