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## GSA Connects 2021 in Portland, Oregon

Paper No. 240-14

Presentation Time: 4:50 PM

### **A TERRESTRIAL BRINE-SEEPAGE ANALOG FOR MARTIAN SLOPE STREAKS NEAR SALAR DE PEDERNALES IN THE ATACAMA DESERT, CHILE**

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Martian slope streaks are elongated down-slope, low-albedo surface features that currently form within sub-annual time scales in the high-albedo ("dusty") regions of equatorial Mars. These km-scale streaks, which can persist up to several decades on the Martian surface, present one of the most enigmatic and dynamic suites of active surface features on present-day Mars. Two categories of explanations remain in debate regarding their nature: 1) "Dry" formation models, in which surface darkening is associated with mass wasting processes, such as dust avalanches; and 2) "Wet" formation models, in which surface darkening is associated with transient wetting of the surface by either seepage of sub-surface brines or deliquescence of atmospheric moisture. Here, we report recently discovered dark slope streaks that occur in the high Atacama Desert in Chile and display a close geomorphic resemblance to the Martian streaks. Field examination of the Atacama slope streaks revealed that they formed through down-slope seepage of groundwater brines sourced from the Salar de Pedernales located 500 m away. Chemical and mineralogical analyses demonstrate that salts deposited from the Pedernales brines combined with detrital input from soils/dust are responsible for surface darkening in the Atacama case. Field-based spectral measurements in the 0.4-2.5 micron wavelength range compare to those obtained from orbit for the Martian slope streaks. In addition, high-resolution topography derived from drone imagery revealed that the Atacama streaks are rougher than their surroundings at the decimeter-scale roughness of the entire hillslope they occur on. A similar distinction was previously established between Martian slope streaks and their surrounding slopes, although on Mars these roughness variations appear to occur at lower-range sub-centimeter scales. Our study of the unique Atacama slope streaks may support "wet" formation as a viable hypothesis for some of the Martian slope streaks.

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Session No. 240

[T115. Geomorphology and Landscape Evolution of Mars](#)

Wednesday, 13 October 2021: 1:30 PM-5:30 PM

[Portland Ballroom 256 \(Hybrid Room\) \(Oregon Convention Center\)](#)

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