

### INTRODUCTION & AIM

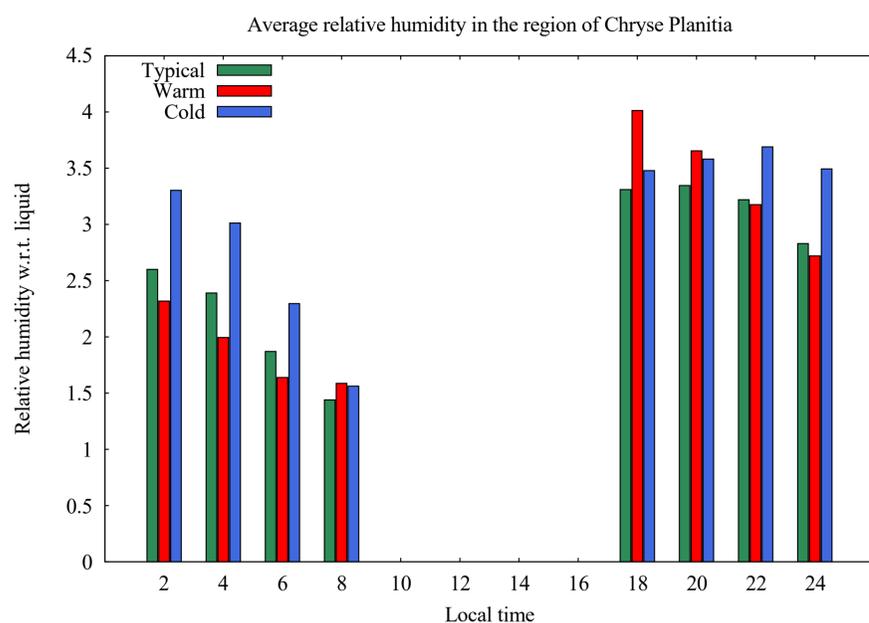
Liquid water availability is an important aspect of Mars habitability studies; however, current conditions allow only transient, localized liquid formation. Perchlorate salts have been identified across Martian latitudes and might deliquesce under ideal conditions. **Deliquescence occurs when temperature and relative humidity exceed salt-specific thresholds.** Atmospheric dust shapes near-surface microclimates where brine formation is possible and understanding how dust conditions influence deliquescence is essential for identifying when and where brines may form on Mars today.

### METHOD

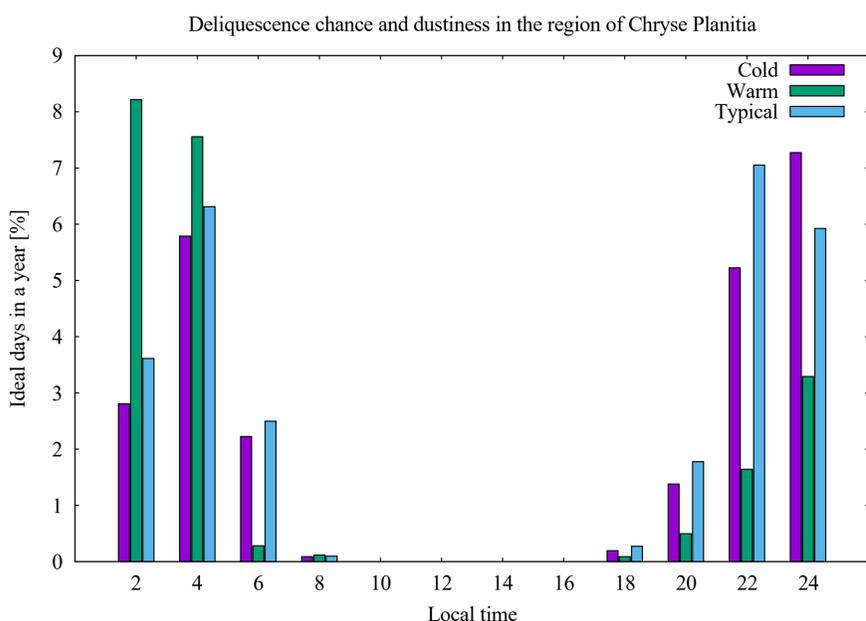
I used the **Mars Climate Database v6.1** to model near-surface conditions in three climate scenarios:

- **Typical** scenario: represents a standard Martian year
- **Warm** scenario: sets dust opacity to the observed maximum (excluding global dust storms)
- **Cold** scenario: corresponds to a clear atmosphere with dust opacity set to the minimum observed over Mars years 24-35.

### RESULTS



**Figure 1:** average relative humidity with respect to liquid in the region of Chryse Planitia. During the late night and early morning hours, the relative humidity is highest on average in the Cold scenario. In the evening, between 6 – 8 PM it is highest in the Warm scenario.



**Figure 2:** the percentage of days in a year when deliquescence is possible. Even though relative humidity was highest on average in the Cold scenario, the overall highest chance for deliquescence does not follow the same trend.

The model ran on a  $3.75^\circ \times 5.625^\circ$  latitude-longitude grid for one year. I selected the region where the overall deliquescence chance was the highest, between  $73.125^\circ \text{ W} - 5.625^\circ \text{ W}$  and  $33.75^\circ \text{ N} - 71.25^\circ \text{ N}$ . To compare the possibility of deliquescence between scenarios, I calculated the percentage of ideal days per year.

### DISCUSSION

- In the typical scenario, deliquescence probability was highest 10 PM – 12 AM, with lower chances at 2 AM and 6 AM, and a secondary peak at 4 AM.
- In the warm scenario, the maximum probability occurred 2 AM – 4 AM, followed by a sharp decline. Between 6 PM – 12 AM, the probability increased gradually.
- In the cold scenario, the probability increased after 8 PM, peaking at 12 AM, with lower values at 2 AM and 6 AM, and a small peak at 4 AM.

Overall, the warm scenario shifted the peak to later in the night. Cold and typical scenarios behaved similarly, with the typical scenario resulting in more ideal days, except for 12 AM. The deliquescence chances shown on Fig. 2 did not follow the same trends as the relative humidity averages in Fig. 1. Further work is planned to determine the detailed effects of dust in the atmosphere on deliquescence chance on Mars.

### REFERENCES

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