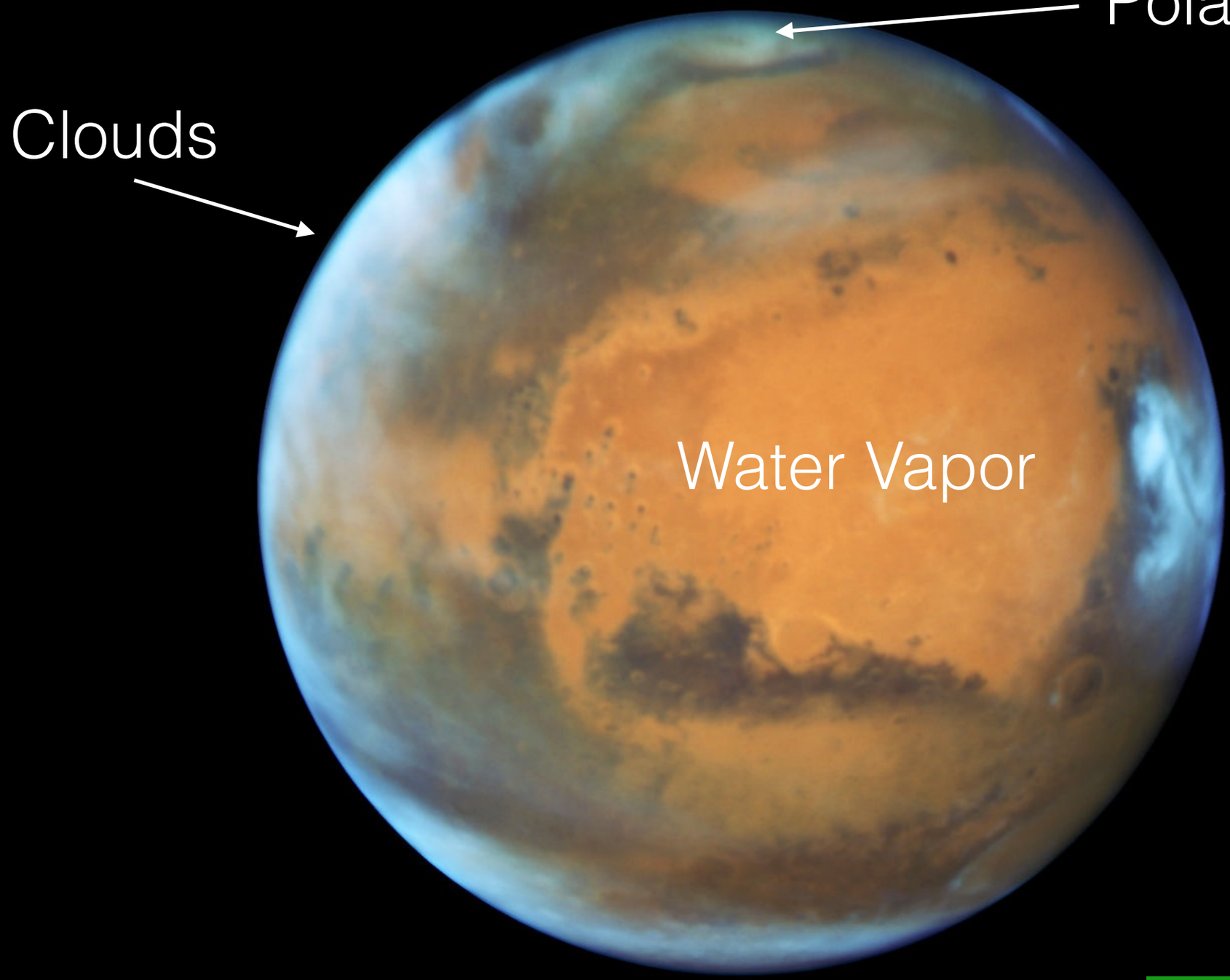
# Reservoirs of H2O

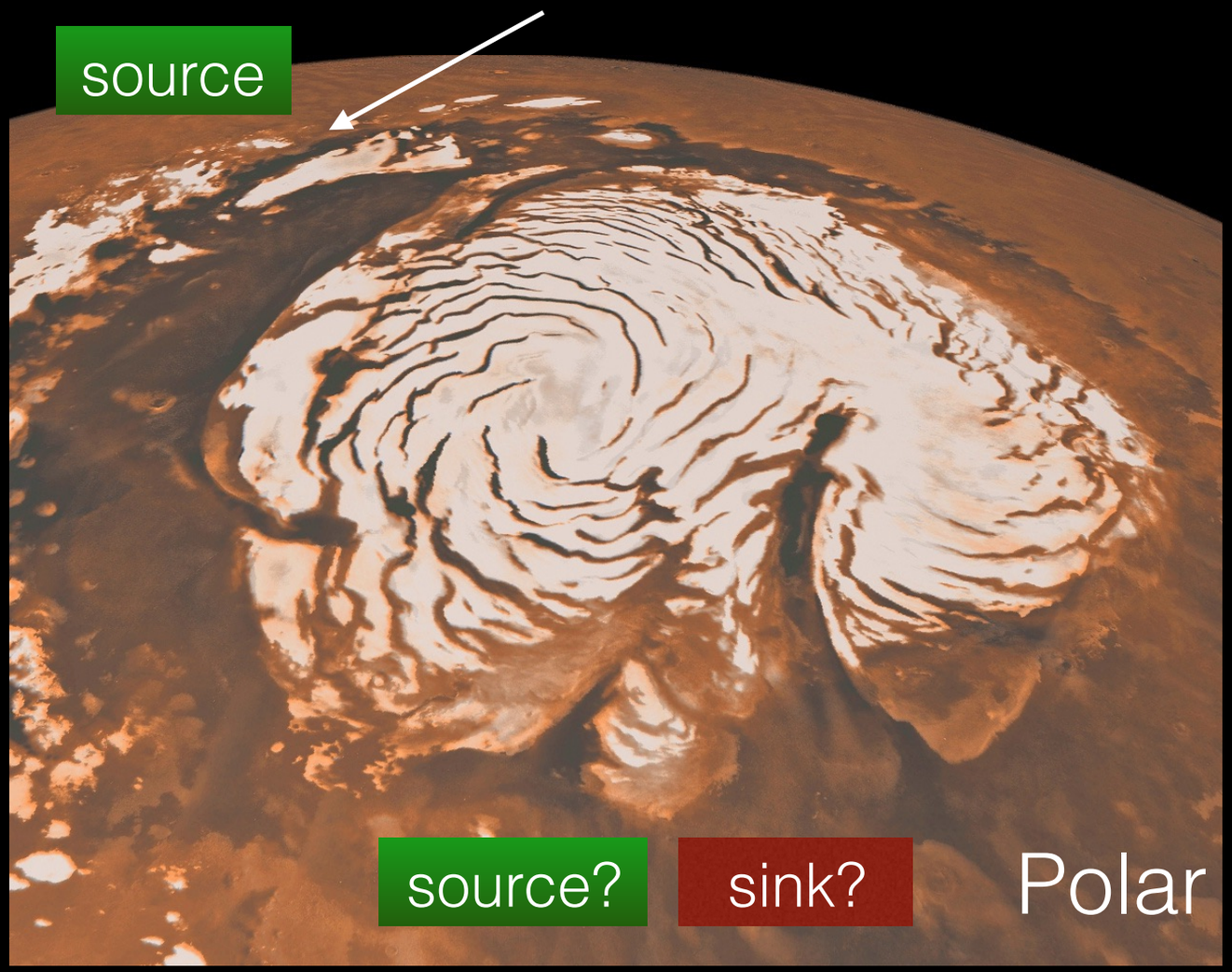



Given atmospheric conditions, clouds and vapor can hold a finite amount of H2O

Beyond a season, atmosphere is neither a sink nor source

# Outlier Deposits, including craters

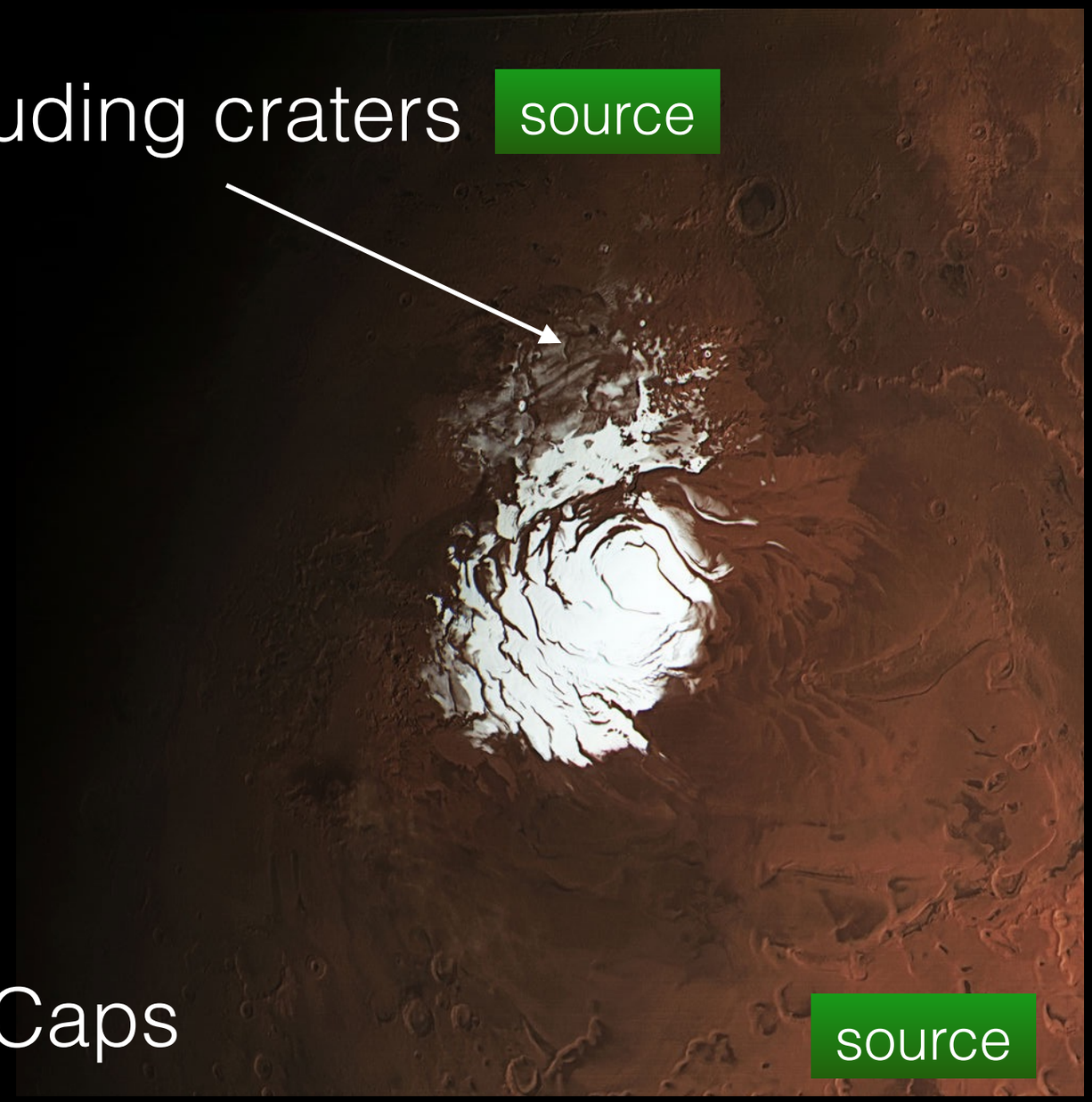
source



source?

sink?

# Polar Caps



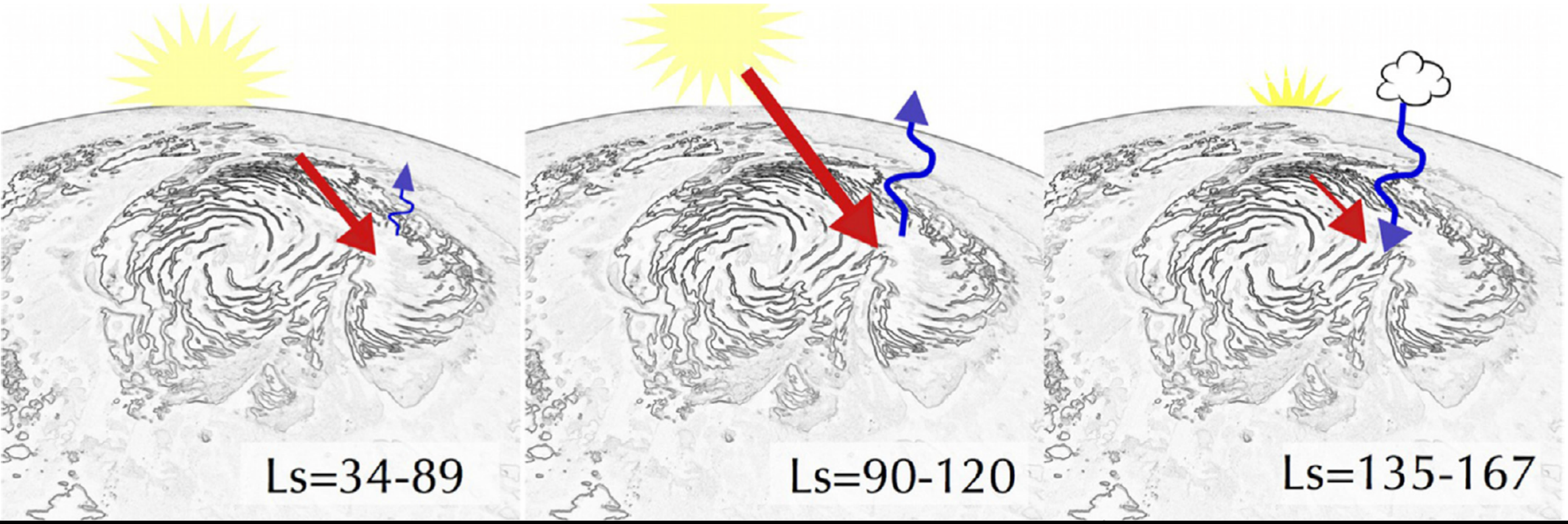
source

## Ongoing debate whether NPLD is gaining or losing mass

Bright surface implies accumulation
Climate models + radar suggest long term growth
Observed deposition (Brown 2016)

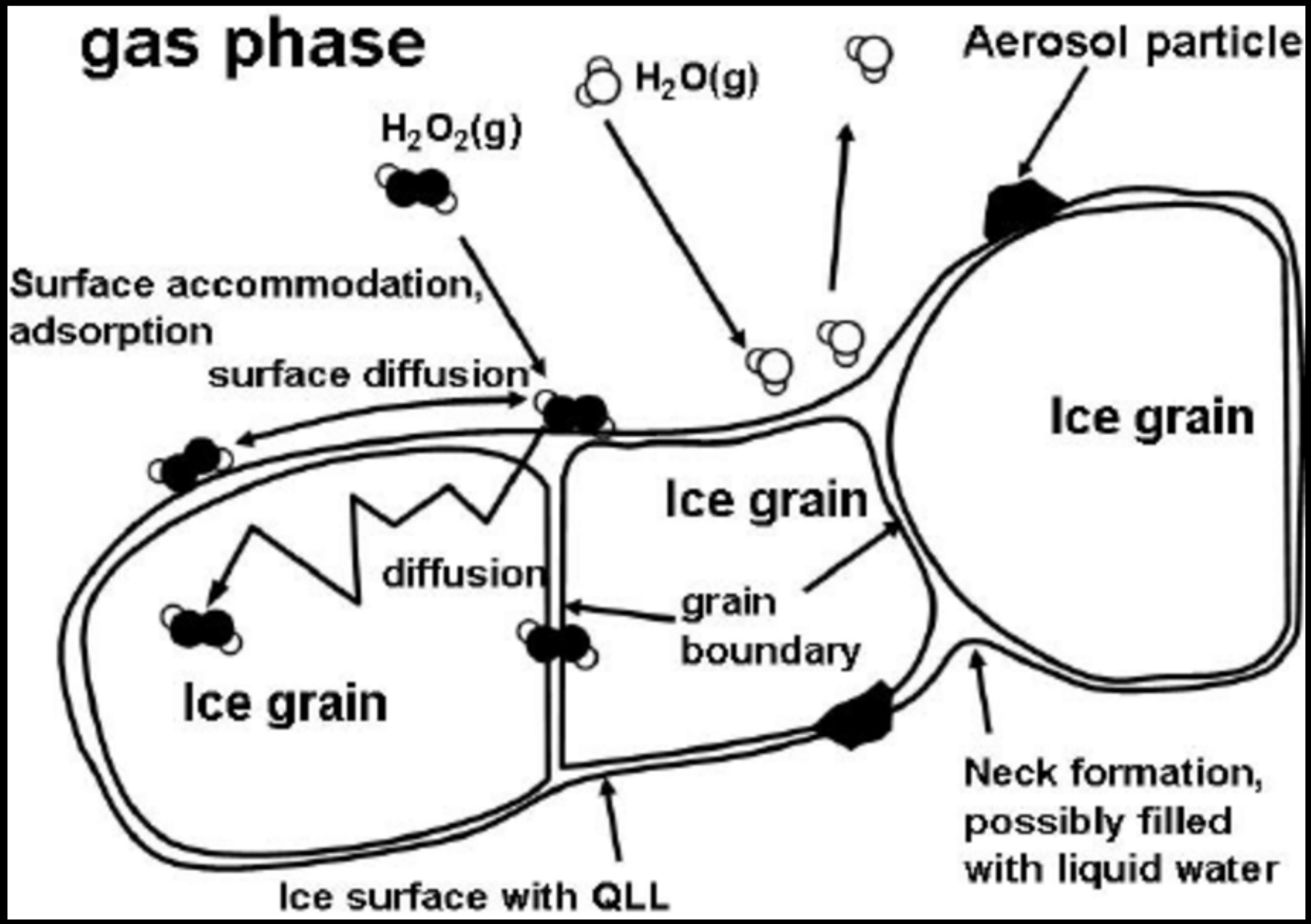
Persistent Large Crystals suggest no growth or ablation

# Late Summer Accumulation

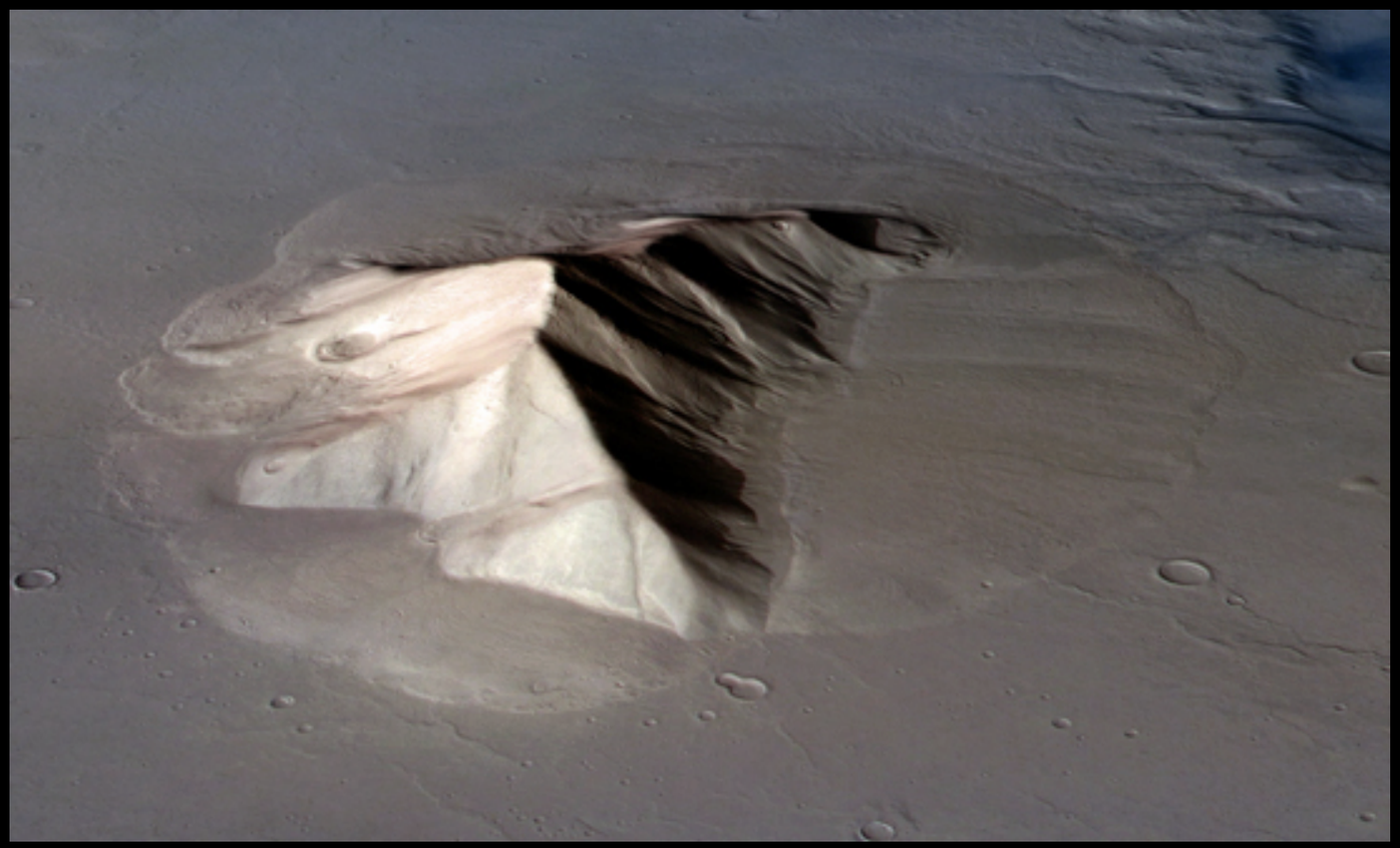



*Under the assumption that the shrinking of apparent grain sizes is due to the deposition of fine grained water ice, we approximated the total amount of water ice deposited on the cap each summer. The scattering calculations presented herein suggest that on average a water ice layer ~70 microns thick is deposited in the late summer $L_s$ = 135–164 period. (Brown et al., 2016)*

# Large grains may be sign of accumulation



# Lobate Debris Aprons (LDA) and Lineated Valley Fill (LVF)




source?

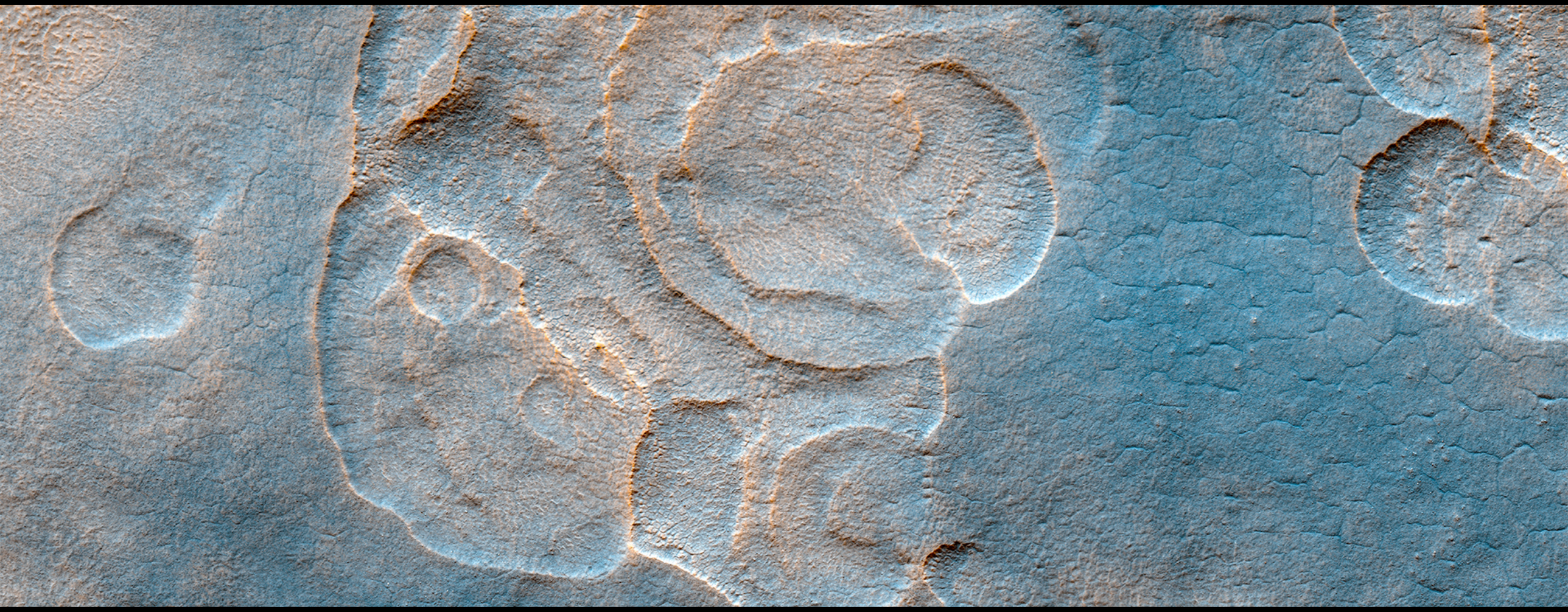
~~sink?~~

maybe neither

cut off

# Mid-latitude ice

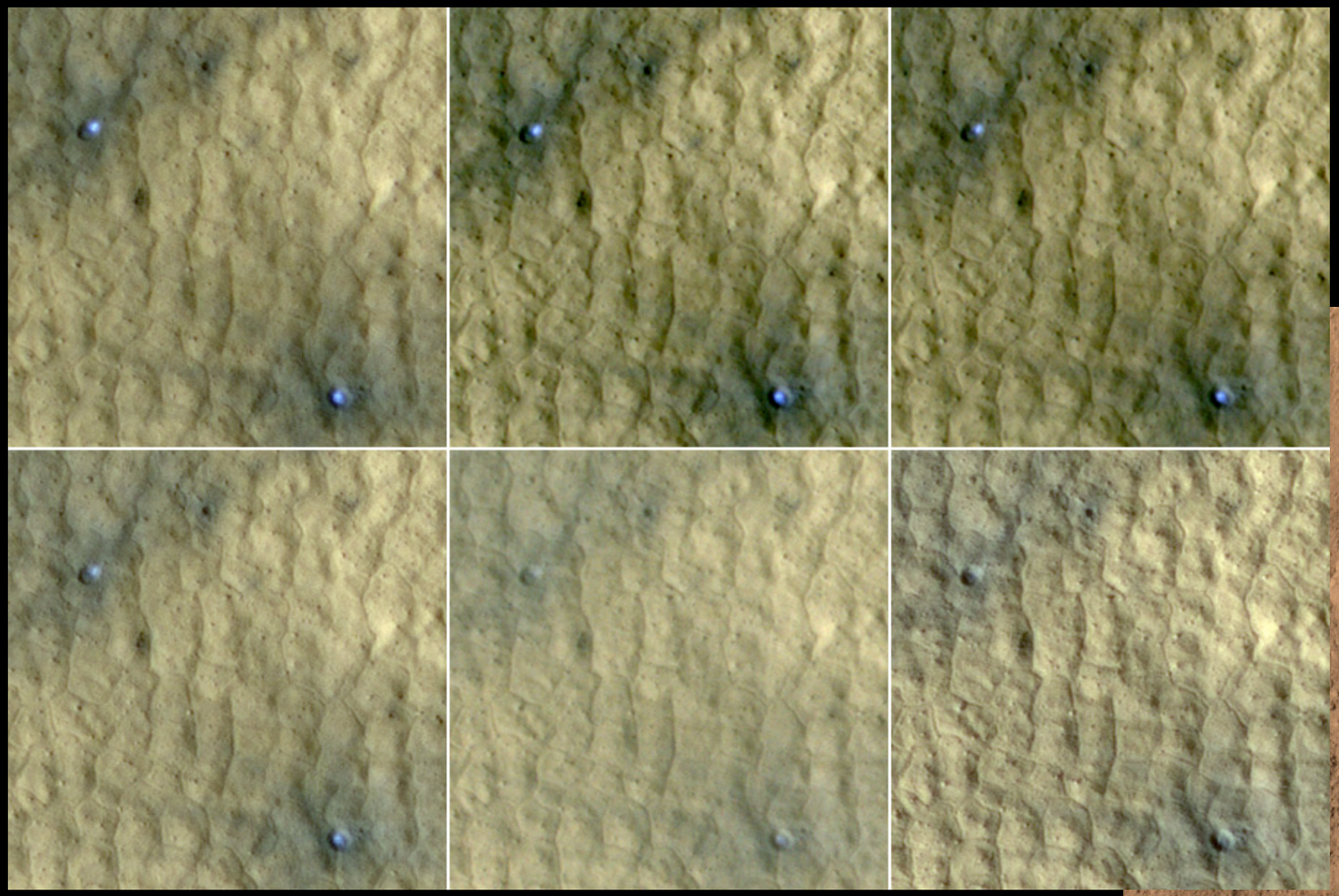
source



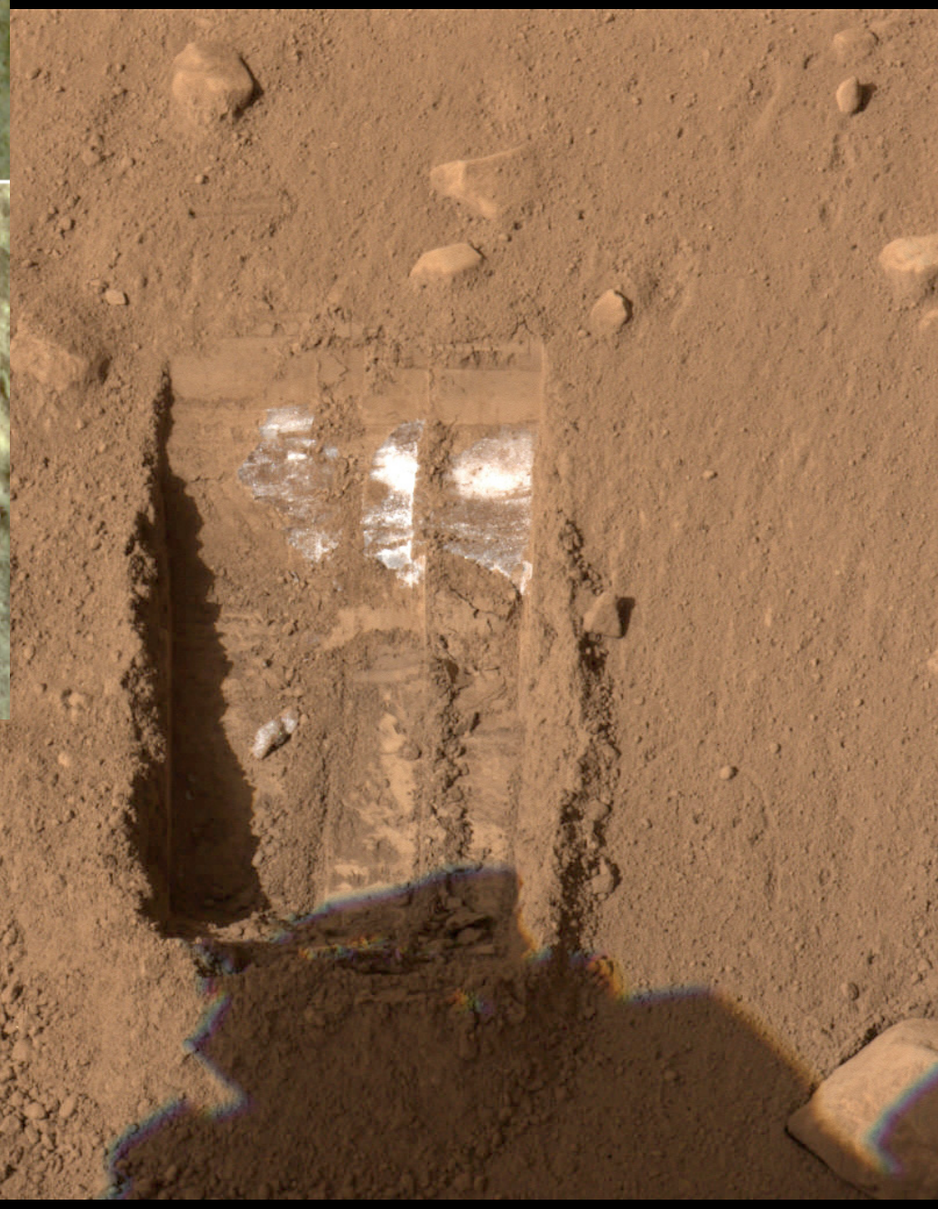
<100 m thick
Utopia and Arcadia Planitias
quantities greater than the Great Lakes

# Excess Ice

source



## Phoenix site



Craters impact ice

~sink

from vapor diffusion
not sure how it got here

# Pore Filling Ice

source

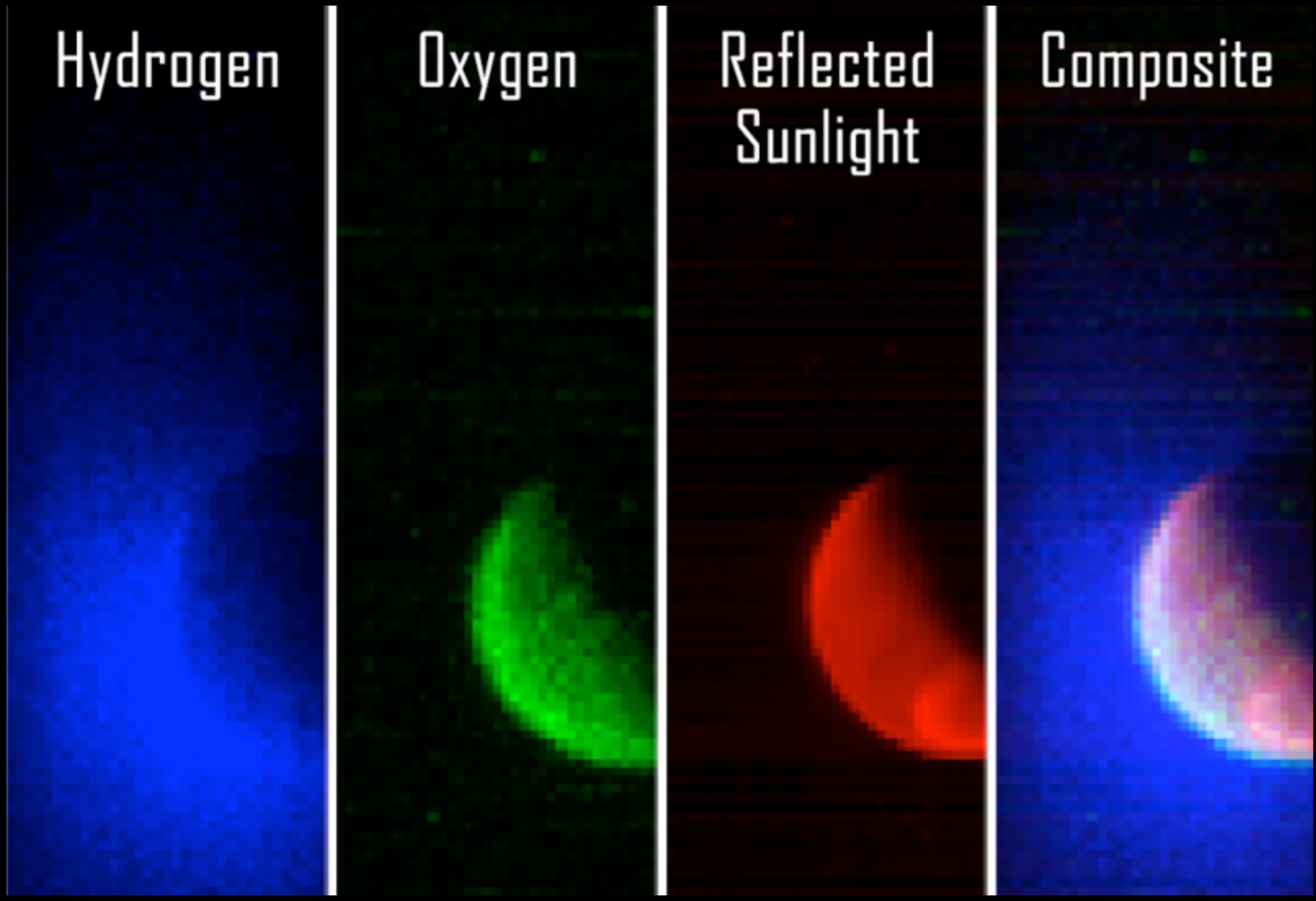
sink?

May depend on location


vapor diffusion moves the molecules

# Loss to Space

sink

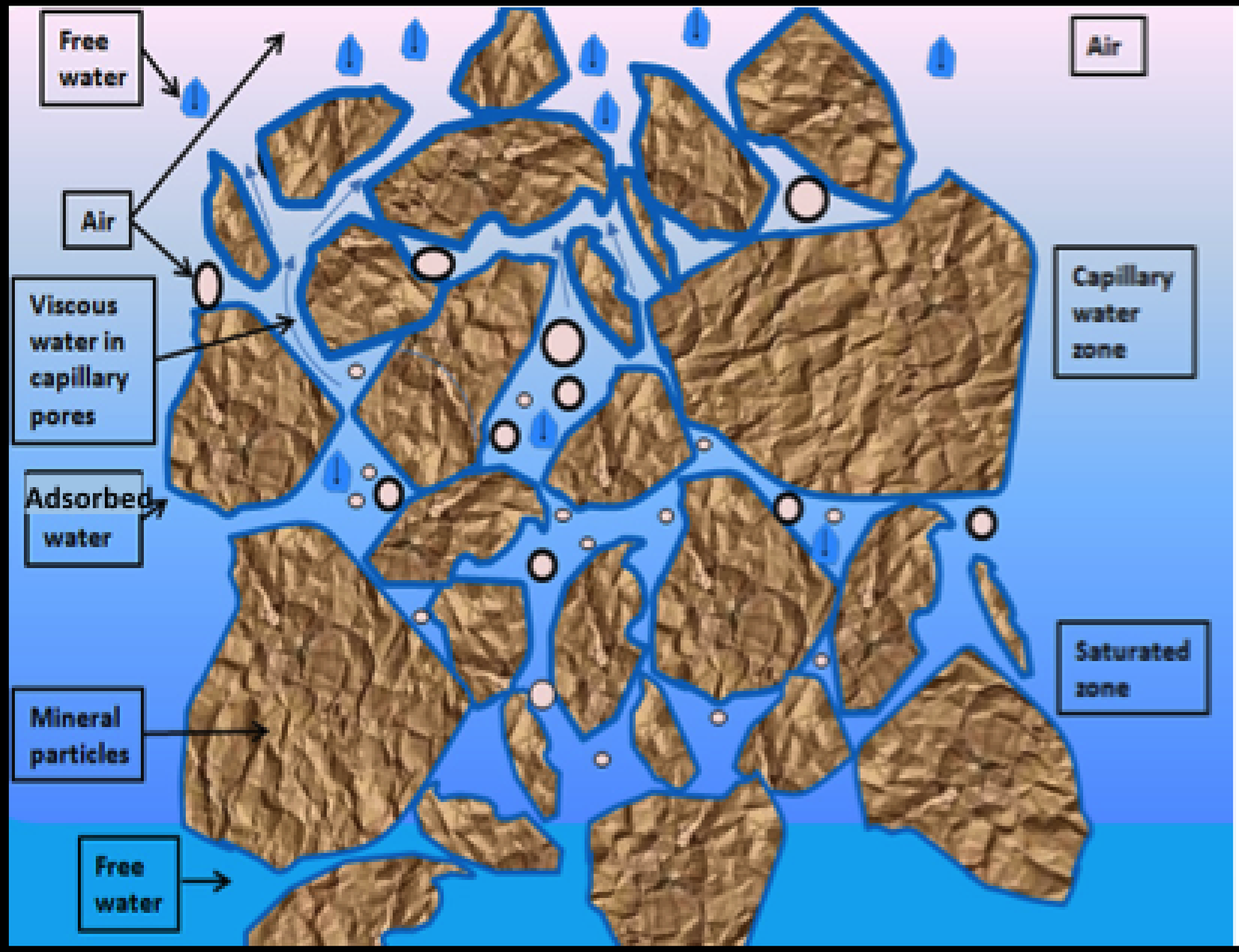


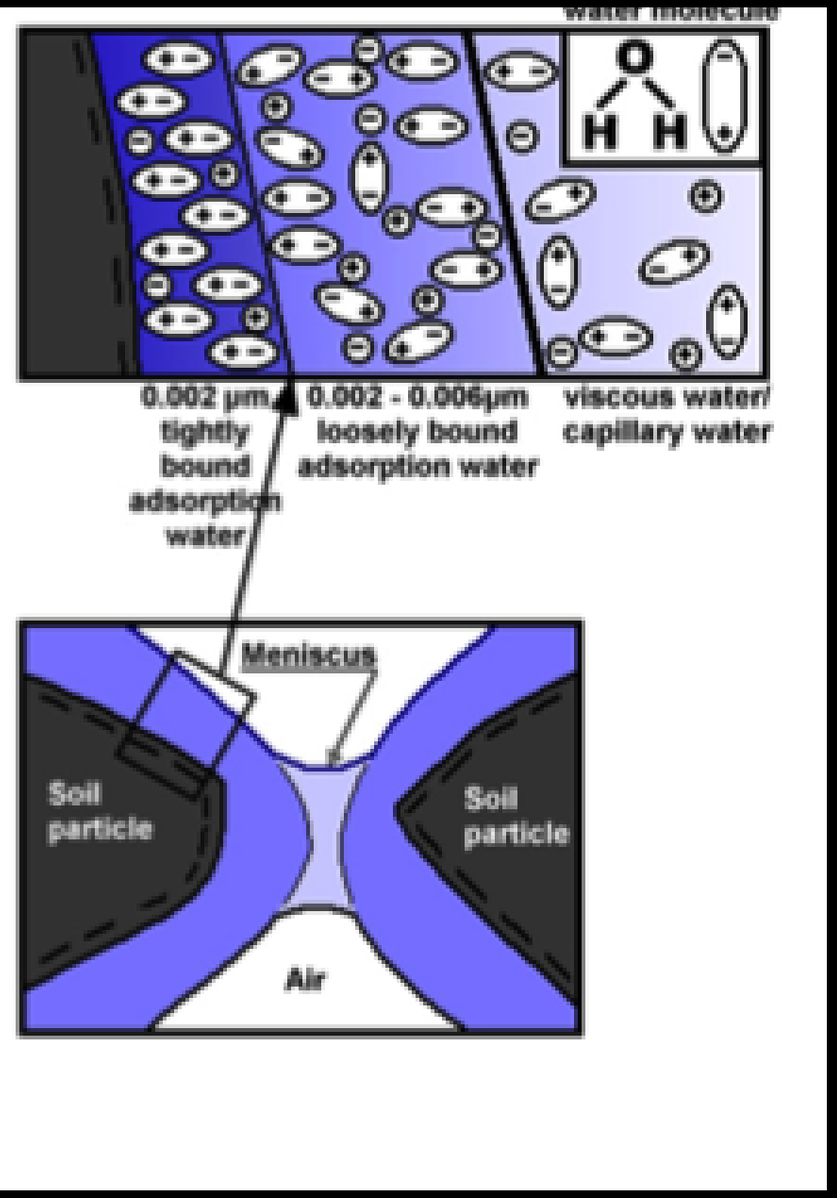

MAVEN spacecraft

# Regolith Adsorption

source

sink



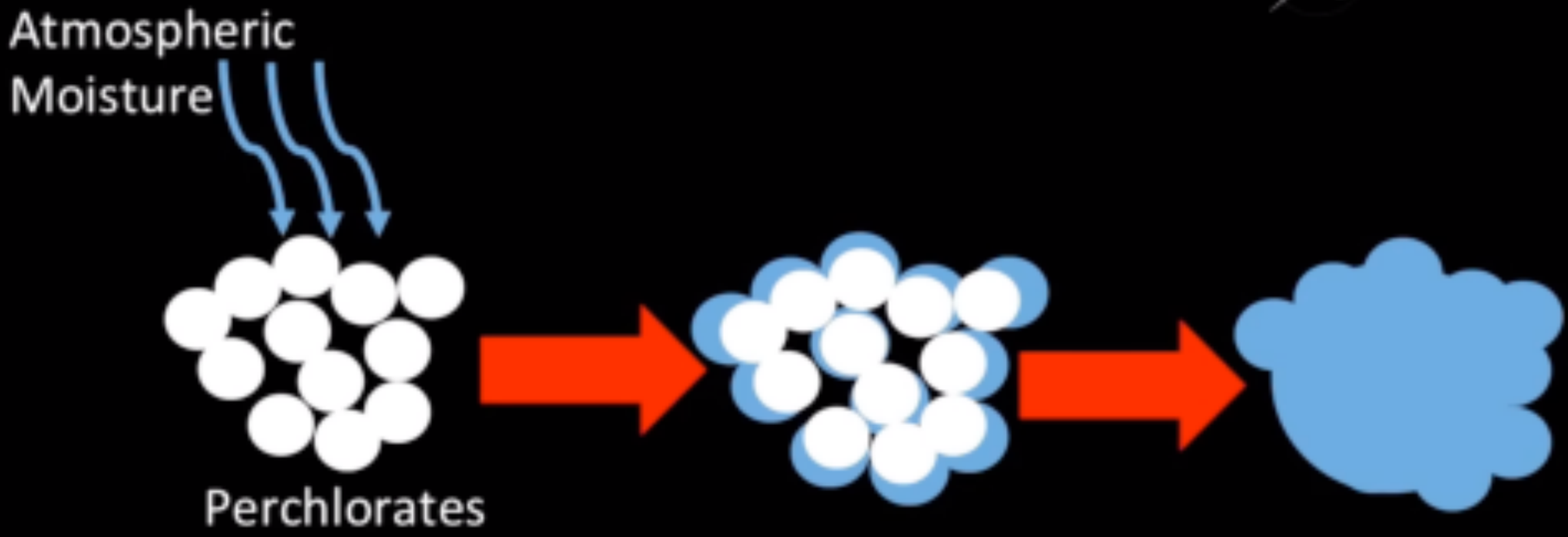

Clays can adsorb water

some finite capacity

# Deliquescence

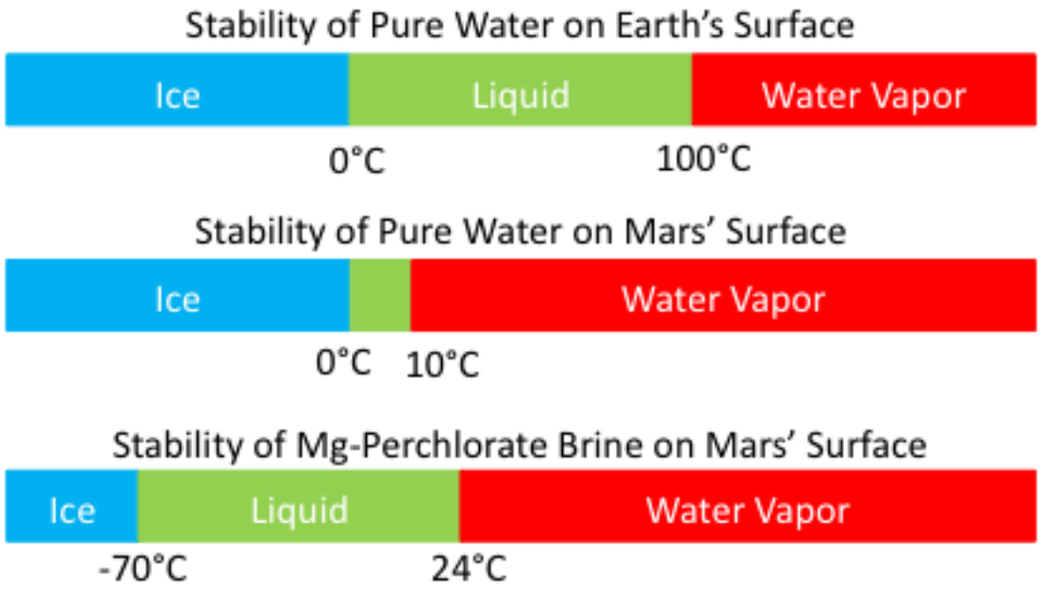
source

sink




some finite capacity

# Salts Extend the Stability of Liquid Water on Mars



# Deliquescence

$Mg(ClO_4)_2 \cdot 6H_2O$
23°C and 75%RH
18 hour timelapse

| | | | |
|---|---|---|---|
| Polar Caps | source | sink | |
| Outliers | source | | |
| LDAs | source | | cut off |
| Mid-latitude / Low-latitude Ice: including, Layered ice | source | | |
| Excess ice | source | | |
| Pore filling ice | source | sink? | |
| Adsorbed in salt or | source | sink | |
| Regolith | source | sink | |
| Grain Growth | | sink | |
| Space | | sink | |