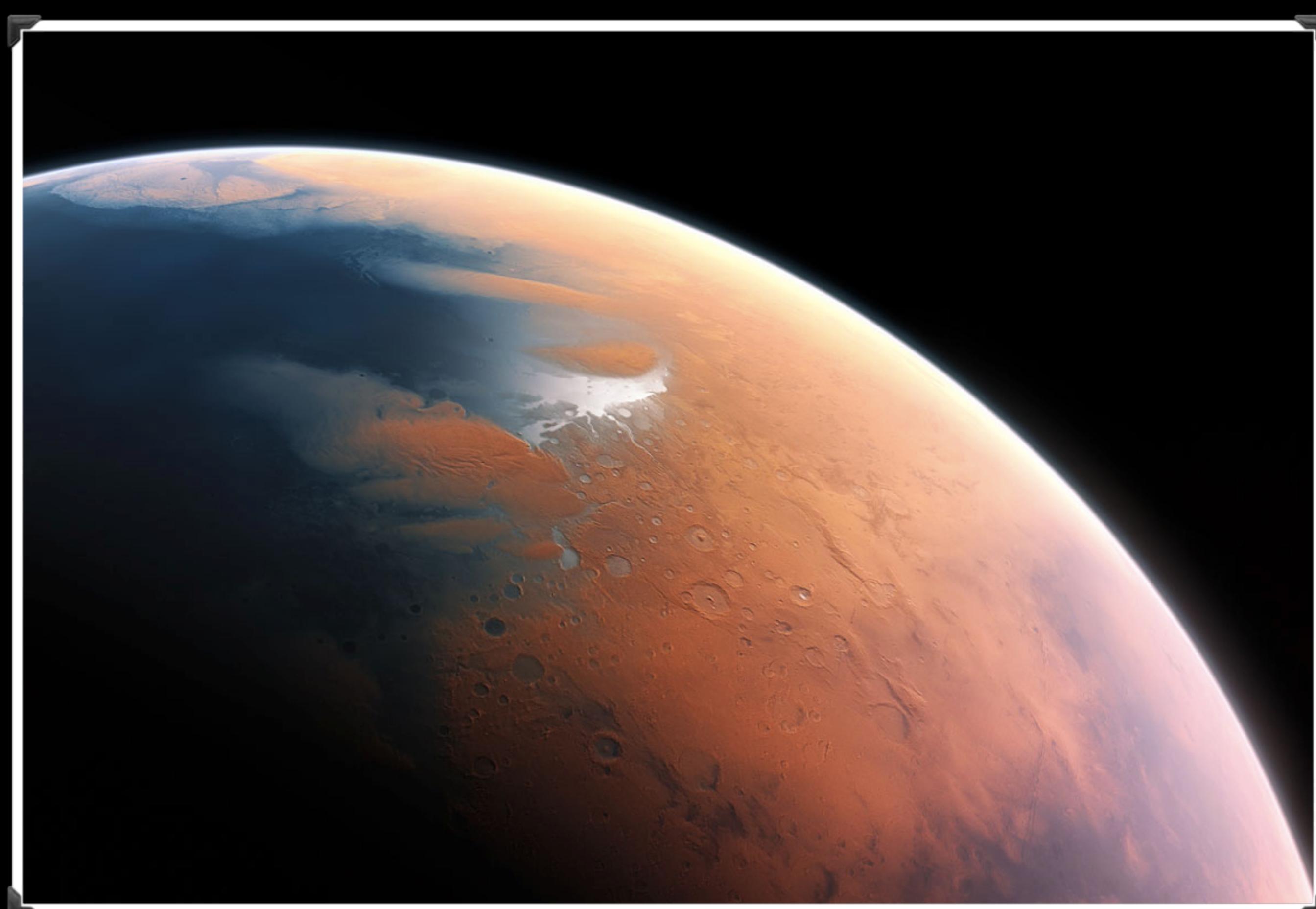
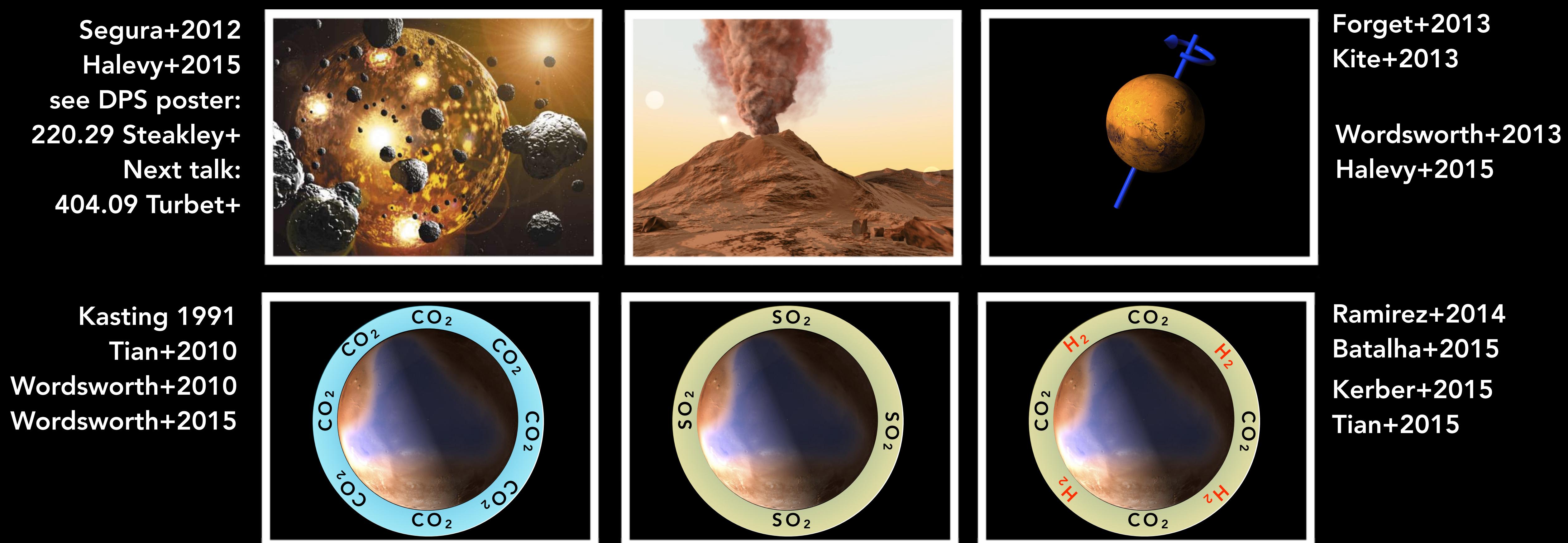


# THERE IS PERVASIVE EVIDENCE FOR SURFACE LIQUID WATER 3.8 BILLION YRS AGO ON MARS

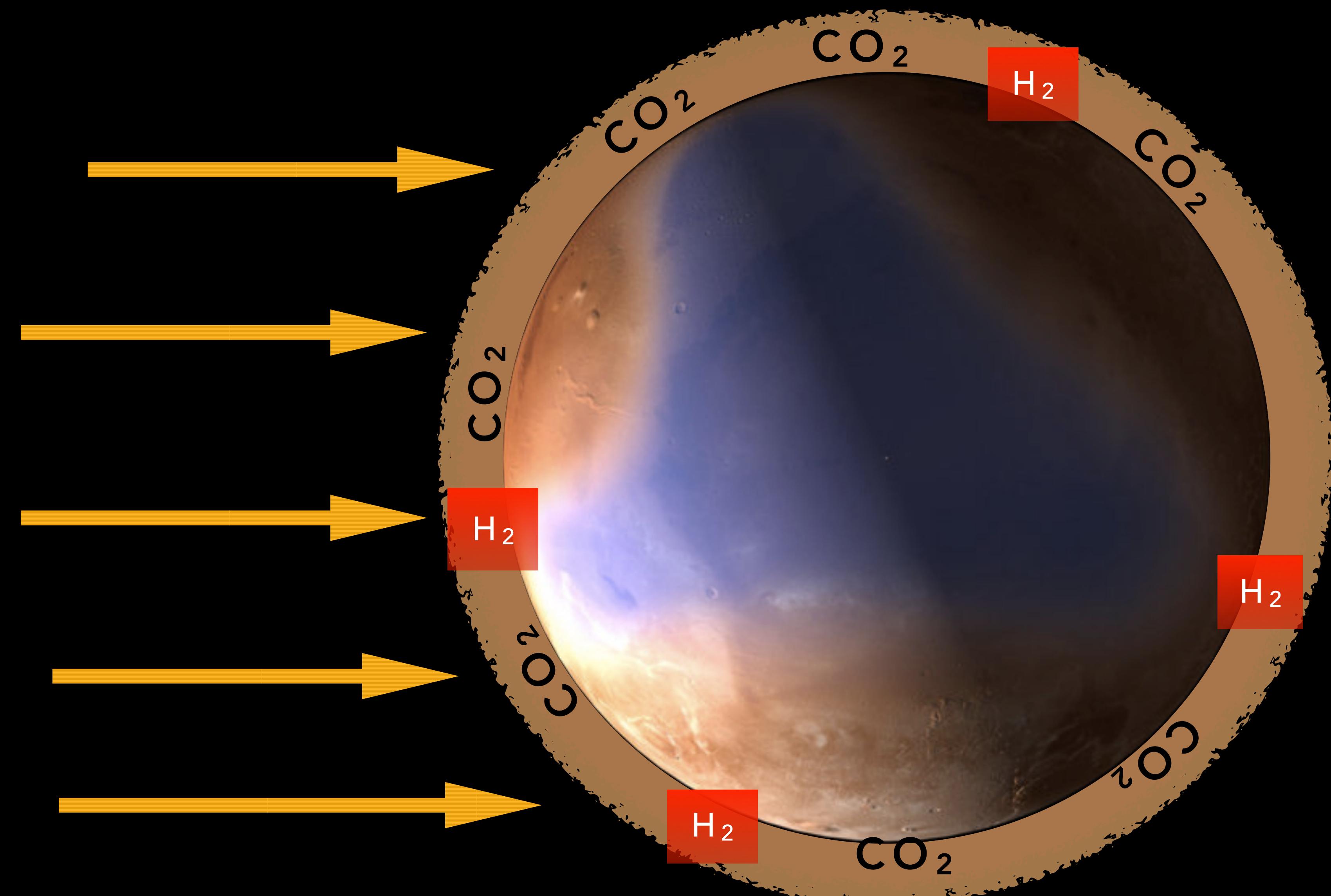


Masursky+1977  
Cabrol and Grin 2001  
Irwin+2008  
Hynek+2010  
Goldspiel & Squyres 1991  
Poulet+2005  
Grotzinger+2015  
.... and many more!

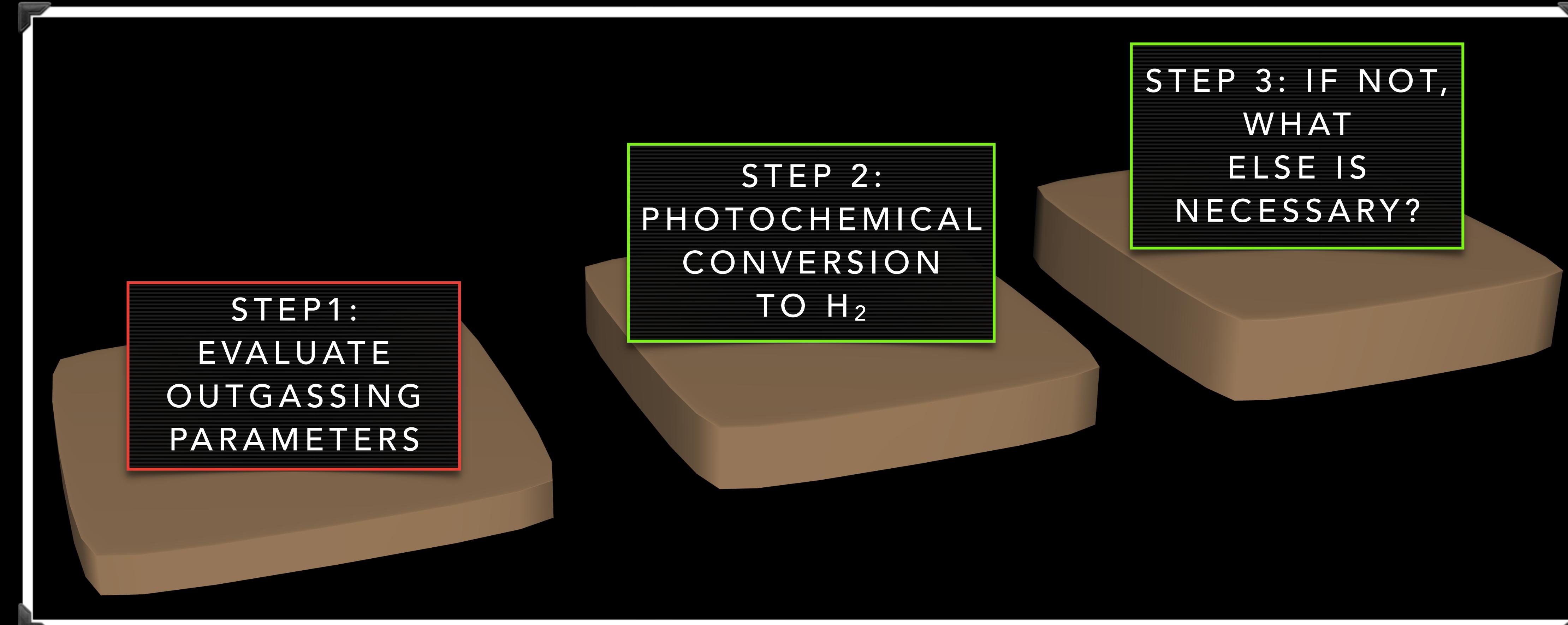
## BUT HOW WAS THIS POSSIBLE?



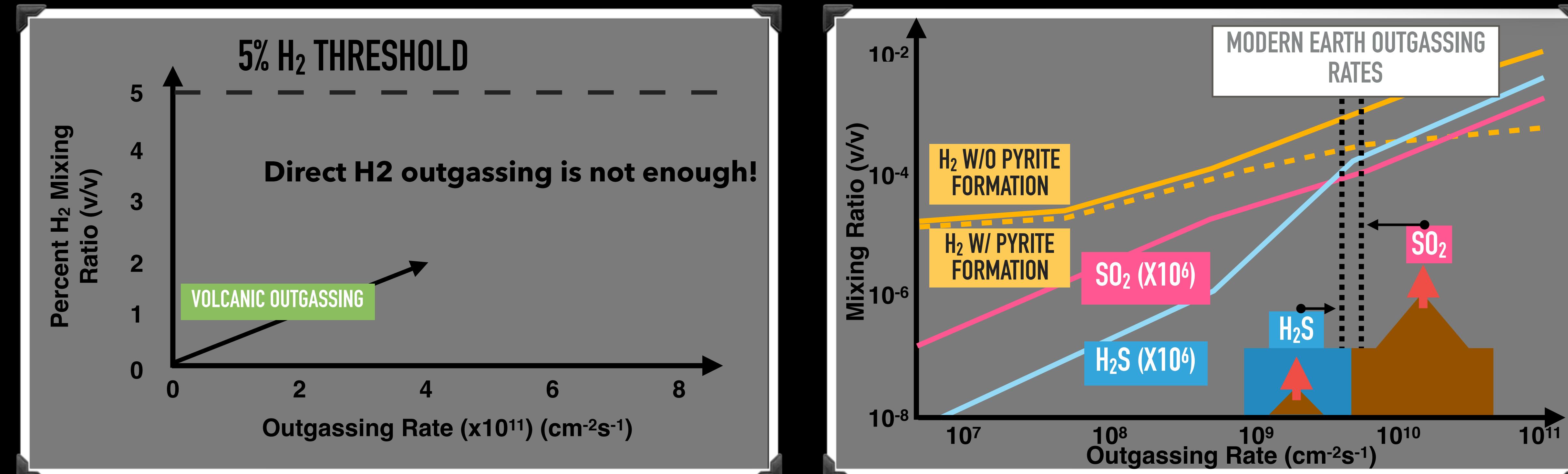
WE FOCUS ON TESTING THE HYPOTHESIS THAT EARLY MARS WAS WARMED BY A THICK H<sub>2</sub>-CO<sub>2</sub> GREENHOUSE ATMOSPHERE



WE ASK: WHAT IS **NEEDED** TO **SUSTAIN** A 5% H<sub>2</sub> ATMOSPHERE ON EARLY MARS?



WE FIND THAT INJECTING DIRECT OUTGASSING IS NOT ENOUGH!



WE DEFINE WHAT ELSE IS NECESSARY FOR THE H<sub>2</sub>-CO<sub>2</sub> GREENHOUSE HYPOTHESIS TO WORK

