



POTENTIAL SCENARIOS

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WORKSHOP GOAL

Develop an informed opinion regarding the future of Mars exploration, dependent on the outcome of upcoming measurements of methane and other trace gases on Mars.



UPCOMING MEASUREMENTS



Mars Science Laboratory

Tunable Laser Spectrometer

Sporadic measurements at a single location

Enrichment runs: reduced error bars



ExoMars—Trace Gas Orbiter

NOMAD & ACS

Good temporal, poor spatial resolution

CH₄ detection limit 0.02 ppb

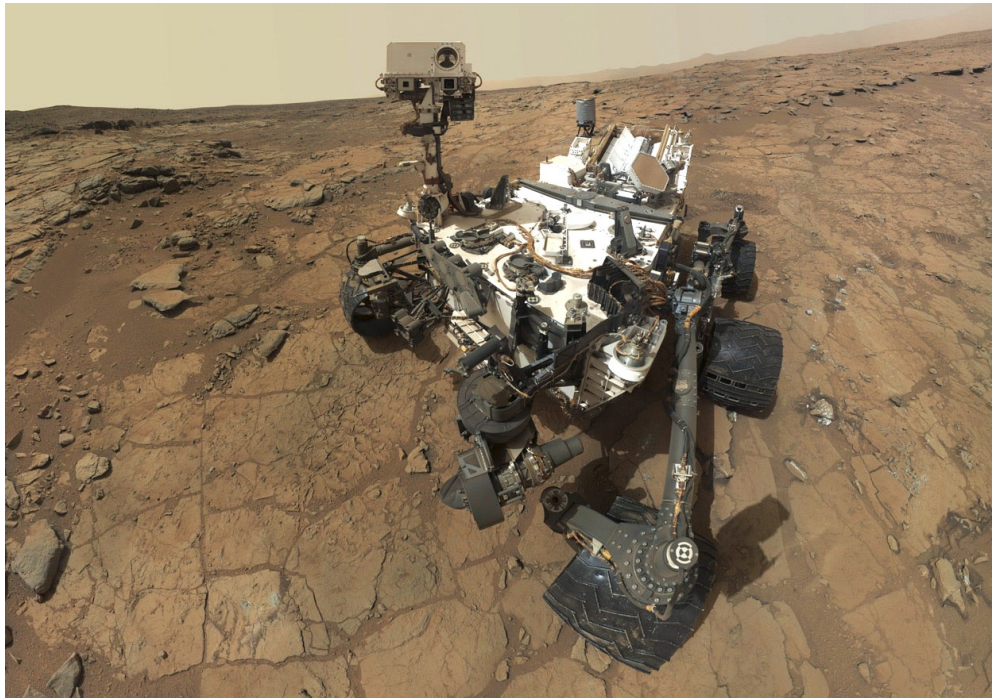
Similar for C₂'s & HCN

NO₂, N₂O, NH₃ limit 0.2 ppb

SCENARIOS



SCENARIOS



Yes CH₄

just background

***background &
random spikes***

***background &
seasonal spikes***

No CH₄

SCENARIOS



Yes CH₄

just background

*background &
random spikes*

*background &
seasonal spikes*

No CH₄



Yes CH₄

constant levels

diurnal variation

seasonal variation

random variation

No CH₄

SCENARIOS



Yes CH₄

just background

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No CH₄

C₂H₂
?

C₂H₄
?

C₂H₆
?

HCN
?

NO_x
?

Yes CH₄

constant levels

diurnal variation

seasonal variation

random variation

No CH₄

THE DREAM

AWESOME



MENESS

***A**tmosphere, **W**ater, & **E**lectrochemical
Survey **f**or **M**ethane **E** Named by
Extremely **S**exy **S**cientists*

OPTIONS

Spacecraft

L1 spacecraft

Excellent spatial and
temporal coverage

MATMOS orbiter

2–3x sensitivity as ExoMars
Possible isotopic data

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Airborne

Balloon/airship

Drones

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***Role of dust,
heterogeneous
chemistry***

Mapping CH₄

Airborne

Balloon/airship

Drones

Lander/Rover

SPEAR

Subsurface
temperature, redox,
electrical cond.,
thermal cond.

Seepage, trace gas ratios

e.g. CH₄/C₂H₆

Mars 2020 Site Selection

Sample Return

Small Platforms

MarsDrop