惑星大気学

今村担当分（新領域＆理学系兼担）講義予定

5月 17, 24, 31日
6月 7, 14, 21日

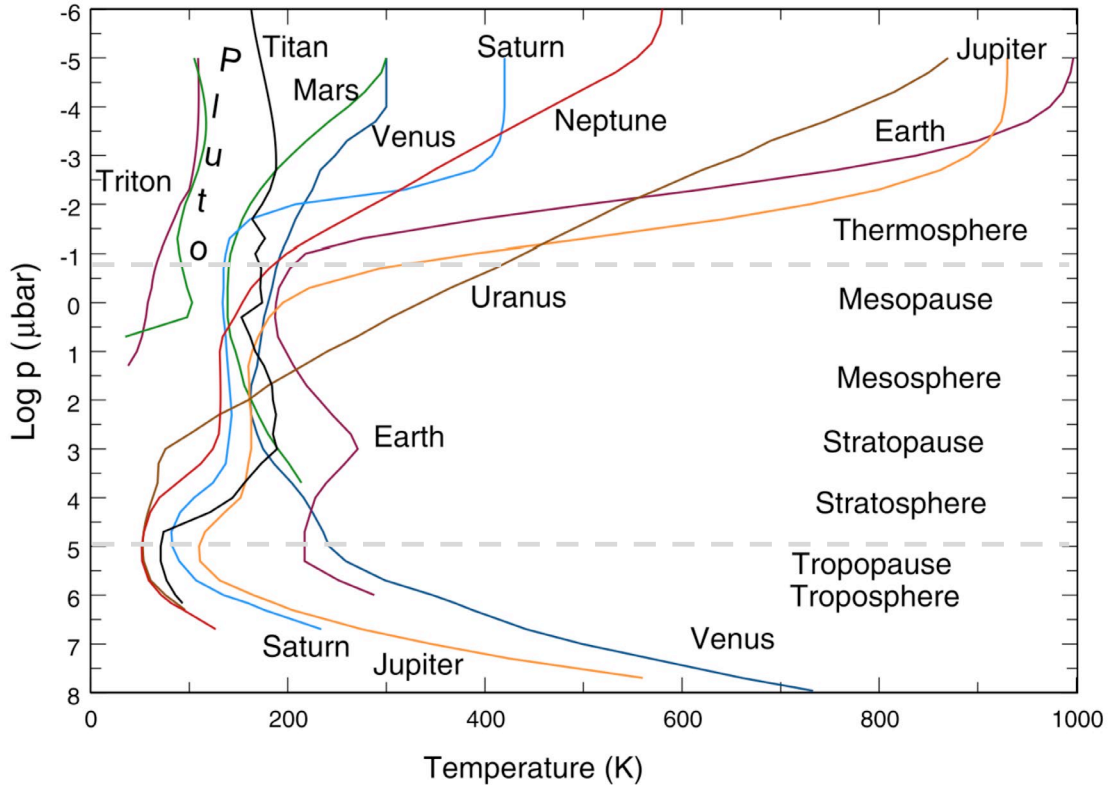
中性大気の物理・化学と観測について解説

- 大気の鉛直構造（熱力学、放射輸送、放射対流平衡）
- 惑星大気の力学
- 大気化学と雲物理
- 大気大循環と気候形成
- 観測手法

講義資料はITC-LMSに掲載

Vertical temperature profiles of planetary atmospheres

(Mueller-Wodarg et al.)

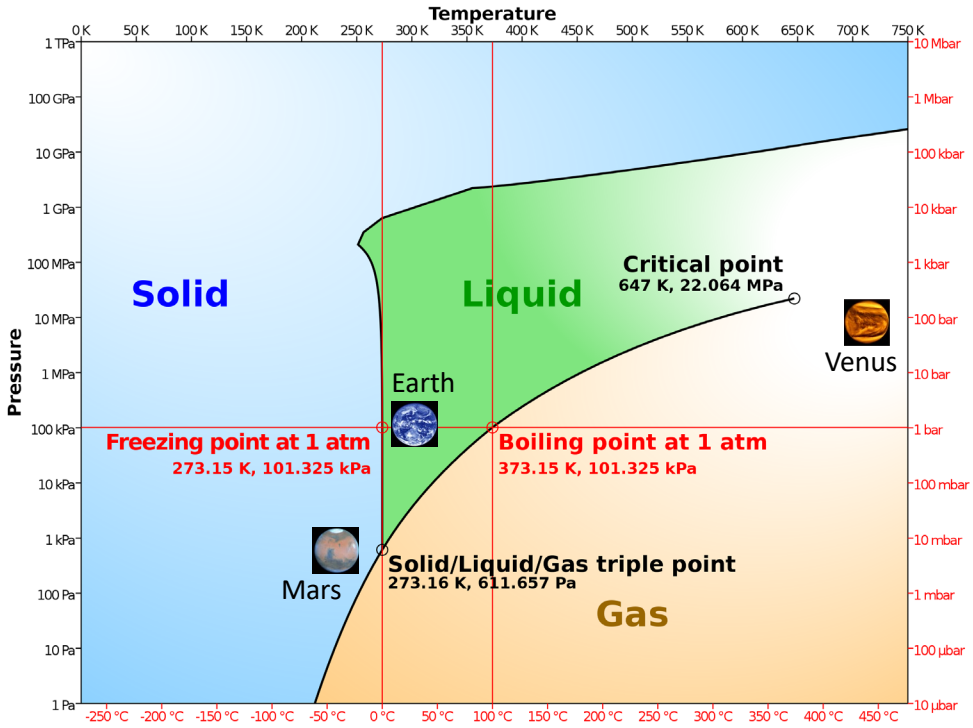


Energy budget and temperature

	Solar flux (W/m^2)	Albedo	Absorbed energy (W/m^2)	Greenhouse effect	
				off	on
Venus	2617	0.78	576	-50°C	470 °C
Earth	1370	0.30	959	-18°C	15 °C
Mars	589	0.16	495	-57°C	-53°C

Phase change diagram for water

From Wikipedia



Phase change diagram for water

Catling & Kasting (2017)

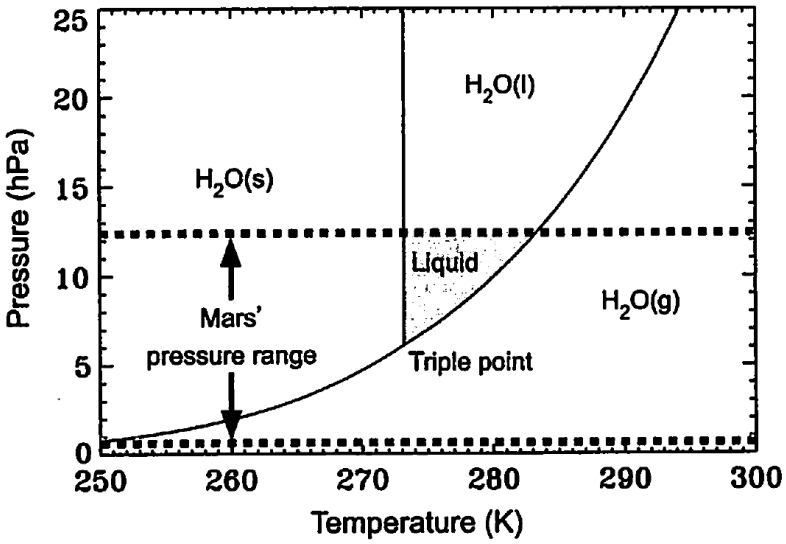


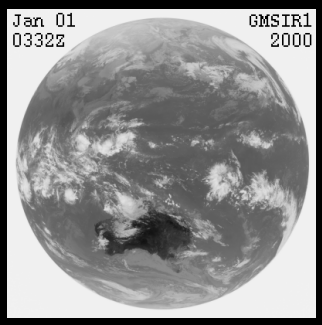
Figure 1.14 Pure phase water diagram showing the range of surface pressures on Mars from the top of Olympus Mons (<0.5 hPa) to the depths of Hellas basin (>12 hPa). Liquid water is stable on Mars against boiling in the shaded zone but not against rapid evaporation.

Clouds and albedo

Albedo 0.78 0.30 0.16

Atmospheric circulation

Venus



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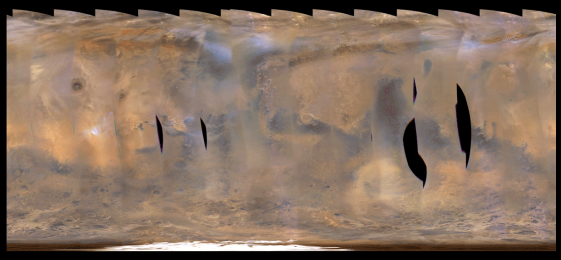
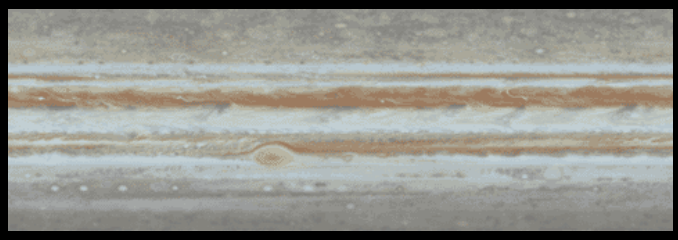
Earth



Mars

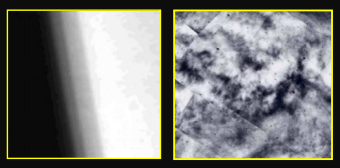


Jupiter

Venus orbiter Akatsuki

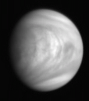
In orbit since Dec 2015

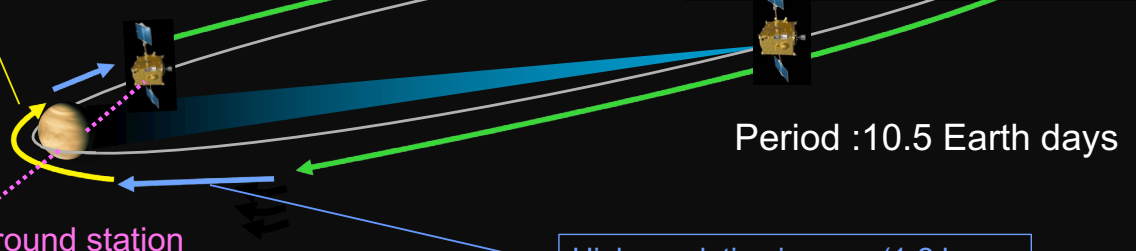
2016-06-16T09:17:29.353
Akatsuki-Venus distance: 359352. [km]
Sub-s/c longitude: 337.076 [deg]
Sub-s/c local time: 14.4159 [h]



Close-up images
Stereo viewing
Limb images

Continuous medium-resolution images (1-2 hours interval)





Period :10.5 Earth days

Ground station

High-resolution images (1-2 hours interval)
Lightning/Airglow in umbra

Temperature / H_2SO_4 vapor / Ionosphere by radio occultation

Martian Moons Exploration: MMX

- Launch: 2024
- In orbit: 2025-2028
- Continuous high-resolution mapping of dust, clouds and atmospheric constituents from a high orbit to reveal the material circulation in the Martian atmosphere