quartz

rime, Dec 2011

feldspars

olivine

pyroxene

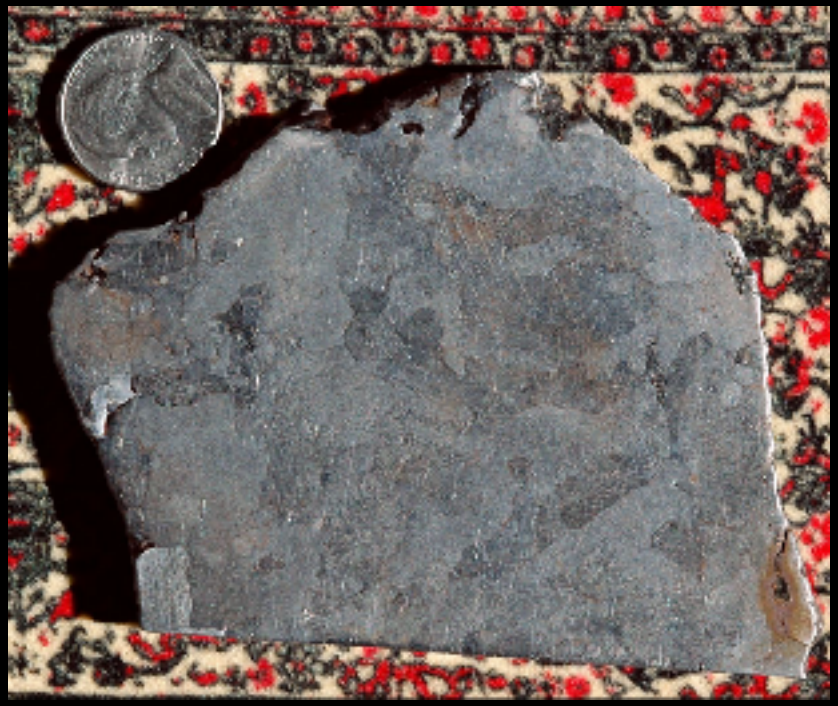
http://www.blinn.edu/STEM/Geology/faculty/Minerals_Web_Page/index.htm

sulfur

hematite

https://volcanoes.usgs.gov/images/pglossary/fumarole.php

http://apod.nasa.gov/apod/ap040405.html



iron-nickel meteorite

http://meteorites.wustl.edu/id/campo_slice_rlk_1284l.jpg

basalt

granite

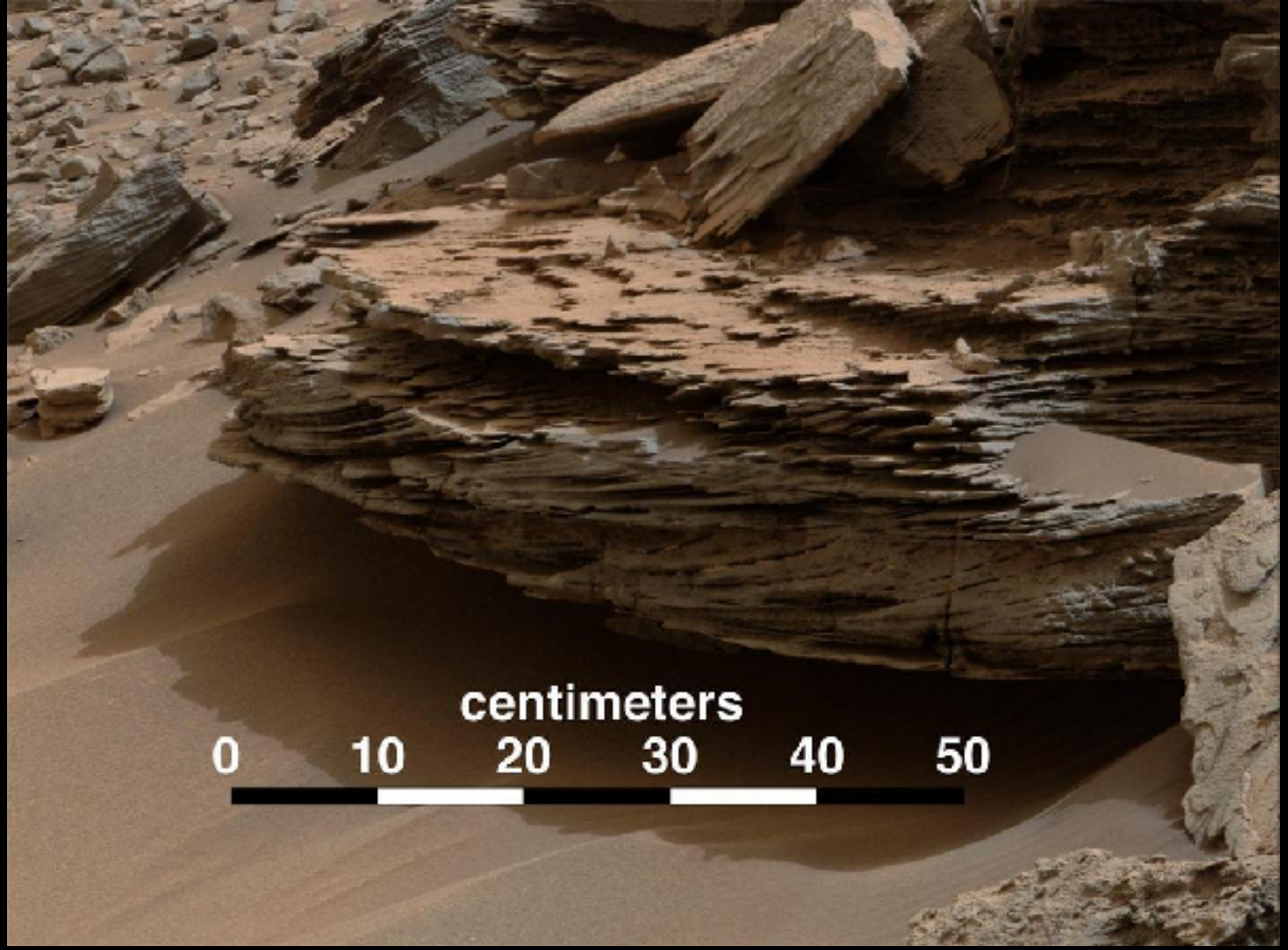
http://mars.nasa.gov/mer/classroom/schoolhouse/rocklibrary/index2.html

columnar basalt near Lake Roosevelt

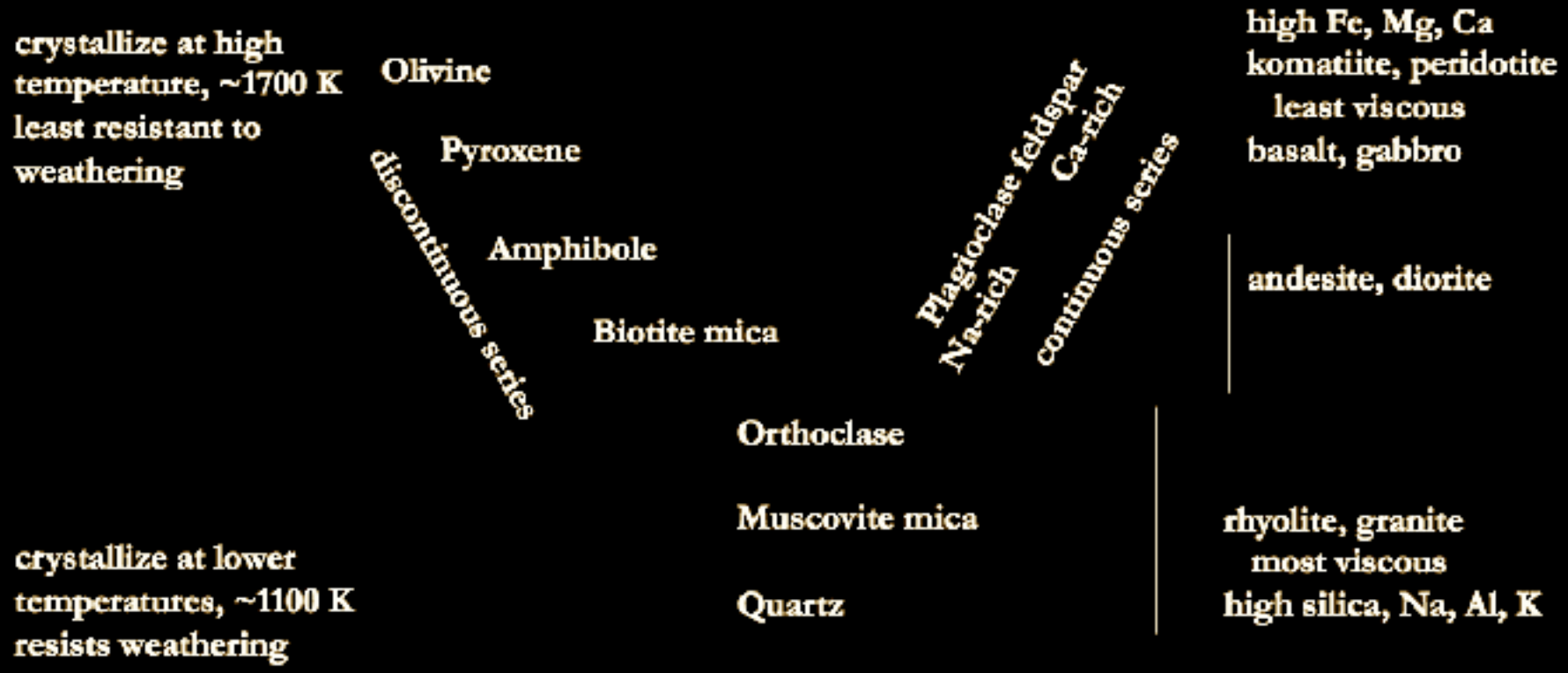
granodiorite Half Dome

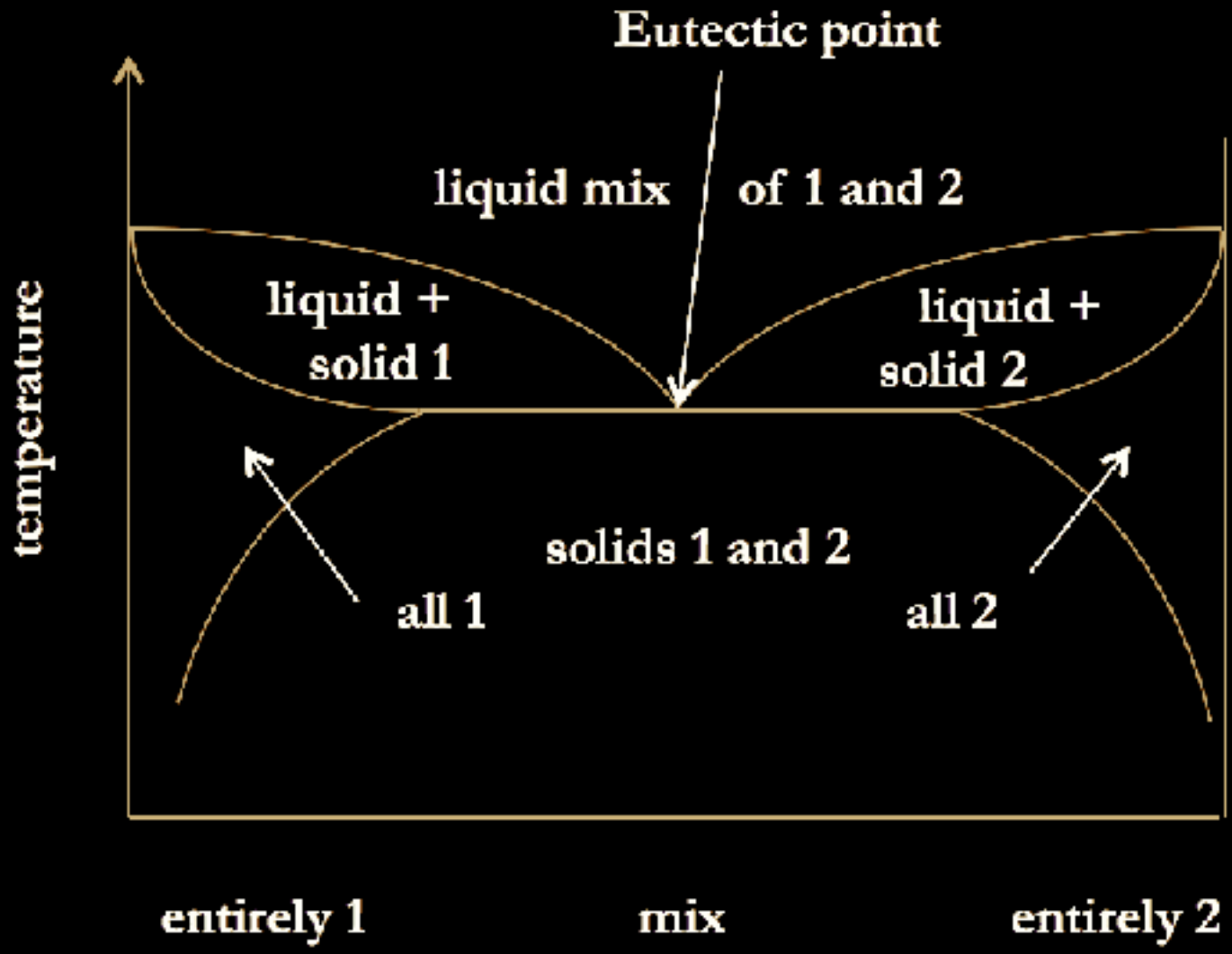
http://www.nps.gov/laro/learn/nature/geology.htm

http://www.nps.gov/goga/learn/education/granite-and-granodiorite-faq.htm



http://mars.nasa.gov/msl/multimedia/images/?ImageID=6871


crystallize at high temperature, ~1700 K
least resistant to weathering
Olivine
Pyroxene
Amphibole
Biotite mica
discontinuous series
Plagioclase feldspar
Na-rich
Ca-rich
continuous series
Orthoclase
Muscovite mica
Quartz
crystallize at lower temperatures, ~1100 K
resists weathering
high Fe, Mg, Ca
komatiite, peridotite
least viscous
basalt, gabbro
andesite, diorite
rhyolite, granite
most viscous
high silica, Na, Al, K


Eutectic point
liquid mix
of 1 and 2
liquid +
solid 1
liquid +
solid 2
temperature
solids 1 and 2
all 1
all 2
entirely 1
mix
entirely 2

http://volcanoes.usgs.gov/images/pglossary/

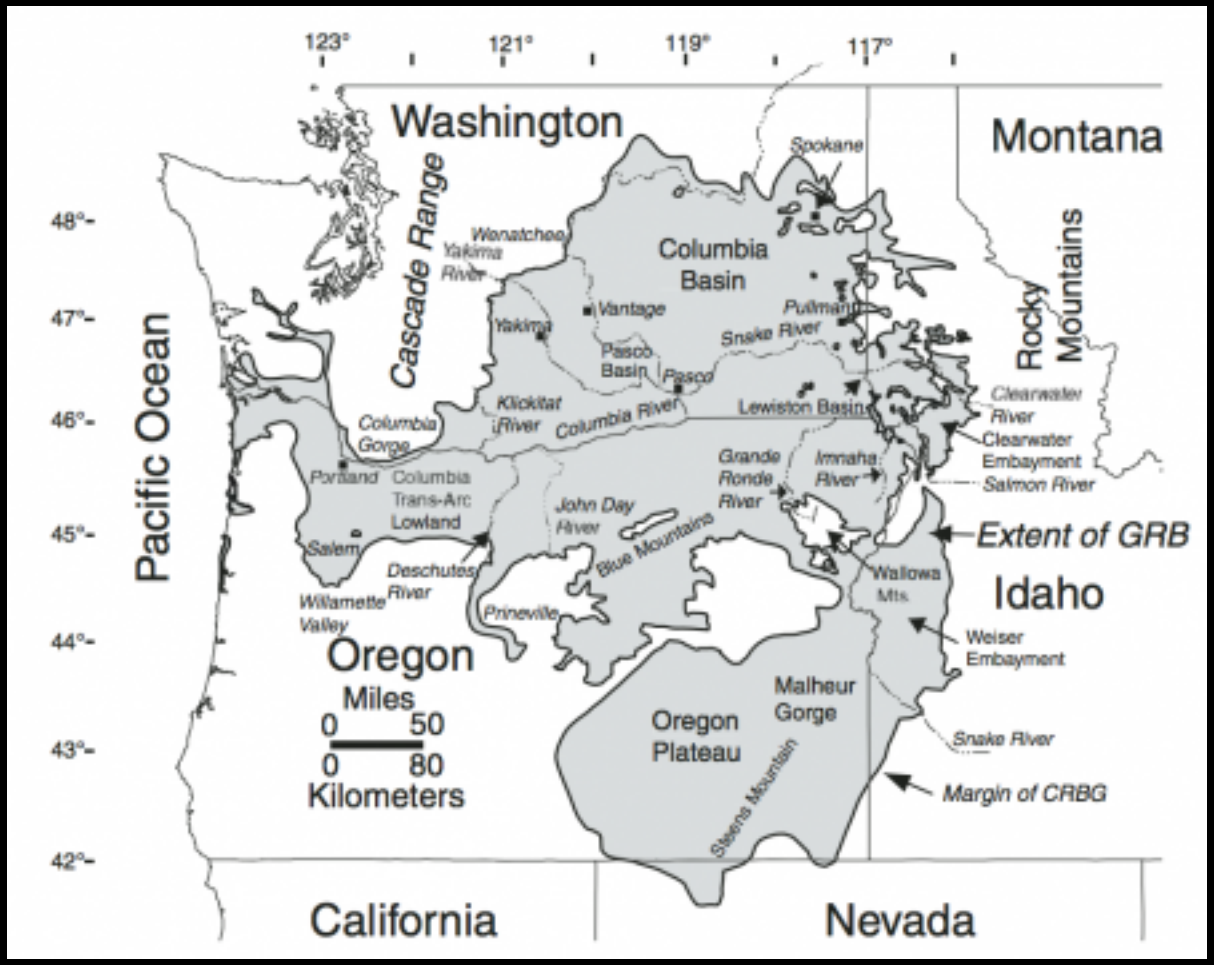
http://www.wired.com/2010/04/eyjafjallajokull-eruption-update-for-4172010/

http://volcano.oregonstate.edu/volcanic-lightning

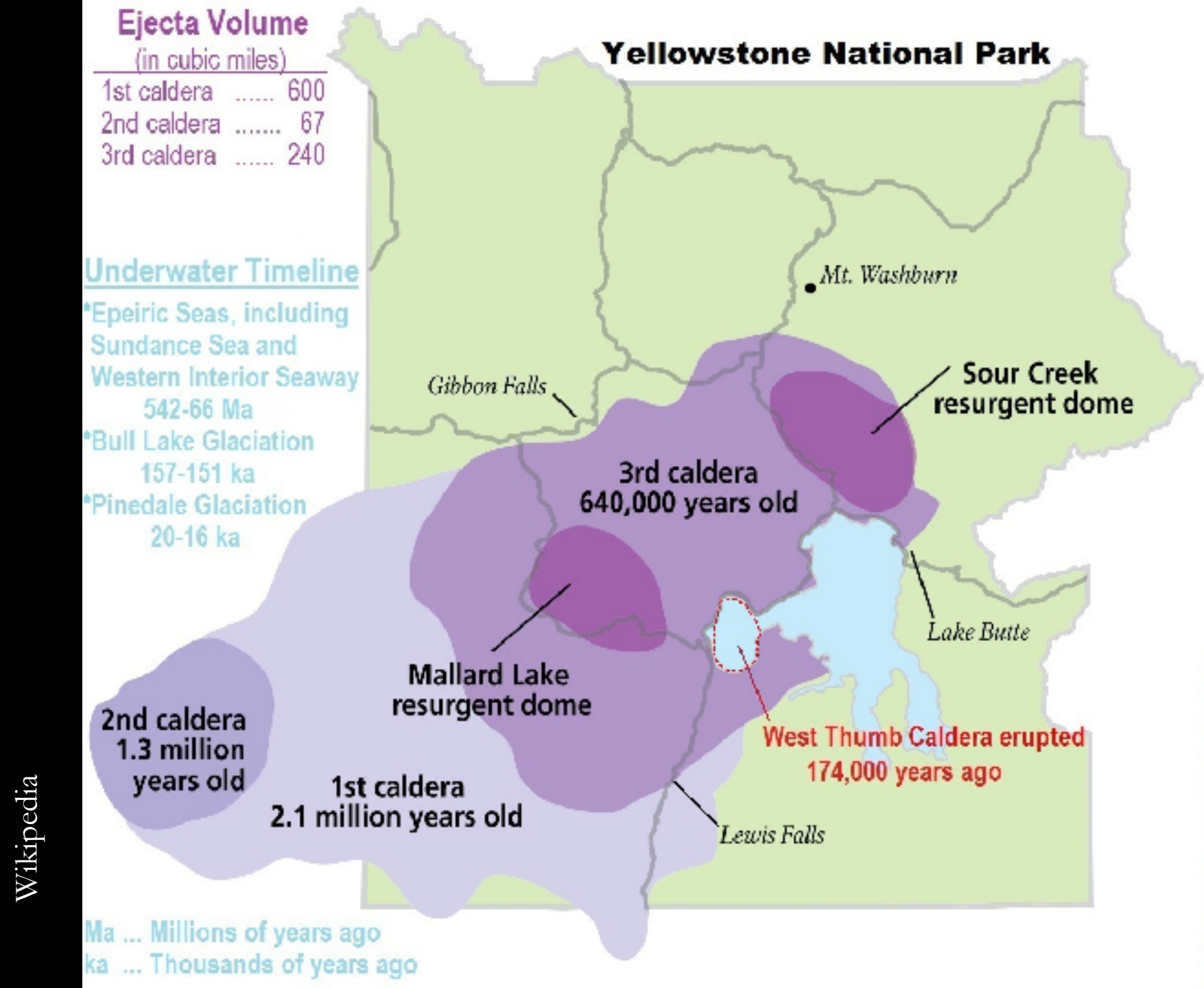
BBC1 lava lake
Explosive planet Io

ice age floods
searching for liquid water
tectonic faults on Enceladus
Titan cryovolcano

http://volcanoes.usgs.gov/observatories/cvo/cvo_columbia_river_basalt.html



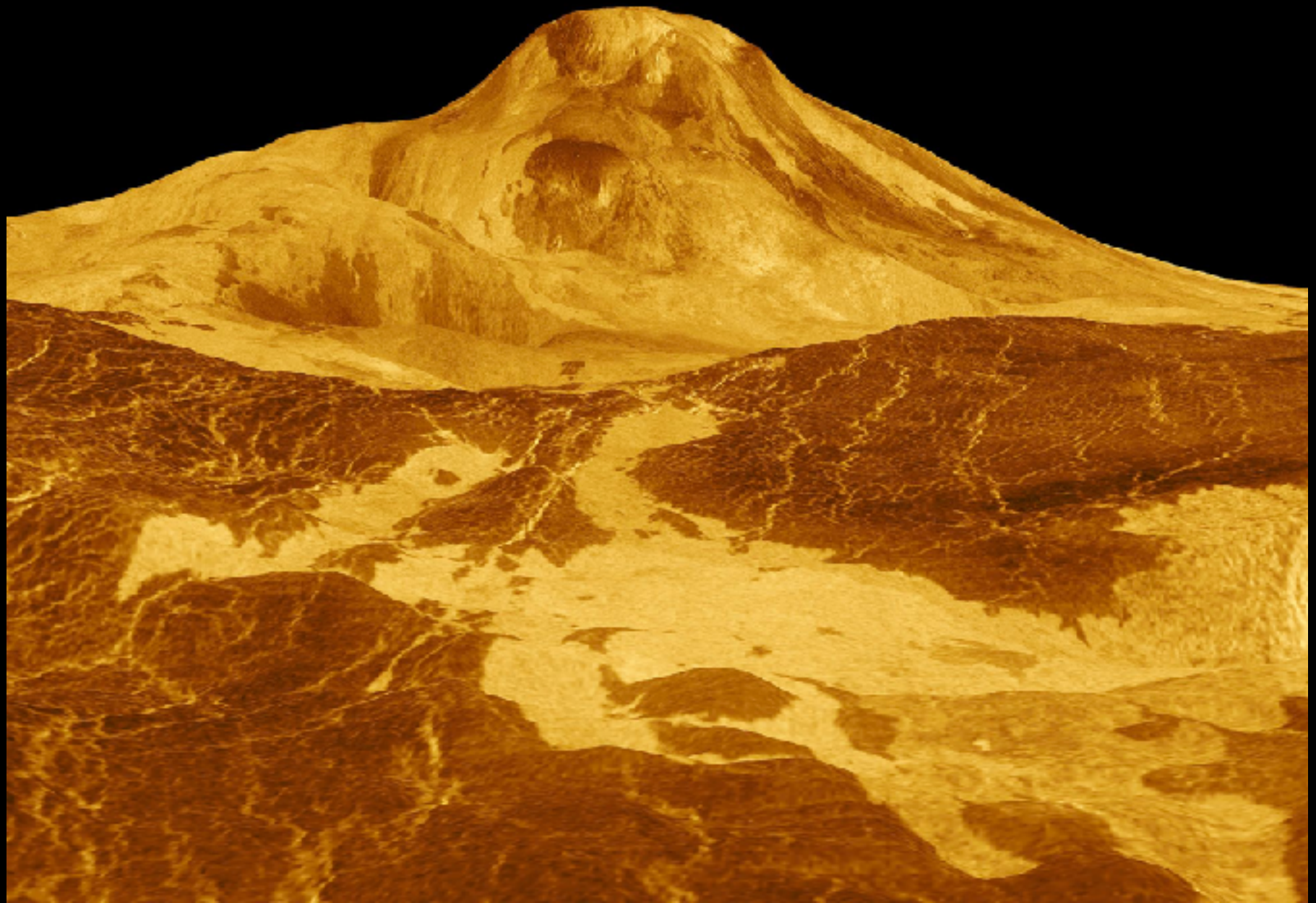
http://volcanoes.usgs.gov/observatories/cvo/cvo_columbia_river_basalt.html

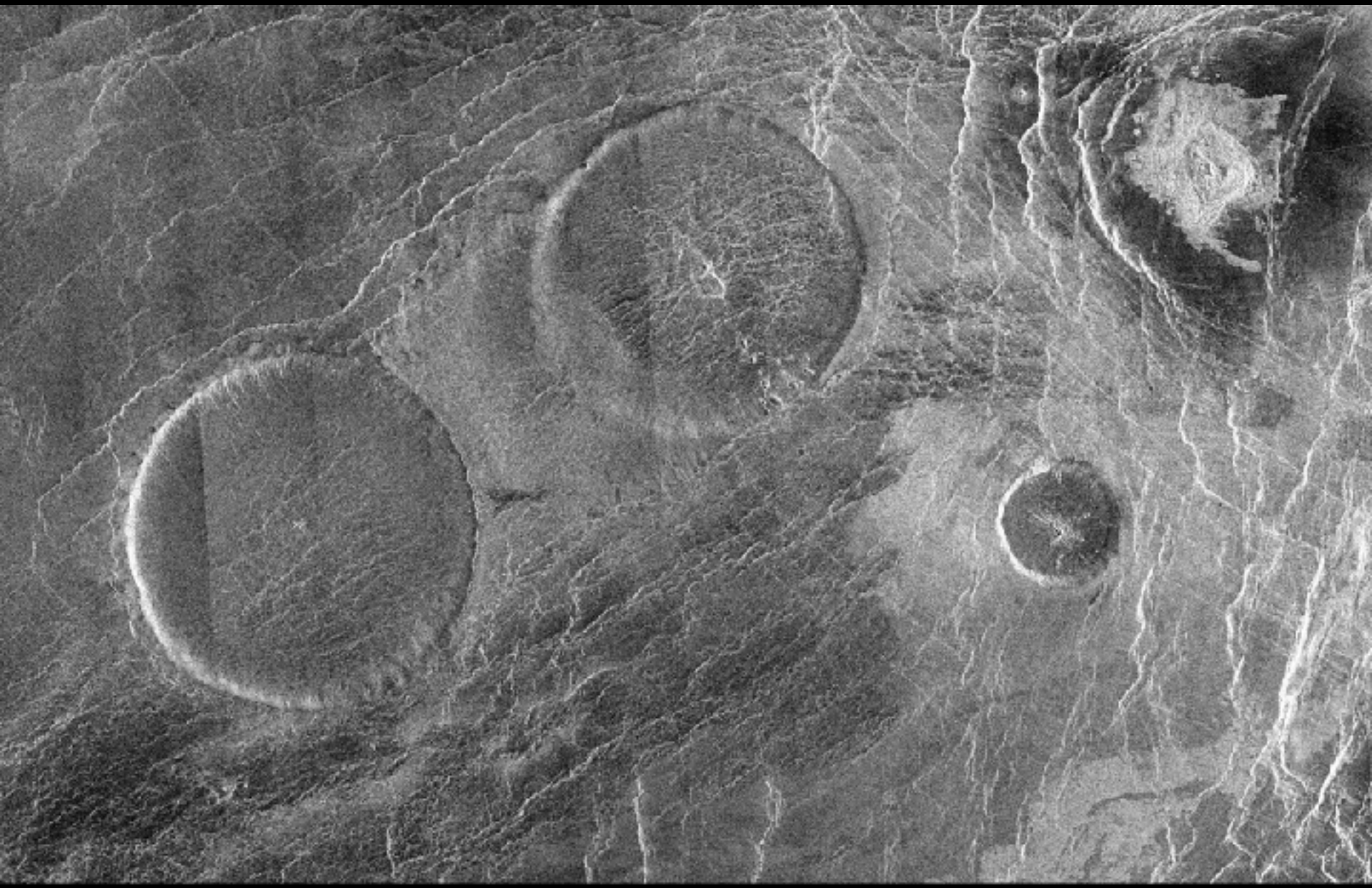


http://www.livescience.com/25958-kileauea-30-year-eruption.html

http://www.nasa.gov/images/content/
503188main_120110a.jpg

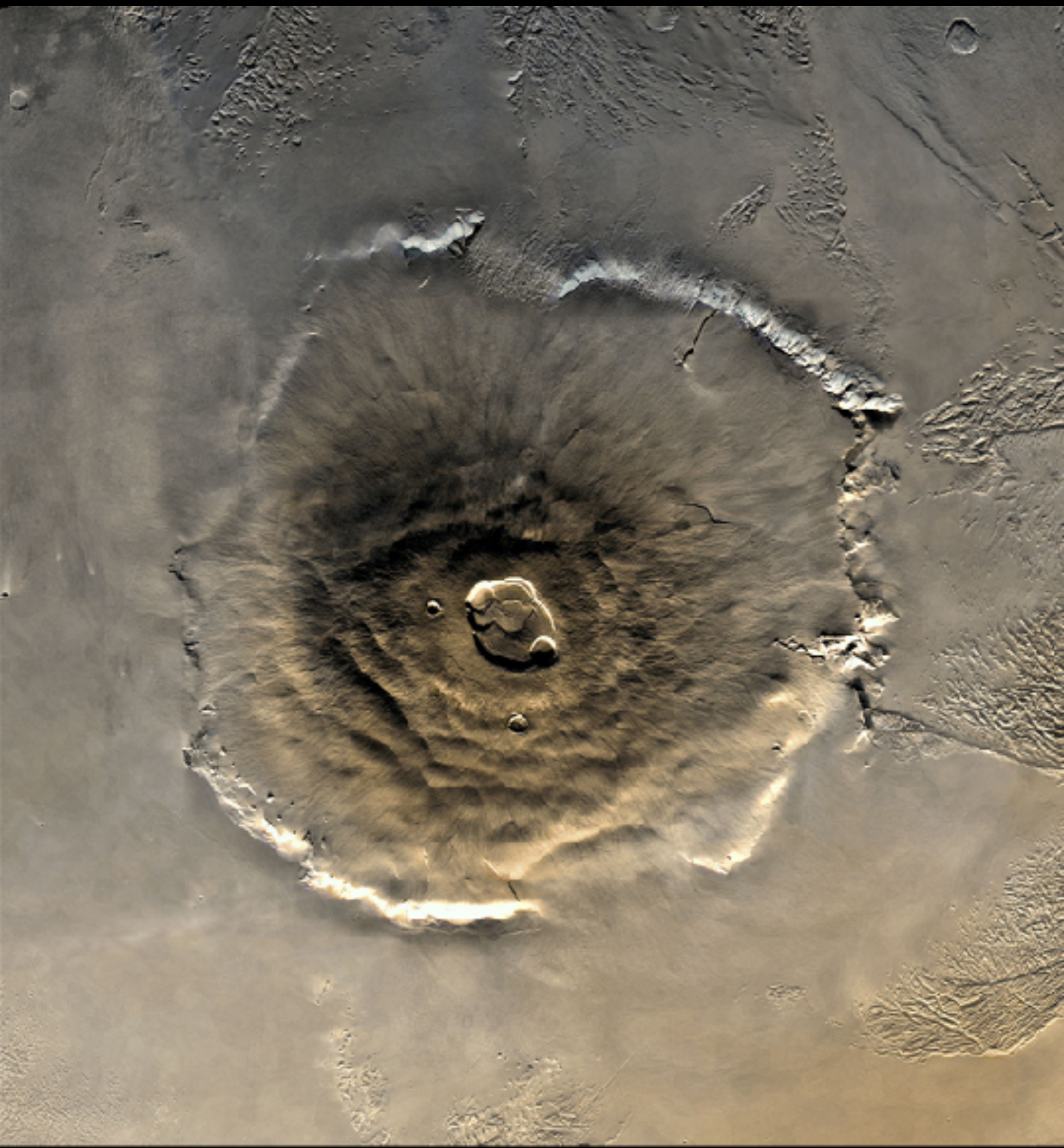
https://en.wikipedia.org/wiki/Volcanology_of_Venus



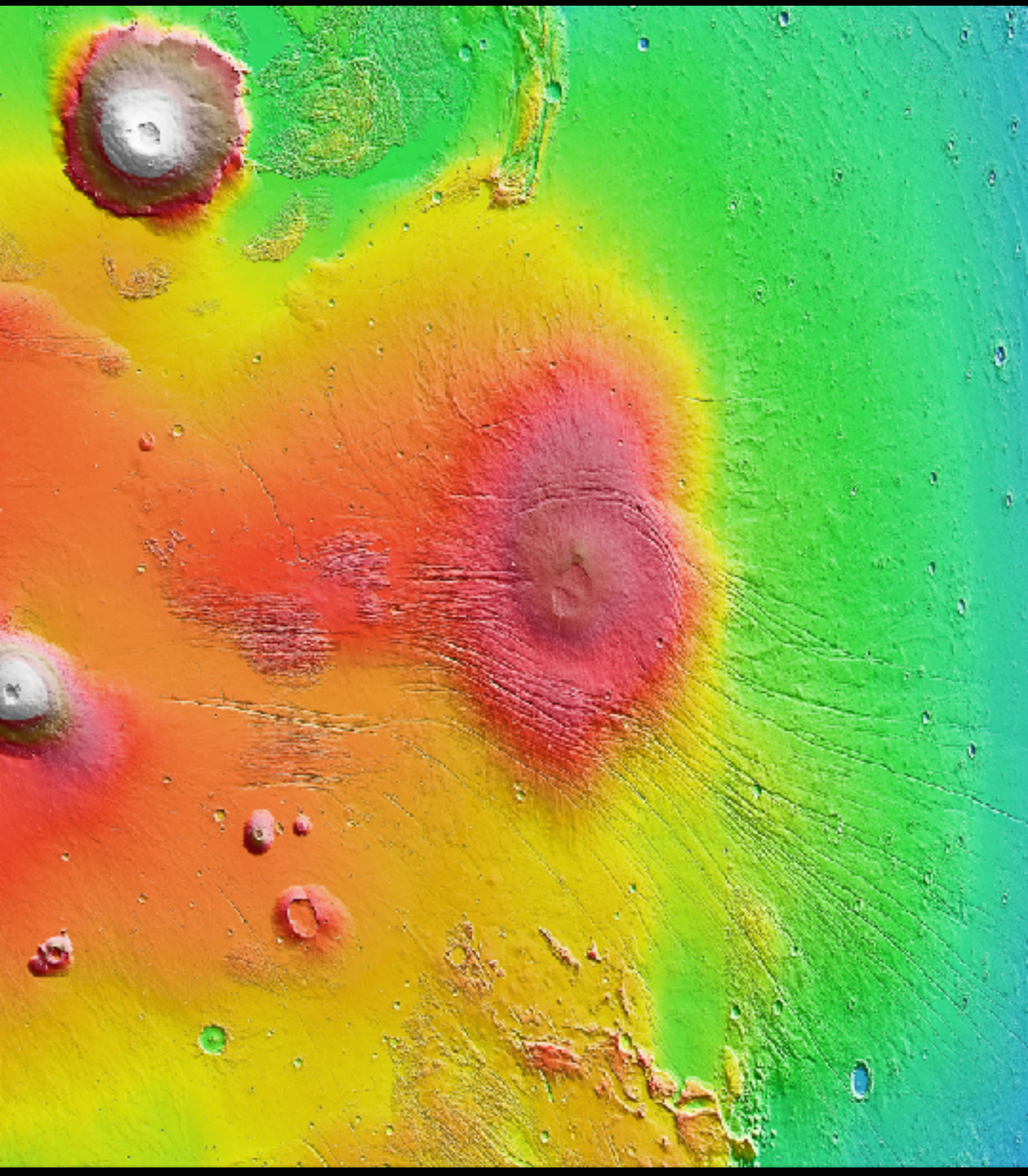


https://en.wikipedia.org/wiki/Volcanology_of_Venus

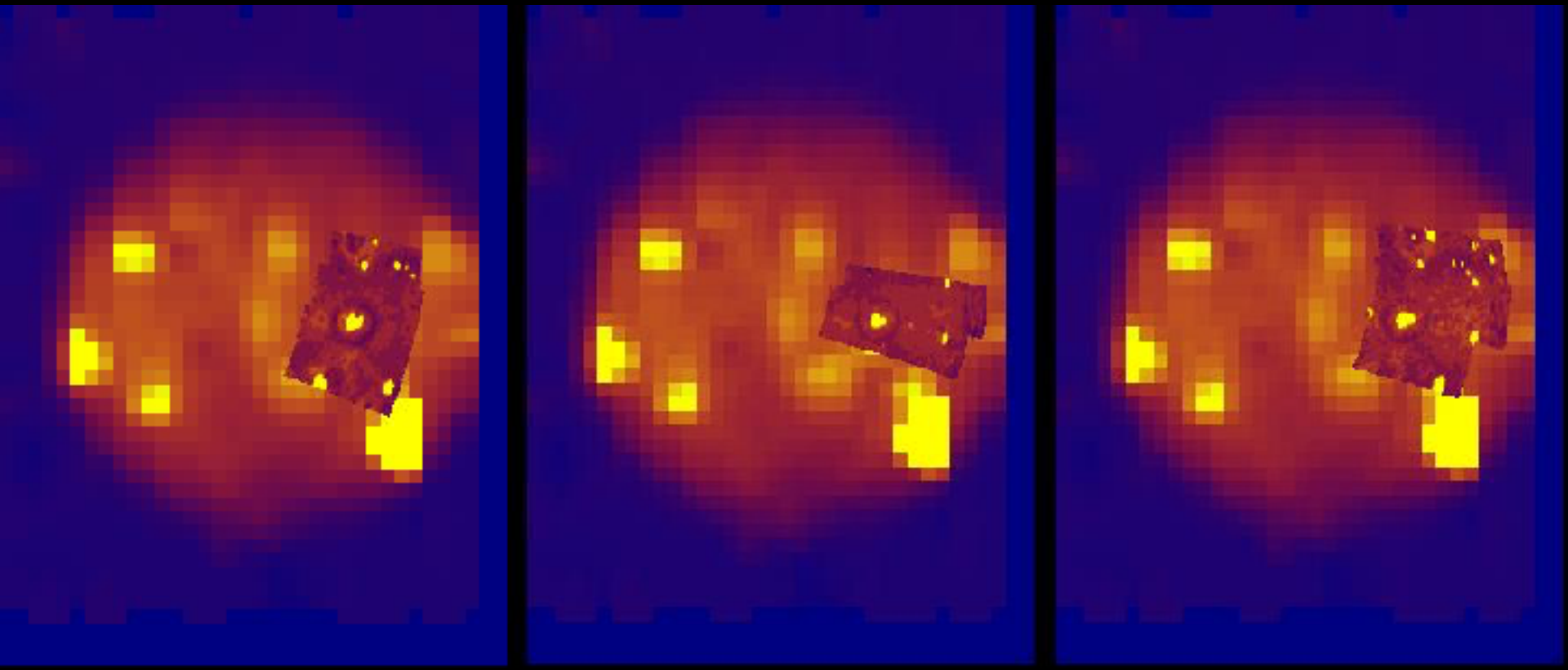
https://en.wikipedia.org/wiki/Olympus_Mons



wikipedia Alba Mons

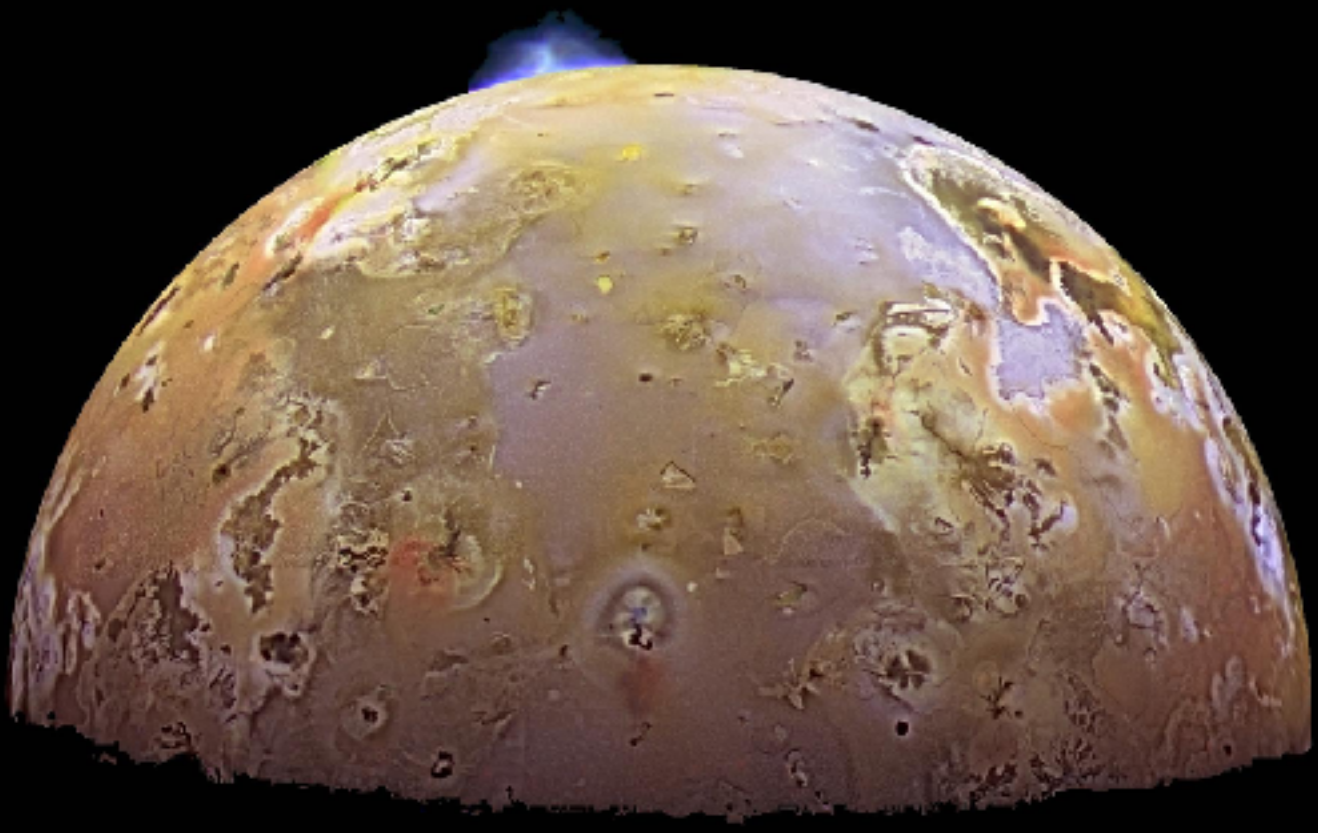


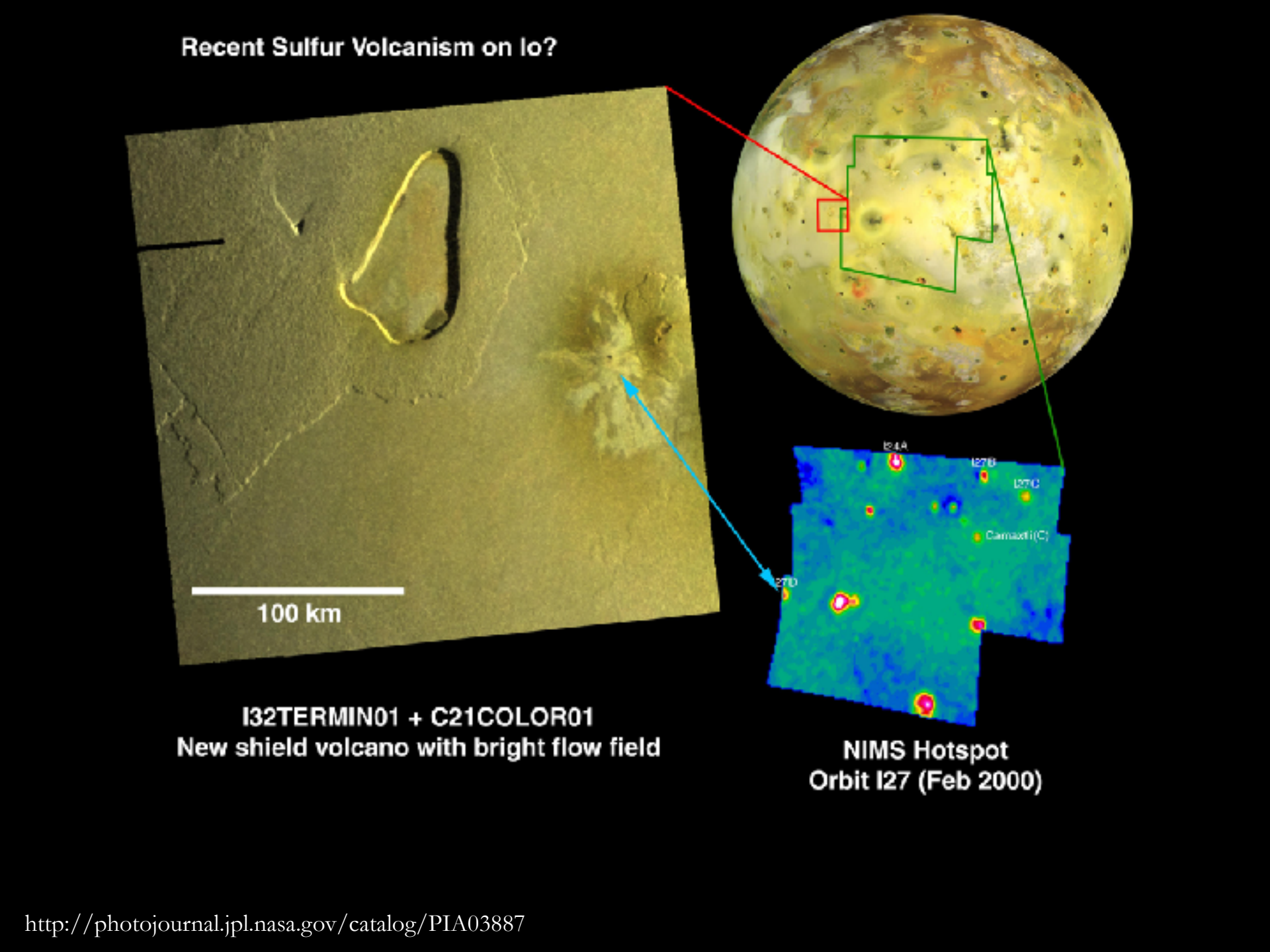
IR Io



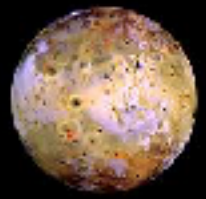
http://photojournal.jpl.nasa.gov/catalog/PIA02558

http://photojournal.jpl.nasa.gov/catalog/PIA01081





http://photojournal.jpl.nasa.gov/catalog/PIA03887



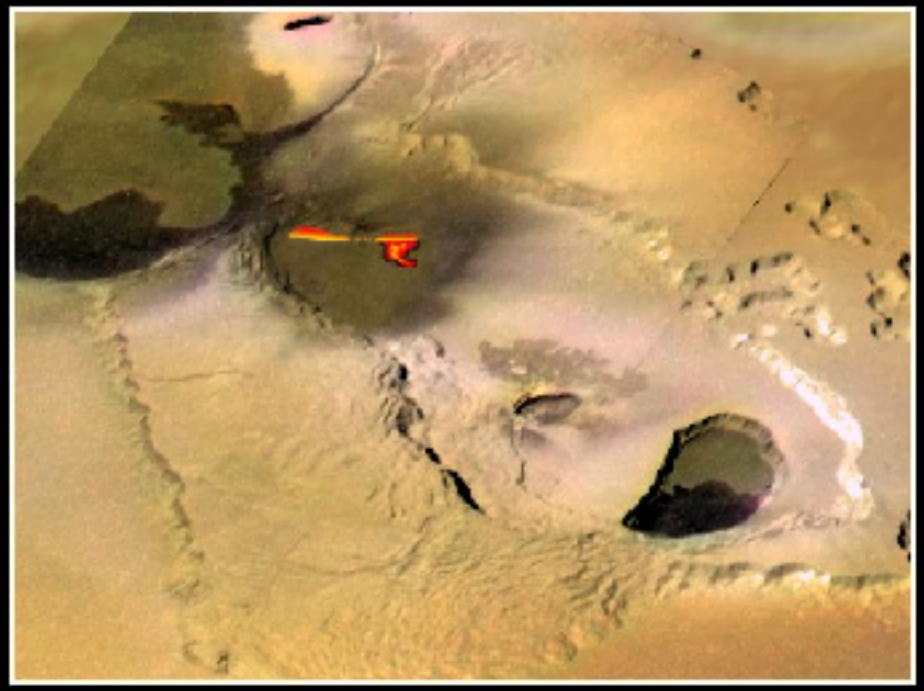
Io — Tvashtar Catena

I25 (26 Nov 1999)

+ C21 low-resolution color
+ fire fountain sketch

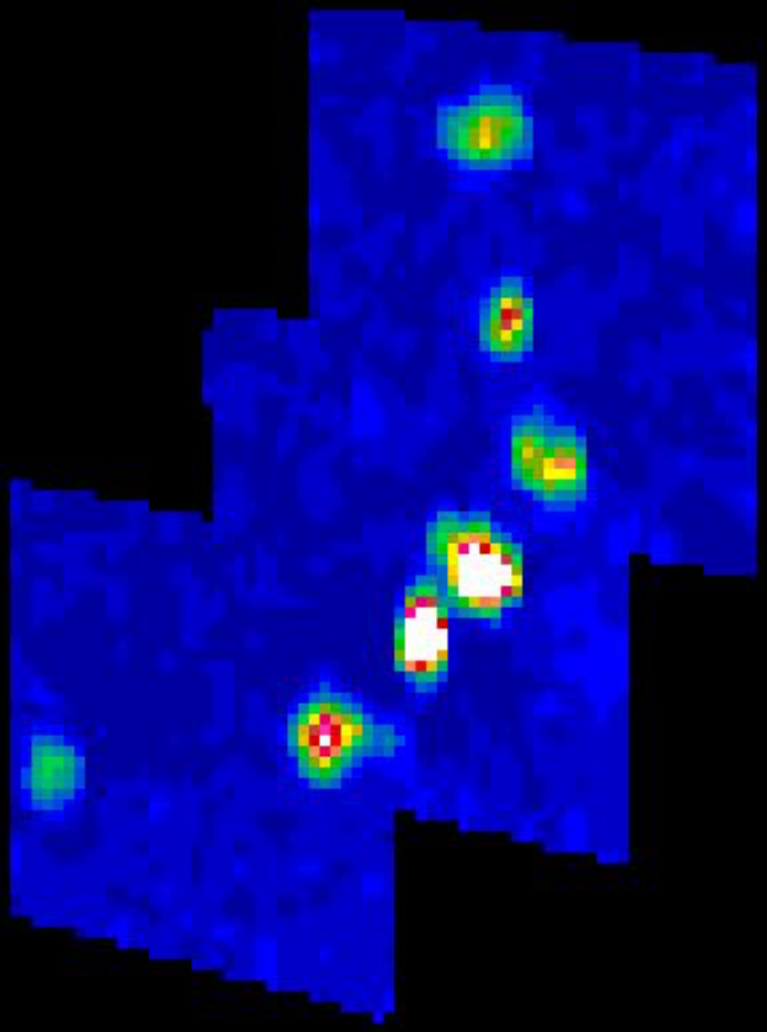
I27 (22 Feb 2000)

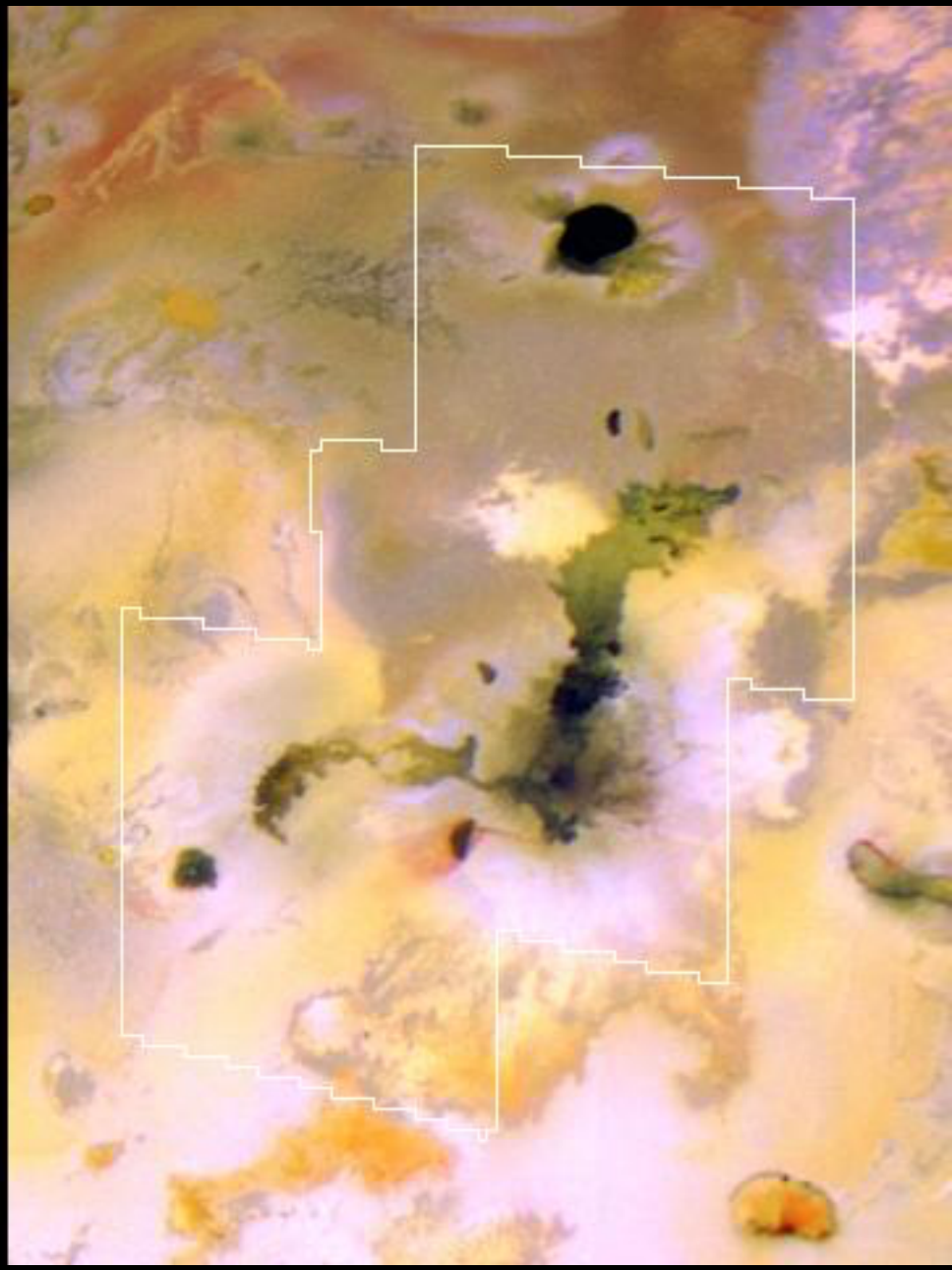
visible wavelength data
+ IR data of active lava flow



http://photojournal.jpl.nasa.gov/catalog/PIA02584

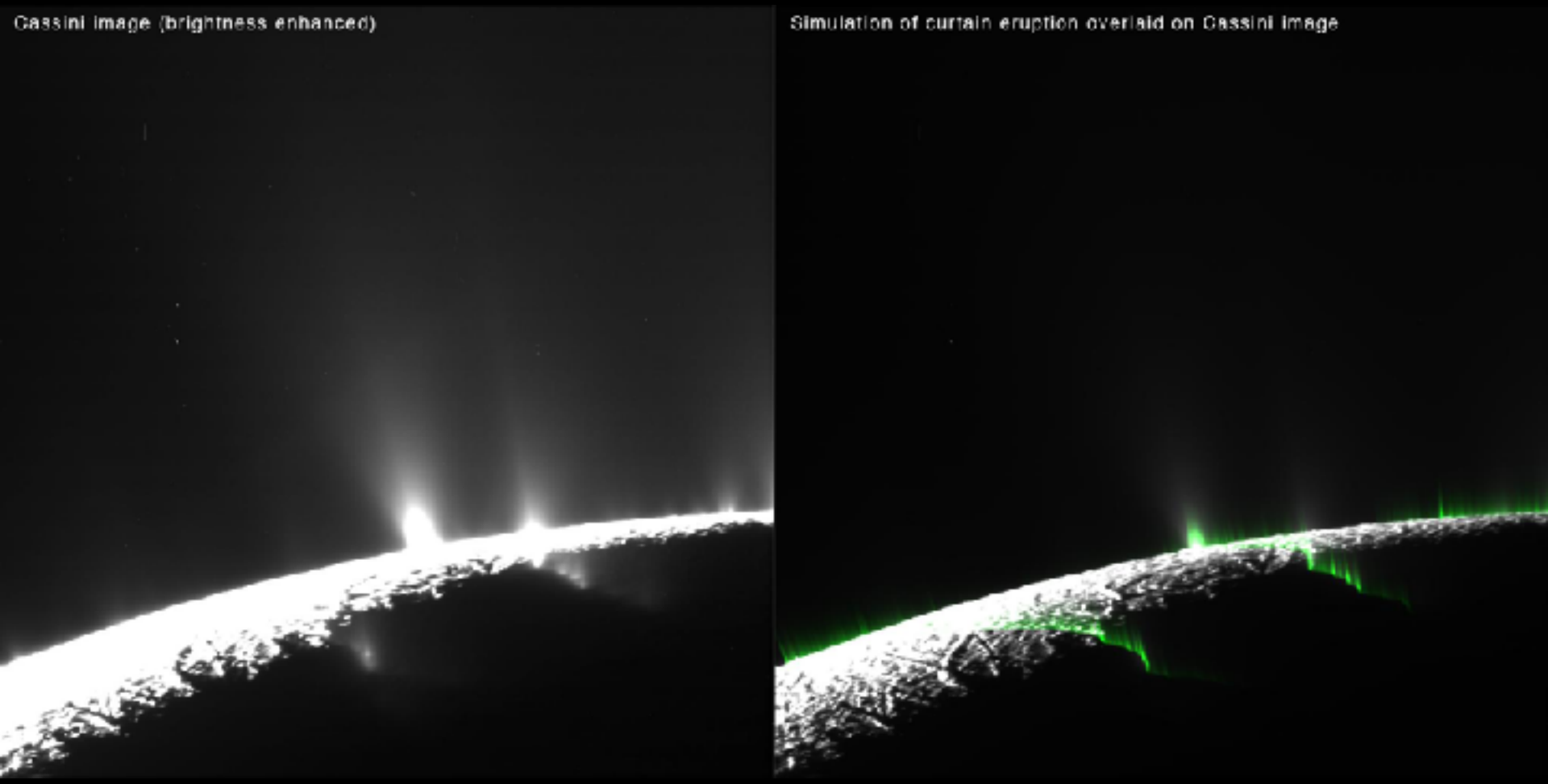
Amirani flow



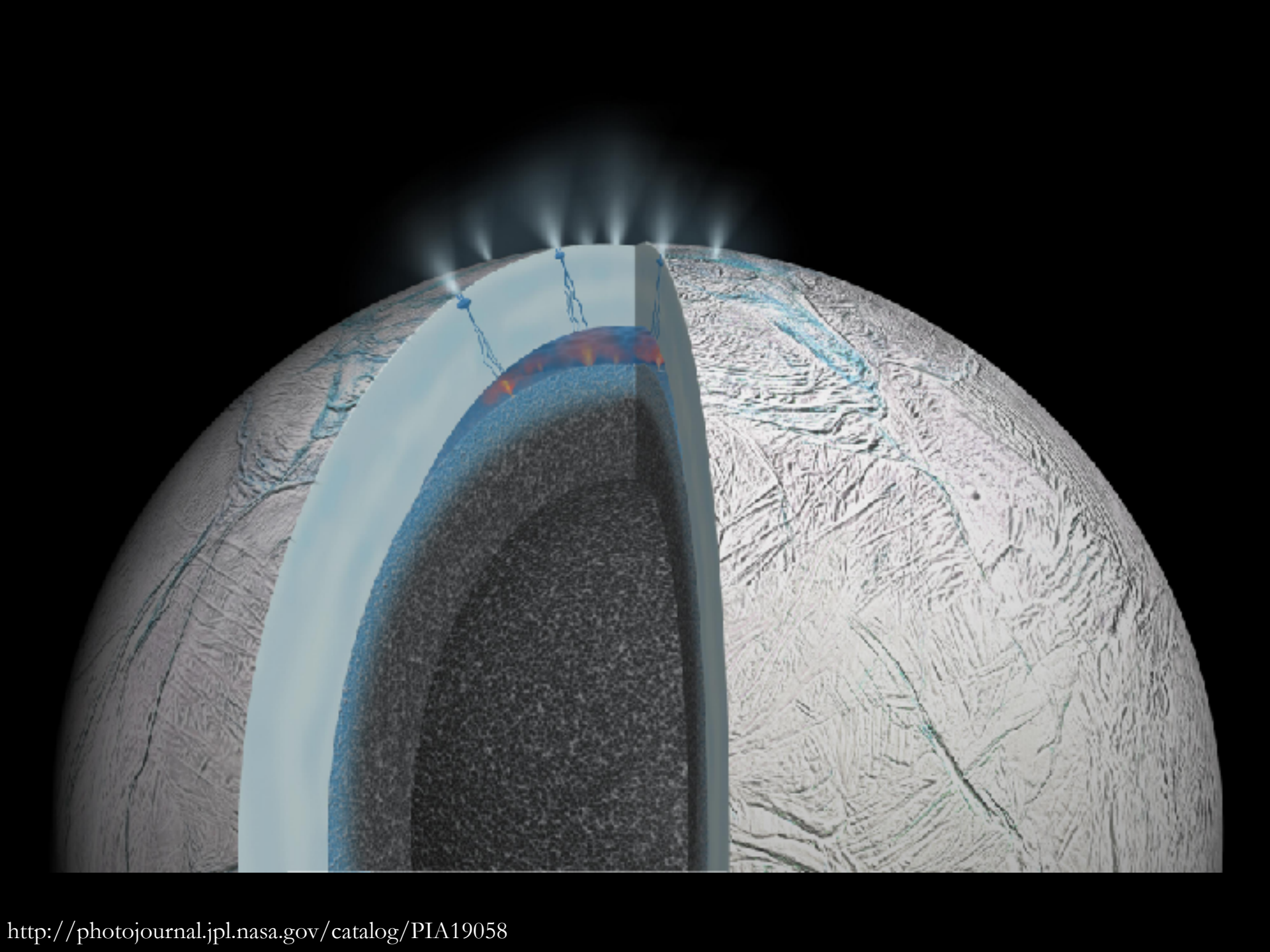


http://photojournal.jpl.nasa.gov/catalog/PIA03533

Enceladus

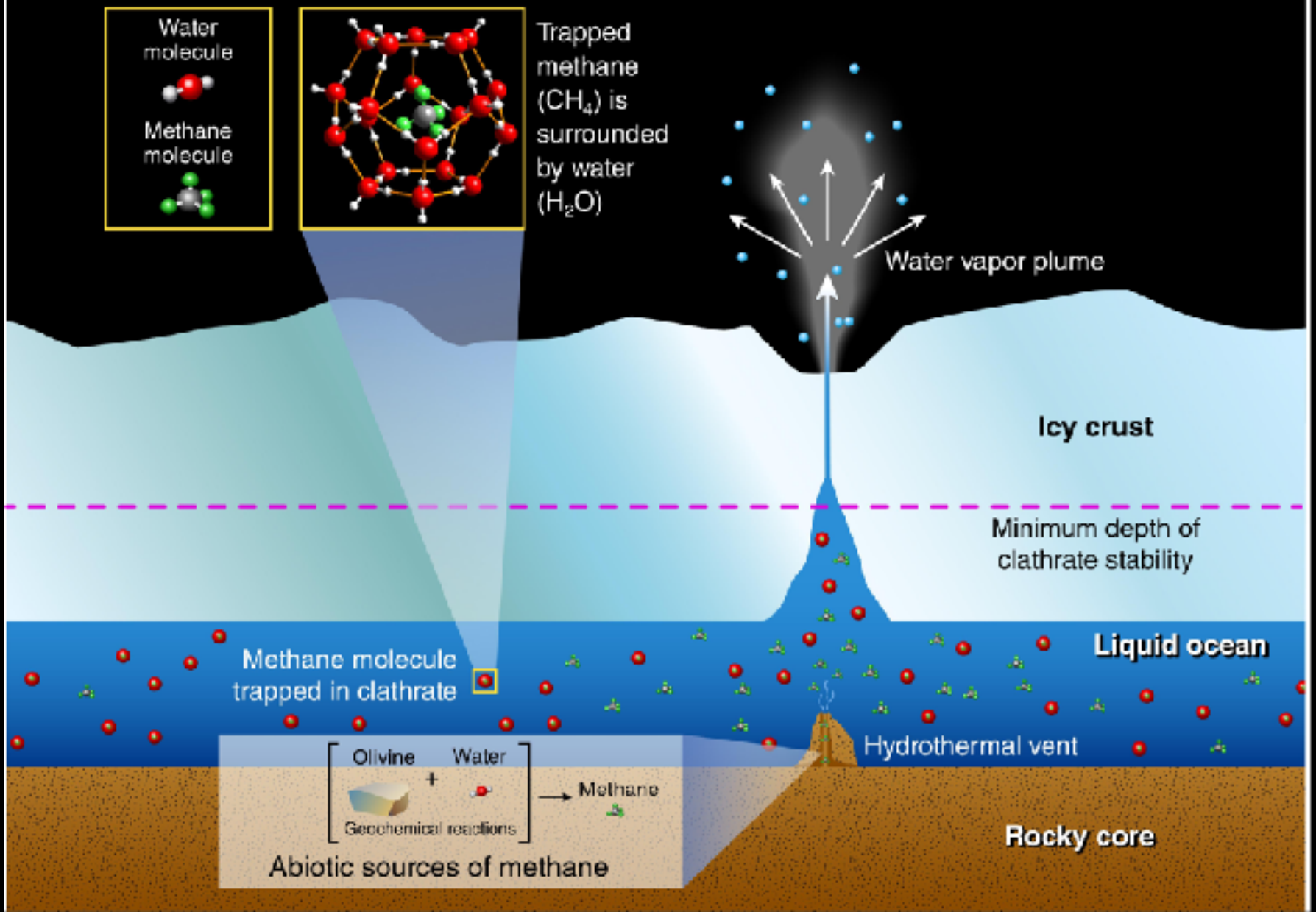


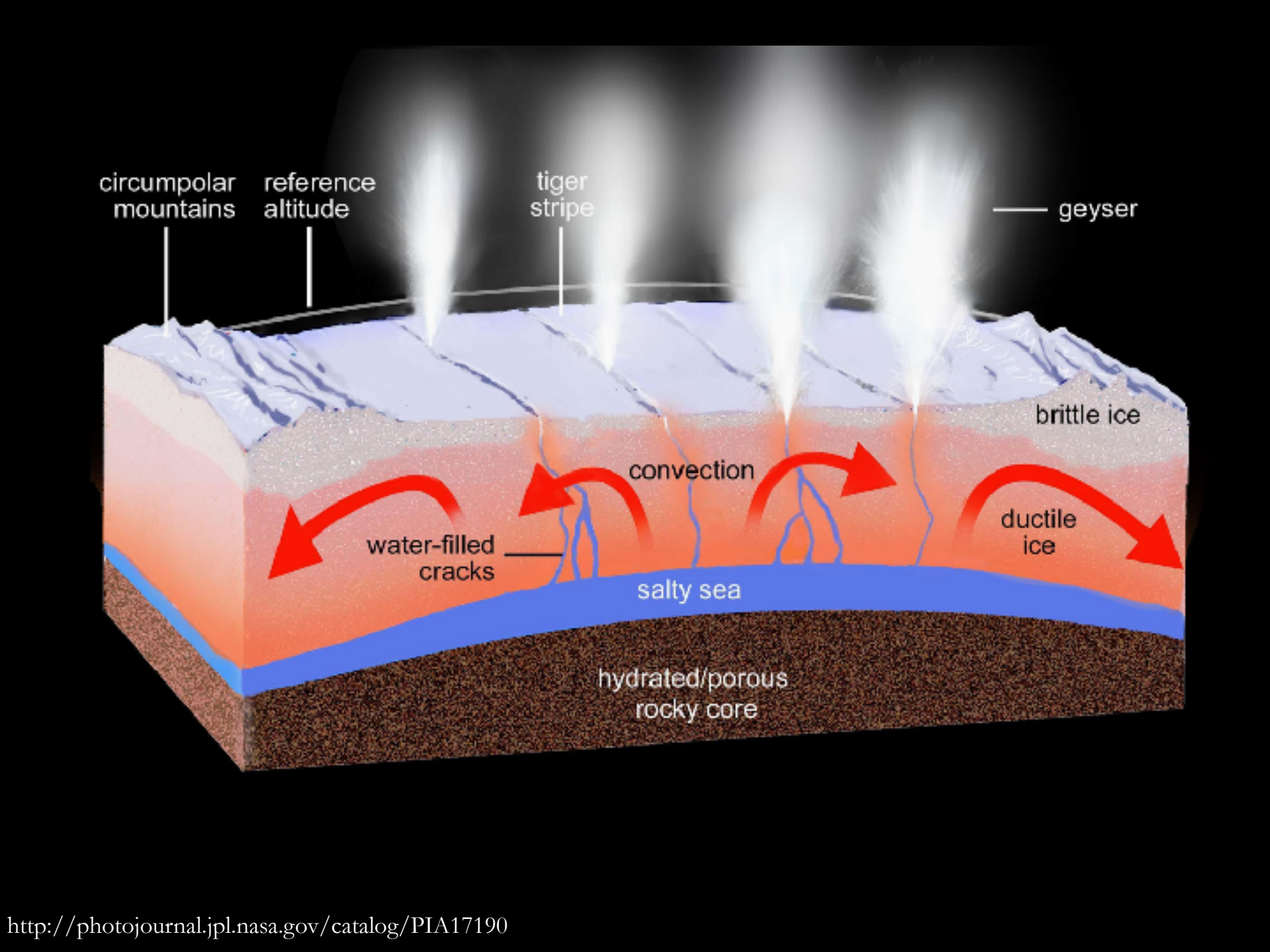
http://photojournal.jpl.nasa.gov/catalog/PIA19061



http://photojournal.jpl.nasa.gov/catalog/PIA19058

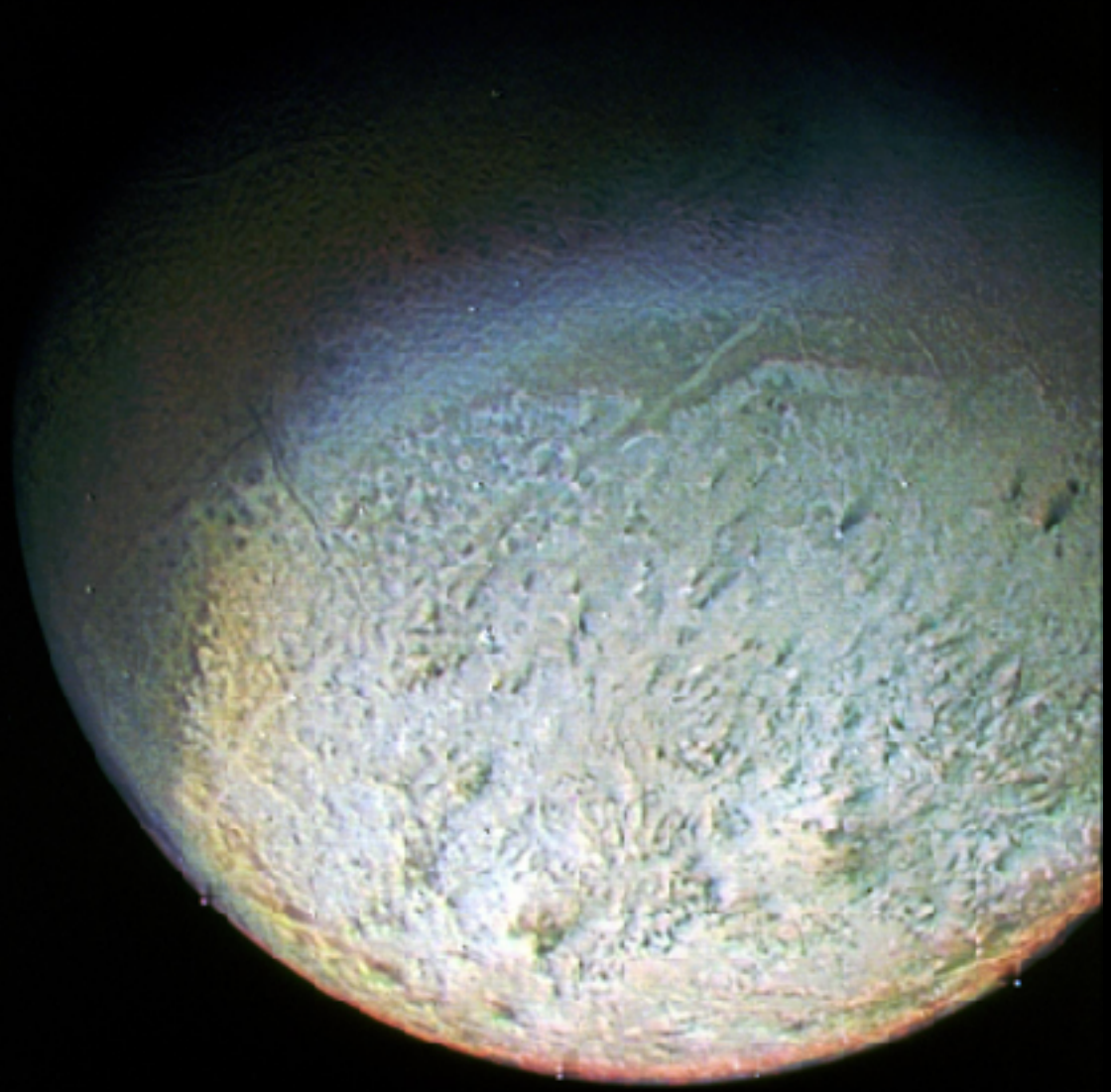
Trapping of Methane in Enceladus' Ocean





http://photojournal.jpl.nasa.gov/catalog/PIA17190

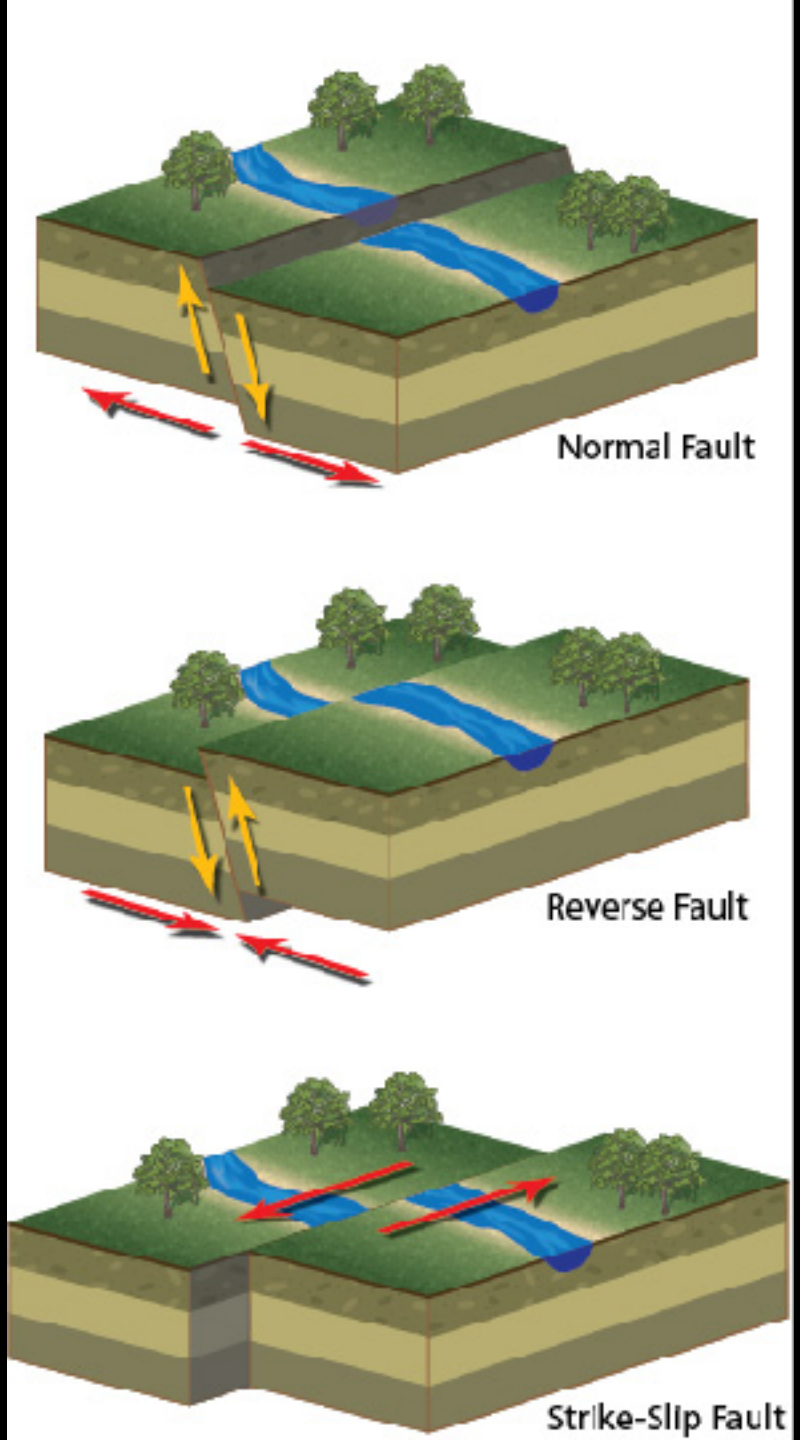
Triton



http://photojournal.jpl.nasa.gov/catalog/PIA01536

http://photojournal.jpl.nasa.gov/catalog/PIA00059

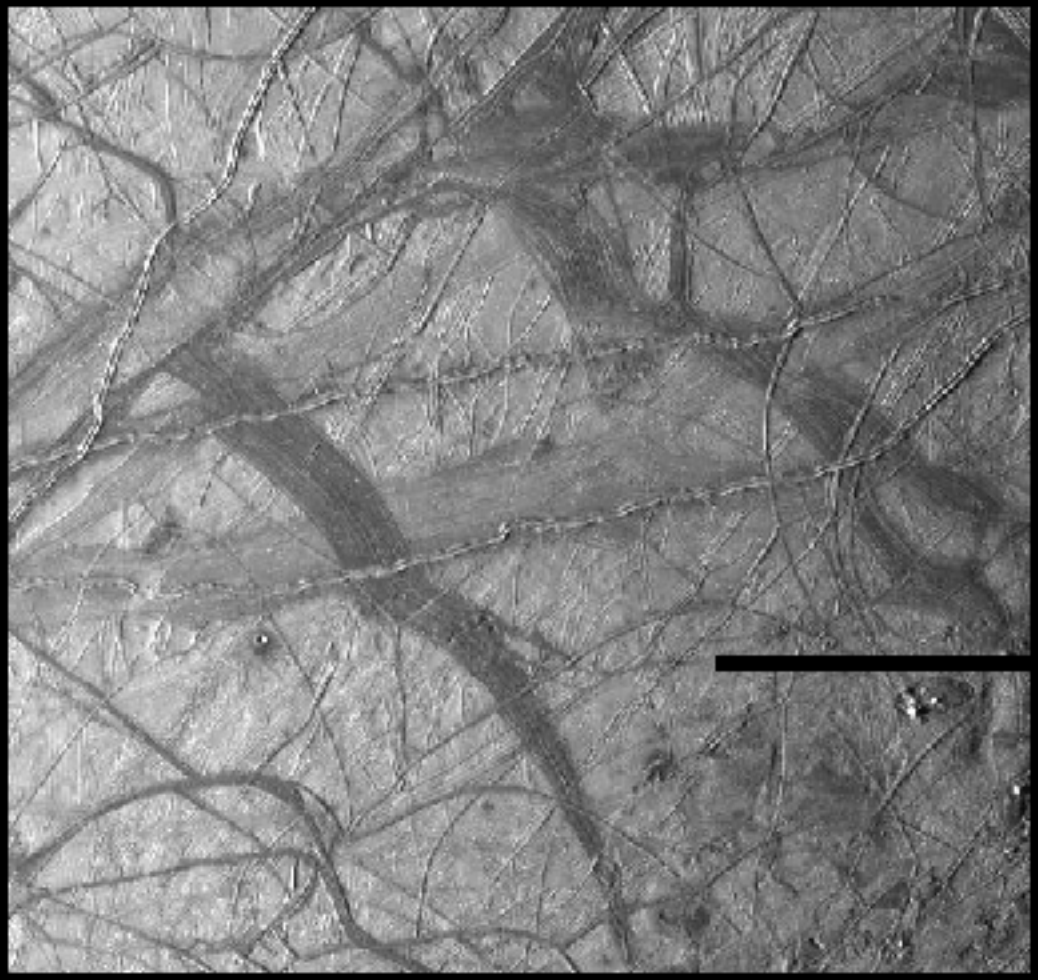
Types of faults



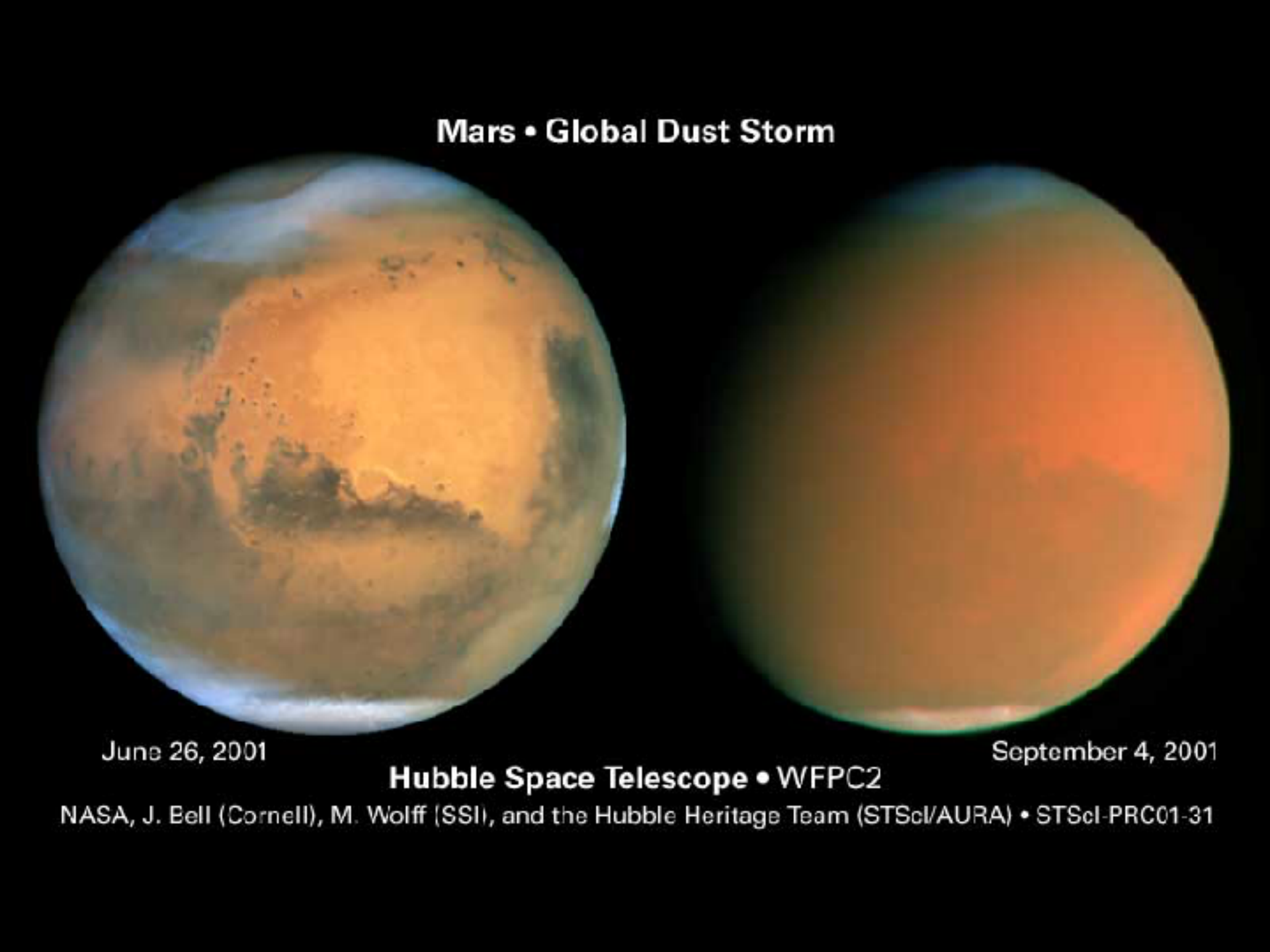
http://www.srh.noaa.gov/jetstream/tsunami/plates.htm

http://earthobservatory.nasa.gov/IOTD/view.php?id=82853

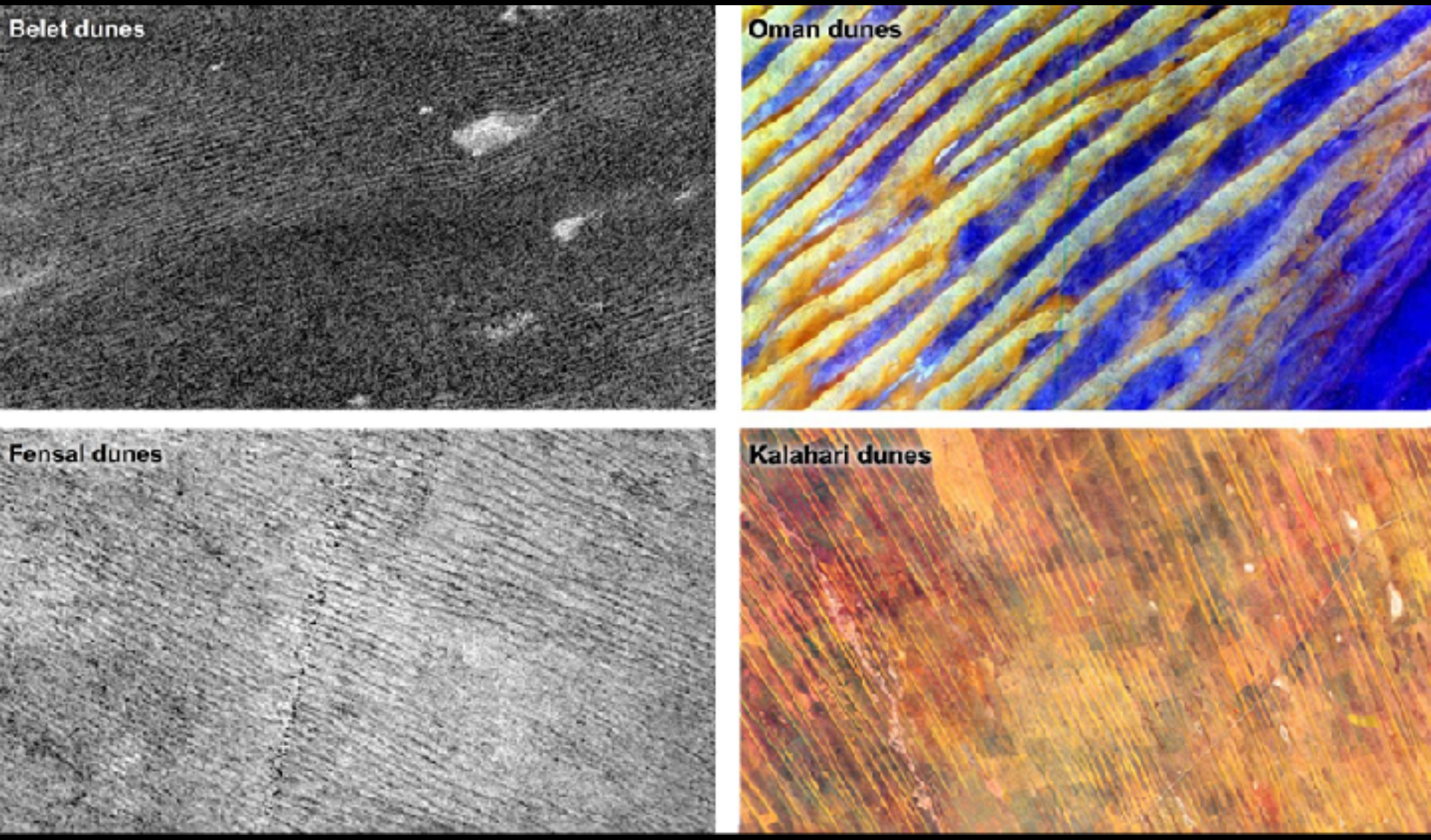
Europa



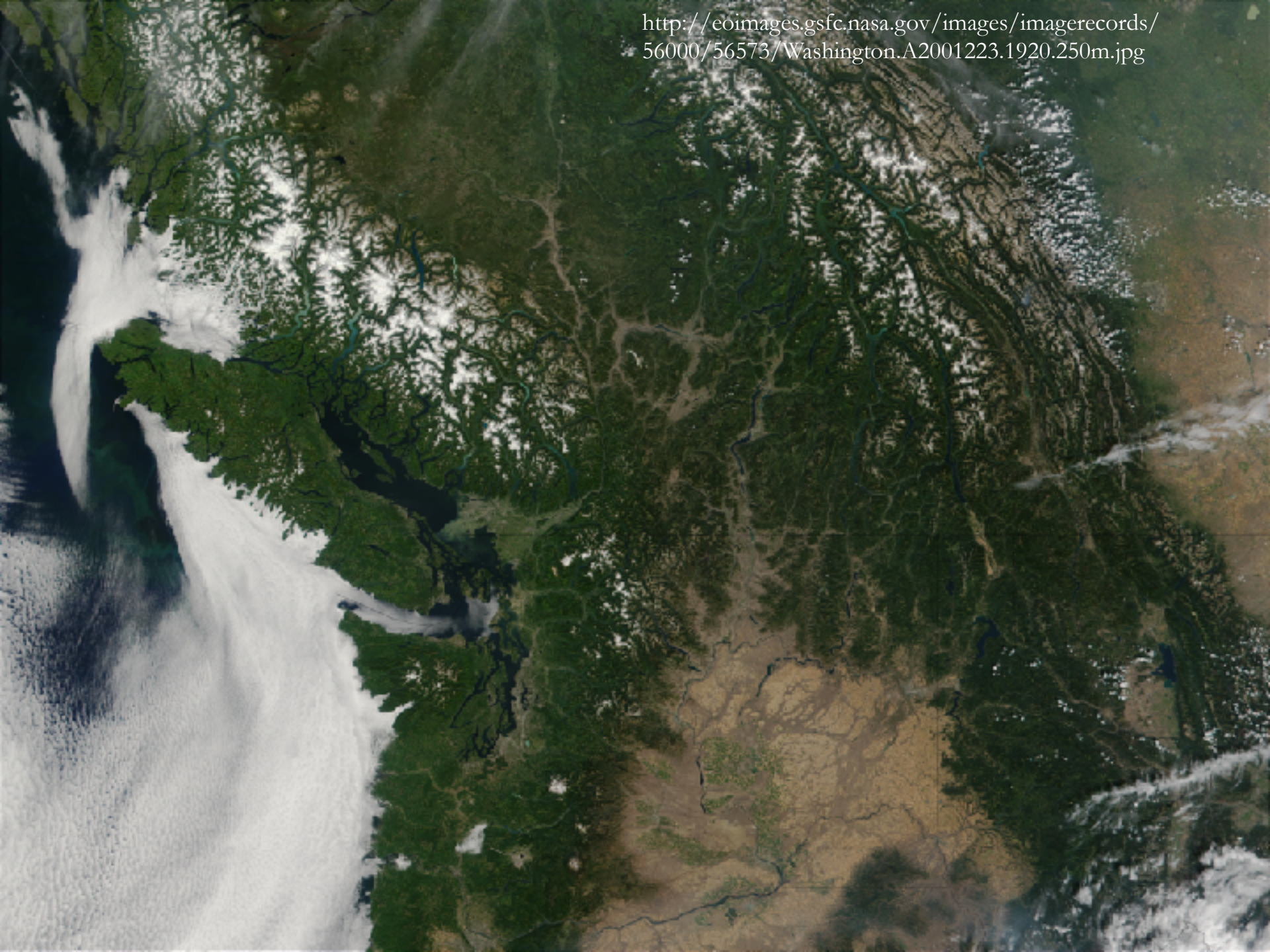
http://photojournal.jpl.nasa.gov/catalog/PIA00518


Mars • Global Dust Storm
June 26, 2001
September 4, 2001
Hubble Space Telescope • WFPC2
NASA, J. Bell (Cornell), M. Wolff (SSI), and the Hubble Heritage Team (STScI/AURA) • STScI-PRC01-31

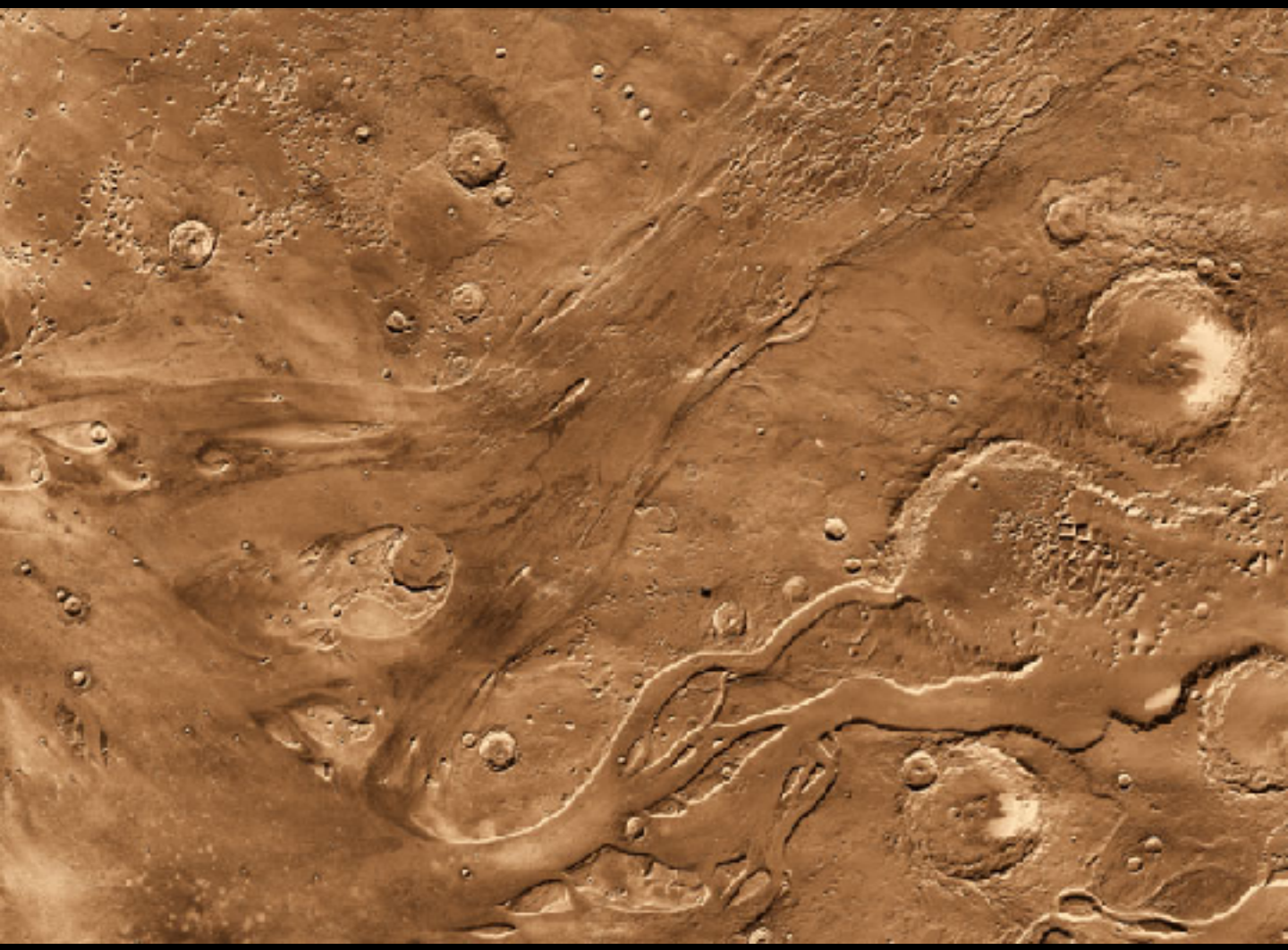
http://www.jpl.nasa.gov/images/msl/20130211/msl20130211-full.jpg



http://photojournal.jpl.nasa.gov/catalog/PIA15225


http://eoimages.gsfc.nasa.gov/images/imagerecords/
56000/56573/Washington.A2001223.1920.250m.jpg

http://mars.jpl.nasa.gov/odyssey/gallery/martianterrain/aresoutflow.html



Mars

Titan

http://photojournal.jpl.nasa.gov/catalog/PIA07232