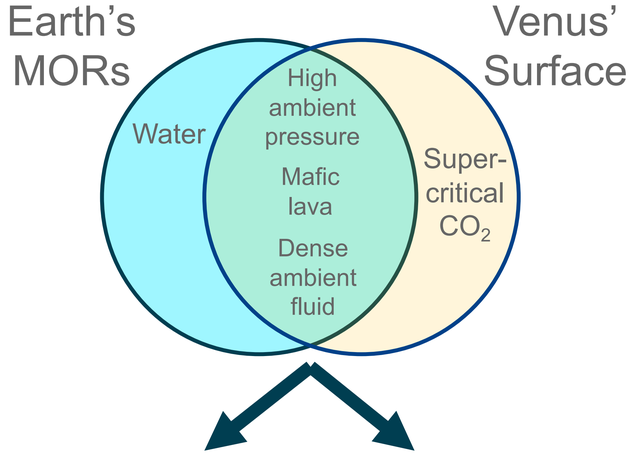
Venusian Plains: Similarities to Mid-Ocean Ridge Basalts

Tracy K.P. Gregg, Dept. of Geology, tgregg@buffalo.edu

Introduction

- similar lava compositions on Earth & Venus (Treiman, 2007)
- Magellan synthetic aperture radar (SAR) reveals smoother lava surfaces on Venus than Hawaiian flows (Campbell & Campbell, 1992; Byrne & Crown, 2002)



High Ambient Pressure

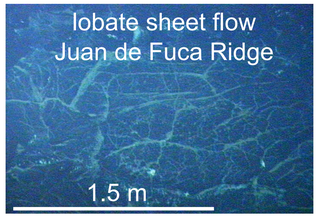
- suppresses vesiculation of MOR basalts (Perfit et al., 2003)
- suppresses a'a' lavas at MORs (Gregg & Fink, 1995)

Dense Ambient Fluid

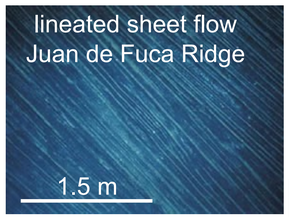
- MOR basalt lava surfaces quench (Fink & Griffiths, 1990)
- quenched drainback "layers" preserved at MORs (Gregg et al., 2000)

Venera 14

smooth interlocking plates



Images courtesy of PMEL



Images courtesy of PMEL

moderate effusion rates: higher than pillows, lower than jumbled

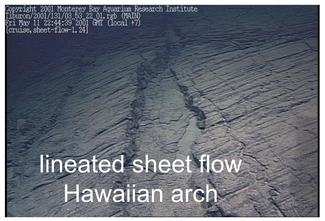
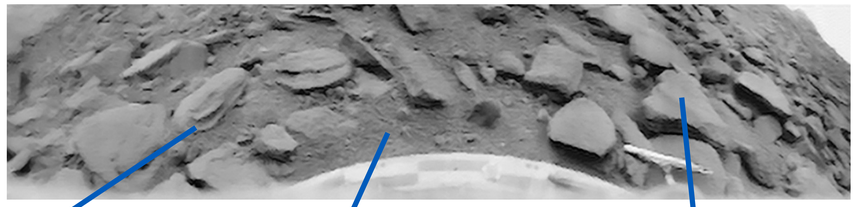


Image courtesy of MBARI

High ambient pressure suppresses vesiculation: crustal autobrecciation at high effusion rates

Venera 9



"layers"

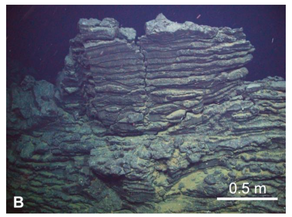


Image courtesy of WHOI

glassy ledges form on draining lava flow surface

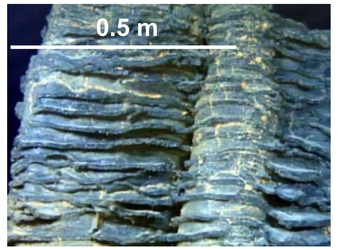
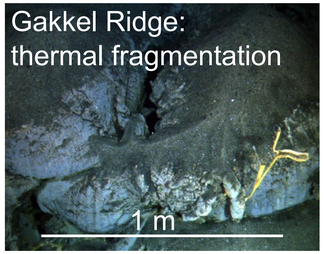


Image courtesy of PMEL

fine-grained material



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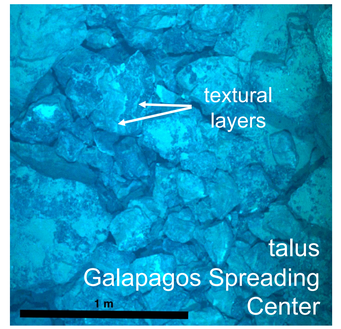
angular blocks



High Ambient Pressure & Dense Ambient Fluid: Predictions for Venus

- Cooling-dominated lava textures
- Suppressed vesiculation:
  - Pahoehoe-like surface textures common
  - No true a'a

https://www.whoi.edu/oceanus/feature/deeply-submerged-volcanoes-blow-their-tops/
https://www.planetary.org/articles/every-picture-from-venus-surface-ever

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University at Buffalo The State University of New York
Department of Geology
College of Arts and Sciences
buffalo.edu