

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

Arsia Mons
Volcanic Field

Methods

Results

Implications

Conclusions

Modeling the Construction and Evolution of Distributed Volcanic Fields on Earth and Mars

Jacob A. Richardson

School of Geosciences
University of South Florida

19 February 2016

Team

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions

Introduction

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

Arsia Mons Volcanic Field

Methods

Results

Implications

Conclusions

- Distributed Volcanism Definition
- Vertical Subregions can be detailed in volcanic systems

Outline of Talk

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

Arsia Mons Volcanic Field

Methods

Results

Implications

Conclusions

- Overview of Dissertation
- Arsia Mons
- Conclusions

Sills in the San Rafael Swell

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

Arsia Mons
Volcanic Field

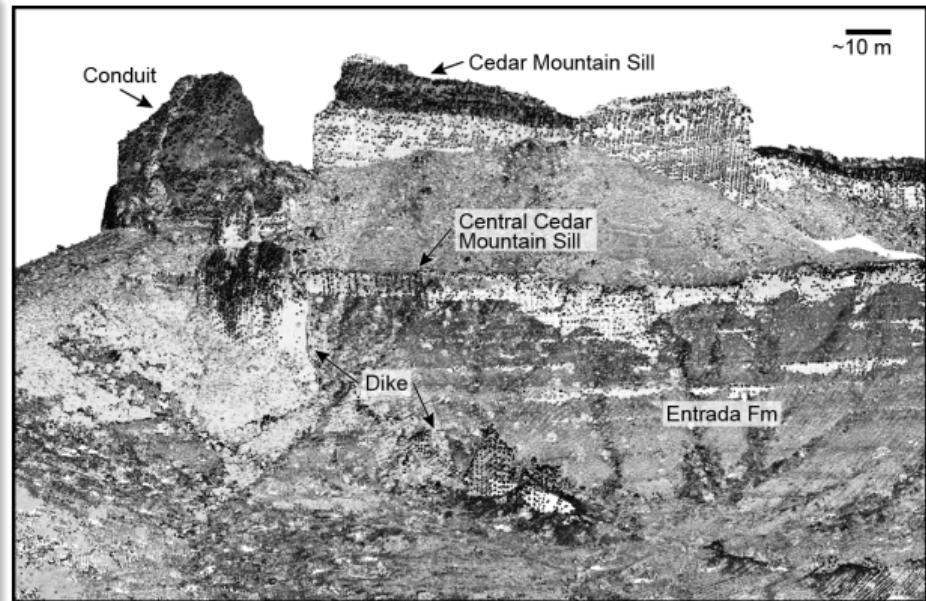
Methods

Results

Implications

Conclusions

- Lidar
- Sills
- Total volume, geometry
- Modulation of eruption style



Sills in the San Rafael Swell

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

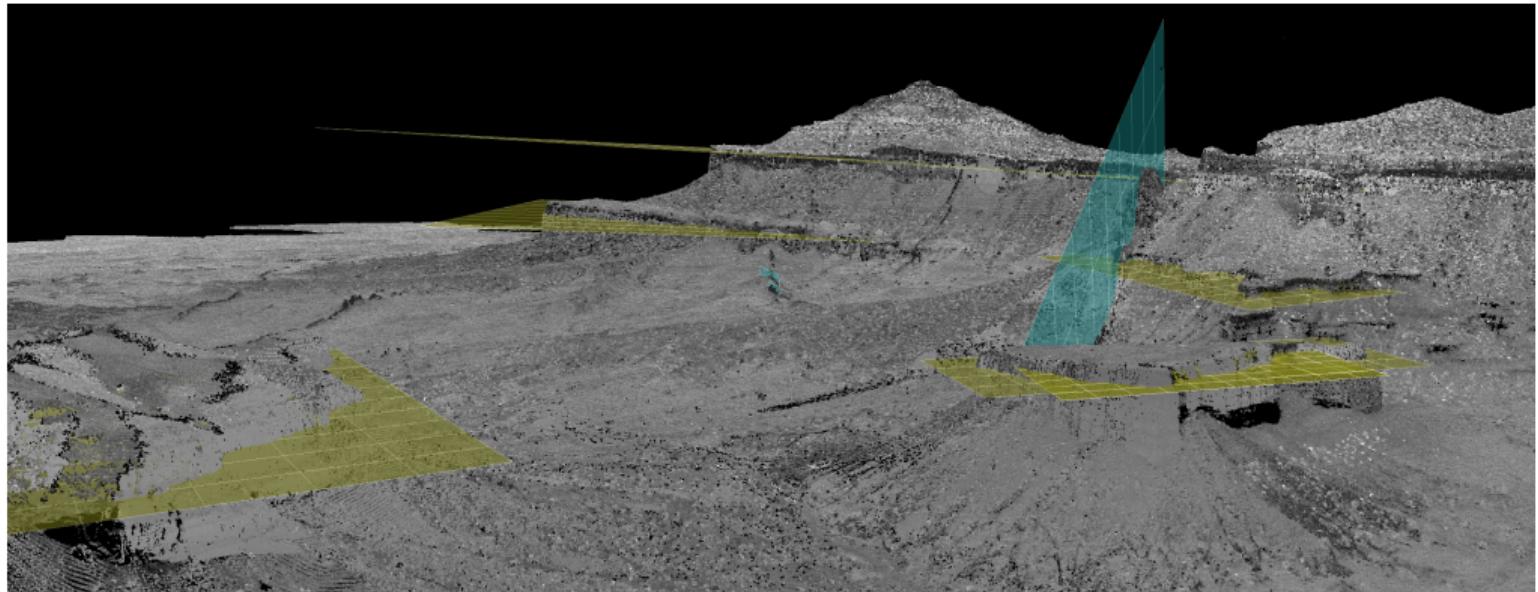
Arsia Mons
Volcanic Field

Methods

Results

Implications

Conclusions



Sills in the San Rafael Swell

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

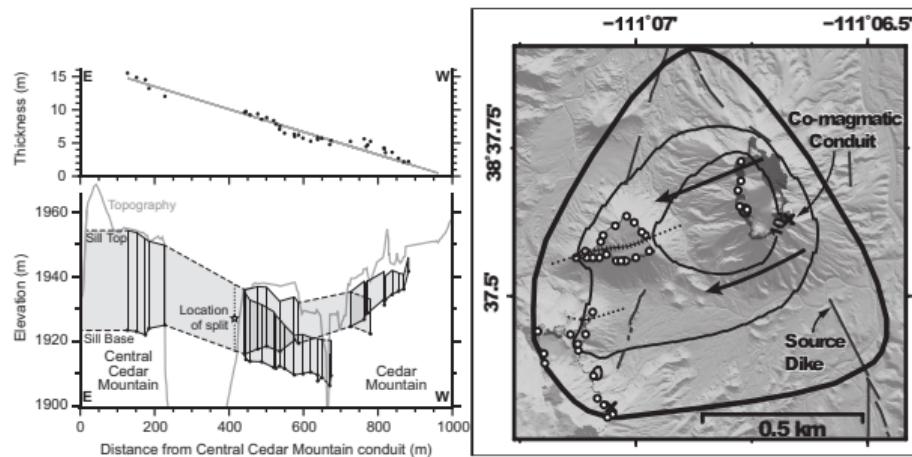
Arsia Mons
Volcanic Field

Methods

Results

Implications

Conclusions



- Lidar
- Sills
- Total volume, geometry
- Modulation of eruption style

Lava Flows/Simulators

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

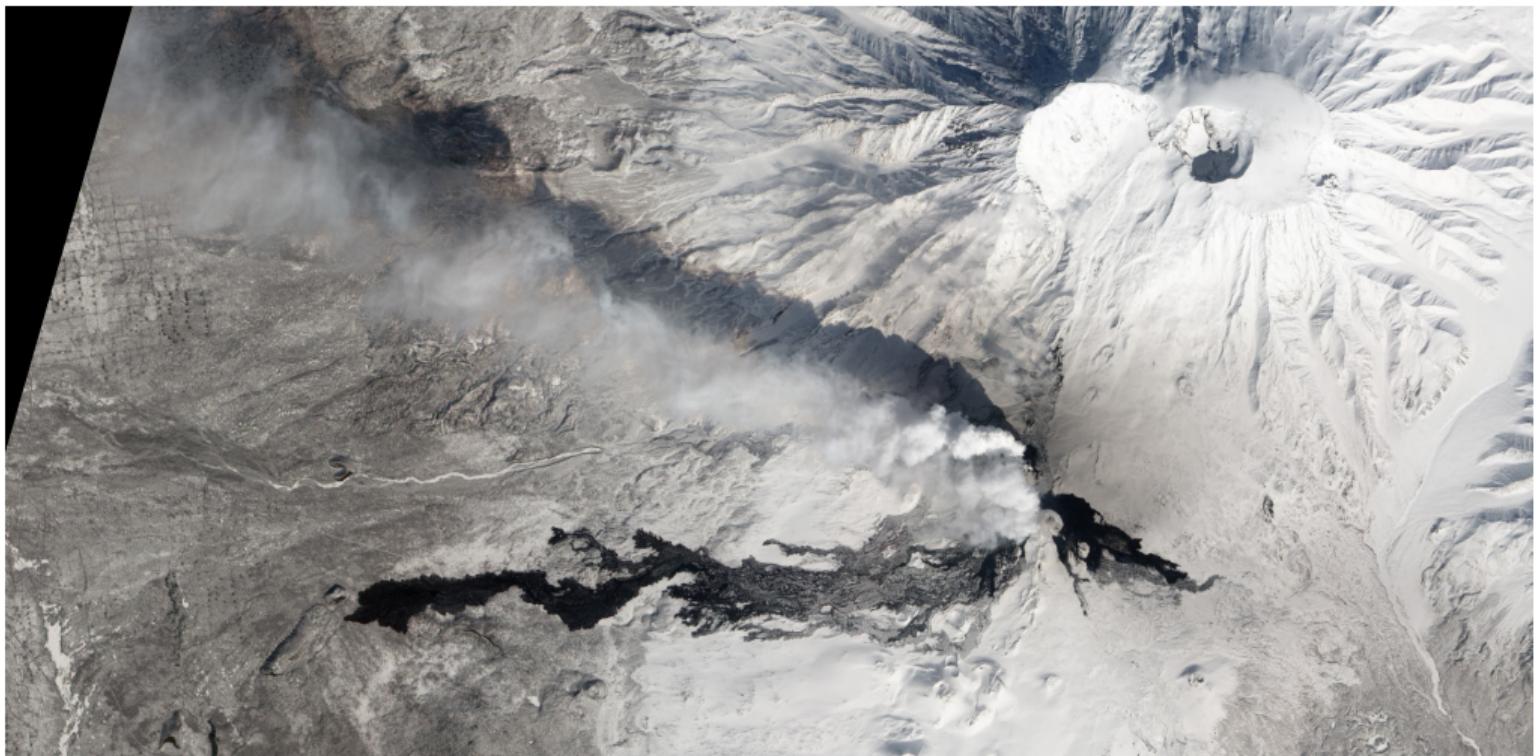
Arsia Mons
Volcanic Field

Methods

Results

Implications

Conclusions



Lava Flows/Simulators

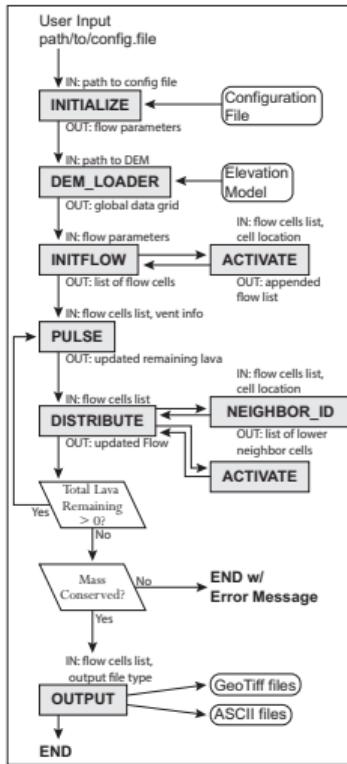
Volcanic
Fields on
Earth & Mars

Jacob
Richardson

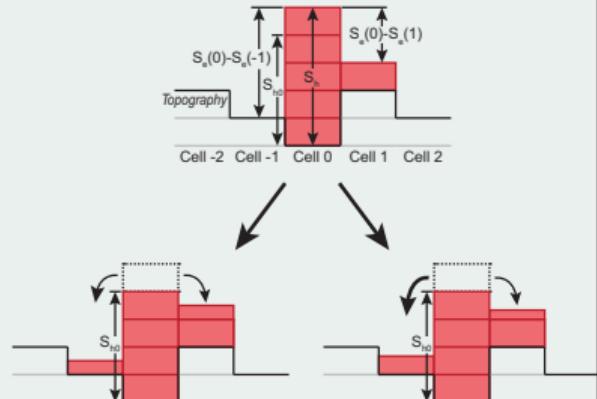
Introduction
Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field
Methods
Results
Implications
Conclusions



MOLASSES — Modular Lava Simulation Software



- MOLASSES
- CA Code

Lava Flows/Simulators

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

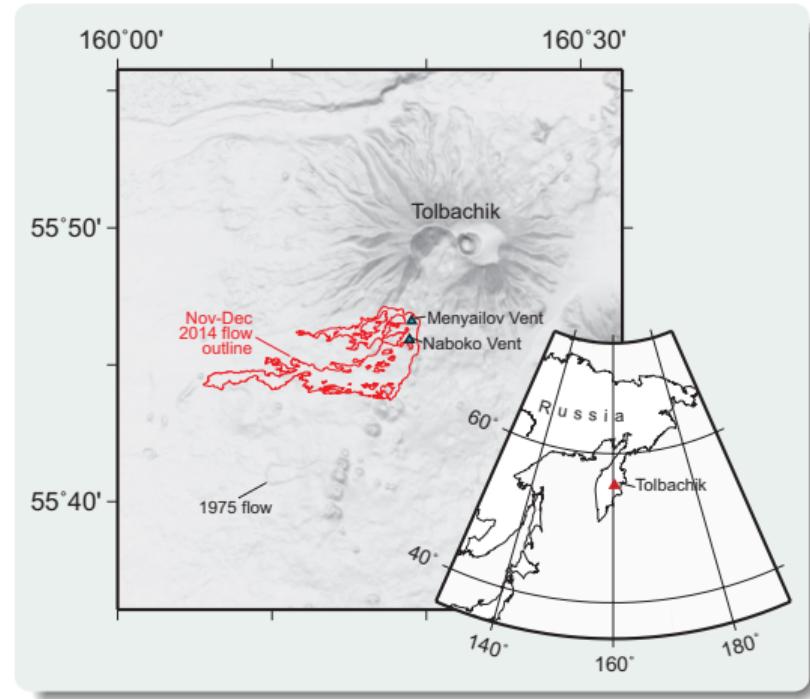
Arsia Mons
Volcanic Field

Methods

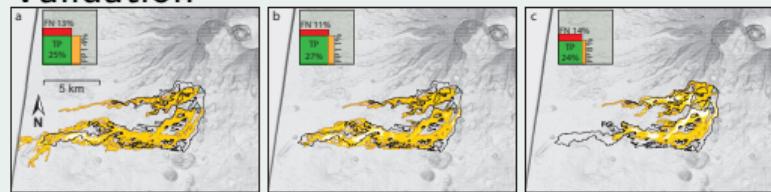
Results

Implications

Conclusions



Validation



Spatial Density of Clusters

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

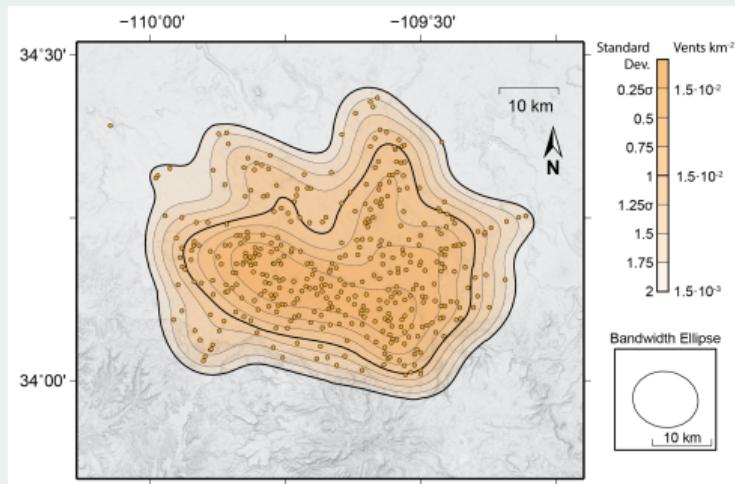
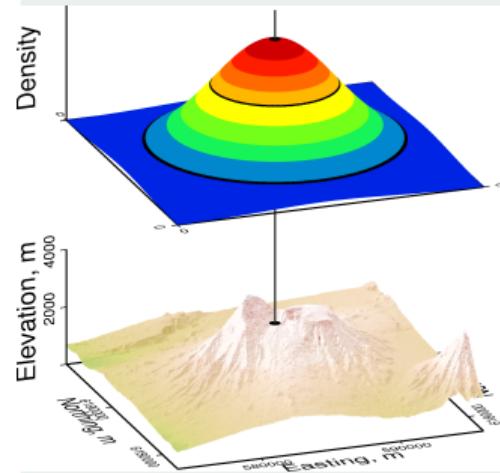
Arsia Mons
Volcanic Field

Methods

Results

Implications

Conclusions



Spatial Density of Clusters

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

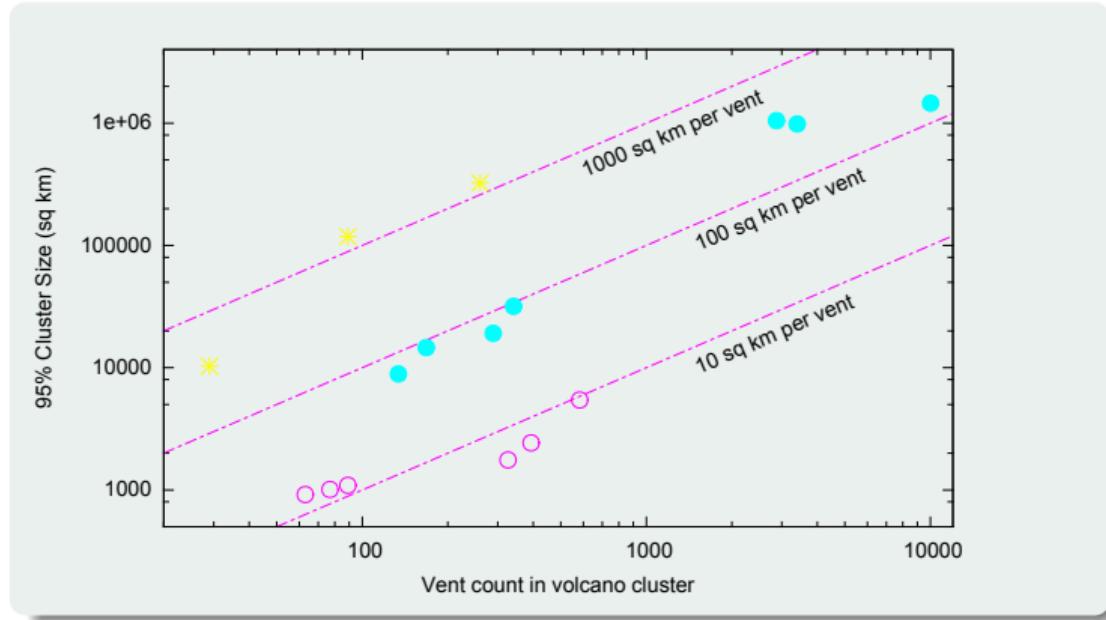
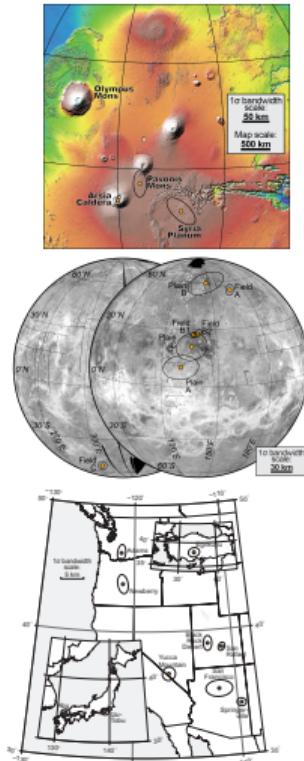
Vent Density

Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions



Syria Planum

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills

Lava Flows

Vent Density

Mars Clusters

Arsia Mons
Volcanic Field

Methods

Results

Implications

Conclusions

- catalog
- trend in crater age dating
- spatial density, possible recurrence rate

Arsia Mons: An introduction

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

**Arsia Mons
Volcanic Field**

Methods
Results
Implications

Conclusions

Questions

- How?
- Can?

Mapping

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods

Results
Implications

Conclusions

Volume

**Volcanic
Fields on
Earth & Mars**

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

**Arsia Mons
Volcanic Field**

Methods

Results
Implications

Conclusions

Ages

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods

Results
Implications

Conclusions

**Volcanic
Fields on
Earth & Mars**

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

**Arsia Mons
Volcanic Field**

Methods

Results
Implications

Conclusions

Recurrence Rate

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions

Volume Flux

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions

Tie in with Ashes and glaciers?

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions

Model of waning volcanism of Arsia

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions

Arsia Specific Conclusions

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions

Other Conclusions

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions

Additional Thanks

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions

Questions?

Volcanic
Fields on
Earth & Mars

Jacob
Richardson

Introduction

Overview

Sills
Lava Flows
Vent Density
Mars Clusters

Arsia Mons
Volcanic Field

Methods
Results
Implications

Conclusions