ROCK CORRAL BUTTE, IDAHO: AN INFLATED FLOW FIELD IN THE EASTERN SNAKE RIVER PLAIN

Kiersten Hottendorf and Tracy K.P. Gregg

kahotten@buffalo.edu

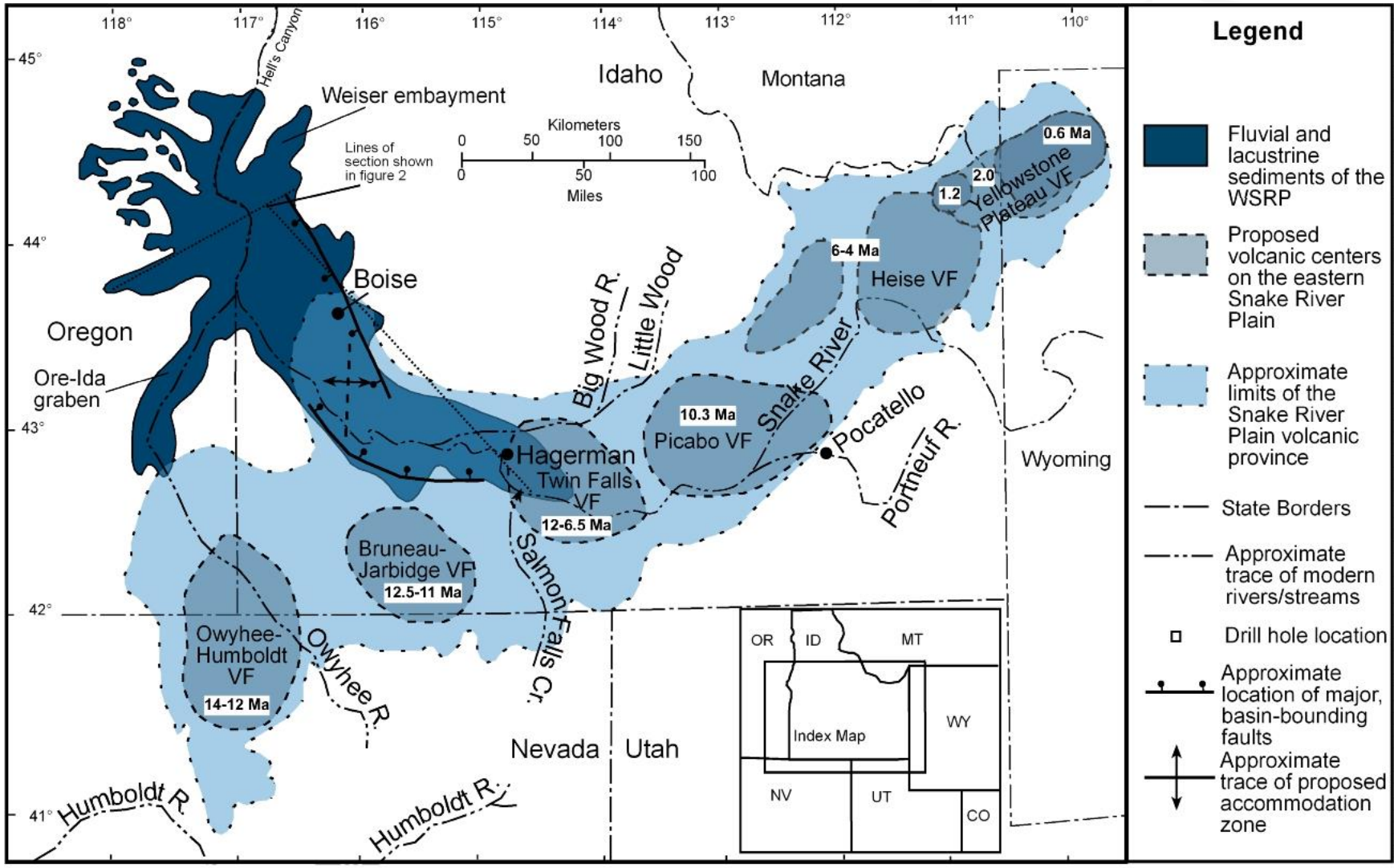
Center for GeoHazards Studies
University at Buffalo
The State University of New York
College of Arts and Sciences

University at Buffalo The State University of New York

Eastern Snake River Plain (ESRP), Idaho

- Formed as a part of the Yellowstone hotspot track

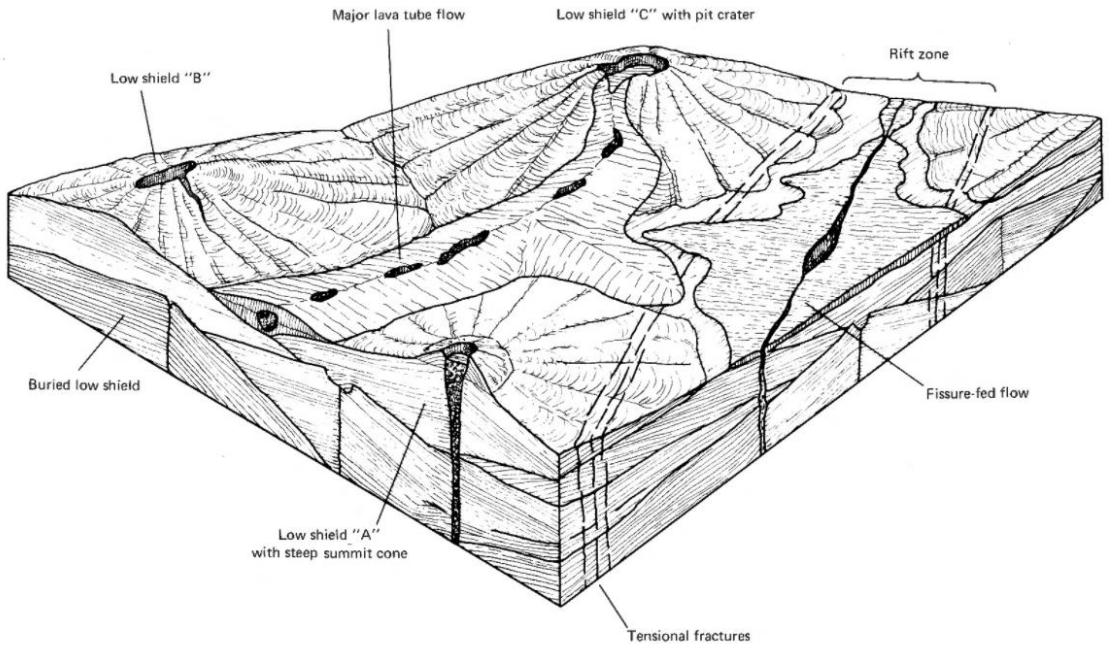
  [Camp and Wells, 2021, GSA Today]

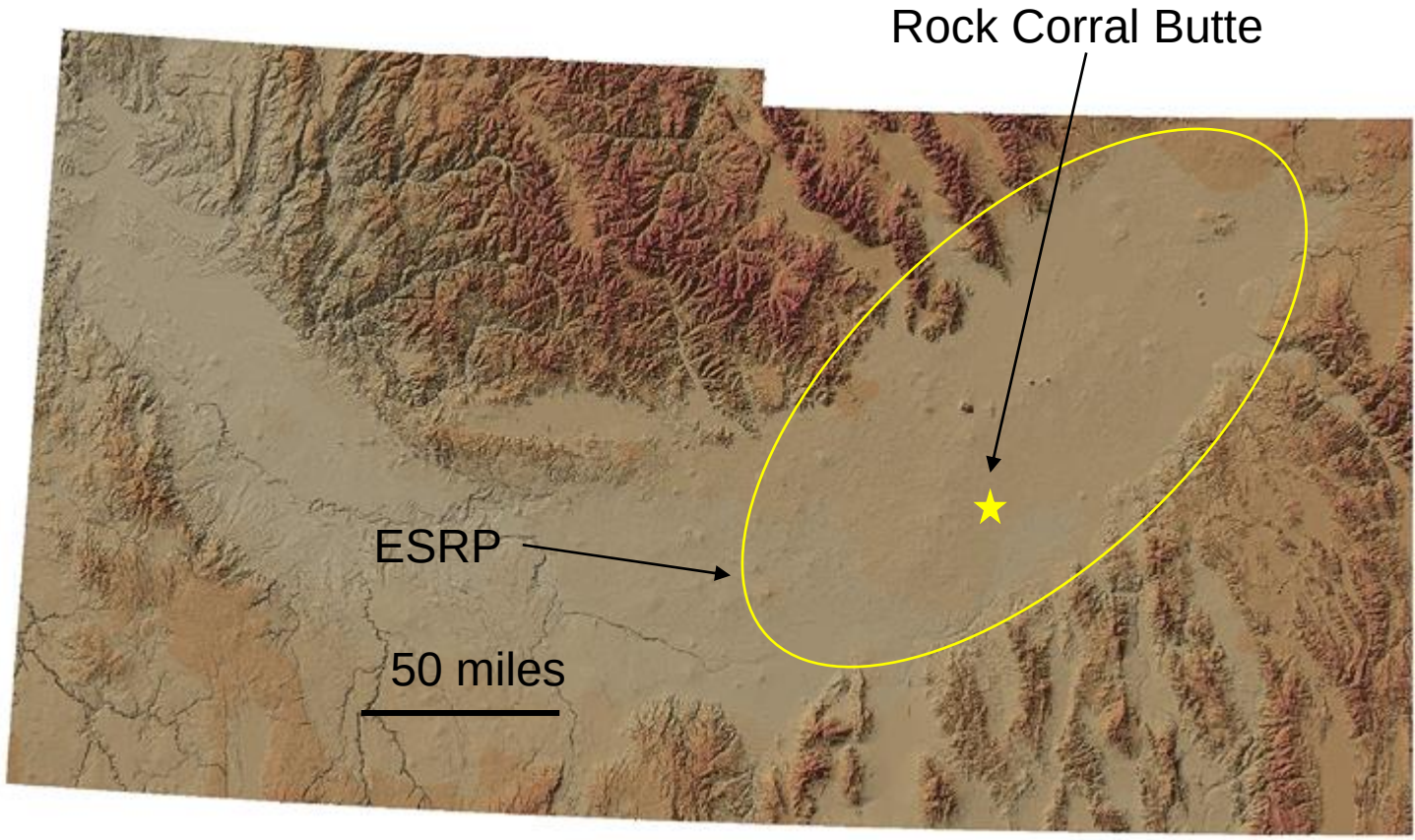


http://geology.isu.edu/Digital_Geology_Idaho/Module11/calderas.jpg

Eastern Snake River Plain (ESRP), Idaho

- Plains-style volcanism and small shield fields *[Greeley and King,1977, Comparative Planetary Geology Guidebook]*



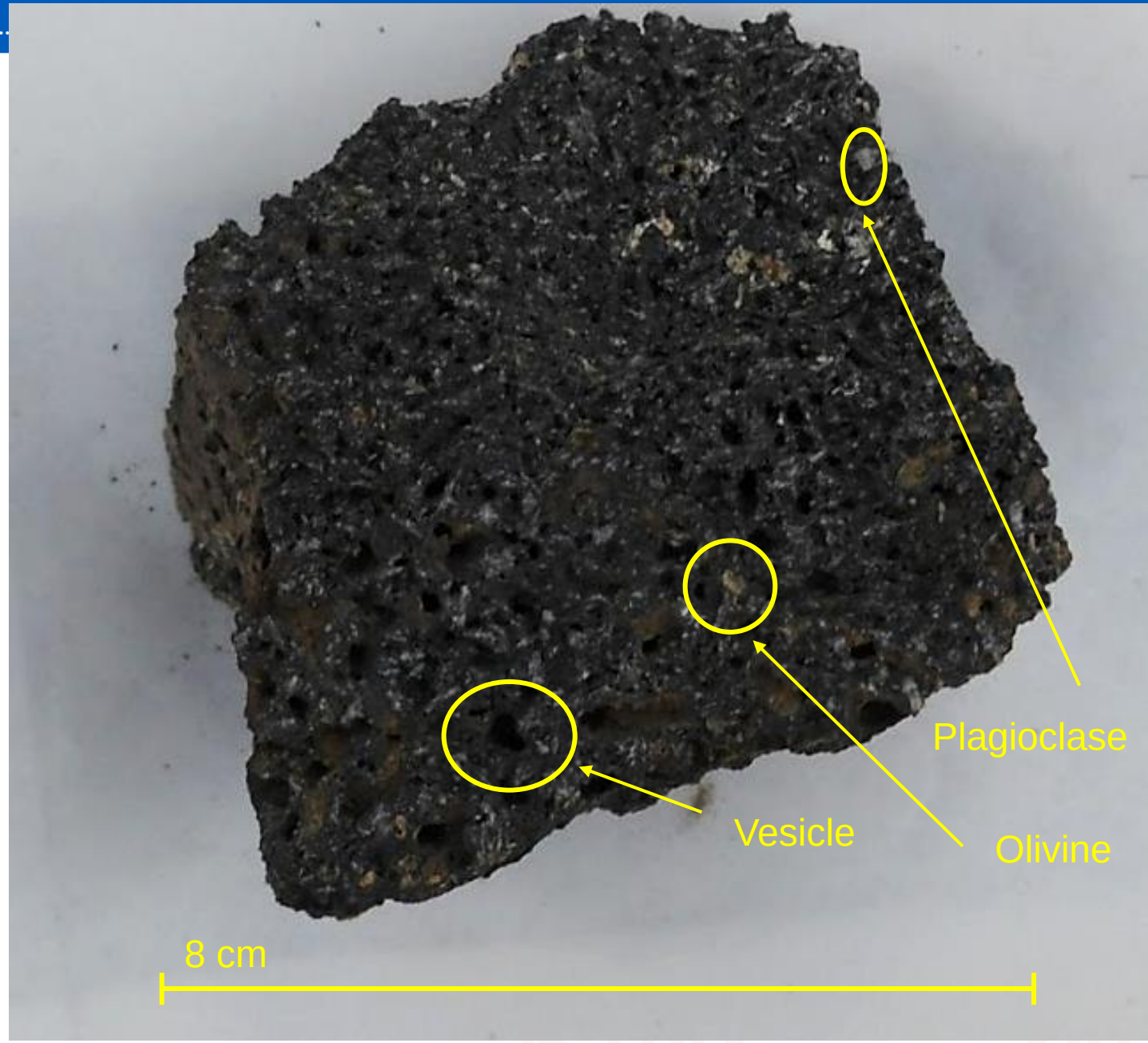


Digital Atlas of Idaho

Eastern Snake River Plain (ESRP), Idaho

- Dominantly tholeiitic basalts

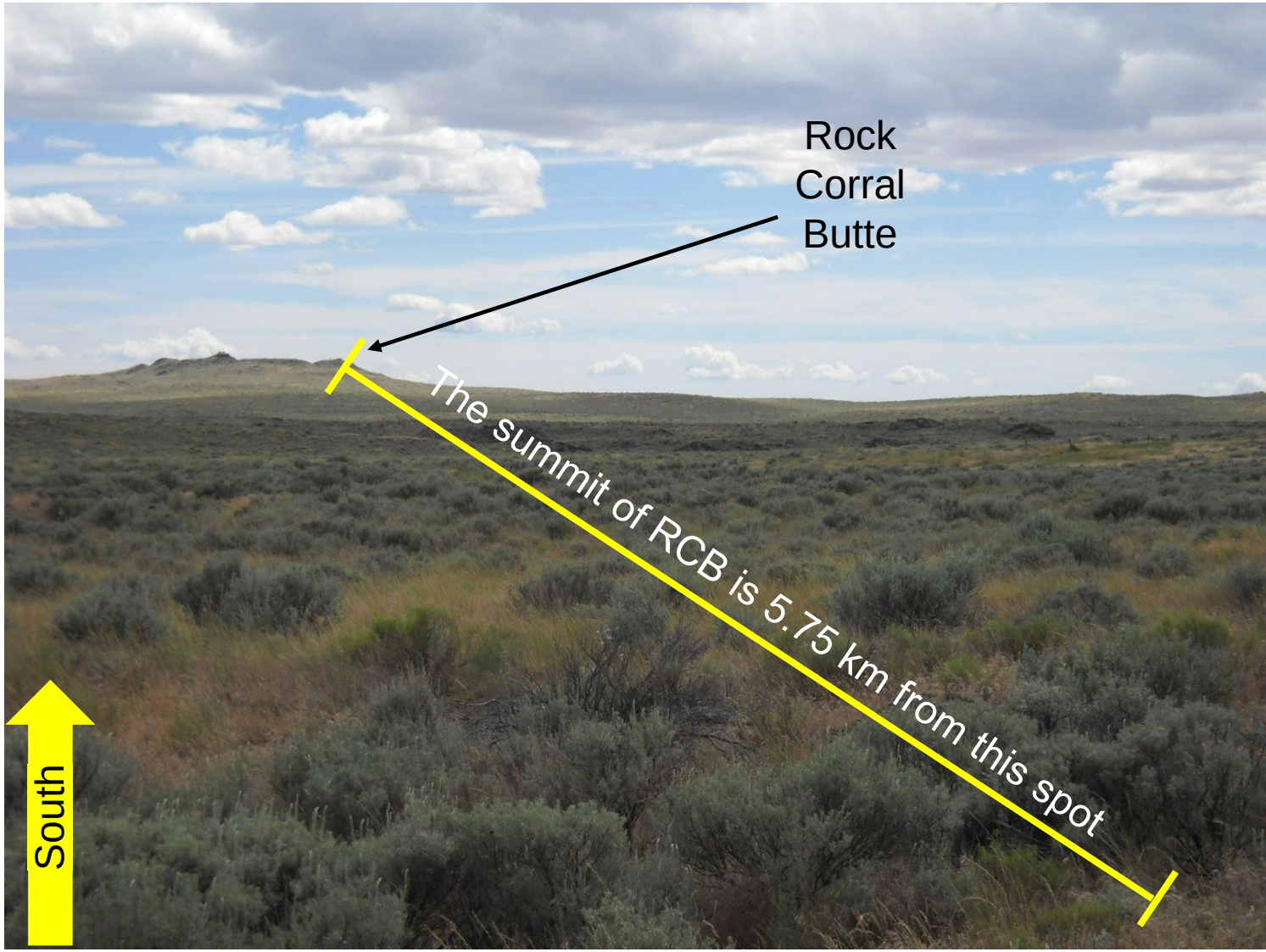
  [Hughes et al., 2002, Idaho Geological Survey Bulletin 30]



Gregg, 2018

Rock Corral Butte

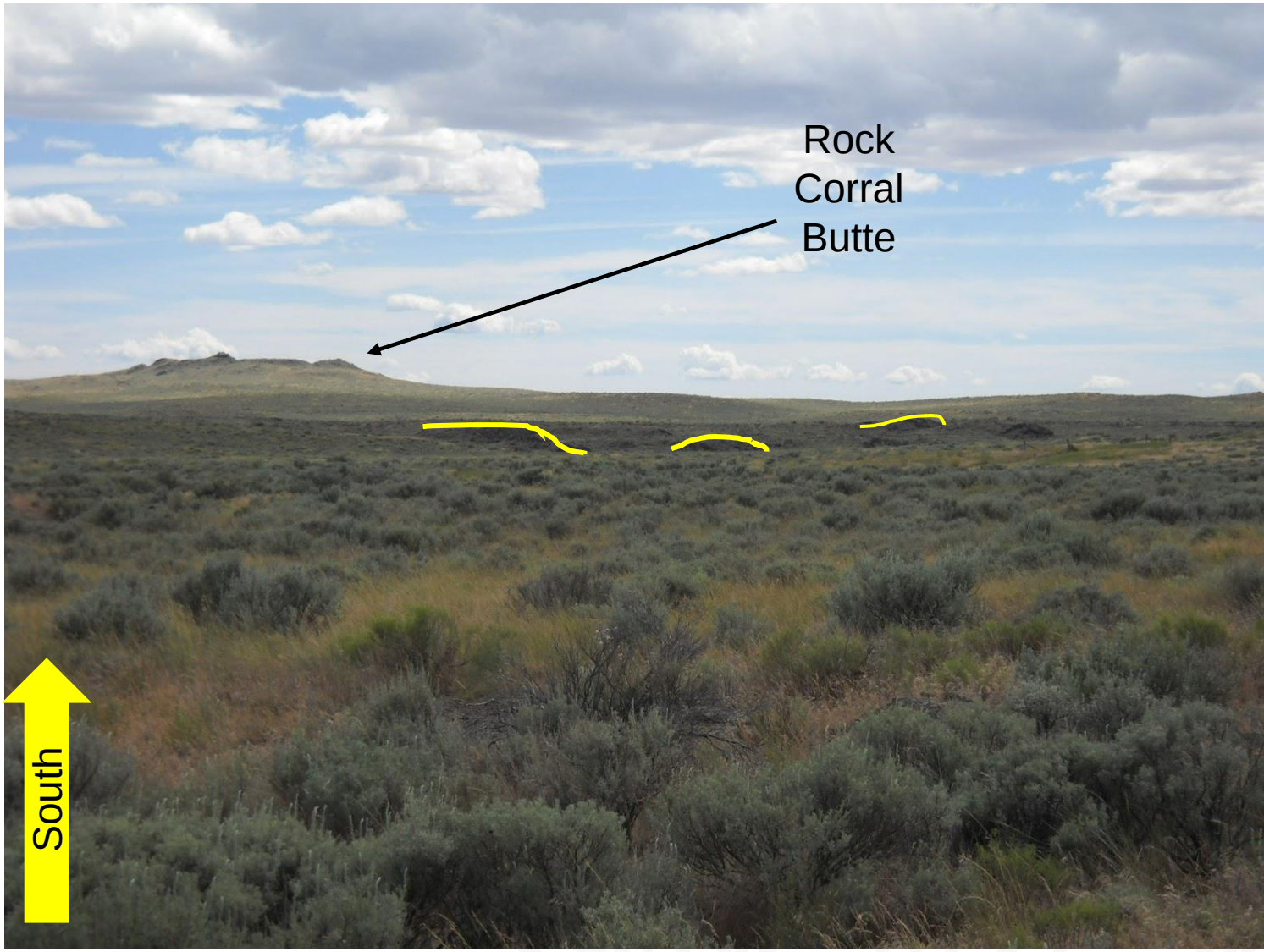
- 50,000-year-old basaltic shield volcano *[Kuntz et al., 2004, Geological Field Trips in Southern Idaho]*



Gregg, 2018

Rock Corral Butte

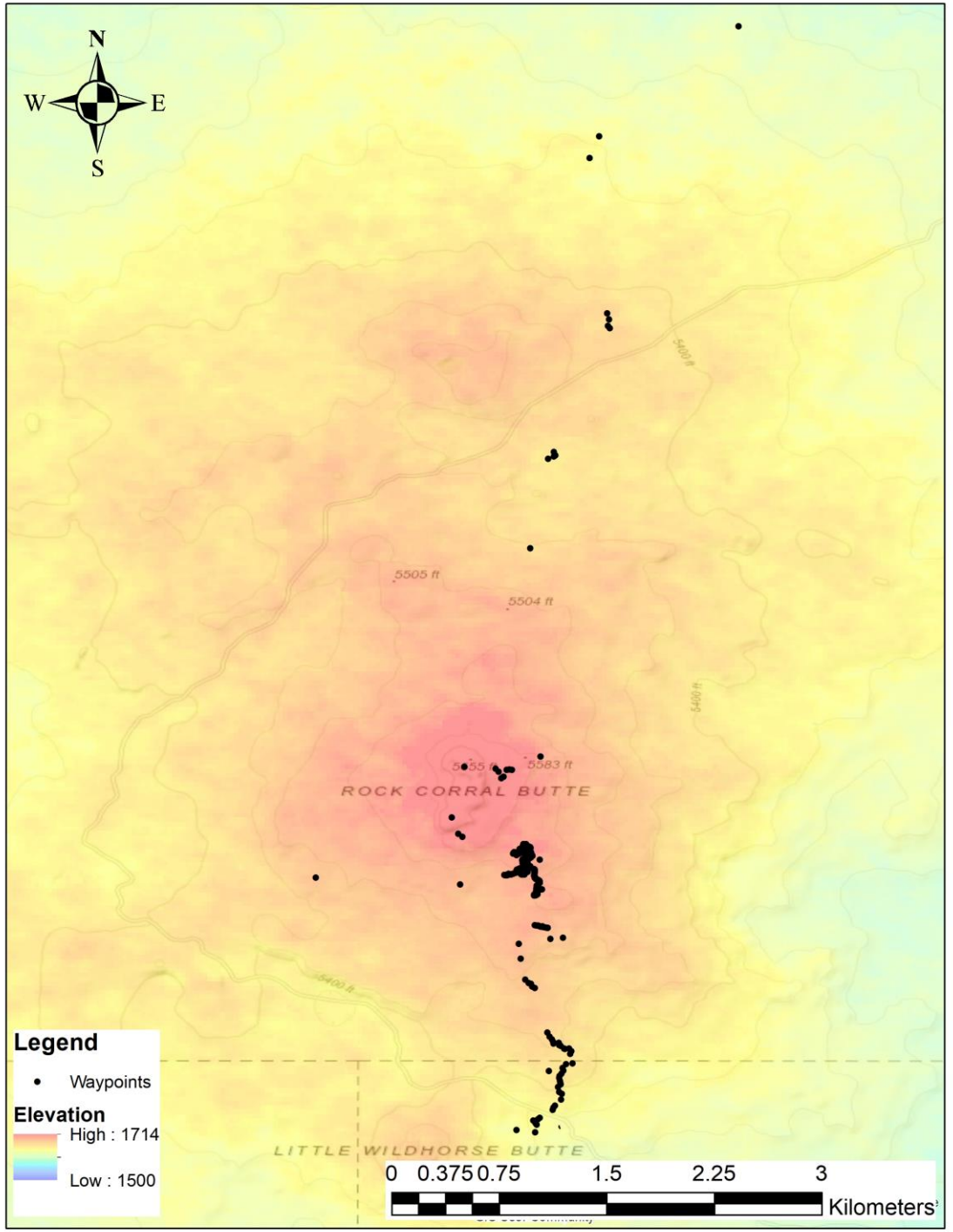
- Displays basalt hummocks in lava field
  - 1 - 4 meters tall,
  - 5 - 10 meters long
  - 3 - 10 meters width *[Gregg, 2004]*
- Inferring the basalt hummocks are inflation features (i.e. tumuli)



Gregg, 2018

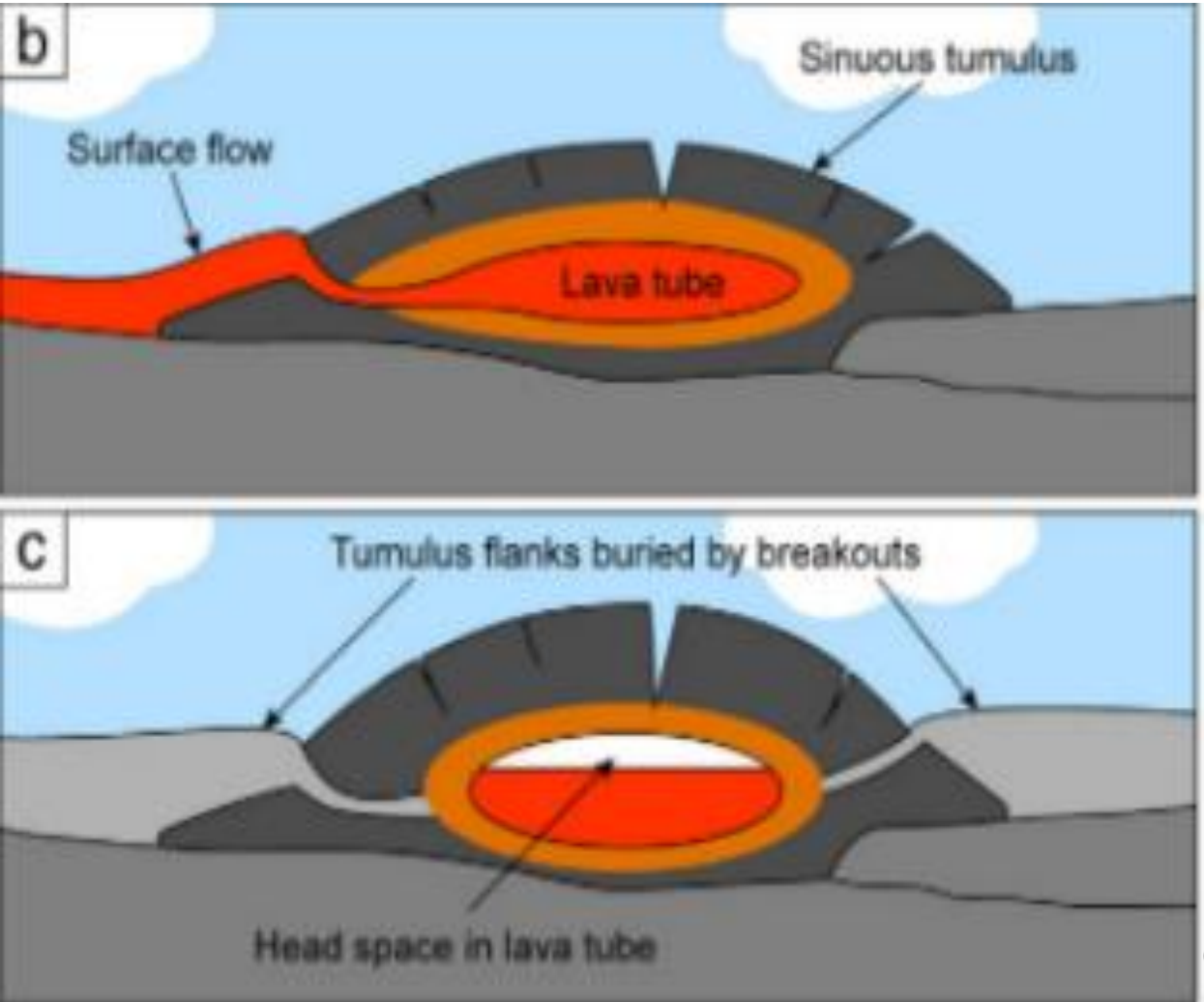
Questions We Have About RCB

- What is the eruption style and duration of RCB?
- Can we use tumuli morphology to constrain eruption style and duration?
- Can we use crystal size distribution (CSD) to constrain the eruption style and duration?



Tumuli

HAWAIIAN



ICELANDIC (*FLOW-LOBE*)

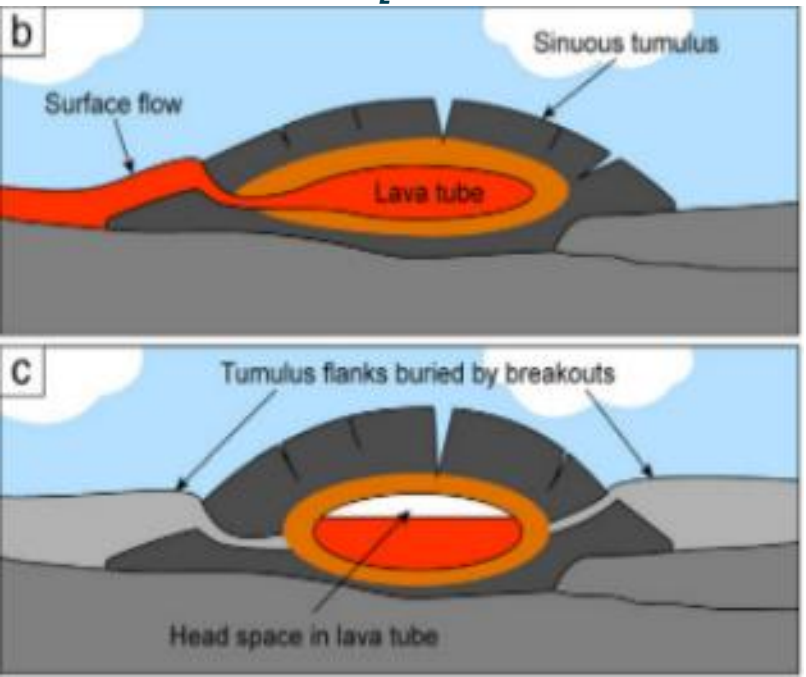
Orr et al., 2013, JVGR

Tumuli

HAWAIIAN

- Football shaped with dimensions of

  ~ 1-10 m *[Orr et al., 2013, JVGR]*



Orr et al., 2013, JVGR

ICELANDIC (*FLOW LOBE*)

Tumuli

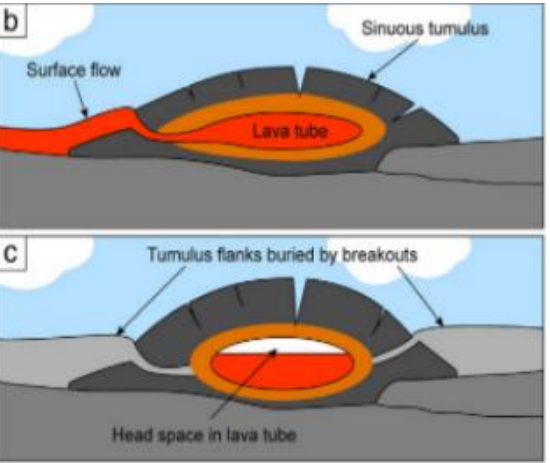
HAWAIIAN

- Football shaped with dimensions of

  ~ 1-10 m *[Orr et al., 2013, JVGR]*

- Forms after initial lava flow emplacement

  [Gregg, 2004]



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ICELANDIC (*FLOW LOBE*)

Tumuli

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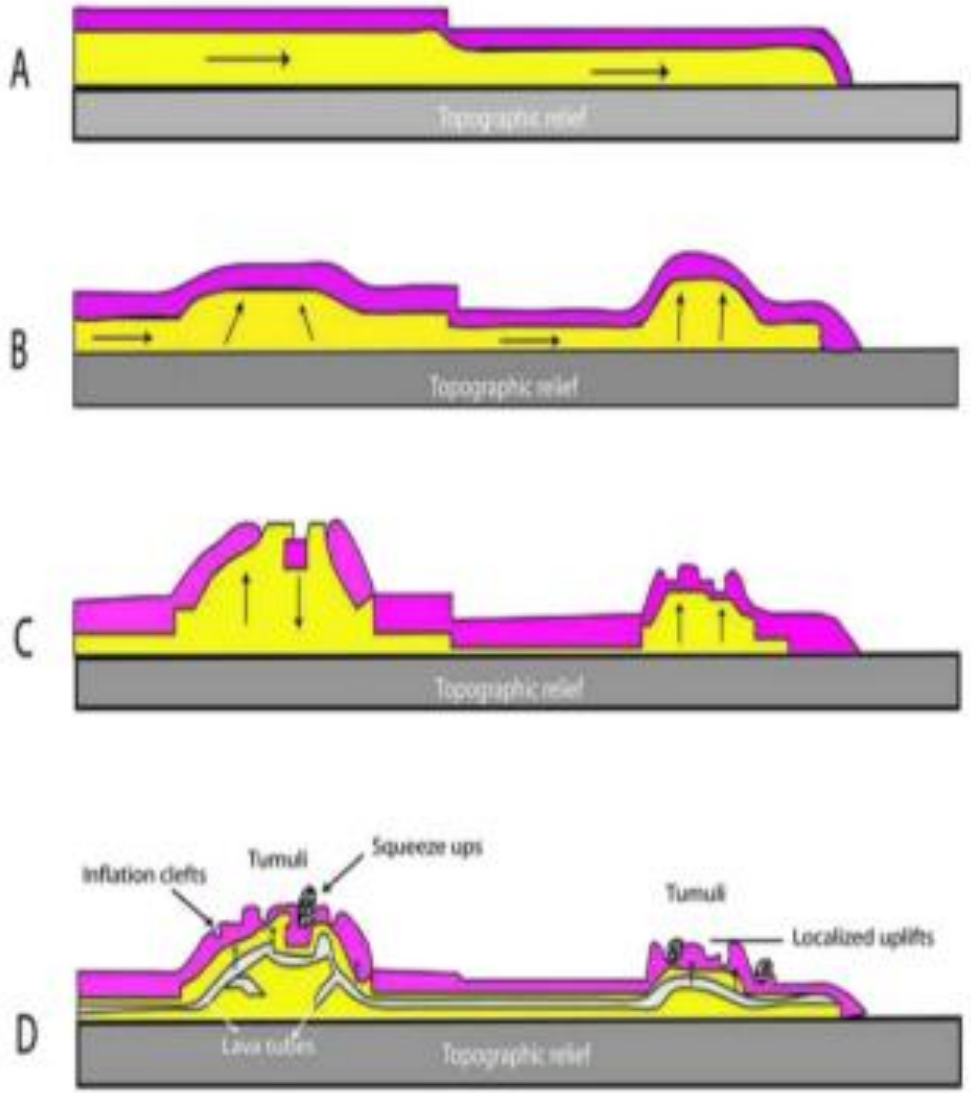
ICELANDIC (*FLOW LOBE*)



Khalaf and Hammed, 2014, J. African Earth Sciences

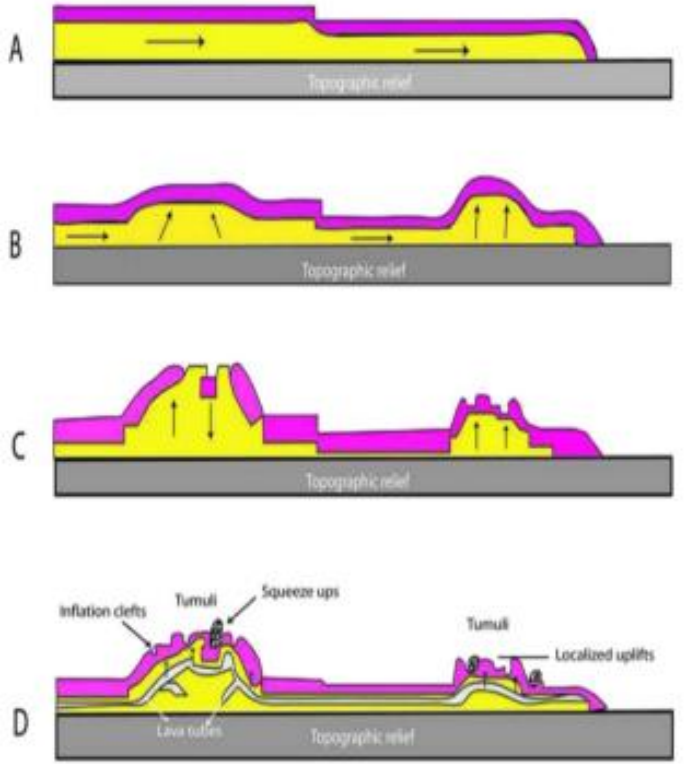
Tumuli

HAWAIIAN

- Football shaped with dimensions of ~ 1-10 m *[Orr et al., 2013, JVGR]*
- Forms after initial lava flow emplacement *[Gregg, 2004]*

ICELANDIC (*FLOW LOBE*)

- Entire lava flow lobes ~ 5-15 m dimensions



Khalaf and Hammed, 2014, J. African Earth Sciences

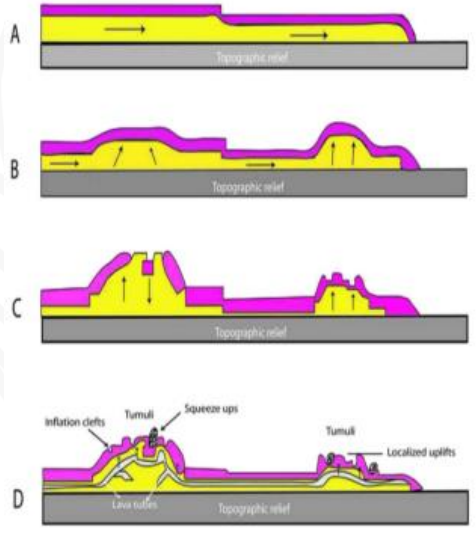
Tumuli

HAWAIIAN

- Football shaped with dimensions of ~ 1-10 m *[Orr et al., 2013, JVGR]*
- Forms after initial lava flow emplacement *[Gregg, 2004]*

ICELANDIC (*FLOW-LOBE*)

- Entire lava flow lobes ~ 5-15 m dimensions
- Form during initial emplacement of lava flow



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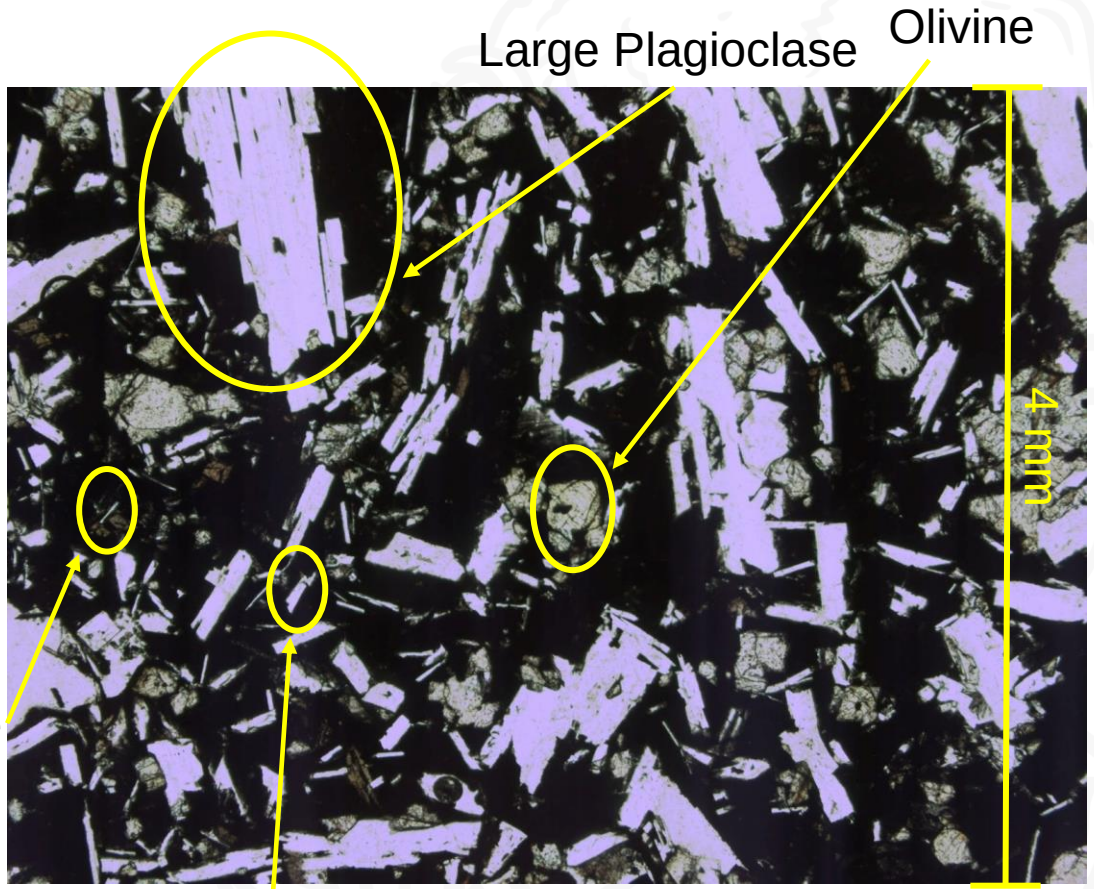
Preliminary Crystal-Size Distribution (CSD) Results

- At least two plagioclase crystal populations found
- Largest phenocrysts formed in the magma chamber *[Hughes, 2002, Idaho Geological Survey Bulletin 30]*
- What environment did the smaller plagioclase grow in?

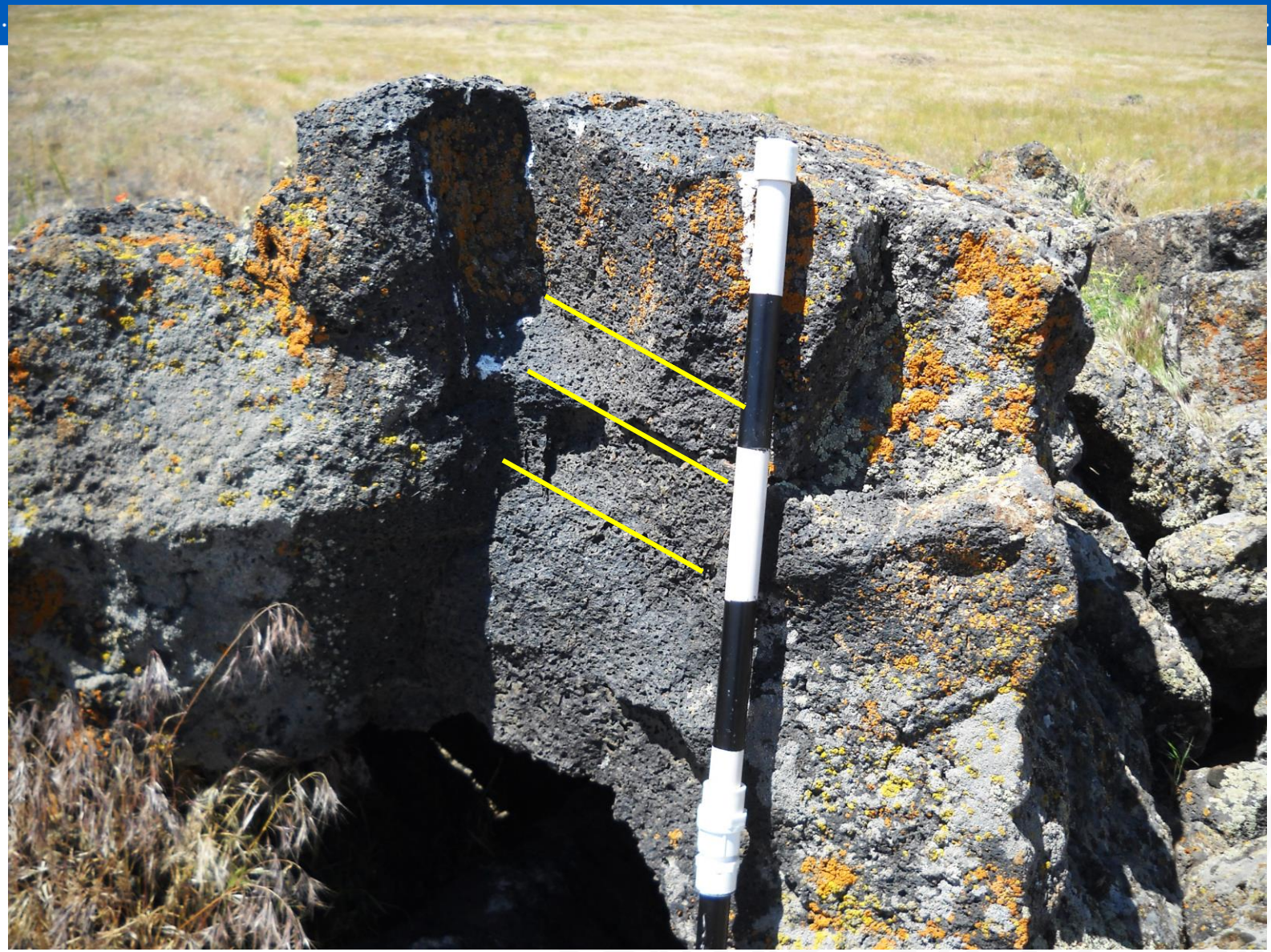


Gregg, 2018

Unknown Crystal Origin

OPTION 1: GREW DURING EMPLACEMENT

- Grew inside of lava flow
- Supports eruption duration of ~ 10^1 to 10^2 years
- Will determine with plagioclase growth rate



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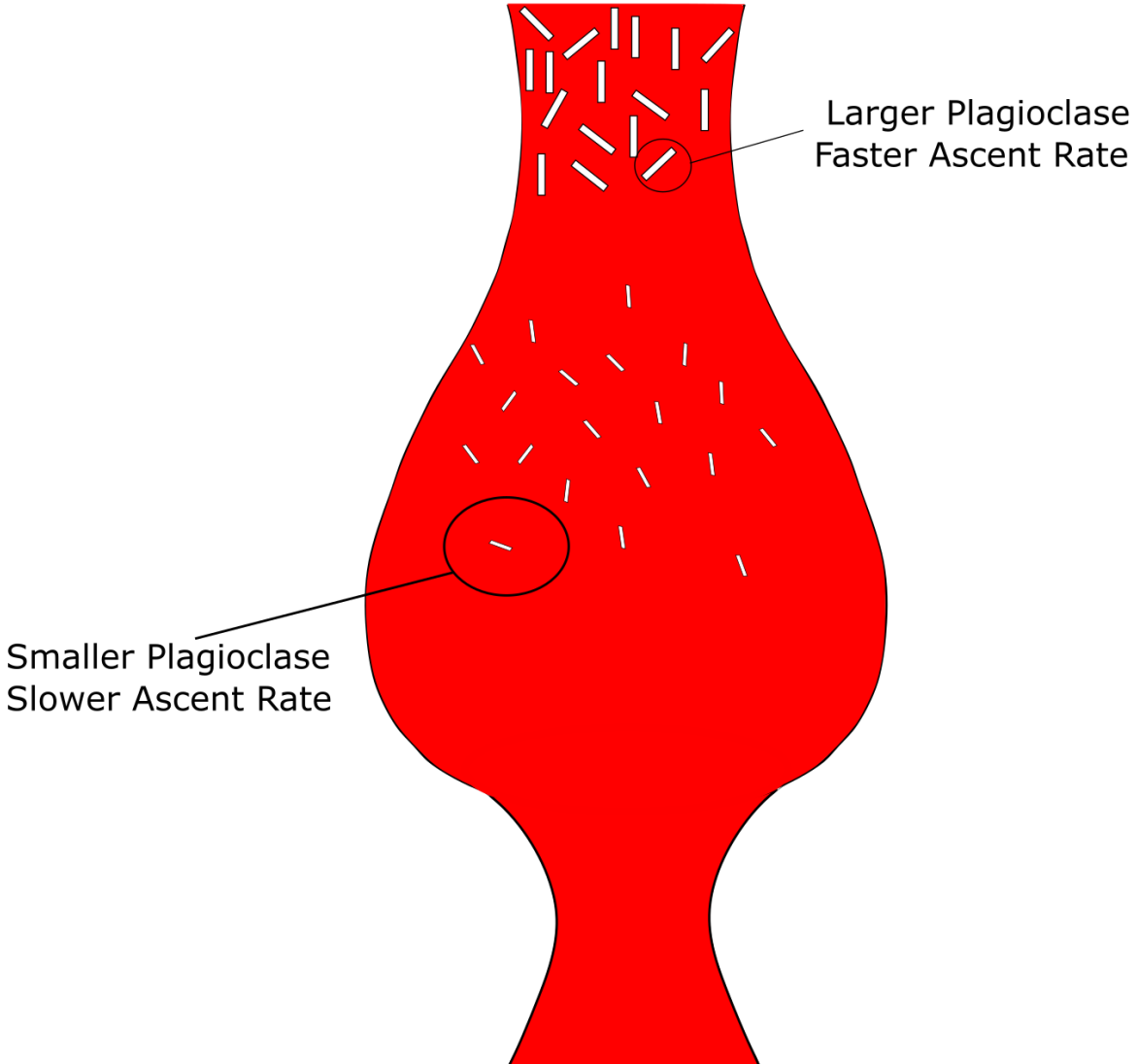


OPTION 2: GREW IN MAGMA CHAMBER

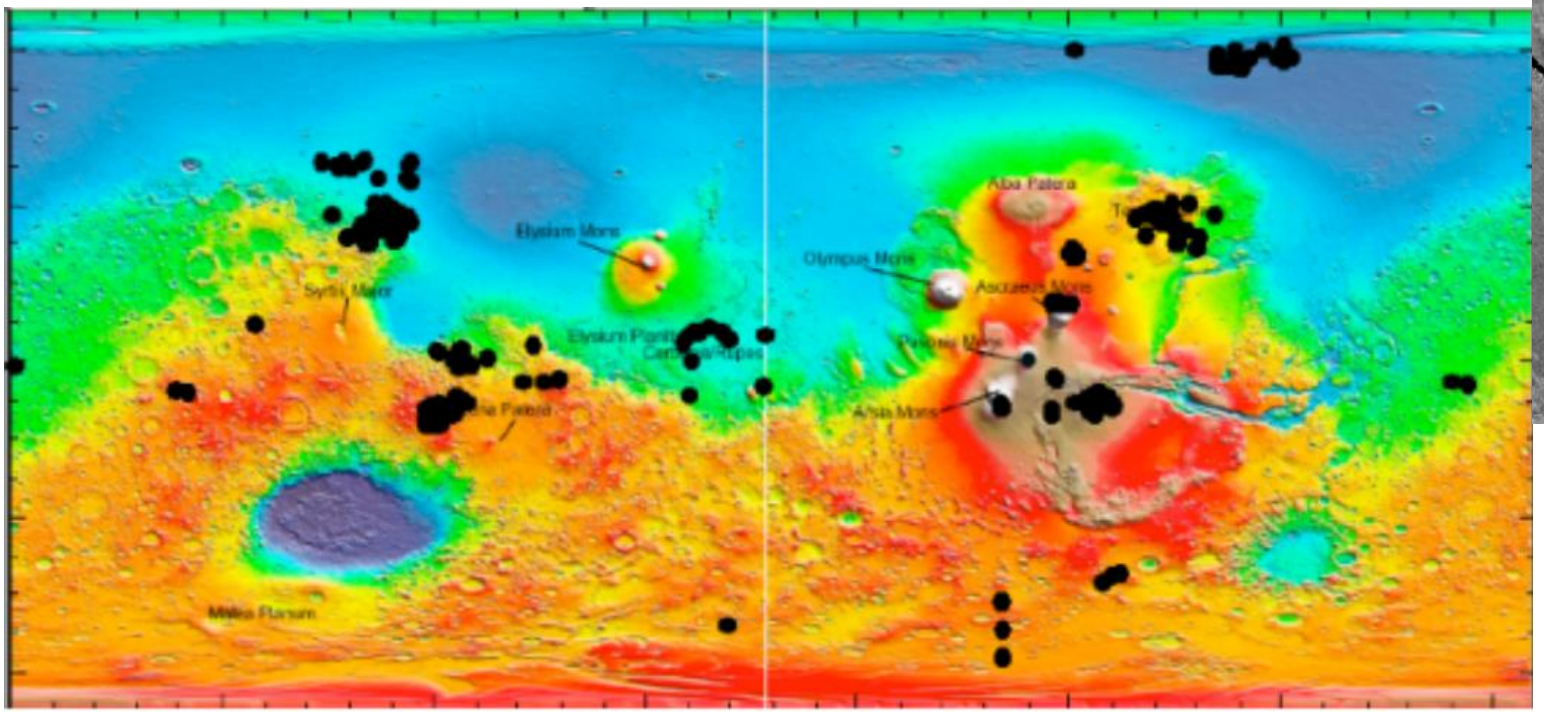
- Larger crystals at top of chamber ascend faster
- Smaller crystals lower in chamber ascend slower

Future Research

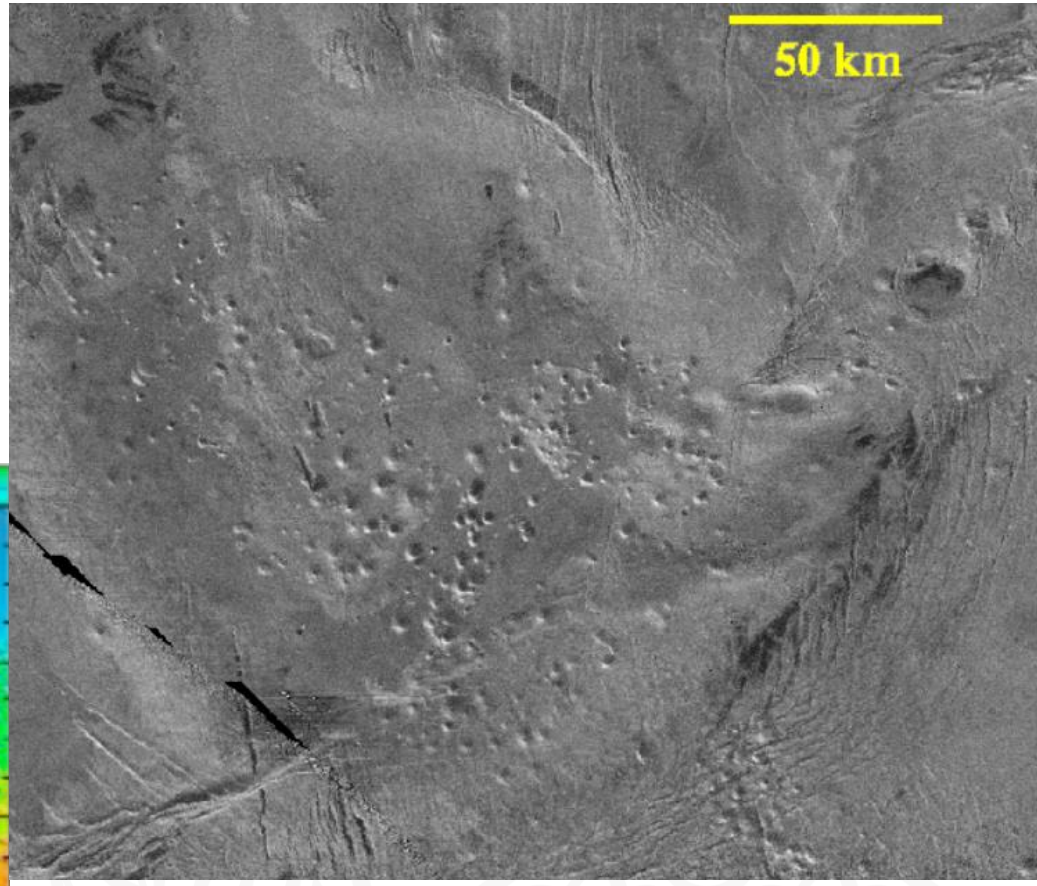
- Growth rate of plagioclase
- Field work at RCB July 2022
- SEM analysis of plagioclase and vesicles
- Small shield field applications

Planetary Application

- Small shield fields on Mars and Venus



Sakimoto, 2008, Lunar and Planetary Science Conference



LPI

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