The reactivation and monitoring of Steamboat geyser, Earth's tallest geyser

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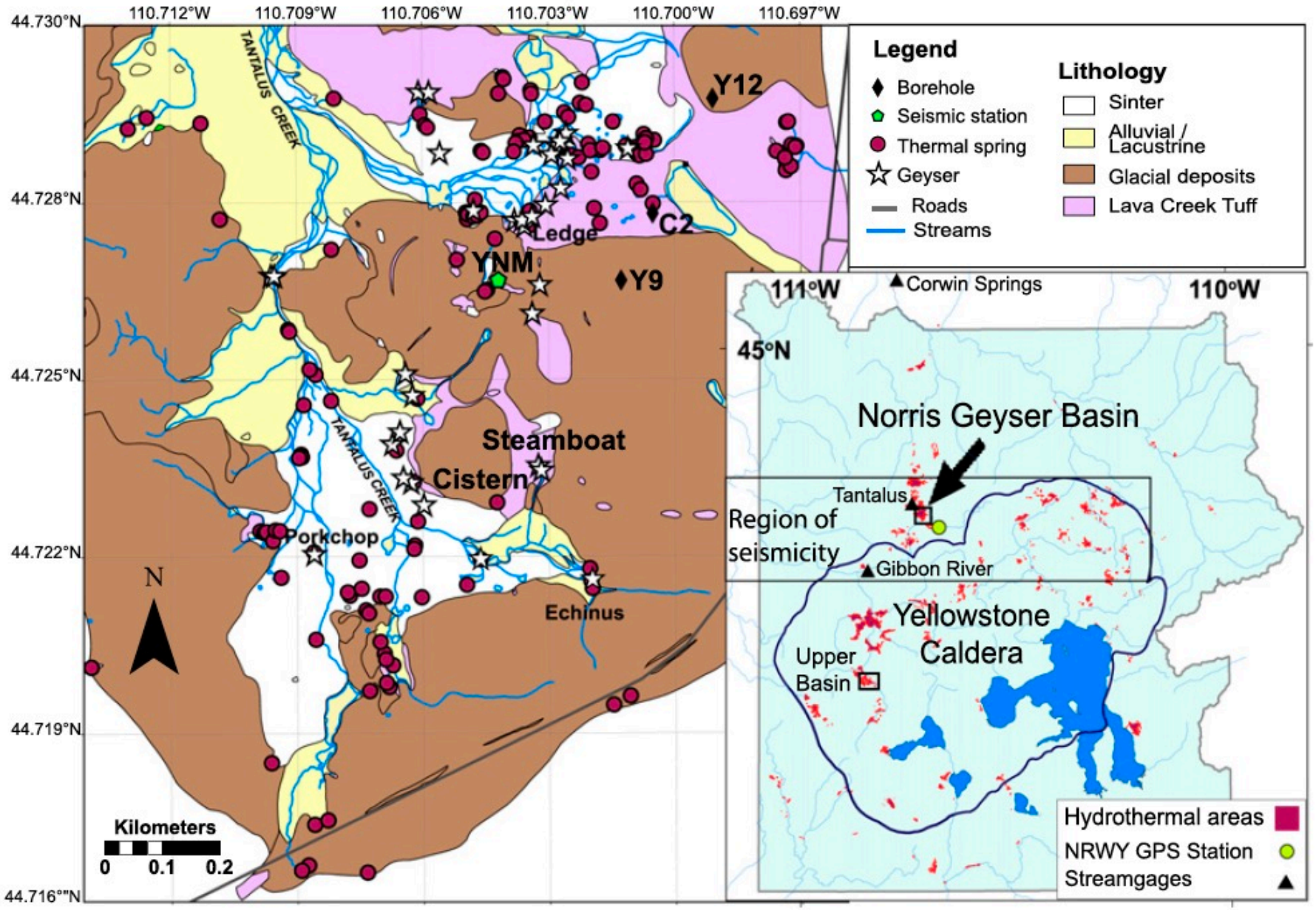
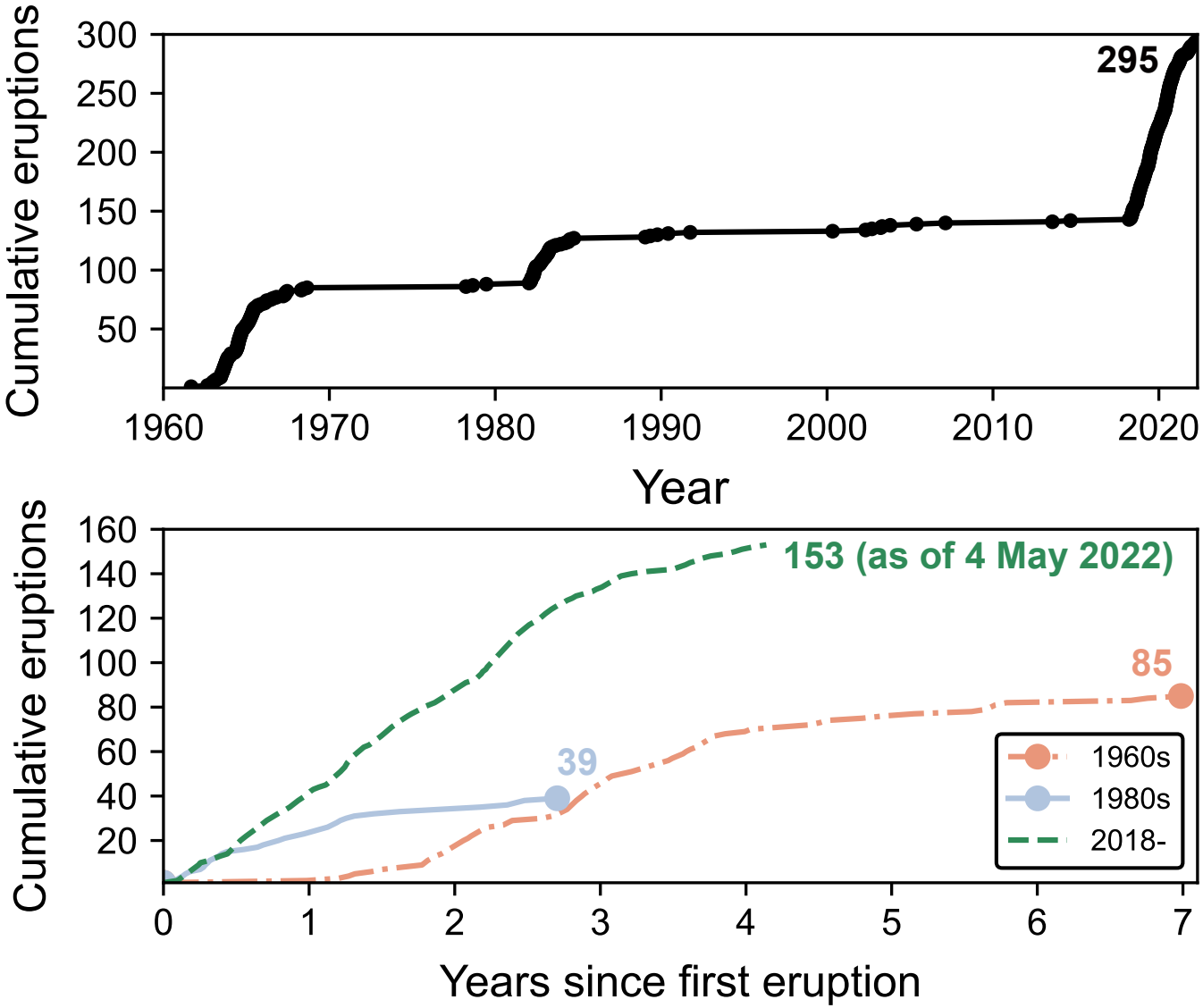
CIDER

Location


44.730°N
110.712°W
110.709°W
110.706°W
110.703°W
110.700°W
110.697°W
44.728°N
44.725°N
44.722°N
44.719°N
44.716°"N
TANTALUS CREEK
Y12
C2
Ledge
YNM
Y9
Steamboat
Cistern
Porkchop
Echinus
N
Kilometers
0 0.1 0.2
Legend
Borehole
Seismic station
Thermal spring
Geyser
Roads
Streams
Lithology
Sinter
Alluvial / Lacustrine
Glacial deposits
Lava Creek Tuff
111°W
Corwin Springs
110°W
45°N
Norris Geyser Basin
Tantalus
Region of seismicity
Gibbon River
Yellowstone Caldera
Upper Basin
Hydrothermal areas
NRWY GPS Station
Streamgages

New active phase in 2018



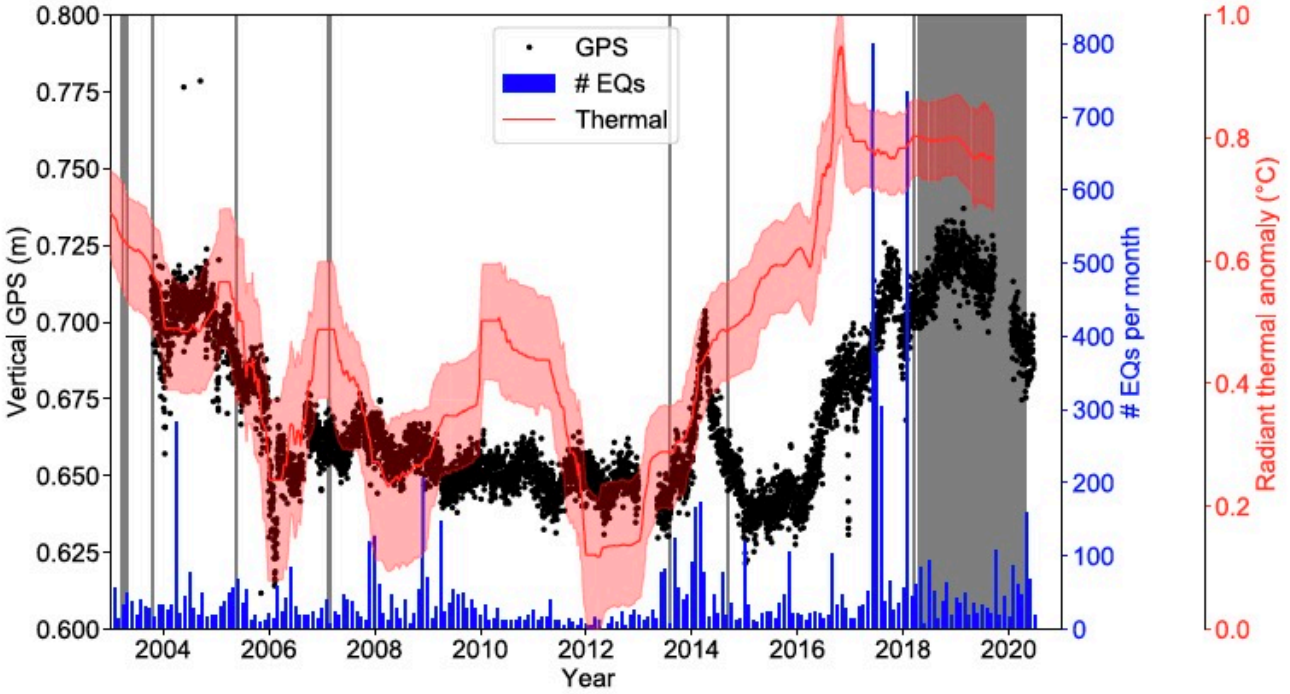
Open questions

Why did Steamboat become active again?

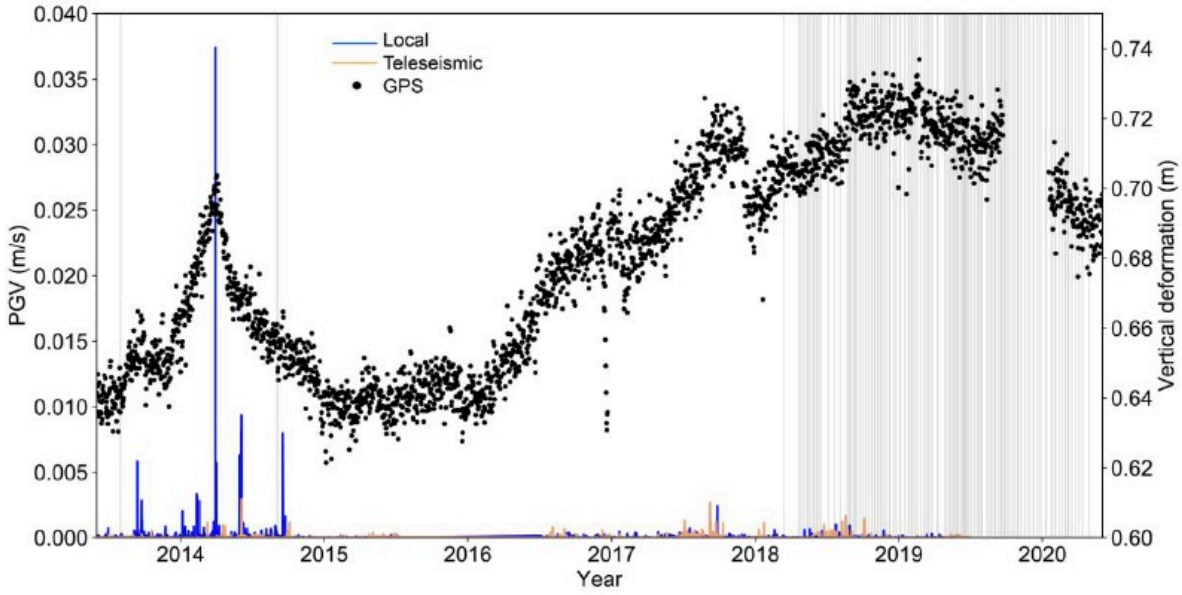
What controls the interval between eruptions?

Why is Steamboat so tall?

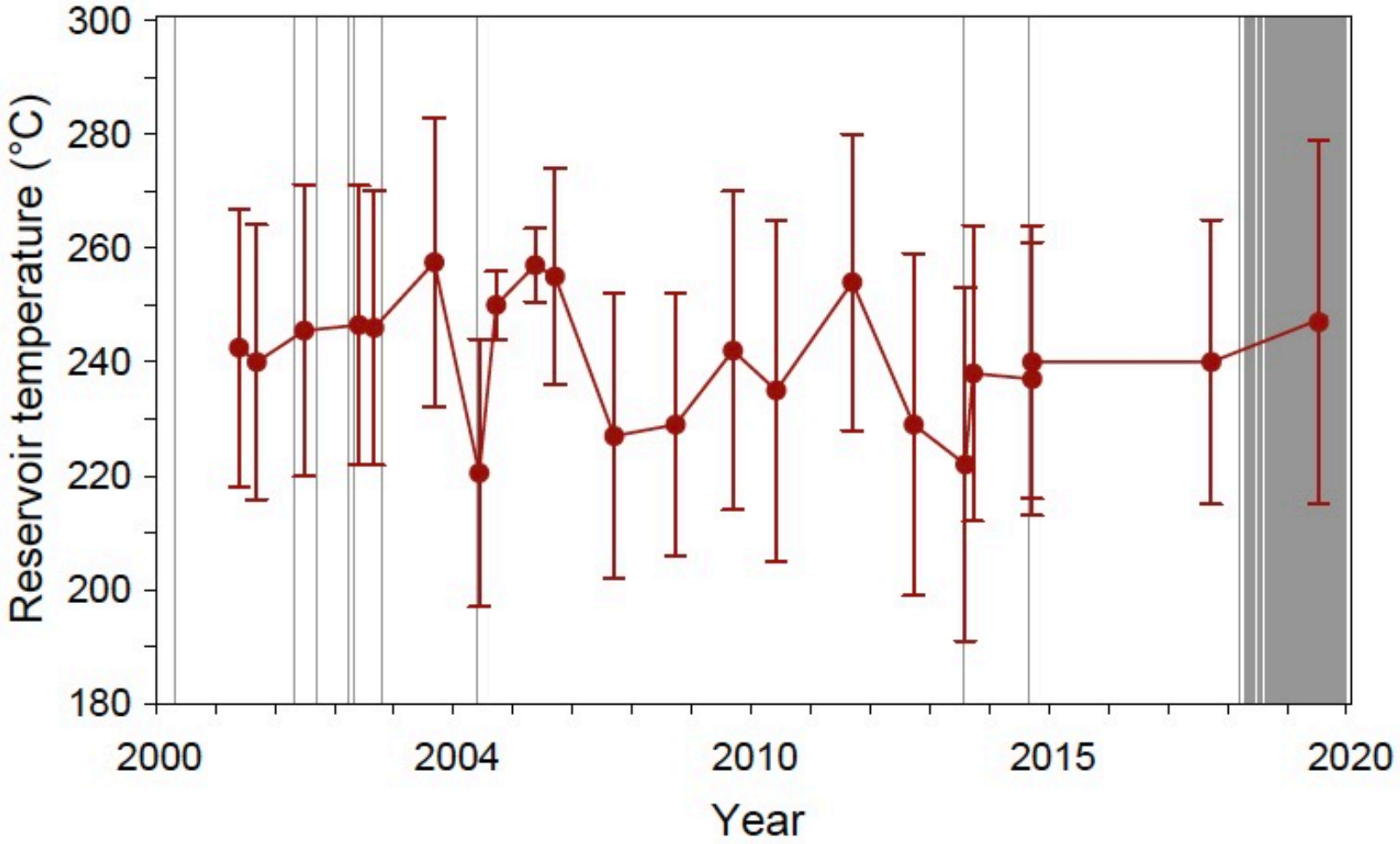
1. Why did Steamboat become active?



No clear connection to seismicity or ground deformation



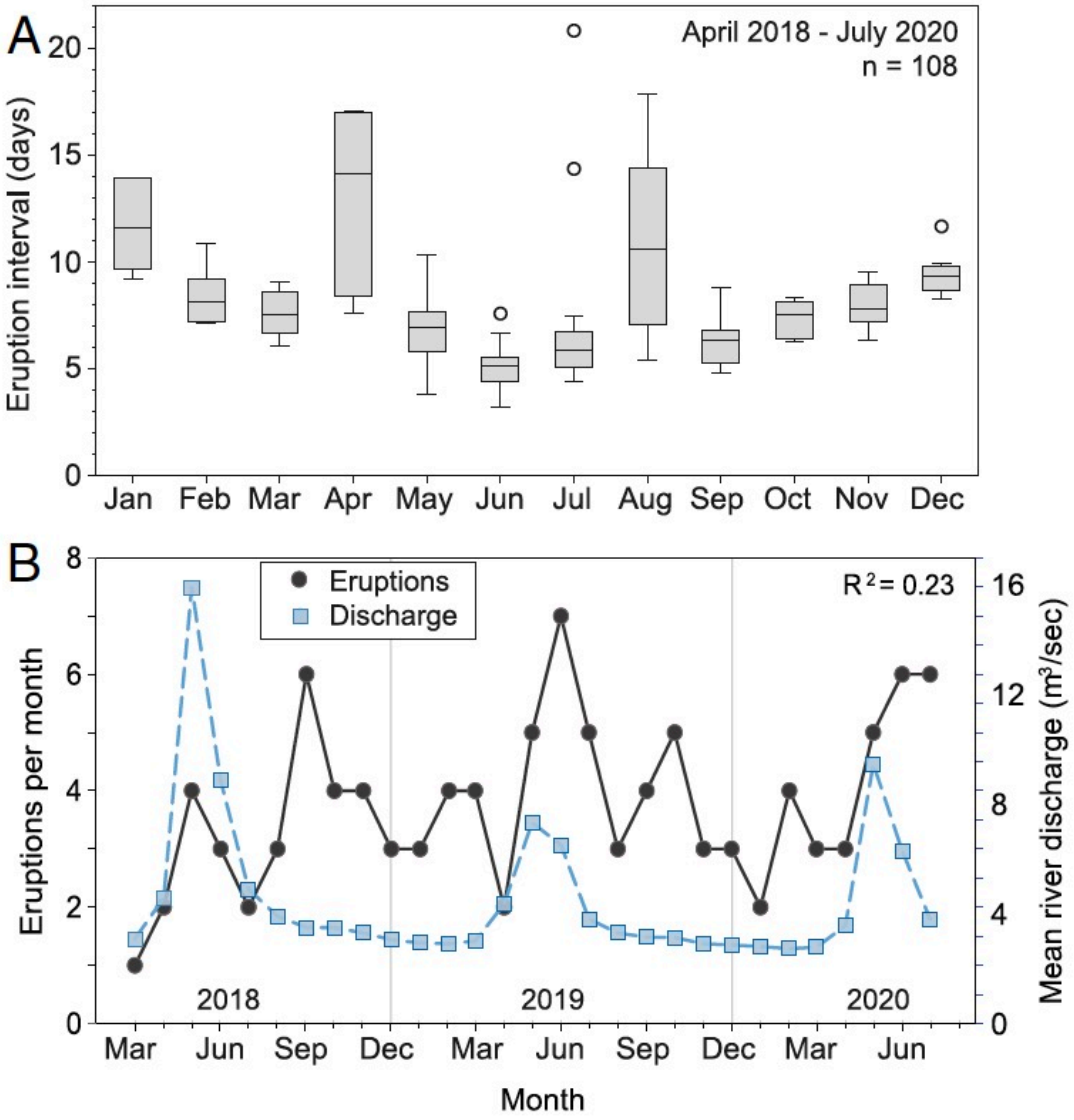
1. Why did Steamboat become active?



No change in reservoir temperature.

Internal hydrothermal processes led to reactivation?

2.Controls on interval between eruption?

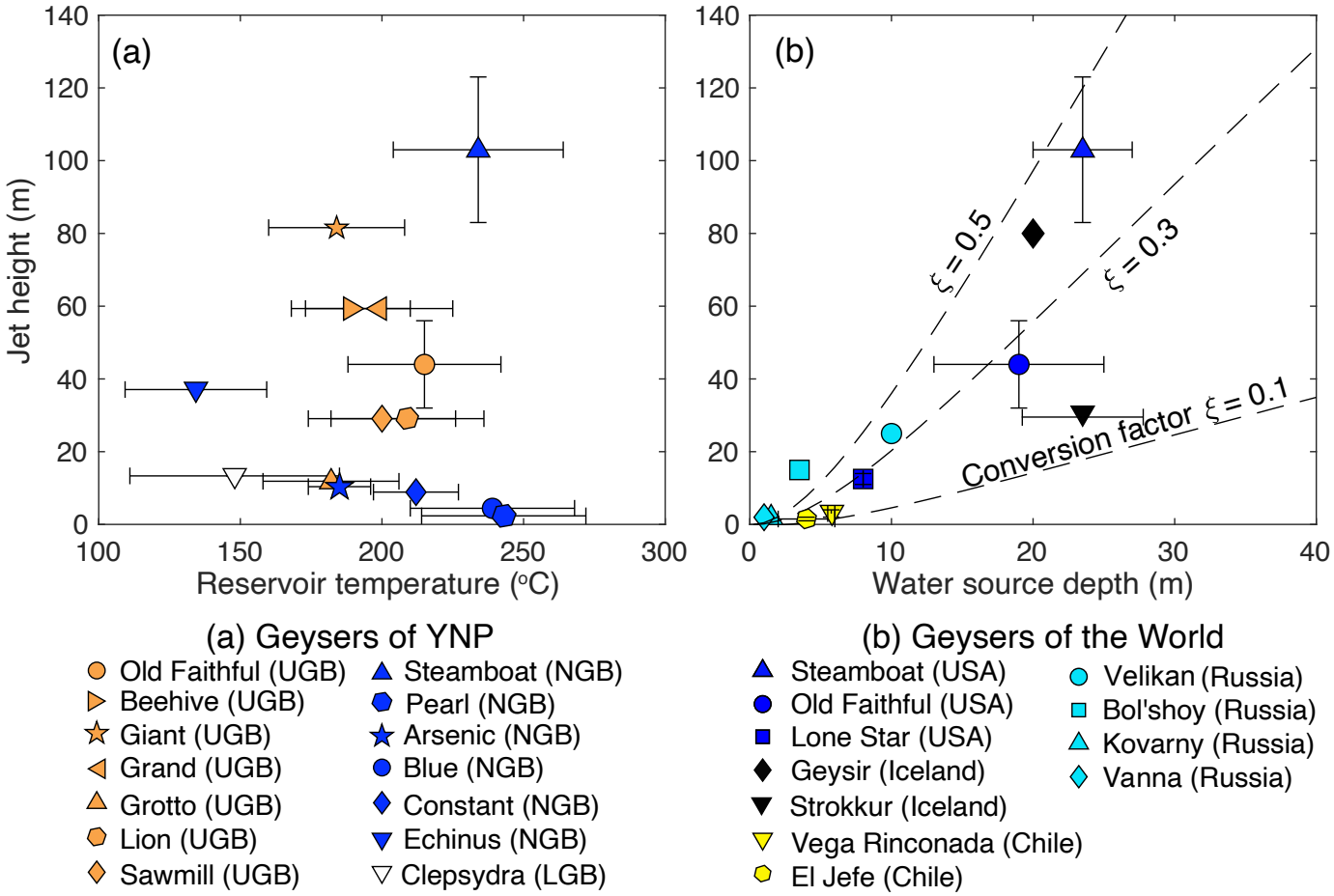


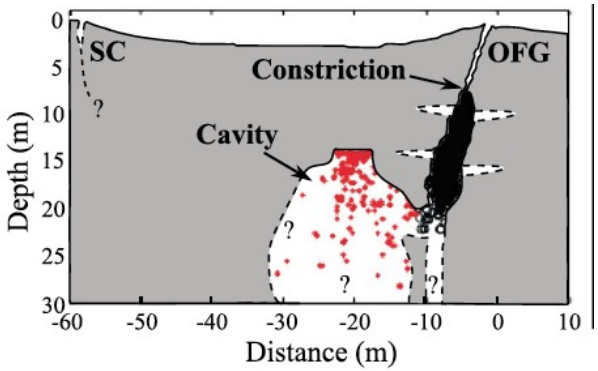
Seasonal modulation, shorter intervals when water levels in subsurface are high

Intervals not affected by wind speed, air pressure, or seismicity

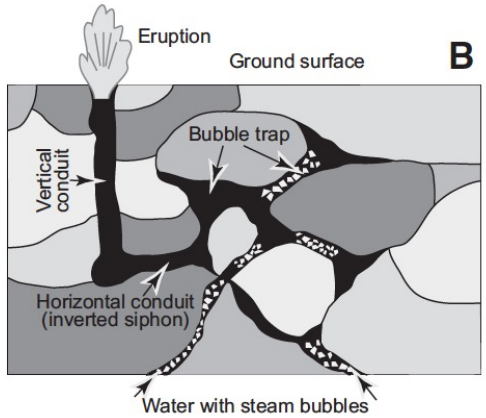
Erupted volume not connected to eruption interval, air temperature and pressure

3. Why so tall?





Vandemeulenbrouck et al (2013)



Belousov et al (2014)

Deeper cavities are hotter and hence have more enthalpy

Open questions

- Why did Steamboat become active again?

Unclear. Internal processes?

- What controls the interval between eruptions?

Internal processes modulated by water levels

- Why is Steamboat so tall?

Depth of shallow reservoir supplying water controls energy available to power eruptions