Missing super-volcanoes, future super-volcanoes, finding them and listening to them!

Benoit Taisne
Earth Observatory of Singapore
Nanyang Technological University

Klyuchevskoy, few days ago...
GVP - Holocene Volcanoes

Total of 1532 volcanoes – Globally (excluding Mid Oceanic Ridges)
GVP - Holocene Volcanoes
Total of 1532 volcanoes – 1065 @ Subduction Zones
GVP - Holocene Volcanoes

Total of 1532 volcanoes – 613 Stratovolcanoes @ Subduction Zones
GVP - Holocene Volcanoes
Total of 1532 volcanoes – 83 Calderas @ Subduction Zones
70% of all Volcanoes
85% of all Stratovolcanoes
86% of all Calderas

Subduction Zones
Missing super volcanoes?

Ground and Remote mapping

Ice core records of volcanic eruptions
63 bipolar events in the past 2000 years - 13 known sources
Are we missing something fundamental here?

Sigl et al., 2014
Future super volcanoes?

Dense geophysical multi-parametric stations

Imaging magma storage region and interconnectivity between caldera-involved edifices

Is the next caldera a caldera? Looking for mature system within clustered volcanoes.

**Toba**, Sumatra
Campaigns 10BB, 30SP and 42SP-3comp
Koulakov et al., 2016, Nature

**Klyuchevskoy group**, Kamchatka
10 years of monitoring data -> 4D tomography
Koulakov et al., 2016
Future super volcanoes?
Dense geophysical multi-parametric stations

Imaging magma storage region and interconnectivity between caldera-involved edifices
Is the next caldera a caldera? Looking for mature system within clustered volcanoes.

In line with philosophy of the following whitepapers:

**Andy Frassetto** – Lessons from USArray

**Taryn Lopez** – Reanalysis Synthesis of existing data, multidisciplinary collaborations

**Diana Roman** – Instrumentation of selected volcanoes, 4D

**Paul Segall** – Multidisciplinary system scale models (gas, geodesy, seismic…. infrasound)

**David Fee** – Integrating Infrasound into SZO
Infrasound... but why?
An early warning system for atmospheric injection of volcanic ash

Global to Regional to Local: Detecting and characterizing volcanic events

Detection from the international monitoring system, CTBTO

Dabrowa et al., 2012
Infrasound... but why?
An early warning system for atmospheric injection of volcanic ash

Global to Regional to Local: Detecting and characterizing volcanic events

1625 km and 1 hour detection capability

The shorter the time... the denser the network
Missing super volcanoes?
Ground and Remote mapping

Future super volcanoes?
Dense geophysical multi-parametric stations

Infrasound… but why?
An early warning system for atmospheric injection of volcanic ash

85% of all Stratovolcanoes
86% of all Calderas
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Subduction Zones