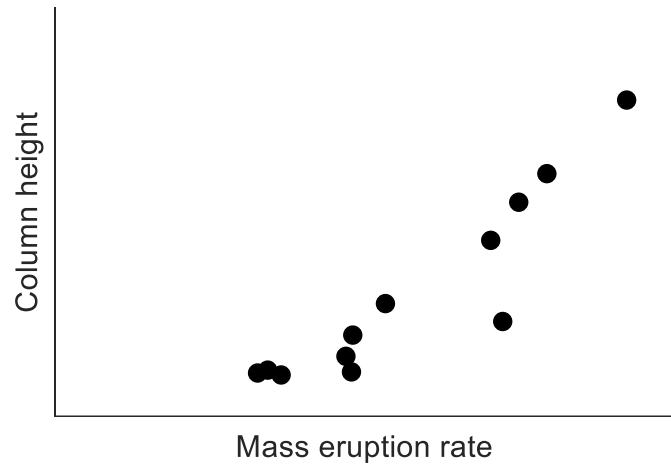
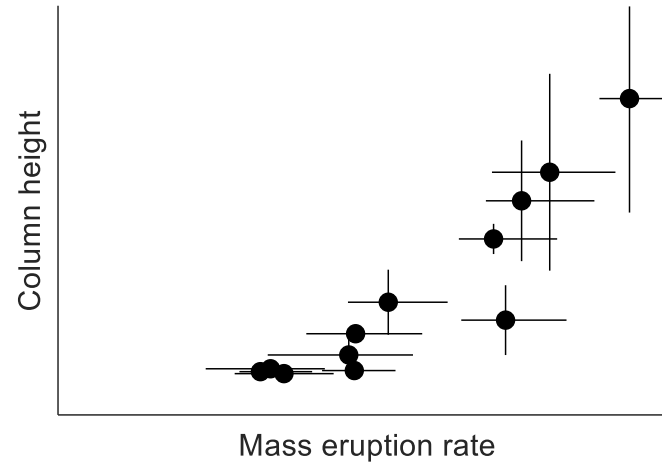


In brief...

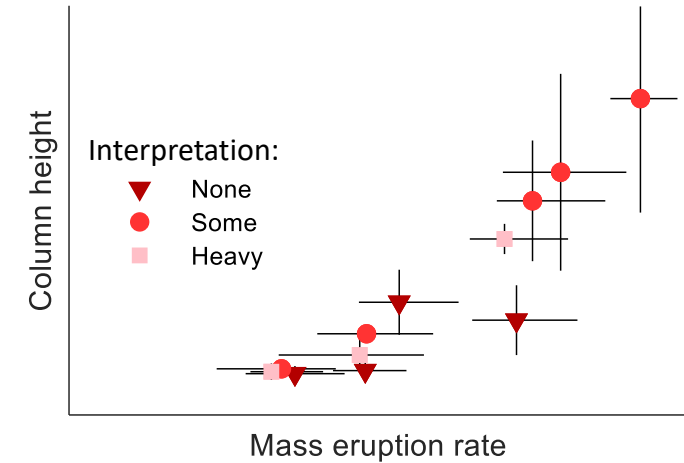
① Eruption source parameter (ESP) datasets are key for initializing and evaluating plume models widely used by research and operational scientists. **We have produced a new ESP database which includes:**



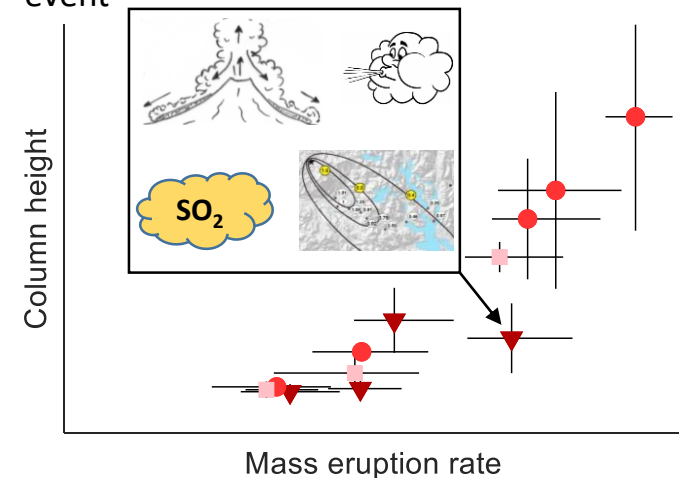
② **Uncertainties** and having **2 co-authors validating independently** each parameter value



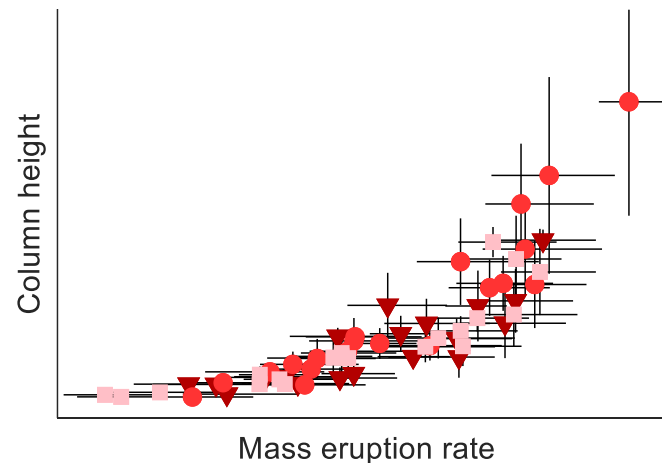
③ **Flags informing amount of interpretation of the literature** required to provide these values



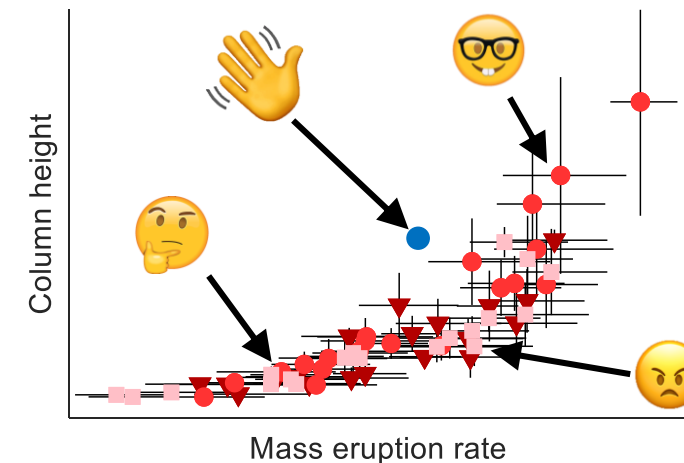
④ Many **new parameters and information** for each event



⑤ **Many new events**



⑥ And we are making it a **database open to the community**



Scroll down through the next 7 slides and chat with us for more details!

A new database of eruption source parameters devoted to eruptive column model evaluation

The IAVCEI independent eruption source parameter database working group:

Samantha Engwell, Thomas Aubry, Sebastien Biass, Costanza Bonadonna, Marcus Bursik, Guillaume Carazzo, Julia Eychenne, Mathieu Gouhier, Don Grainger, Mark Jellinek, David Jessop, Larry Mastin, Simona Scollo, Isabelle Taylor, Alexa Van Eaton, Kristi Wallace



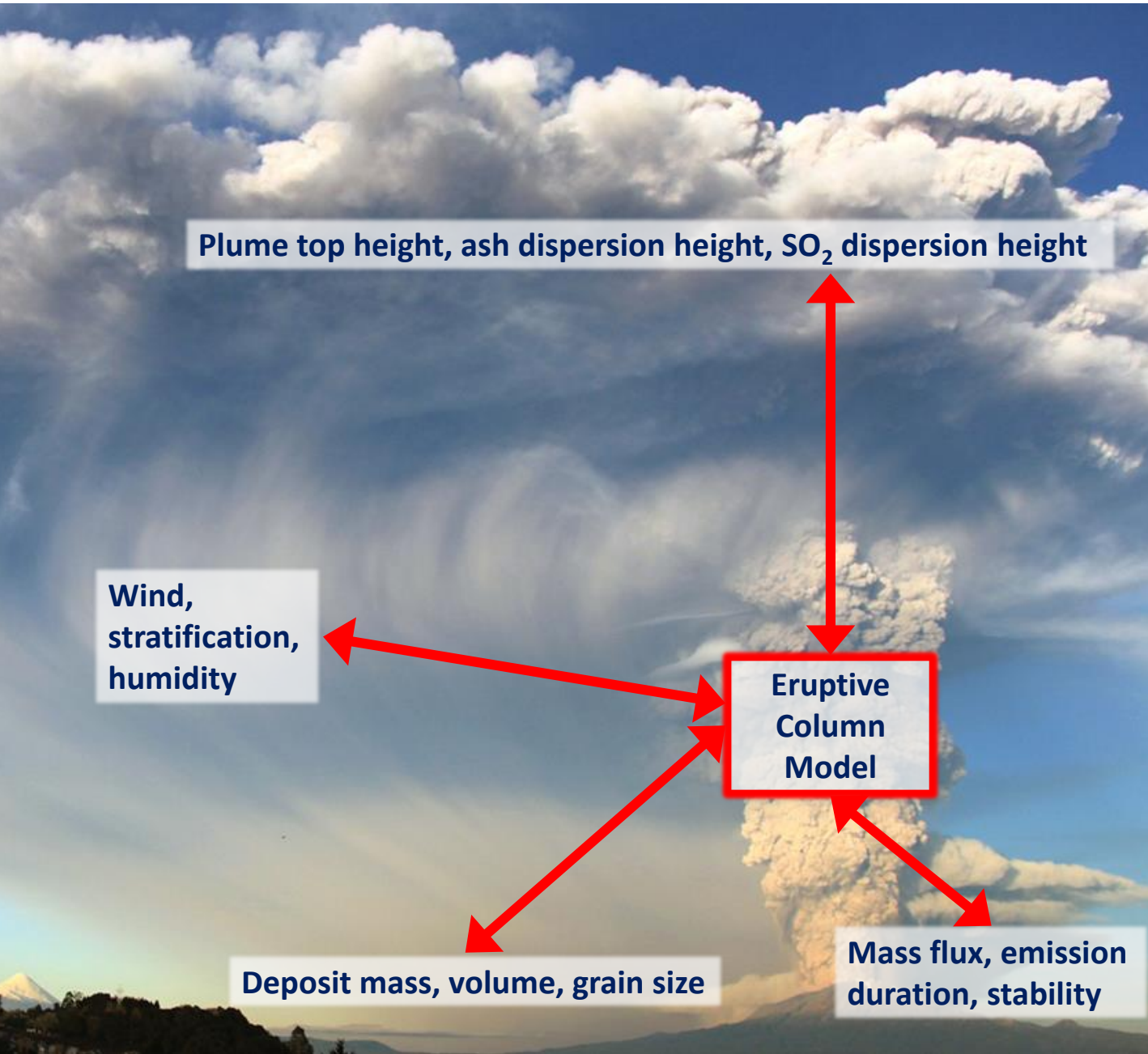
UNIVERSITY OF
CAMBRIDGE



Funded by the Horizon 2020
Framework Programme of the
European Union



Motivation

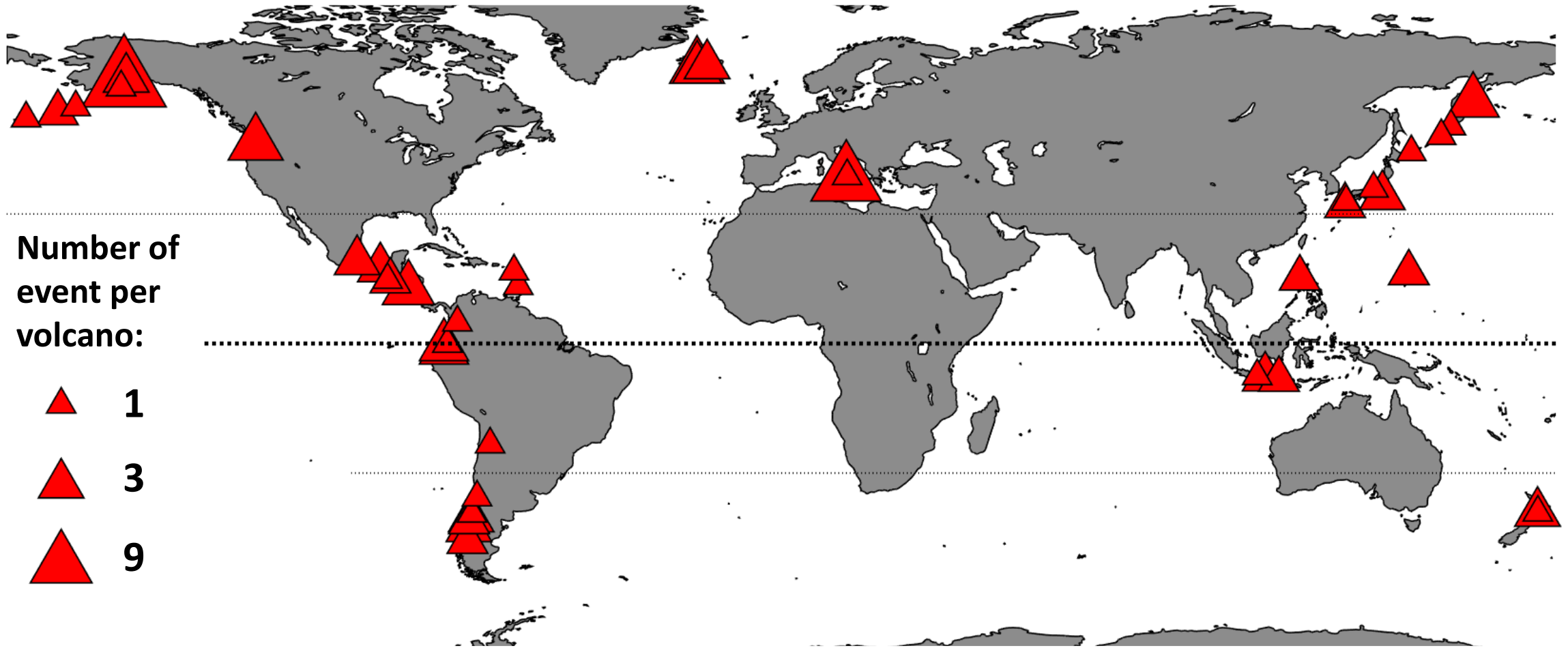


- Eruptive column models are crucial to reconstruct past eruptions, inform management of eruptive crisis, and plan for future eruptions
- Independently estimated eruption source parameters (ESPs) are required to develop and test these models
- A working group was formed within the IAVCEI commission on Tephra Hazard Modelling to build a new database of independent ESPs hosted by the British Geological Survey
- We present preliminary results of this new working group

Methodology for building a new database of independently estimated Eruption Source Parameters (ESP)

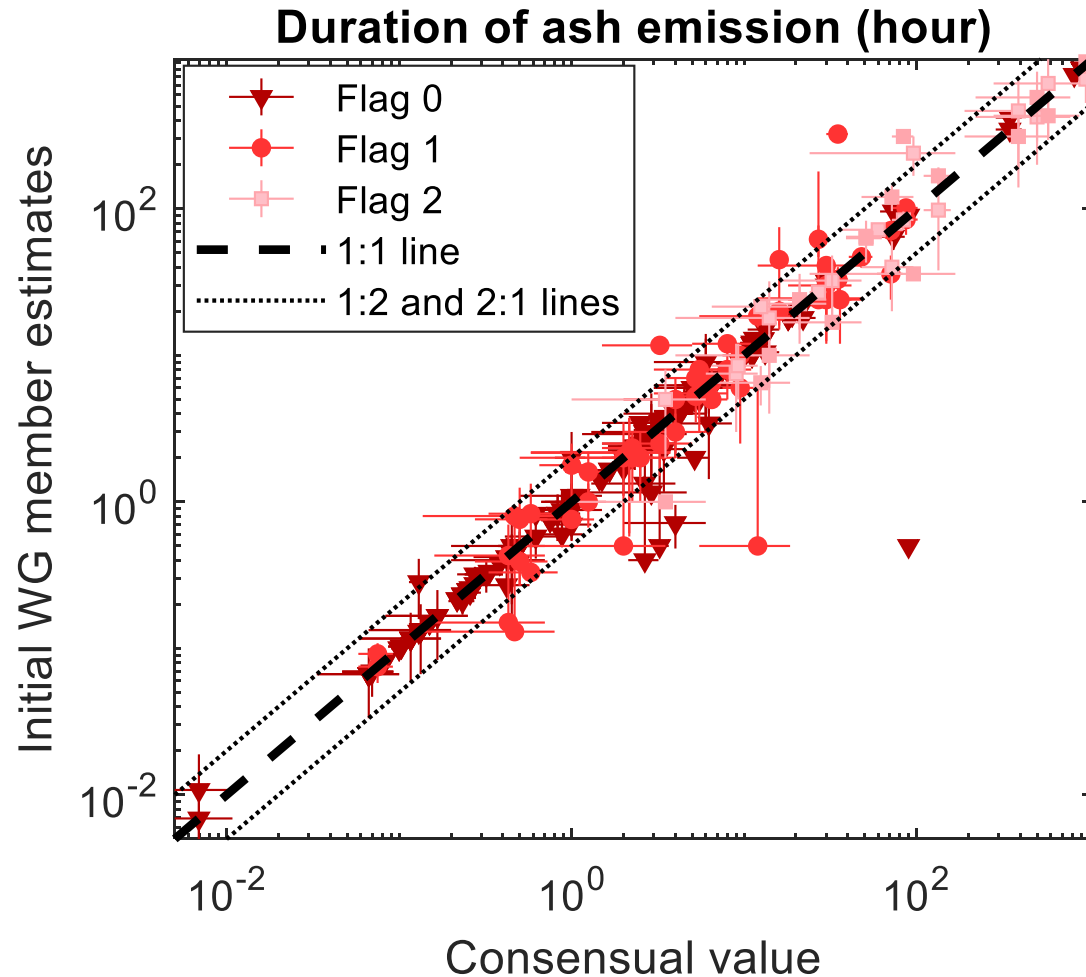
- **We collected ESPs for explosive volcanic events with independently estimated column height, tephra fallout mass, duration and atmospheric conditions**
 - In addition to those key ESPs above, we provide other information such as eruption style, the mass of pyroclastic flow, eruption plume shape, and total grain size distribution
 - We distinguish the height of the top of the ash plume, the ash injection height, and the SO₂ injection height separately
- **Strong focus on providing an informed and quality dataset**
 - Uncertainties systematically provided
 - Each event independently reviewed by two members of the working group (WG) to reach a consensual value
 - Flags inform extent of literature interpretation required to provide each ESP value
- **The database is under construction**
 - Dedicated website hosted by British Geological Survey
 - Open to the community for feedback, corrections, new event entries
 - Maintained and updated

Distribution of database events



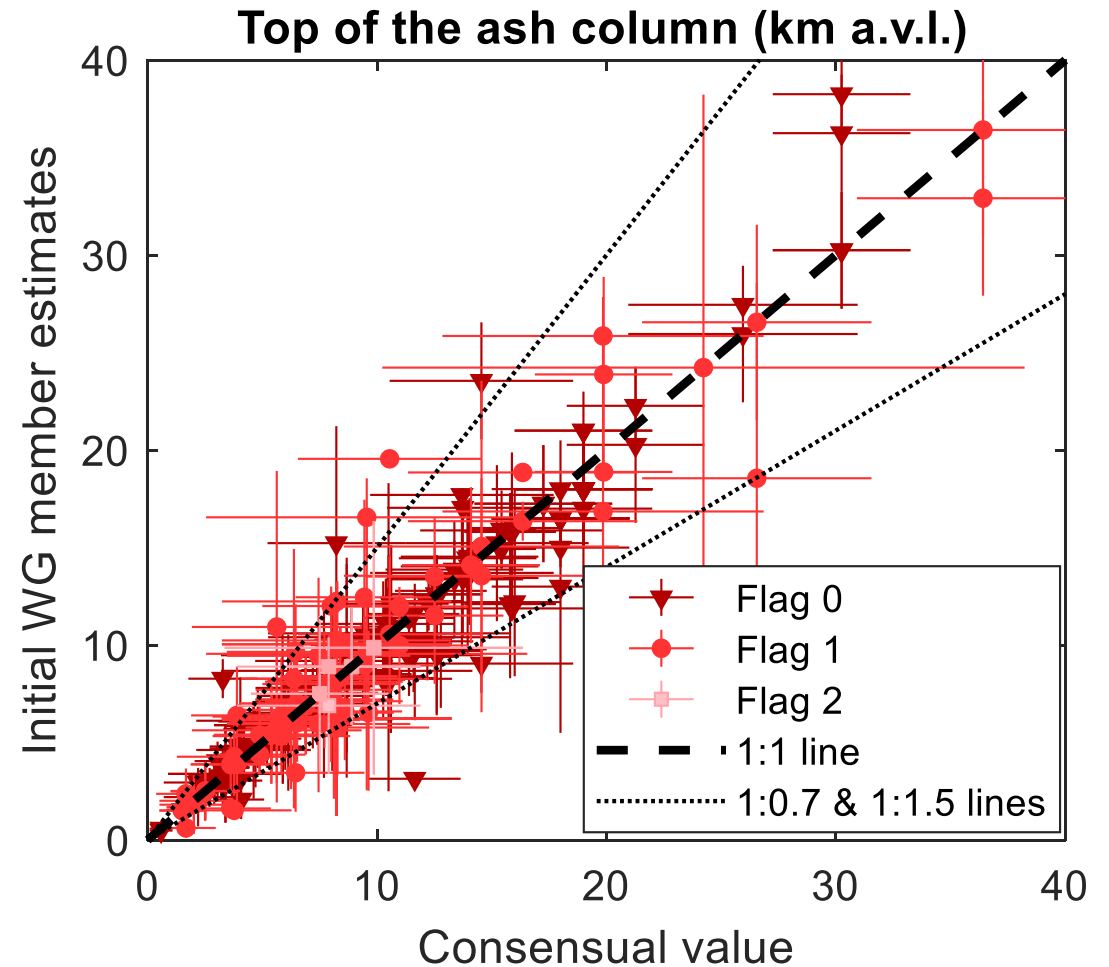
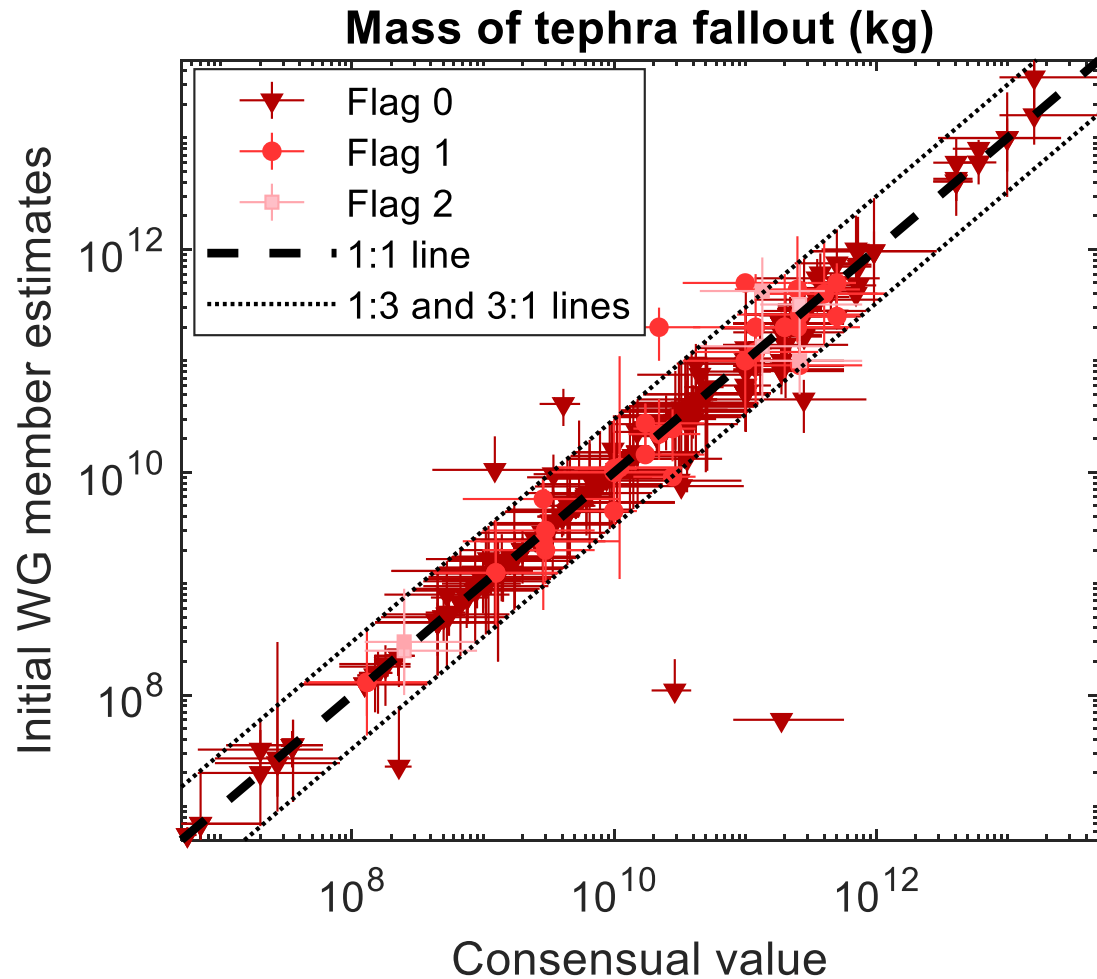
- 134 events from 70 eruptions and 45 volcanoes (ca. 25 events in *Mastin et al. (2014)*, 90 in *Aubry et al. (2017)*)
- Large number of events and diversity of parameters provided offer exciting opportunities for analysis targeting a specific region or volcano, e.g. for volcanic hazard response, and ash aviation purposes

Initial ESP estimates vs. final consensual values (1/2)



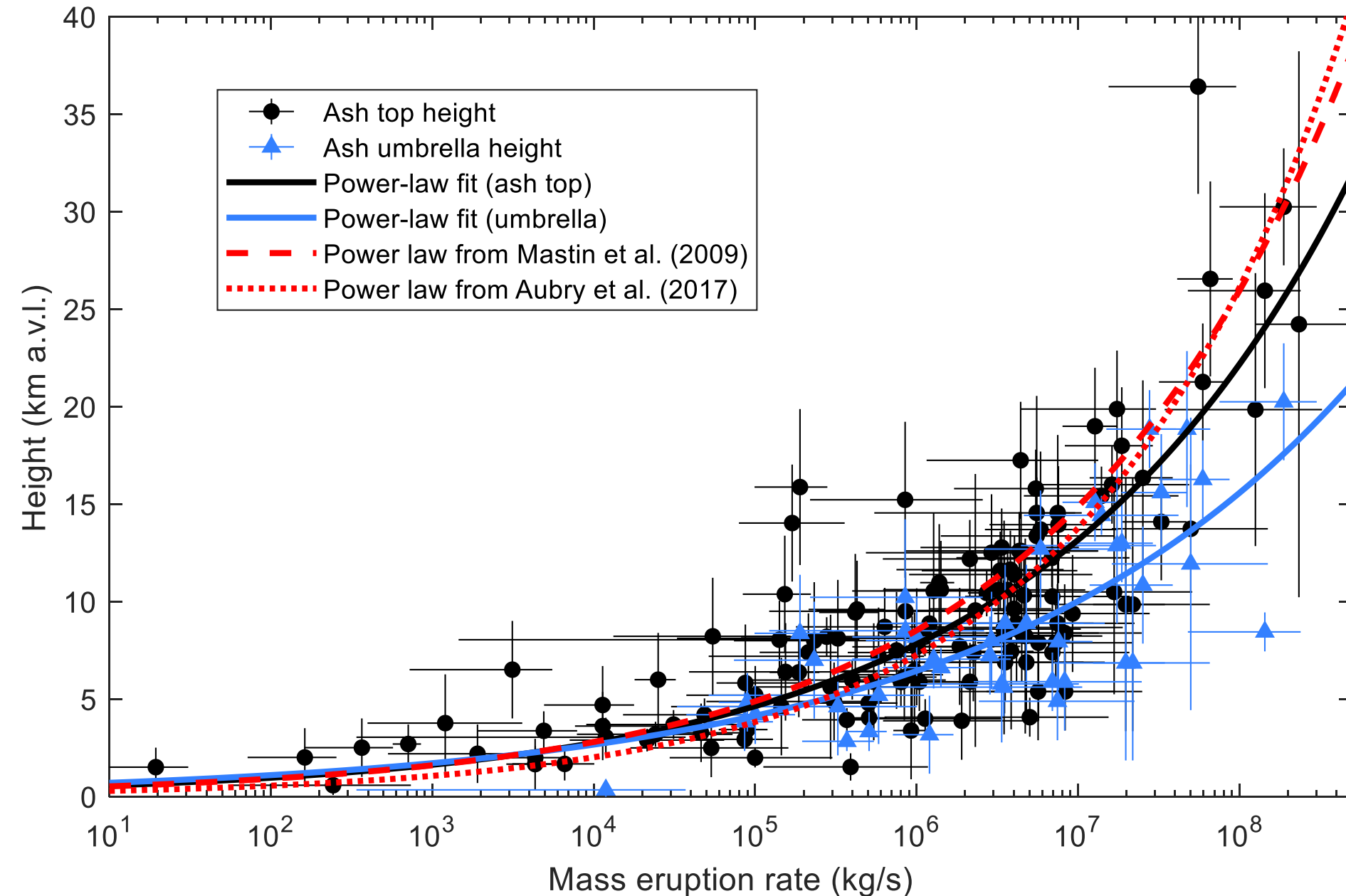
- For each “key” ESP, two members of the working group (WG) independently provided their estimates (y-axis) for a best value and uncertainty, and then reached a consensual value (x-axis)
- We attributed a flag to each parameter value indicating whether negligible (**flag 0**), some (**flag 1**) or significant (**flag 2**) interpretation of the literature was required to provide the value
- Misreporting or partial literature search can result in very large errors
- Duration was one of the most challenging parameters to define, with uncertainty commonly reaching a factor of 2.
- Surprisingly but comforting, WG members agreed relatively well on their values for events requiring significant interpretation of the literature (flag 2)

Initial ESP estimates vs. final consensual values (2/2)



- Consensus was easily reached on values for the mass of tephra fallout estimated from the eruption deposit
- Consensus was harder for the ***time-averaged height*** of the top of the ash column, with initial estimates by WG members often above the final consensual value because of a bias towards providing maximum height

Sneak peek on our revised height-mass eruption rate relationship



Outlook

- We will calibrate the mass eruption rate (MER)-height canonical power-law relationship accounting for both uncertainties and flag in weighting of each database event
- The diversity of information provided (e.g. atmospheric conditions, eruption style, pyroclastic flow mass) offers an exciting opportunity to explain the large variability in plume height beyond its relationship to MER

Summary

- *Stay tuned for a new database of independently estimated Eruption Source Parameters with major improvements on:*
 - *Number of events and parameters*
 - *Uncertainty and quality control*
 - *Format and community access*
- *Please be in touch with us if you'd like to be involved, have suggestions, or if you recently published/reviewed papers with erupted tephra mass estimated from deposit*

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