

FUTUREVOLC real-time tephra sampling: a state-of-the-art mobile laboratory to characterize eruptive dynamics and enhance ash-dispersal forecasting

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To model a plume

We need complicated information from source region:

mass flux,
gas composition,
temperature,
atmospheric condition,
altitude rise
fragmentation or volcanic ash,



Grímsvötn 2011

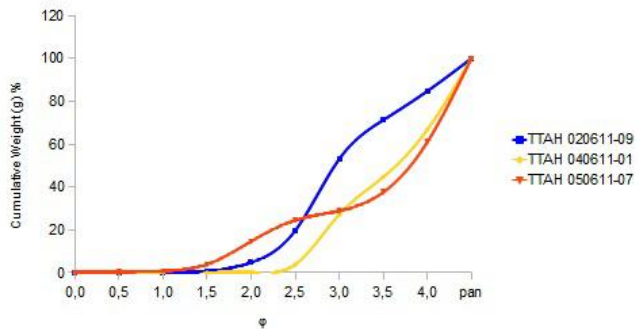
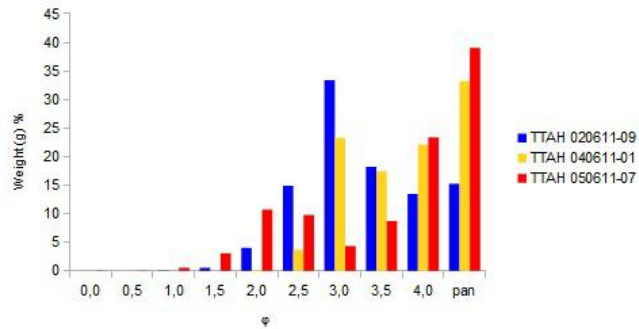


Eyjafjallajökull 2010

To model for dispersion

Fragmentation = grain size

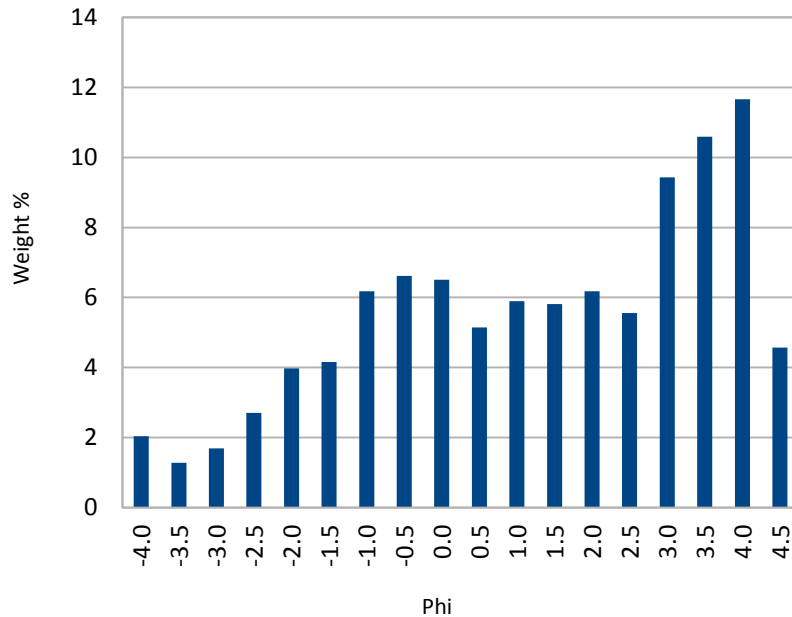
Sampling tephra



Tephra sampling



Weight %



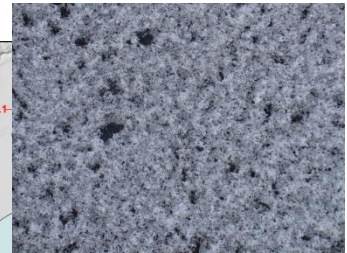
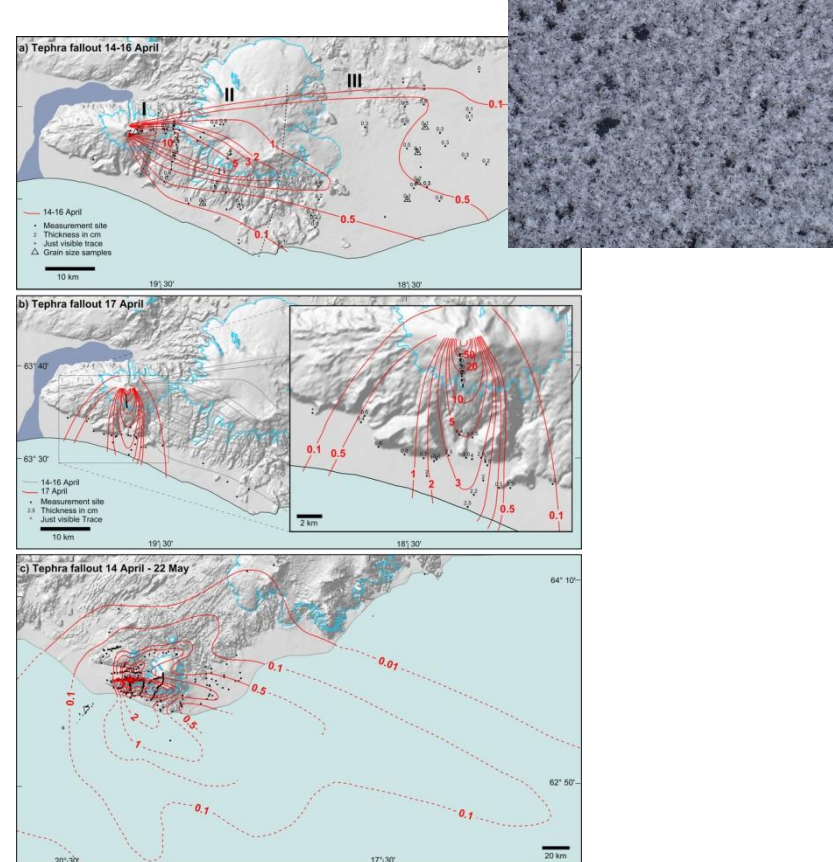
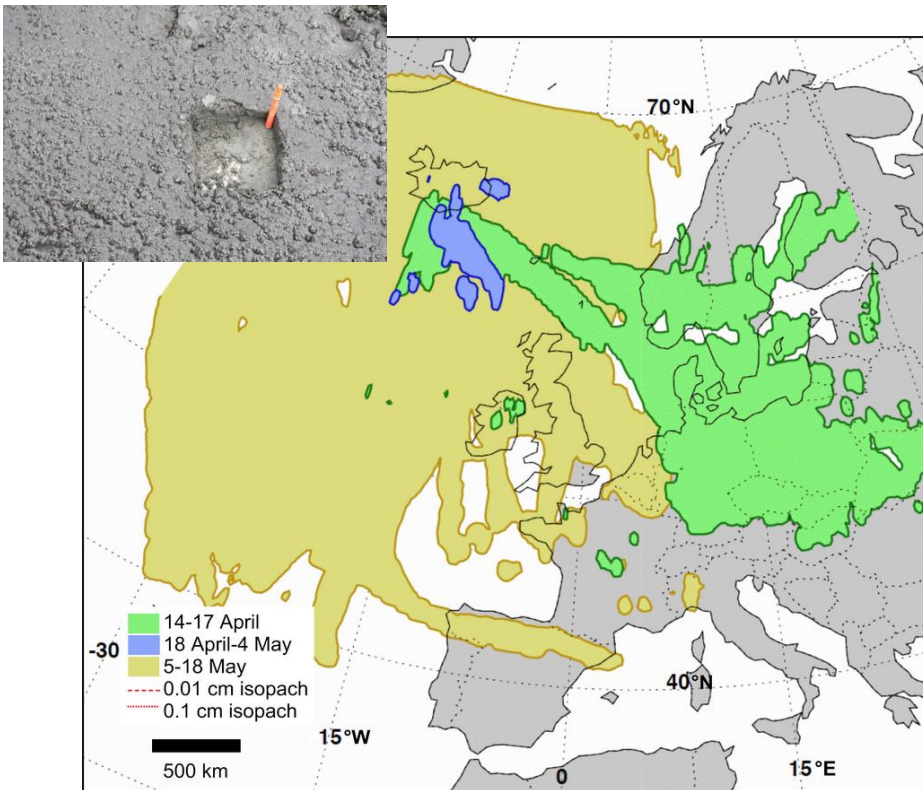
Complicated and time consuming



Large area under consideration

Can go far from the volcano

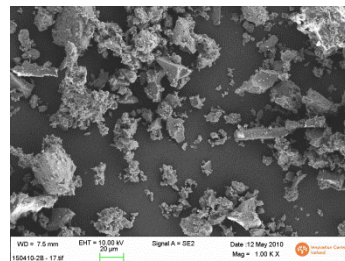
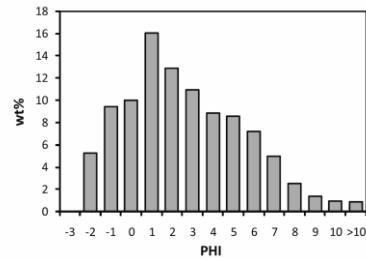
Tephra distribution



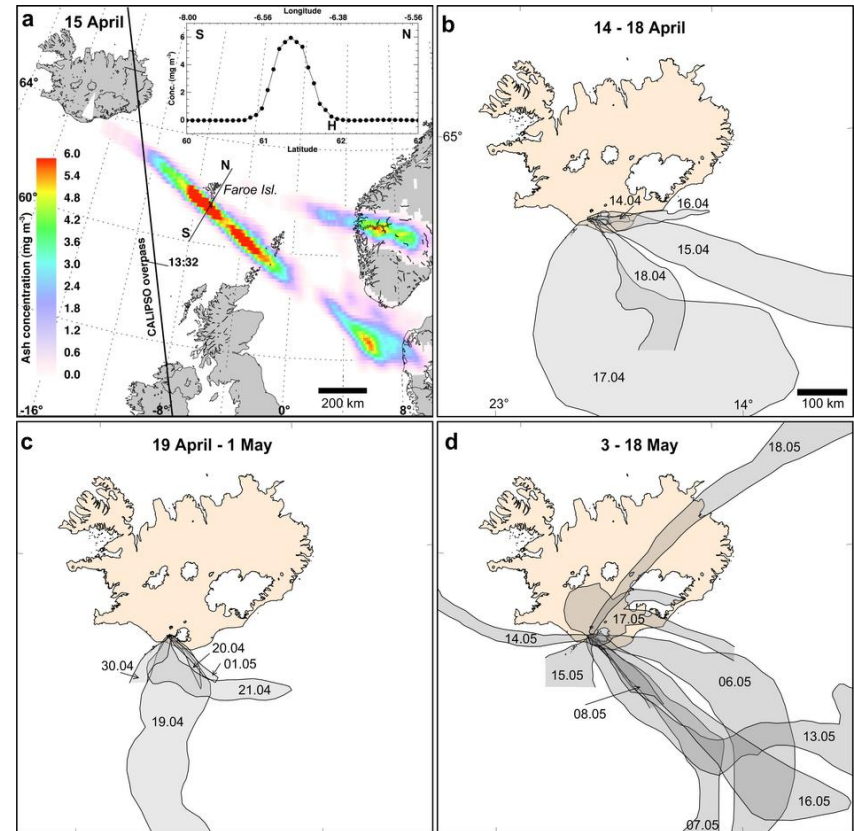
Important parameters

Solid particles have

- Density
- Size
- Shape



Affecting transport models



Rapid analysis

Bring it to the field



Near automatization

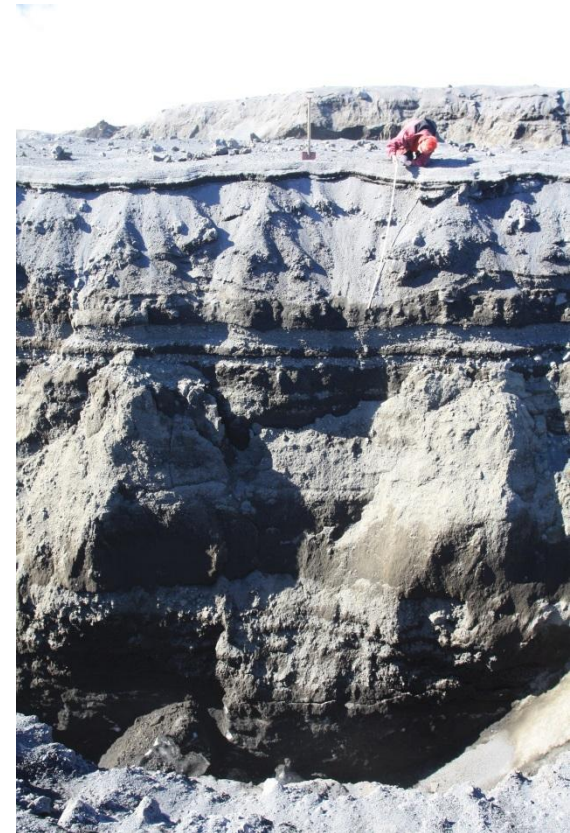
Getting information on volcanic ash towards modellers in near real time.

Challenge to get comprehensive near real time data towards model makers from waste area



Manual labor

- Sampling
 - Manual sampling in the field
 - New online instruments that record selected information regarding the tephra
 - Grain size
 - Mass deposition



Bring the lab to the field

Main aim of field laboratories

- Since volcanic eruptions usually do not happen down town!
 - Decrease distance to lab
 - Shorten analytical time
 - Shorten interpretation time
 - Shorter verification time



Shorter response time



What is needed:

- Sieving instruments
- Balance
- Oven for drying
- Shape analysis facility
- Chemical analysis
- Cars for transport
- People for sampling

Volcanic tephra in the field



Primary equipments

Drying



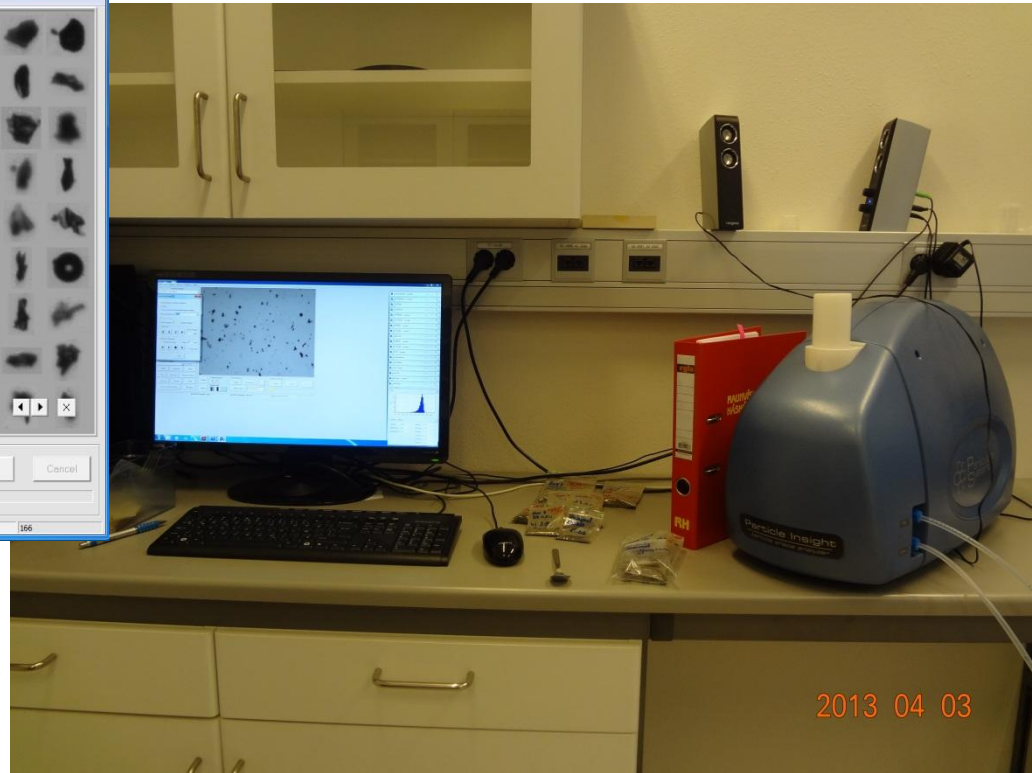
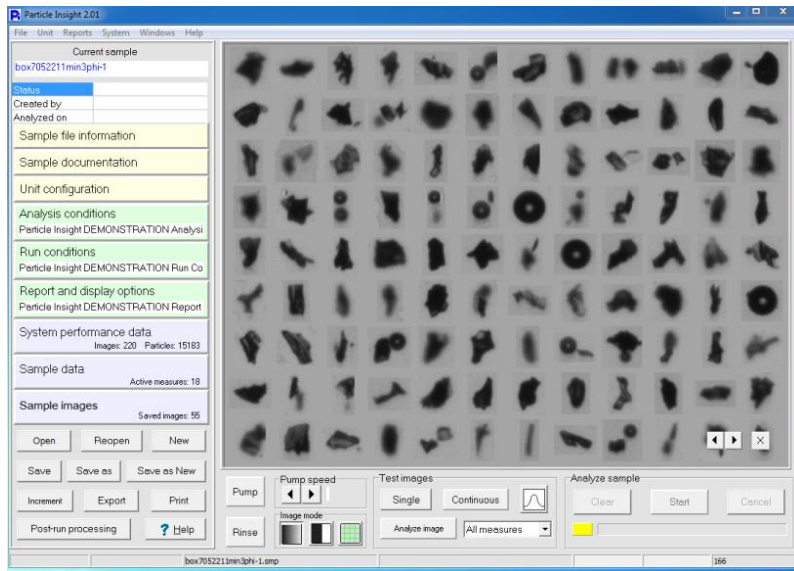
Sieving



weighting



The particle insight analyser

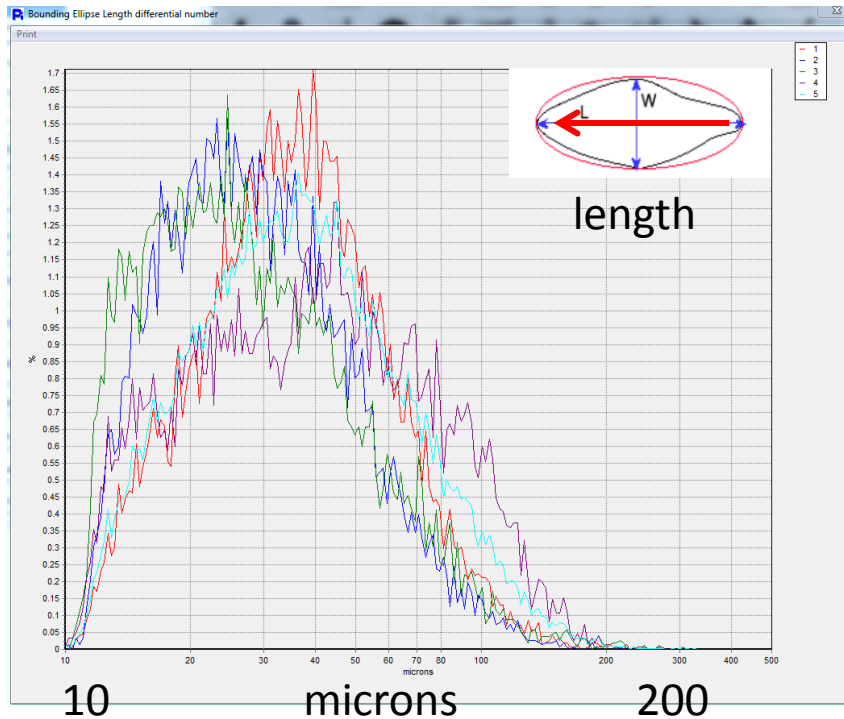
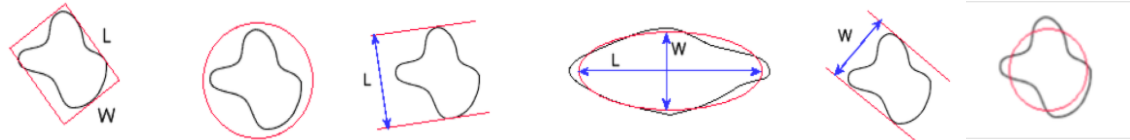


Counts 30.000 grains
Measures 10 different parameters,
resolution 1 pixel = 0.8 micron
Calculates 8 parameters
Time for a sample run 5 min

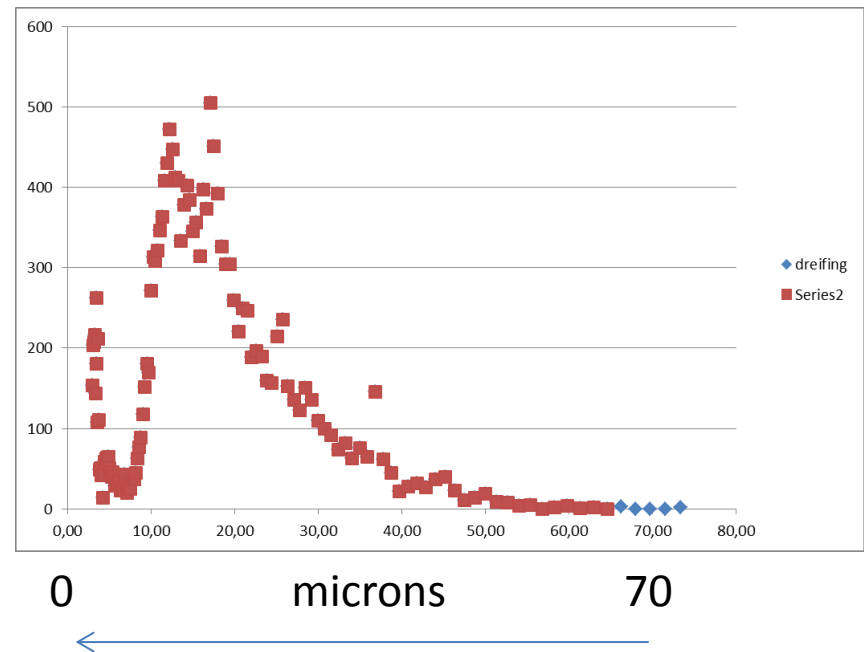
Particle insight

measures 28 different shape and size parameters

Grain shape



Grain size

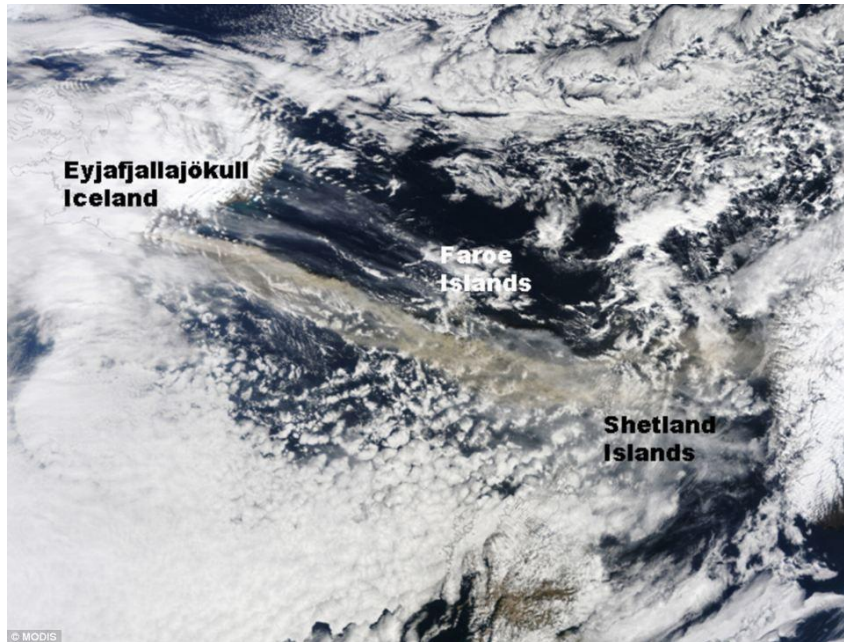


Hitachi TM3000 Portable SEM

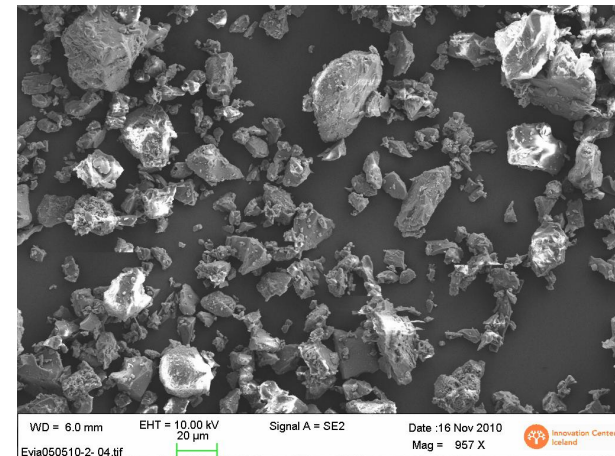
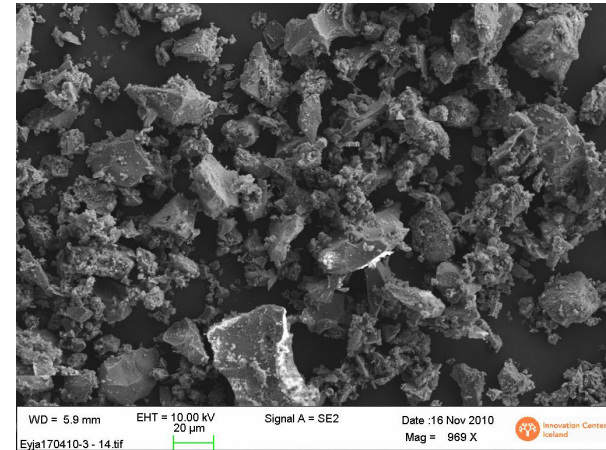


SEM analysis

What leaves Iceland?



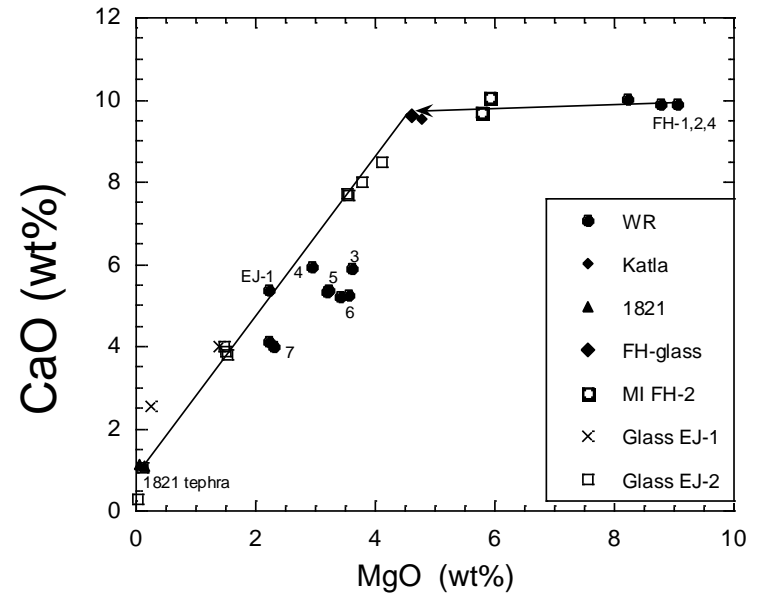
SEM of tephra



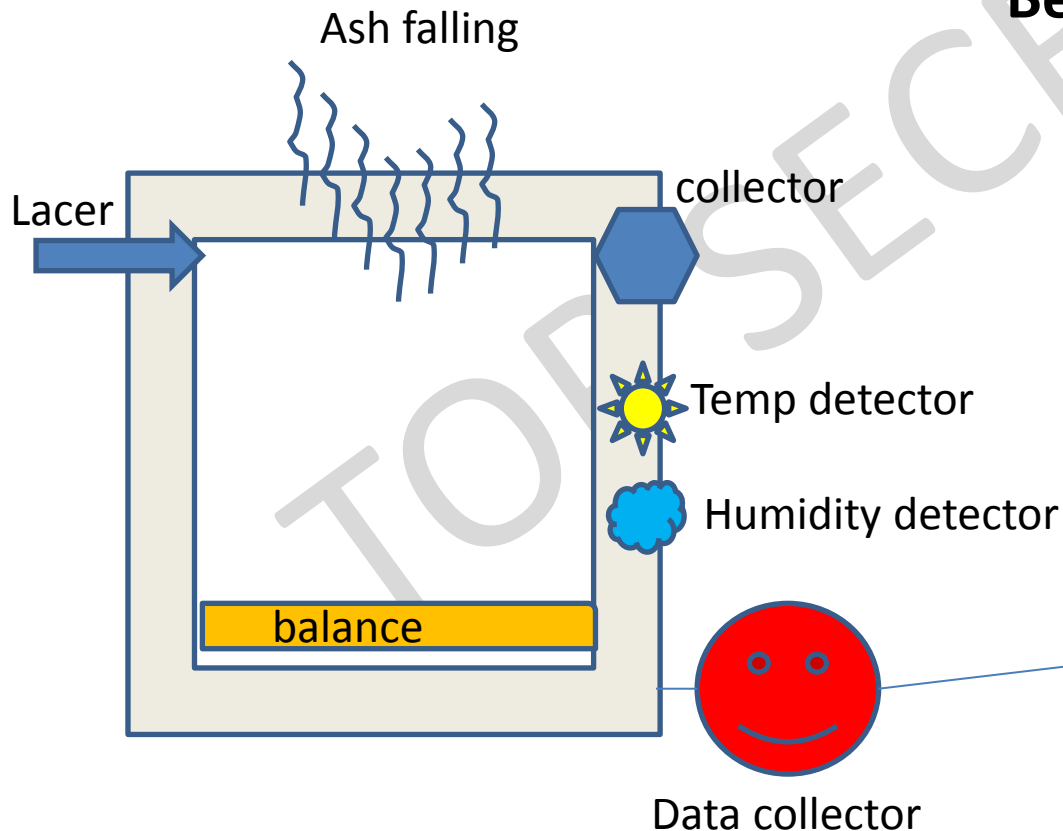
Chemical composition



Time variation in composition



Alone in the field



Beaming info to labs

See further poster by :
Marchetti et al.

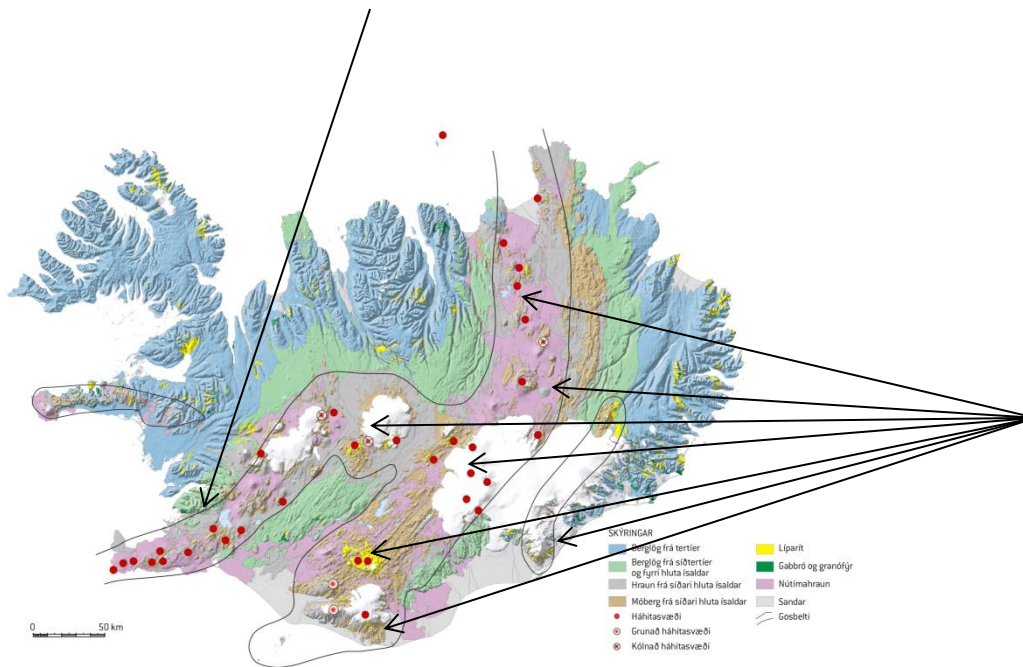
**Towards real-time
measurements of
tephra fallout grain-size
distribution**

CONCLUSION

Get lab as close to volcano as possible

Reykjavik

Major volcanos



Takk og góðar stundir