

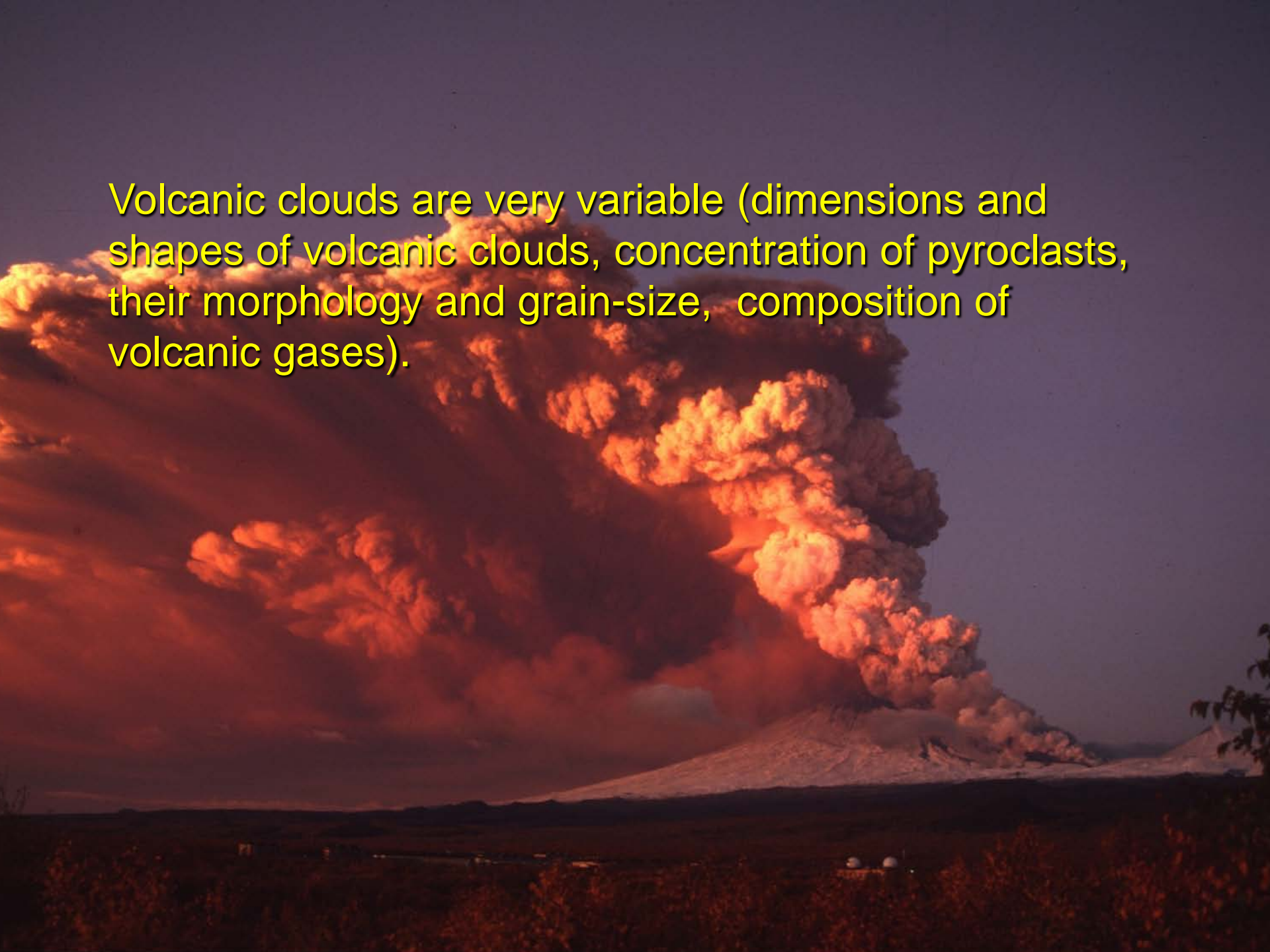
Direct sampling of eruptive clouds using tethered balloons: results of the 2003 and 2004 field experiments on Karymsky volcano, Kamchatka, Russia

Belousov Alexander ^{1,2}, Belousova Marina ^{1,2}

1- Institute of Volcanology and Seismology, Petropavlovsk-Kamchatsky, Russia;

2 -Institute of Marine Geology and Geophysics, Yuzhno-Sakhalinsk, Russia

Volcanic clouds are very variable (dimensions and shapes of volcanic clouds, concentration of pyroclasts, their morphology and grain-size, composition of volcanic gases).



- Volcanic clouds are very dangerous.
- Knowledge of parameters of the clouds is important.
- Direct measurements of parameters inside volcanic clouds have been not achieved until now.



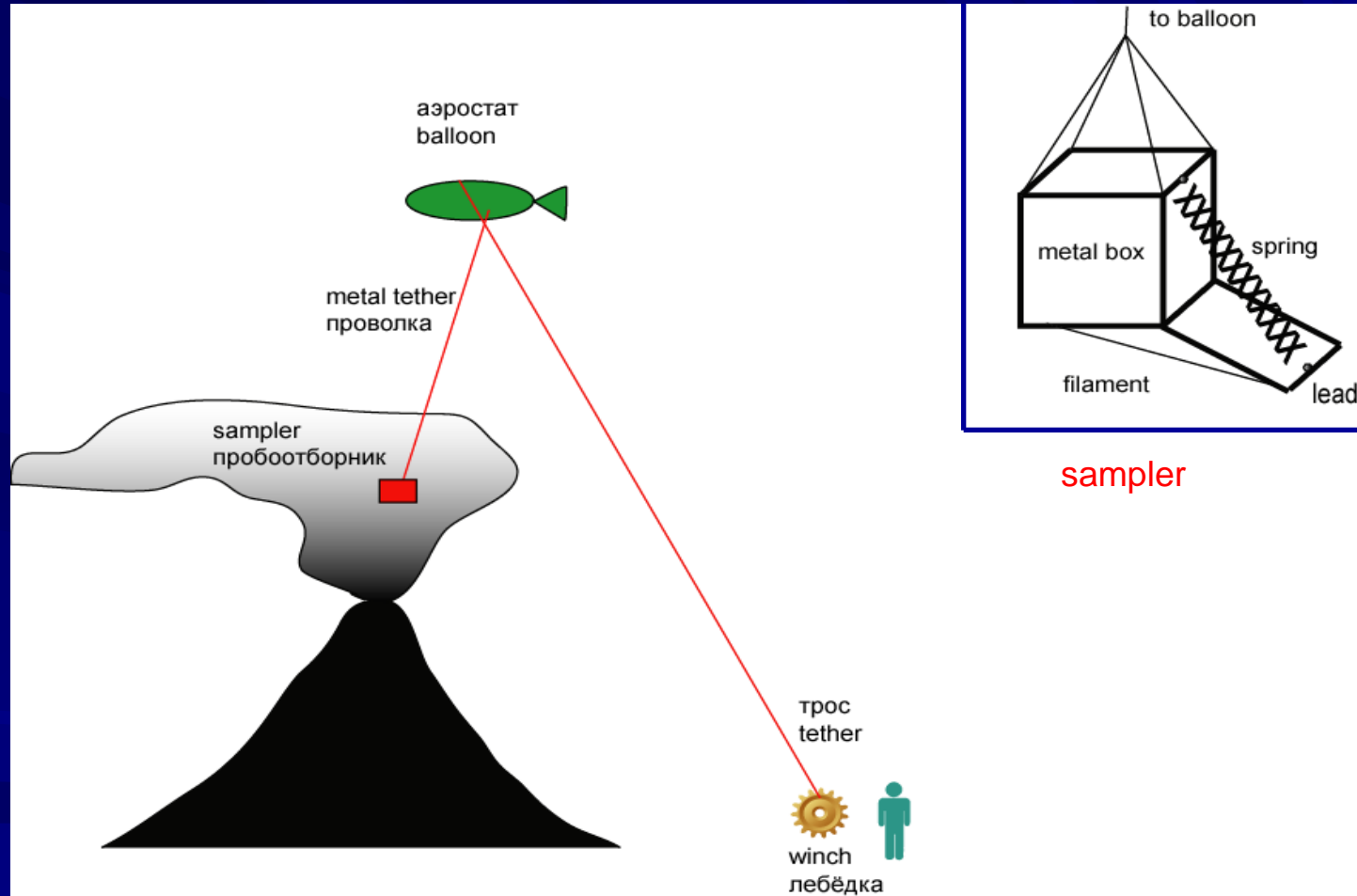
Main goals

- To design a method of direct sampling of eruptive clouds.
- To determine grain-size distribution of pyroclasts in eruptive clouds.

Experiment 2003



Sampling procedure used in the 2003.





Activity of Karymsky in 2003 – frequent (5 – 40 min), moderate (0,2 -1 km) vulcanian explosions.



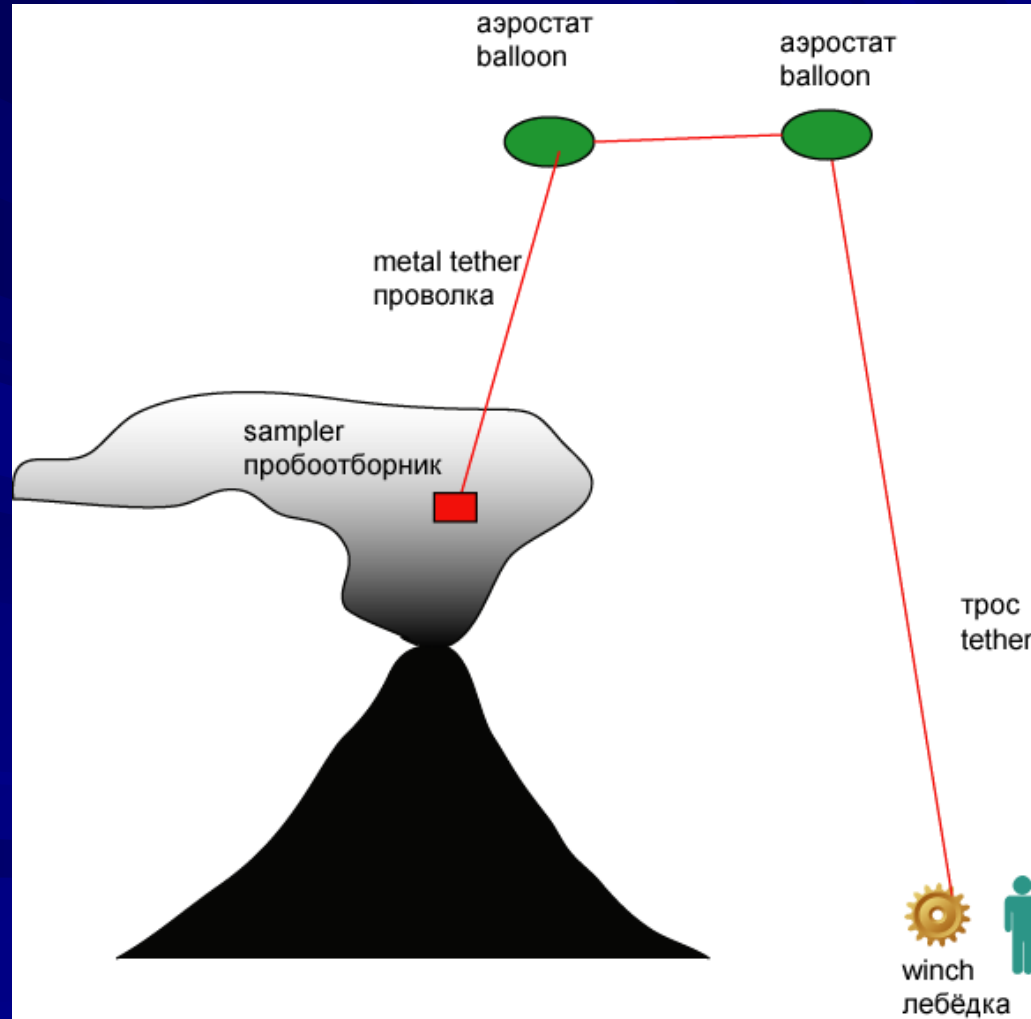


Sampling of eruptive cloud was not achieved in 2003 because the balloons we used were not sturdy enough to withstand strong winds.



Experiment 2004

New type of balloons as well as modified sampling procedure were tested in 2004.





Activity of Karymsky in 2004 - rare (4 – 48 h), strong (1 - 3 km) vulcanian explosions.



Inflation of the balloons with helium.



Transportation of the inflated balloons to the volcano.



Preparation of the first launch.



Balloon flies toward the volcano.

Sampling of eruptive cloud was not achieved in 2004 because Karymsky stopped to erupt.



Conclusions

- The experiments have confirmed that tethered balloons as well as the suggested sampling procedure can be used for sampling of eruption clouds.
- The suggested method has potential to become a powerful tool to study eruptive clouds.

Future plans

Grant "Direct sampling of volcanic cloud with the goal to determine real grain-size distribution of pyroclastic particles" have been received from the National Geographic Society to continue the experiment in the 2005.

Acknowledgments

The 2003 and 2004 experiments were supported in part by the grants from RFBR and CRDF.