Maars of Kamchatka
(Russian Far East): the first data

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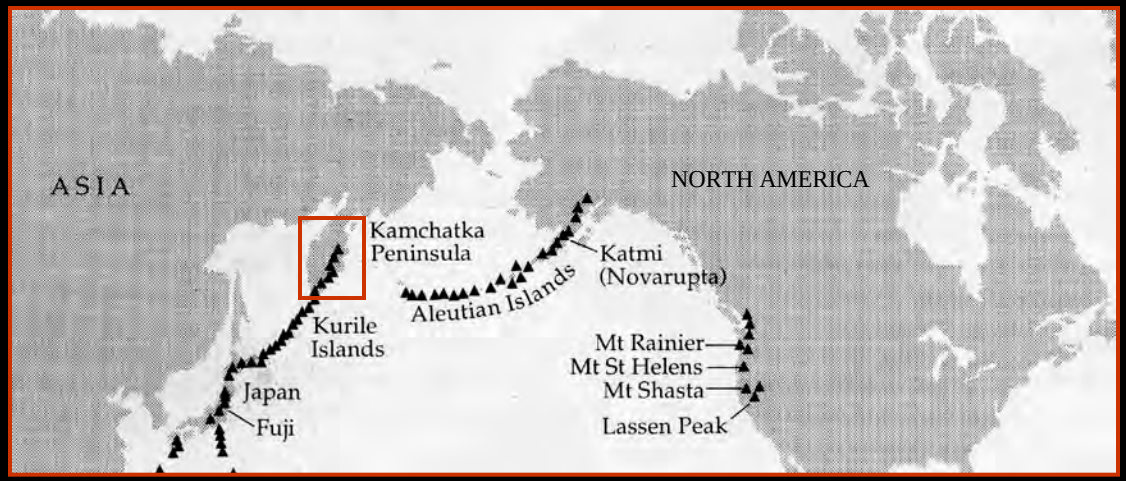
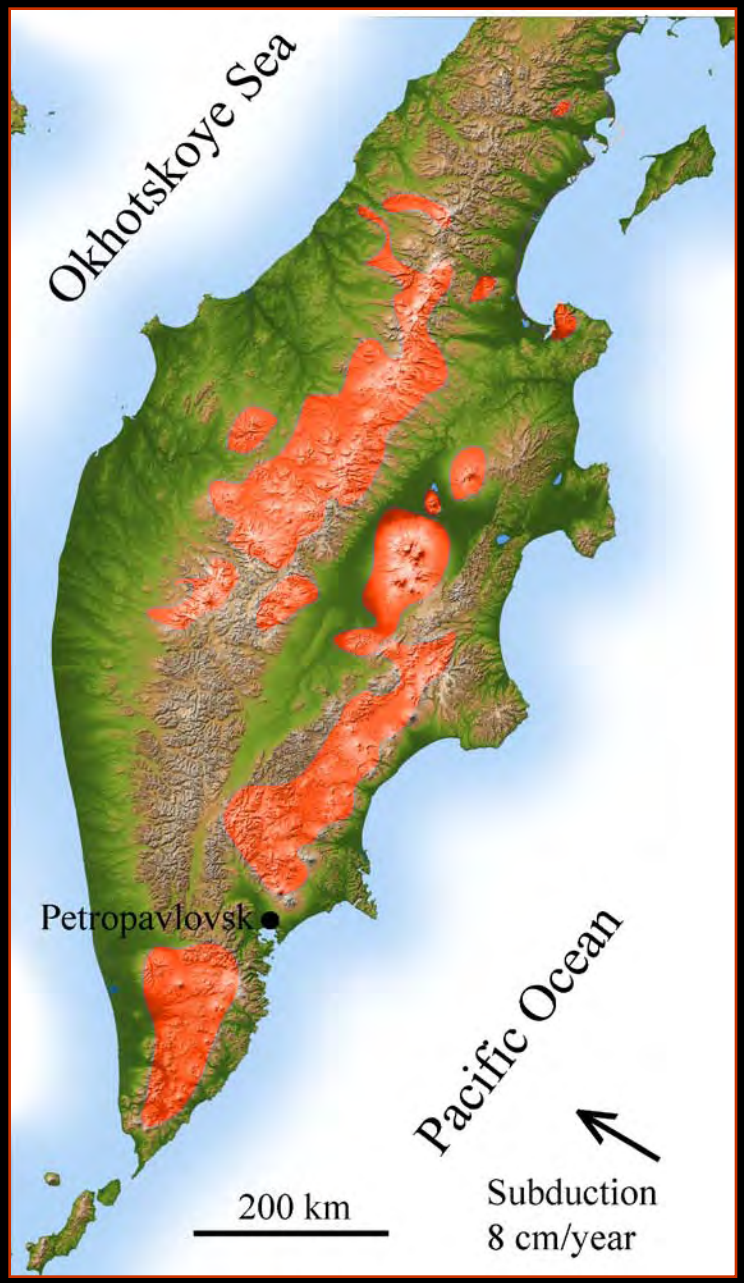


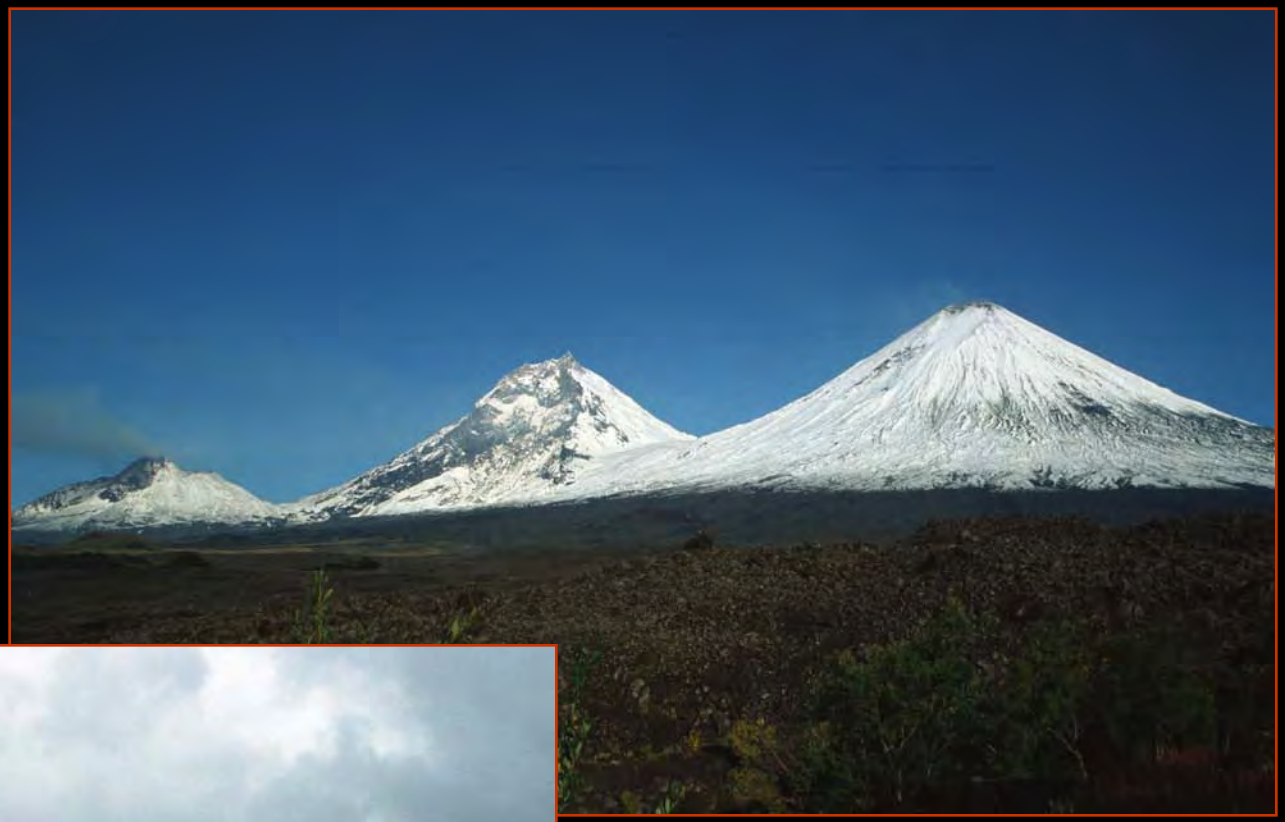
Kamchatka -

very intensive subduction-related volcanism in Pleistocene - Holocene



Distribution of Pleistocene –Holocene volcanic rocks (red areas)

Kamchatka -
giant
stratovolcanoes



and extensive areas
covered by
monogenetic
volcanoes

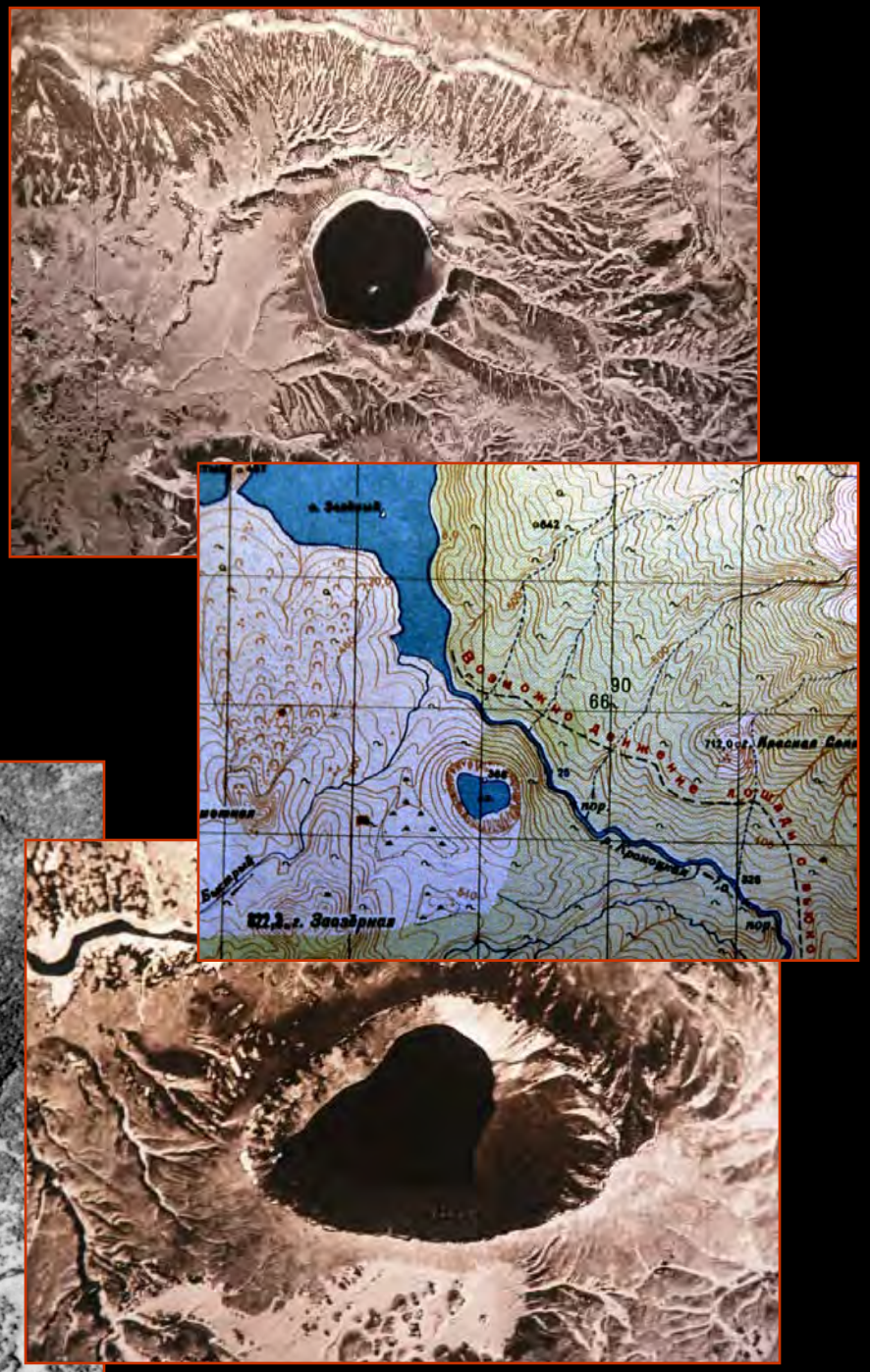
Goals

- To estimate the role of water-magma interaction in formation of monogenetic volcanoes of Kamchatka.

- To distinguish factors determining location of maar-forming eruptions in Kamchatka.

Maps and aerial images were used to identify the maars

Totally 19 maars have been identified in Kamchatka



Kenenin Maar – the youngest in Kamchatka
Basalt; crater 1.6 km; 1100 BP

Dal’neye Lake Maar
Basaltic andesite; crater1.2 km; 3300 BP

Valentina Maar – one of the oldest in Kamchatka
Basalt; crater 0.8 km; Late Pleistocene


Chasha Maar
Rhyolite; crater1.2 km; 4600 BP

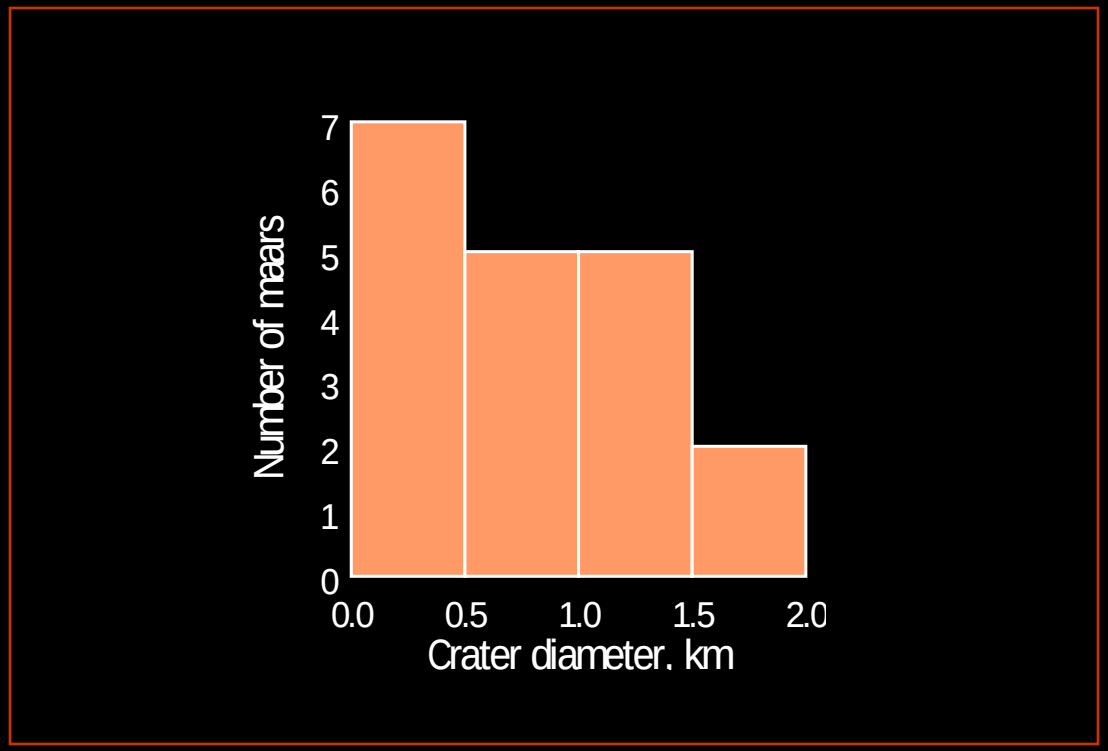
Krokur Maar

Basalt; crater 1.3 km; 4900 BP

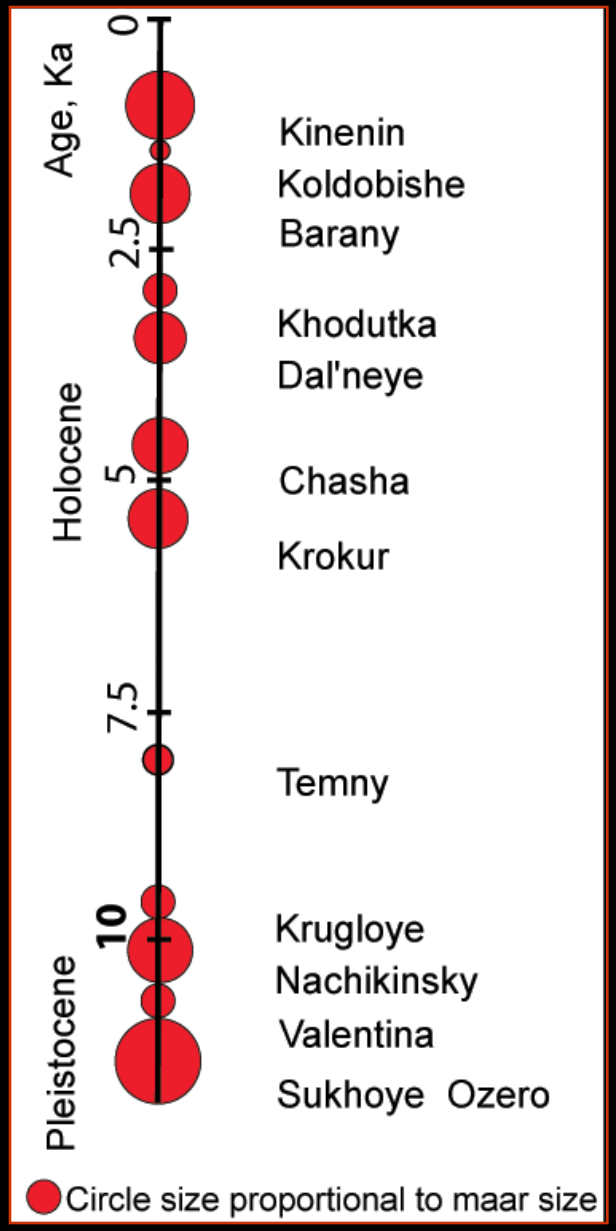
Maars of Kamchatka

Name	Age (Ka)	Crater (km)	Composition
Nachikinsky	10	1.6	Basalt
Kenenin	1.1	1.6	Basalt
Krokur	4.9	1.3	Basalt
Dal’neye Lake	3.3	1.2	Basaltic andesite
Valentina	>10	0.8	Basalt
Sukhoye Ozero	>10	2.0	Basalt
Koldobishe	1.2	0.3	Basalt
Chasha	4.6	1.2	Rhyolite
Barany	1.5	1.4	Rhyolite
Temny	8.0	0.7	Basalt
Khetik		0.3	Basalt ?
Khodutkinsky	2.8	0.8	Rhyolite-dacite
Krestovka		0.8	Basalt ?
Krugloe	9 ?	0.8	Basalt ?
Ilinsky		0.3	Andesite ?

Diameter of maars

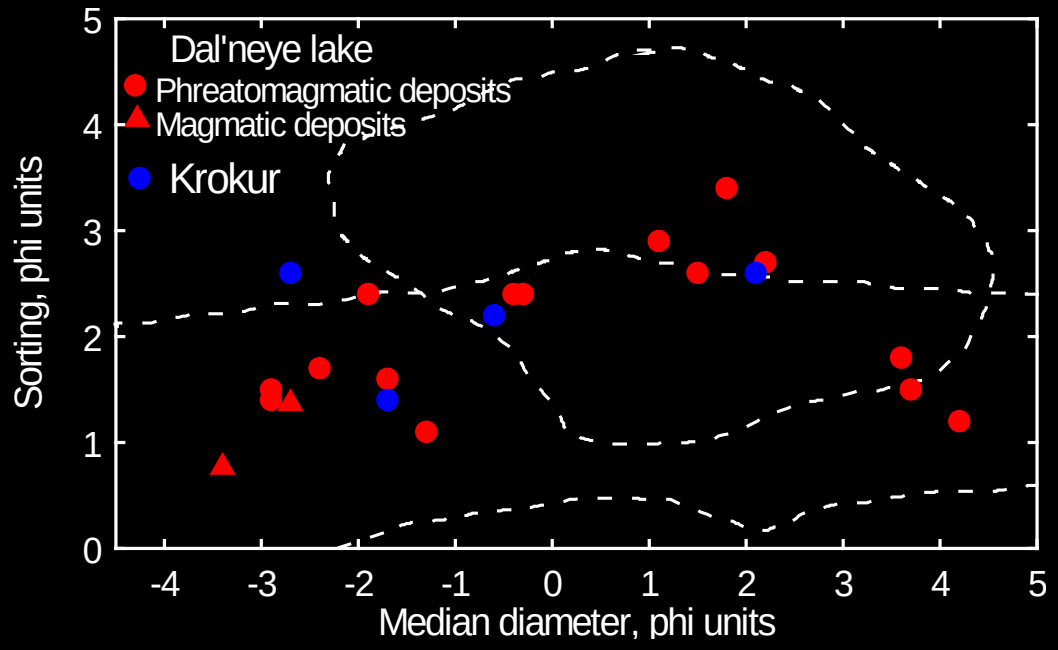


Age of maars



Maar deposits

Fallout and base surge deposits. Commonly poorly sorted – wet eruption clouds.



Maar deposits

Rhythmic layering – pulsatory eruptive style


Dal'neye Lake Maar

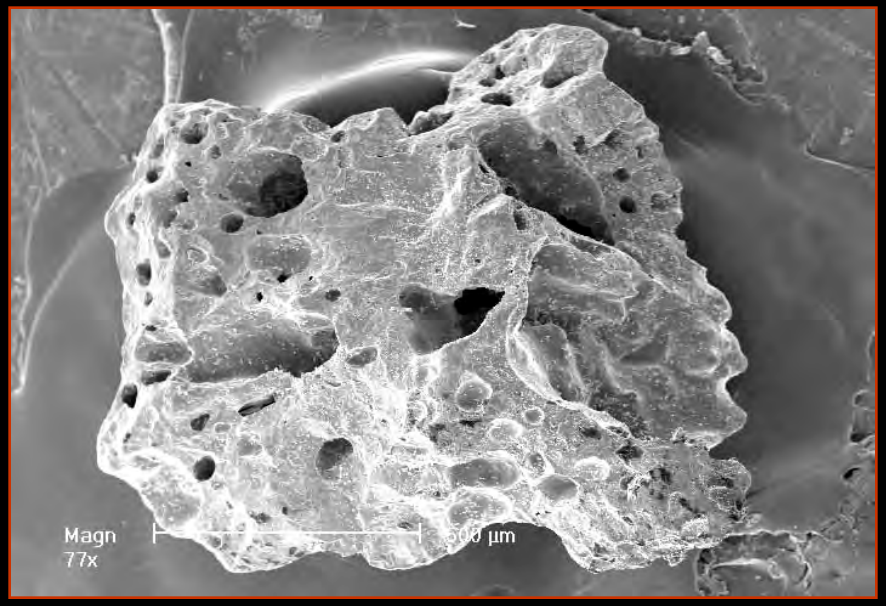
Enriched by accidental clasts – excavation of deep craters into pre-existing rocks

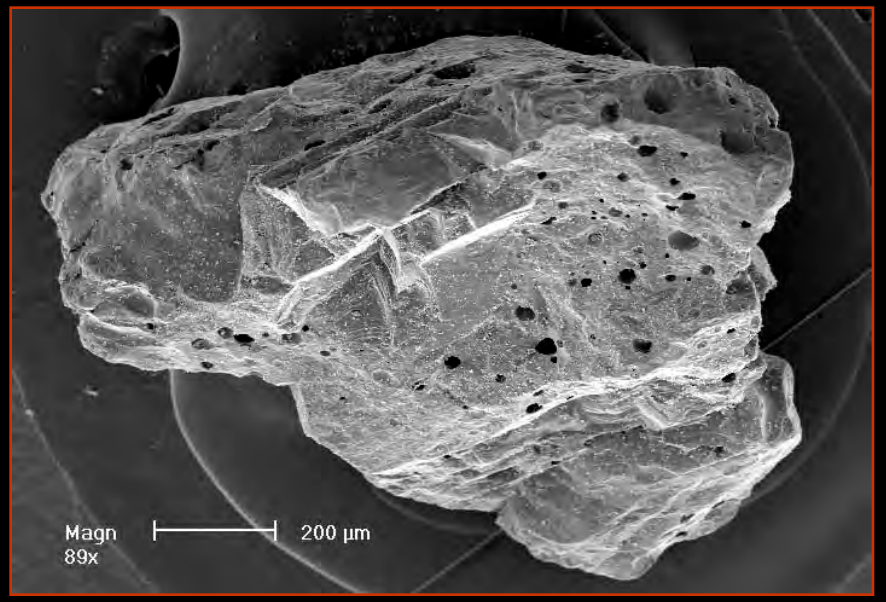

Chasha Maar

Maar deposits

High average density and blocky morphology of pyroclasts – fragmentation of quenched magma

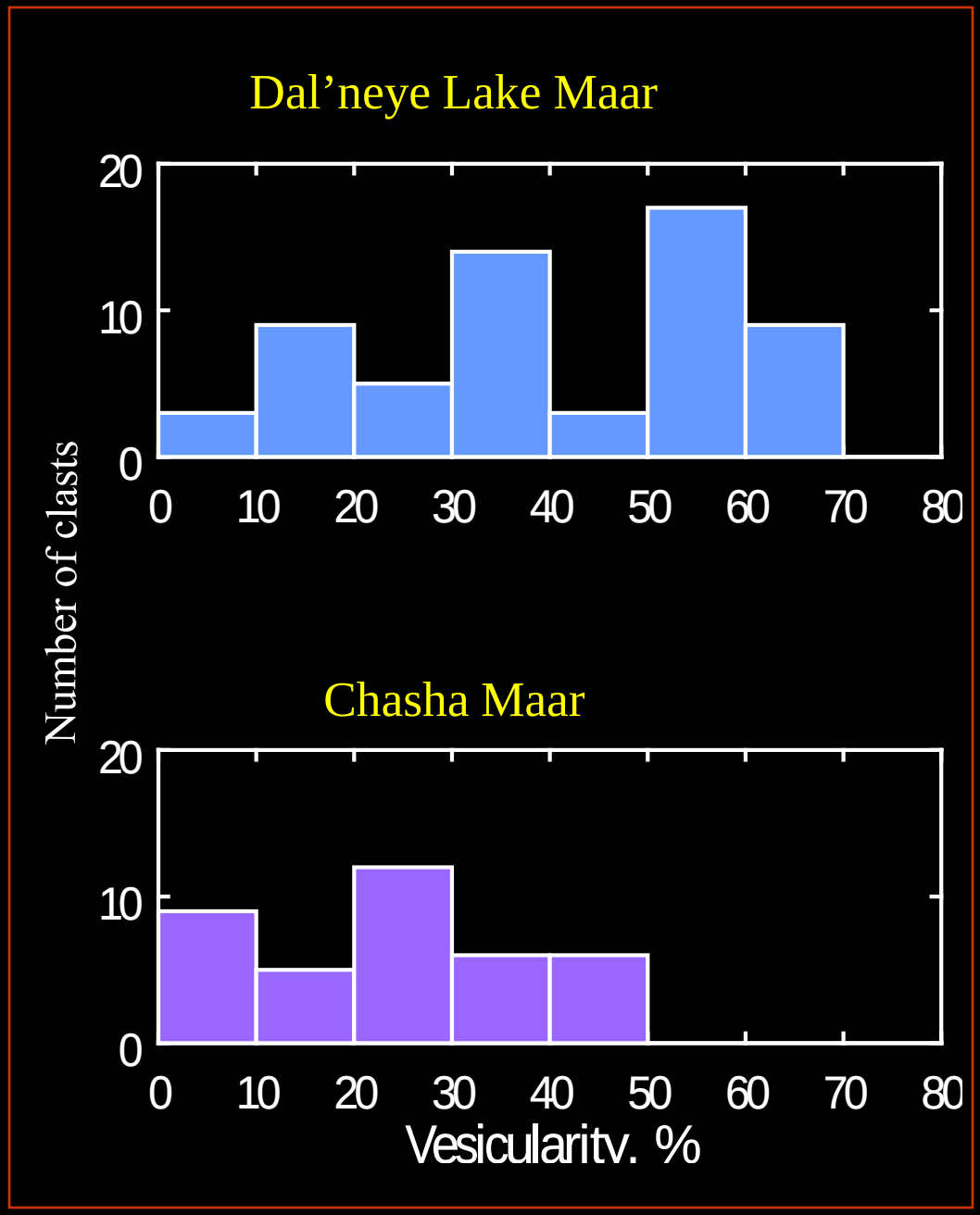
Cauliflower bomb. Dal'neye Lake Maar





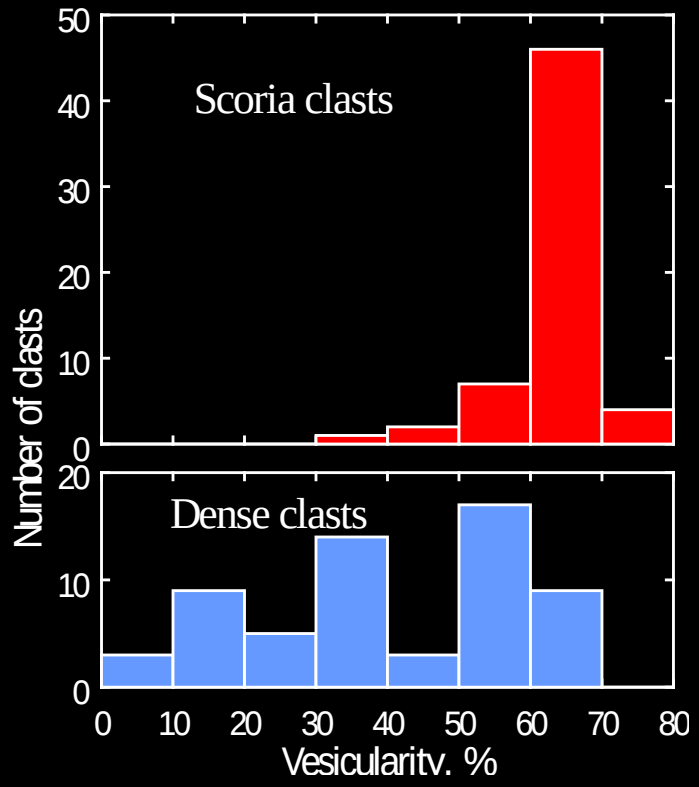
Maar deposits

Variable density of pyroclasts – vesiculation of magma was arrested by quenching



Maar deposits

Transition from dense phreato-magmatic deposits to scoria – exhausting of water in aquifer in the eruption course



Maar deposits: clear evidence of water-magma interaction.

Where do maars “like” to be formed?

Common formation of maars on lowermost parts of eruptive fissures

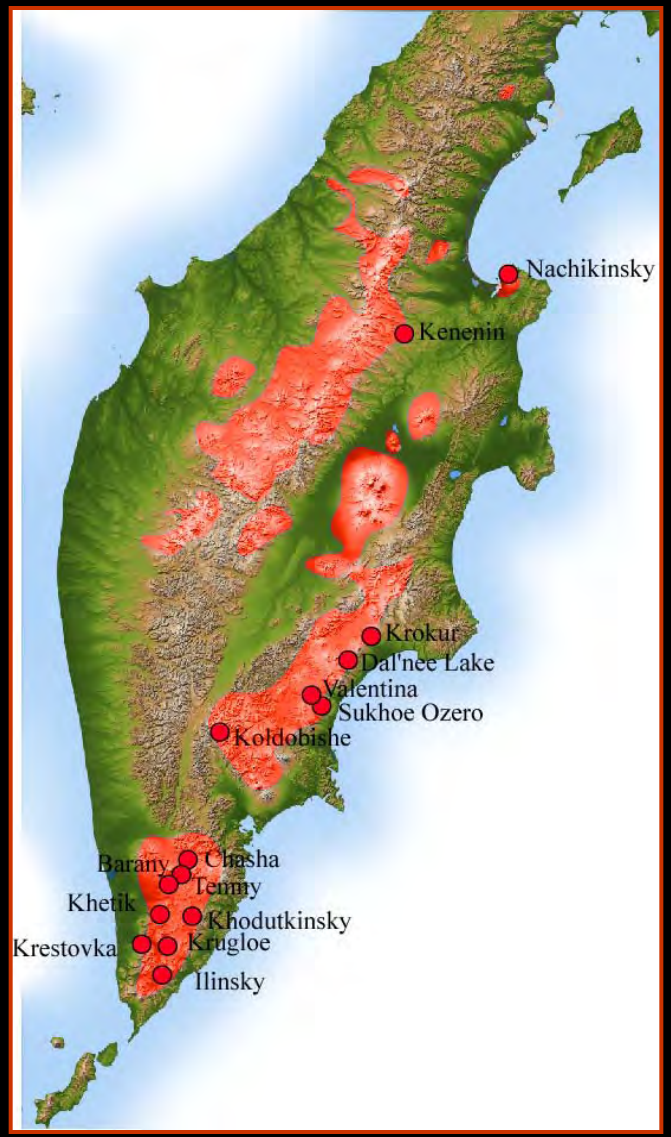
Common location of maars near big lakes

Maars comprise less than 1% of monogenetic volcanoes of Kamchatka.

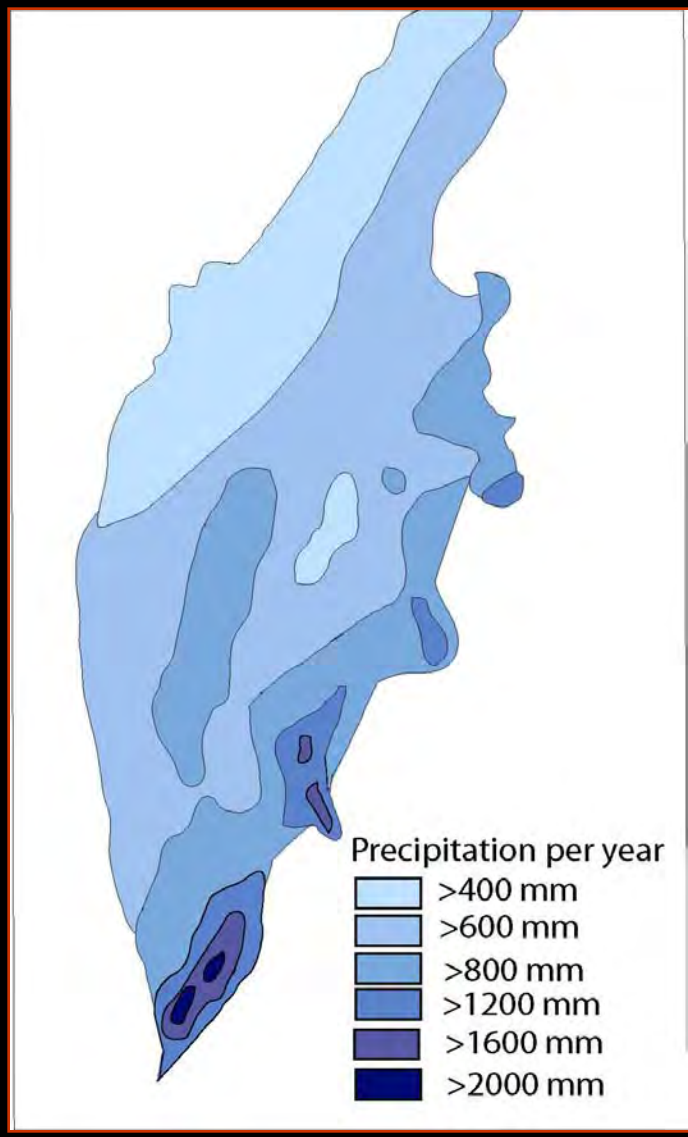
Why are they so rare?

Highest concentration of maars is in the areas with highest precipitation rates (>1200 mm/year)

Distribution of maars



Precipitation rate



Conclusions

- There are at least 19 maars in Kamchatka.
- Maars are relatively rare (<1% of monogenetic volcanoes of Kamchatka).
- Deposits of the maars show clear evidences of water-magma interaction.
- Maars are located in the wettest areas (near big lakes or see, lowermost parts of eruptive fissures).
- There is a link between annual precipitation rate and concentration of maars in Kamchatka.