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; crater 1.2 km; 3300 BP
Valentina Maar – one of the oldest in Kamchatka
Basalt; crater 0.8 km; Late Pleistocene
Chasha Maar

Rhyolite; crater 1.2 km; 4600 BP
Krokur Maar
Basalt; crater 1.3 km; 4900 BP
## Maars of Kamchatka

<table>
<thead>
<tr>
<th>Name</th>
<th>Age (Ka)</th>
<th>Crater (km)</th>
<th>Composition</th>
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<tbody>
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<td>Sukhoye Ozero</td>
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<td>Ilinsky</td>
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<td>0.3</td>
<td>Andesite ?</td>
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</table>
Diameter of maars

Age of maars

- Kinenin
- Koldobishe
- Barany
- Khodutka
- Dal’neye
- Chasha
- Krokur
- Temny
- Krugloye
- Nachikinsky
- Valentina
- Sukhoye Ozero

Circle size proportional to maar size
Maar deposits

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

Rhythmic layering – pulsatory eruptive style

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

Dal’neye Lake Maar

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 phreatomagmatic 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)
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.