# 8<sup>th</sup> International Maar Conference Petropavlovsk-Kamchatsky, Russia 24-30 August 2020

# SECOND CIRCULAR



### Dear colleague,

On behalf of the Local Organizing Committee and the International Association of Volcanology and Chemistry of Earth's Interior (IAVCEI) I am pleased to invite you to the 8th International Maar Conference (8IMC), which will be held in Petropavlovsk-Kamchatsky, Russian Federation, on 24-30 August, 2020. The 8IMC is a multidisciplinary congress on maar volcanoes, crater-lakes, and monogenetic volcanism (see information below).

FERENC

We hope you will consider presenting the results of your research in the next IMC.

Best regards,

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#### Alexei Ozerov, chair of the 8IMC.

### SCOPE

Since the first "International Maar Conference" (IMC) meeting, the series has become one of the most successful discussion forums in volcanology, mainly because it provides a unique opportunity to bring together people from many different volcanological fields (geologists, physical volcanologists, sedimentologists, modellers, geophysicists, petrologists, etc.) with researchers from environmental and post-volcanic subjects. Previous IMC meetings have been held in volcanic areas that present different problems in terms of eruption dynamics, products, and landforms. The venue of the next IMC will be Kamchatka – one of the most volcanically and seismically active regions on Earth. Besides 30 active volcanoes, Kamchatka hosts more than 20 monogenetic volcanic fields located both in frontal and back-arc settings. This volcanic region provides a unique place for holding this multidisciplinary volcanological forum due to its highly active nature. We suggest making a special focus at 8IMC on the subduction dynamic and its influence on the onset and development of monogenetic volcanism and phreatomagmatism.

The conference will include five days of scientific sessions, which will combine keynote speakers, oral presentations and posters. The field trips which will be scheduled during this meeting, will allow the participants to explore the diversity of volcanic landforms of this area focusing on monogenetic volcanism and phreatomagmatism.

Front page photo:Maar Dal'nee lake from the east, at background - rim of the Uzon caldera and Kichpinych volcano. Photo by Alexander Belousov

### **IMPORTANT DATES TO REMEMBER RELATED TO THE 8IMC**

- Grant application deadline: January 15, 2020
- Abstract submission deadline: January 15, 2020
- Early bird registration closes at April 16, 2020
- Pre-conference volcanological field school for young scientists: August 10-23, 2020 (preliminary)
- Conference: August 24-30, 2020
- Intra-conference field trip: August 26-27, 2020 (preliminary)
- Post-conference field trip: August 31- September 6, 2020 (preliminary)

#### VENUE

All scientific sessions and posters presentation of the 8IMC will be held at the Conference Hall of the Institute of volcanology and seismology (IVS) FEB RAS, located in Petropavlovsk-Kamchatsky, Kamchatka, Russia.



# **Abstract submission**

- Please download the abstract template from the web-site of the conference and follow the guidelines in it. The abstract must be sent by email <u>ivs-maar@kscnet.ru</u> together with the registration form (see below). Please indicate the desired session # and preferred type of presentation (oral or poster).
- Please fill in the registration form available at conference website and send it by email <u>ivs-maar@kscnet.ru</u> together with your abstract (no payment is needed at this stage).

# Scientific program

 Session 1. Morphology and structure of maars and monogenetic volcanoes Session Leader: Alison Graettinger Monogenetic volcanic landforms preserve evidence of the construction, modification and preservation of volcanic deposits from small volume eruptions. This session invites contributions about the morphology, architecture, and distribution of explosive and effusive small volume eruptions including subsurface structures as in maar-diatremes. The morphology of individual landforms and comparisons of size and shape across groups of landforms can be used to help reconstruct eruption history, associated hazards, and interactions with surrounding geology. This session encourages contributions on the full spectrum of monogenetic volcanic features including maar-diatremes, scoria cones, spatter ramparts, and lava flows. Contributions from field studies, numerical and analog modelling, remote sensing, geophysical techniques, and spatial analyses are welcome.

#### • Session 2. Eruption mechanism of maars and associated volcanoes Session Leader: Alexander Belousov

Originally maars were considered as craters of pure gas eruptions which ejected no juvenile magmatic material. Later quenched juvenile pyroclasts were recognized in most of the maar deposits and it became widely accepted that maars are products of phreatomagmatic eruptions from a highly explosive interaction between ascending magma and groundwater. Recently however appeared evidences that at least some maars were formed by violent release of CO2 probably of mantle origin. This session invites multidisciplinary submissions that will provide insight into eruptive mechanisms of maars based on investigation of lithology of maar deposits, properties of the erupted juvenile material. Presentations that investigate the link between maar forming eruption mechanism and more magmatic explosive eruption-driven eruption styles (such as Strombolian for instance) are particularly welcome.

## Session 3. Monogenetic volcanoes: eruption dynamics, magma plumbing systems, structure, physical and petrological modeling.

#### Session Leader: Xavier Bolós

This session invites scientific contributions about eruption dynamics of monogenetic volcanoes, their internal structure, and the physical and petrological modelling of its magma plumbing system.

Small-scale basaltic volcanic systems are the most widespread forms of magmatism on the planet and are expressed at the Earth's surface as fields of small volcanoes which are the landforms resulting from explosive and effusive processes triggered by the rise of small batches of magma. This session is concerned with the growth, geomorphology, eruption dynamics, geodynamic distribution and degradation of this type of volcanism. Monogenetic volcanoes distribution inside a volcanic field depends in each case on their regional and local tectonic controls. The great variety of eruptive styles, edifice morphologies, and deposits shown by monogenetic volcanoes are the result of a complex combination of internal (magma composition, gas content, magma rheology, magma volume, etc.) and external (regional and local stress fields, stratigraphic and rheological contrasts of substrate rock, hydrogeology, etc.) parameters, during the magma transport from the source region to the surface. This is meant to be a multi-disciplinary session and we invite contributions that include different type of methods, such as; field studies, geophysical methods, numerical and analogue modeling of volcanic processes, GIS analysis, and petrological studies focused on its magma plumbing system and eruption dynamics.

## Session 4. Petrology, geochemistry and characteristic times of magmatic processes at monogenetic volcanism

#### Session Leader: Tatiana Churikova

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Petrology and geochemistry of the volcanic objects are the surface representation of the deep underground processes, which are controlled by regional and local tectonic conditions. Among other volcanic objects, monogenetic volcanism, including large monogenetic fields, flank areal volcanism, diatremes and phreatomagmatism, with its abundance of mafic lavas produces the least contaminated rocks and therefore is informative to study the primary mantle sources and processes. Due to high source-tosurface ascent rates, the composition of zoned minerals from the monogenetic events often keeps information about times of such processes as magma mixina. magma chamber replenishment. fractional ascent. magma crystallization and crustal assimilation. Correlation of these times with geophysical and observed parameters and events improve the understanding of eruption mechanisms and its forecasting. We invite contributions that include field observations, petrological, geochemical, and isotopic data, as well as diffusion timescales records based on the distributions of the chemical compositions in minerals.

## Session 5. Volcanic hazard and risk assessment in monogenetic volcanic fields Session Leader: Gabor Kereszturi

A volcanic field is produced by distributed basaltic to rhyolitic volcanism of a variety of explosive and effusive eruption styles, which is often termed monogenetic. These types of eruption are often episodic and characterized by short periods of intense activity (e.g. days to years). Moreover, each new eruption occurs in a distinct location, rather than repeatedly from the same site, such as at polygenetic volcanoes. This apparent evolution pattern and overall behavior make eruption forecast and volcanic hazard assessment of monogenetic volcanic fields extremely complex. In contrast, many monogenetic volcanic fields are situated near critical infrastructure, transport routes and large populations, requiring continuous development and refinement of the current practice of volcanic hazard assessment. This session invites submissions to further our understanding of volcanic hazards within active monogenetic volcanic fields, including but not limited to field-based, remote sensing, numerical modelling, geophysical and statistical approaches.

#### Session 6. Maar lakes and environment Session Leader: Dmitri Rowet

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Most volcanic lakes on Earth are maar lakes. Many maar craters are occupied by a lake. These two strong statements require major attention in future research. On the one hand, the presence of water intrinsically inhibits the study of the geological record, as a large portion of volcanic deposits is submerged by the lake. On the other hand, the deep anoxic water enables to preserve volcanogenic as well as allochthonous sediments. As such, the investigation of the well preserved sediment cores permits to (1) reconstruct the past volcanic activity, in time (100-1000s of years) and space (crater vs field), (2) detail the genetic process of the maar crater, (3) detect inter-eruptive periods, limnic gas bursts and possible climate change events that alternated with volcanic activity in the area. Thorough insights into the architecture of aguifers surrounding maar lakes and their relation with the lake itself helps to assess future hazardous scenarios (e.g. phreatomagmatic activity) for monogenetic or polygenetic maar fields. Moreover, the limnology of the lake water permits to trace back on the year to decade time scale. How stable is the lake water stratification throughout the seasons and years? Are there any signs of active volcanic input (e.g. sublacustrine hot springs or degassing vents)? Is CO<sub>2</sub> accumulated in the deep lake strata, up to critical conditions to cause a "Nyos-type" gas burst? What is the relation between the lake's thermal regime and the tectonic environment (e.g. geothermal heated deep rift lakes)? This session seeks for studies on (1) the sedimentology of lake core sections and its relation to the reconstruction of the genetic processes of the lake basin, (2) physical and biological limnology of the lake water, (3) geochemistry of water and dissolved gases of maar lakes.

## Session 7. Maars and monogenetic volcanoes in geoheritage and geoconservation

#### Session Leader: Karoly Nemeth

Monogenetic volcanoes are commonly defined as erupting only once during their eruptive history through distinct eruptive phases. Systematically or randomly changing magma discharge rates, fluctuation of external versus internal influences on the eruption styles, and magmatic versus phreatomagmatic fragmentation can produce a great range of volcano types in terrestrial and subaqueous environments. In addition, monogenetic volcanic fields are the most common manifestation of volcanism on Earth hence they exist in every geotectonic settings and geoenvironments. As monogenetic volcanism played an important role in the global magmatism through the Earth history, there are monogenetic volcanic fields through the entire time of the evolution of Earth, hence we can come across with active, young or old eroded varieties of them. This extraordinary variety of monogenetic volcanism making it a very suitable subject to utilize them for geoeducation particularly for demonstrating of the variety of volcanic hazards. The small size, and the relatively simple volcano architecture that formed over short time making monogenetic volcanoes "human-scale" volcanic features hence perfect sites to promote volcanology to the general public. Monogenetic volcanic fields carry high geoheritage value especially if their eruptions influenced human society, they have high aesthetic value, or they are used as reference areas to describe unique volcanic processes. The complex geoheritage aspect of monogenetic volcanism has recently been recognized in geoconservation point of view and more and more monogenetic fields are in the frontline in various level of geopark establishments. In this session we call submissions that highlight this complex geoheritage aspects of monogenetic volcanism and its main volcanic landforms such as maars, tuff rings, tuff cones and scoria cones. Presentations that deal with various evaluation method to define the geoheritage values of monogenetic volcanic landforms as well as their link to human society, archaeology, indigenous world views and art are particularly welcomed in this session. Works that link modern and intact volcanic landforms to old eroded fields to utilize the geoeducation values of monogenetic volcanoes are also expected to be presented in this session. Works presenting new and advanced technologies applied in understanding the interaction of human societies with volcanic fields especially linking social studies, archaeology and volcano science are most welcome to this session.

# **Grant application**

We can offer a limited number of grants that can provide support for registration and/or partial expenses (accommodation and meals), depending of available funding and number of applications. Students, young researchers and scientists attending from developing countries are encouraged to submit their applications. To apply, please fill in the grant application form available at the web-site of the conference and send it to email <u>ivs-maar@kscnet.ru</u> with "GRANT APPLICATION" at the subject line. You must submit the abstract in order to apply for the travel grant and be a paid IAVCEI member for 2020 to be eligible for the financial support.

# **Registration Payment**

Will be activated soon

Registration payment can be made only online. Method of payment: Credit Card or Bank Transfer. By Bank Transfer please send a copy of the transfer by email (ivs-maar@kscnet.ru) clearly indicating the name of the participant in the subject field. Once we verify the bank transfer, we will confirm registration by email. Please note if the Technical Secretary does not receive any proof of your payment within 10 days after registration, your registration will automatically be cancelled.

<b>Registration Fees</b>	Early Bird	Normal rate	On Site Rate
	Before April 16	April 17 – August 16	August 17 – 24
IAVCEI Life member			
Regular participant	370	420	470
Student participant	270	350	400
IAVCEI regular member			
Regular participant	400	450	500
Student participant	300	350	400
Accompanying person	125	150	170
One-day registration	125	125	140

# **Registration Fees**

## Registration fee includes:

- ✓ Access to the scientific sessions
- Admission to the Ice Breaker
- Admission to the Farewell Dinner
- Conference registration, copy of Abstracts (PDF format and printed volume) and program brochure
- ✓ Field guide brochure
- Conference set (name badge, pen, notepad, bag)
- Souvenir products about Kamchatka
- ✓ Coffee breaks
- $\checkmark$  Lunch boxes
- ✓ Airport transfers (2 days before the conference, 1 or 2 days after the conference) from Petropavlovsk and from Paratunka resort area
- Transfers Paratunka-PK-Paratunka during the conference (for participants staying in Paratunka's hotel)
- $\checkmark$  Invitation fee

### Accompanying person registration fee includes:

- Admission to the Ice Breaker
- ✓ Admission to the Farewell Dinner
- ✓ Coffee breaks
- Airport transfers (2 days before the conference, 1 or 2 days after the conference) from Petropavlovsk and from Paratunka resort area
- Transfers Paratunka-PK-Paratunka during the conference (for participants staying in Paratunka's hotel)

## One Day registration fee includes:

- $\checkmark$  Access to the scientific sessions during the day
- Conference registration, copy of Abstracts (PDF format and printed volume) and program brochure
- Conference set (name badge, pen, notepad, bag)
- $\checkmark$  Coffee breaks during the day

# INFORMATION ABOUT FIELD TRIPS

Vilyuchinsky volcano. Photo by Dmitry Melnikov, IVS FEB RAS

• Payment for the field trips will be made onsite by cash only; all participants willing to take part in the field trip(s) have to indicate the desired field trip in the registration form and send it by email together with the abstract.

## Pre-conference: International volcanological field school for students

For students and PhD candidates it is possible to participate in Mutnovsky volcanological field school, co-organized by University of Alaska, Fairbanks and Institute of volcanology and seismology FEB RAS. The school will be held in Mutnovsky and Gorely volcanoes area (Kamchatka) approximately from August 10 to August 23, 2020. Details can be found at <a href="https://www.uaf.edu/geology/academics/international-volcanology/">https://www.uaf.edu/geology/academics/international-volcanology/</a> and at Facebook page of the school. Application must be submitted directly to the field school organizers. Amount of places is limited, it is important to send application in time.



## **INTRA-CONFERENCE FIELD TRIPS**

### (2 days during the conference depending on the weather)

**Helicopter field trips** – the fees are calculated according to the prices of 2019 (costs include helicopter, transfer from/to the hotel, lunch during the excursion) per one person <u>IN CASE OF FULL OCCUPANCY OF</u> <u>THE HELICOPTER</u> (minimum amount of participants per one excursion – 20 (1 helicopter), maximum – 40 (2 helicopters)). Price may increase in 2020 (and most likely will) depending on the price of the helicopter hour. We need your registration forms to understand the amount of participants before the final calculation of the prices!

### Field trip H1: Valley of Geysers, Uzon caldera ~670 Euro



Uzon-Geysernaia twin calderas form a 9 x 18 km depression, which originated as a result of large explosive eruptions in the late Pleistocene time ~ 39  $600\pm1000$  BP (Florensky, 1984; Braitseva et al., 1995). Associated ignimbrite sheet covers an area of 1700 km<sup>3</sup>.

Valley of Geysers and Uzon caldera are part of Kronotsky Reserve. Valley of Geysers is a narrow canyon, carved by the Gersernaya River. More than 40 geysers and numerous pulsating springs, mud and water caldrons, steam jets and other geothermal features are concentrated in this small area. This is one of

the largest geyser fields in the world and the only one in Eurasia The northwestern part of the caldera (or Uzon caldera) hosts a large geothermal field and numerous hot and cold lakes. Present geothermal activity is concentrated in a 0.3 x 5 km zone filled with boiling springs, gas-steam jets, mudpots, small mud volcanoes, hot lakes and springs with colonies of blue-green algae and thiobacteria (Piip, 1937; Pilipenko, 1976; Karpov, 1992; Leonov et al., 1991). Some of the lakes are located in the craters of hydrothermal eruptions: a crater enclosing Khloridnoe Lake formed 1.5-2 ka BP; Bannoe Lake ~ 3.5 ka BP. The most recent eruption took place in 1989 and created a 14 m wide crater. The only definitely Holocene magmatic feature in Uzon is a maar filled with Dal'nee Lake.

http://www.kscnet.ru/ivs/volcanoes/holocene/main/main.htm

Maar Dal'nee lake is located at the NW part of Uzon caldera. Formation of maar inside Uzon caldera happened 3300 BP when migration of magma happened along a fault from Krasheninnikov volcano. At first magma came up to the surface at high elevations when scoria cones Duga and Zametny were emerged. Then at low elevations inside Uzon caldera, magma interacted with ground water, phreato-magmatic eruption started and maar was formed. At the terminal stage of the eruption the water influx to magma was run out, the eruption became pure magmatic, and a small scoria cone formed in the central part of the maar (Belousov, 2006).

Maar is located at the altitude 670 m above sea level, its diameter 1.2 km and it is filled by closed lake 43 m deep. At the middle of the lake there is a small island composed by last portions of erupted material. Maar break through glacial deposit which filled Uzon caldera.

There is a good trail from heli landing place inside Uzon caldera to the maar rim. On the maar slopes there are several outcrops where phreato-magmatic deposits gradually changed to magmatic scoria, basaltic andesite in composition.

### Field trip H2: Karymsky volcano ~310 Euro



The Karymsky volcano and Academy Nauk caldera belong to a chain of volcanoes, calderas, and maars, the location of which is controlled by a local north-trending fault. Magmas erupted during Holocene time along the fault varied in composition from basalts to rhyolites, andesites and dacites being the most voluminous. Basalt eruptions in the Karymsky-Academy Nauk area have been rare and subordinate in volume. Karymsky is an 5300-yr-old andesitic stratovolcano located in the center of an 7900-yr-old caldera (Braitseva and Melekestsev, 1991). In historic time (since 1771) more than 20 prolonged eruptions are known. Before 1996 the volcano had been dormant since 1982. Now it is almost continuously active.

Karymskoye intracaldera lake is located in an uninhabited region of the Eastern Volcanic Belt, 125 km north-east of the town Petropavlovsk-Kamchatsky. It is 7 km to the south from Karymsky stratovolcano. Around the lake there are several late Pleistocene-Holocene stratovolcanoes of basalt to rhyodacite composition. Karymskoye lake fills one of them—the Akademiya Nauk caldera which formed in the late Pleistocene time; the fission-track age is 28-48 ka. Karymskoye lake is 4 km across and has a maximum depth of 70 m. The surface of the lake has an altitude of 620 m above sea-level.

Eruptive activity in the lake included two pre-historic eruptions at c. 4800<sup>14</sup>C yr BP (Belousov et al., 2001). The first is interpreted as a Surtseyan eruption that occurred at the water depth about 50 m. The second of the 4800<sup>14</sup>C yr BP eruptions deposited extensive cross-laminated base-surge deposits and is interpreted to have occurred in shallow water. These two eruptions, which occurred with short time interval have formed the underwater tuff ring which was expressed as a shoal in the northern part of the lake.

On 2-3 January 1996 an explosive eruption discharging ~  $10^6$  kgs-1 of basaltic magma occurred in Karymskoye lake at an initial water depth of ~ 50 m. The eruption formed an underwater tuff ring of basaltic composition (52 – 53% SiO<sub>2</sub>) with crater 600 m in dimeter. The total volume of deposit is estimated as approximately 0.047 km<sup>3</sup>.

Characteristics of the deposits together with analyses of a videotape of several explosions have allowed to model the eruptive events (Belousov et al., 2001). Initial vent-clearing phreatic explosions ejected blocks of country rocks (up to 3 m diameter) to distances of up to 1.3 km. Then followed 10-20 h of phreatomagmatic Surtseyan activity: 100-200 outbursts of water-gas-pyroclastic mixtures to heights of up to 1 km, with initial velocities of 110 m/s. The eruption slugs collapsed back into the lake and produced base surges with runout up to 1.3 km and average velocity 12.5 m/s. The convective eruption plume rose to a height of 3 km and deposited a thin distal fall deposit.

The most widespread hazards of the eruption were tsunamis and lahars. The highest runups of tsunami waves (20 – 30 m) (Belousov et al., 2000) occur on the shore immediately adjacent to the tuff ring, 700 m from the center of the crater.

## Field trip H3: Tolmachev Dol (Chasha and Baraniy Amphitheatre maars) // helicopter trip~240 Euro

### Field trip L3: Tolmachev Dol // Onland field trip (all—terrain vehicles) – min 50 Euro (include transfer from/to the hotel, lunch during the excursion, permission to attend the territory, transportation during the field trip)



Tolmachev Dol is a lava plateau northeast of Opala volcano. It host numerous Late Pleistocene and Holocene basaltic scoria cones. The latest eruption, which formed a scoria cone and a large lava flow in the far northwestern part of the plateau, occurred only 1600- 1700 years BP as suggested by stratigraphic position of its erupted products between OP (1500 years BP) and KS1 (1800 years BP) marker ash layers (Oleg Dirksen, personal communication)

The most unusual Holocene event at Tolmachev Dol was an eruption of about 1  $km^3$  of rhyolitic tephra from a large Chasha (Bowl) crater in the northern part of the plateau. The eruption took place about 4600 <sup>14</sup>C years BP. Its ash layer, coded OPtr, is a good marker in the regions between Avachinsky volcano in the north and Mutnovsky volcano in the south.

Maar Chasha is located at the lowland Tolmachev Dol (southern part of Kamchatka peninsula), close to lake Tolmachevo. It is consisted of a group of

funnels: one small dry funnel and at the distance of 200 m two more merged funnels occupied by a lake 1.2 km across. Maar has rhyolitic composition, the volume of erupted material 0,9-1 km<sup>3</sup>.

Tolmachevo lake and maar Chasha are closely connected through the aquifer. When as a result of dam construction in 1999–2000 the water level of Tolmachevo lake was elevated up to 18 m, the water level in maar Chasha raised up 12 m.

### POST CONFERENCE FIELD TRIP Tolbachinsky Dol, 7 days, maximum 22 persons: 650 Euro



Price ilncludes food, tents, all-terrain vehicles, guides, permission to visit the territory of the National Park. Does not include personal equipment (sleeping bags and sleeping mats, clothes, boots, medicine, etc)

Tolbachik volcano is located 600 km to the north from Petropavlovsk-Kamchatsky. It has two rift-liked structures to the north-east and south-west from the volcano edifice. In Holocene more than 120 scoria cones up to 300 meters high were formed along these zones. During last 80 years 3 big eruptions happened here (in 1941, 1975-76 and 2012-2013), so this area is very well studied by a variety of methods.

It will take about 1,5 days to get to Tolbachik. Participants need to have the individual field equipment (sleeping bags, backpacks, etc – the full list will be provided later). The field trip includes 3-4 nights camping in the field.

# Local Organizing Committee

Alexei OZEROV IVS FEB RAS - Chair of the conference

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Conference webpage management and maintenance, technical support of the conference: Leonid PTASHINSKY, Sergey VASILIEV (IVS FEB RAS)

Conference WEB page http://www.kscnet.ru/ivs/conferences/ maar2020/en/

Eruption of Karymsky volcano. Photo by Dmitry Melnikov, IVS FEB RAS

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