

*Newsletter of the Volcanology and Igneous Petrology Division  
Geological Association of Canada*

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## From the President

Another year is behind us and we are making plans not only for the coming year but also for the following year (2011). Regarding the latter year, the division made a proposal to the 2011 GAC organizing committee for a 1 day field trip and a short course in addition to a special session. The field trip will focus on the carbonatites and related rocks of the Ottawa region and will be led by Don Hogarth. It will be similar to the successful field trip that was run during the 1997 GAC/MAC meeting in Ottawa but with considerable new data. The division is also sponsoring a short course on classical optical mineralogy with applications to petrology. The course will provide examples of how optical mineralogy forms the basis upon which more sophisticated techniques such as cathodoluminescence and laser ablation are applied to solving petrological problems. The coordinators of the course are Jim Nicholls and Dan Kontak. The short course will probably be co-sponsored by the Mineralogical Association of Canada.

Among other activities of the division, Georgia Pe-Piper is finishing the editing of a series of volcanology/igneous petrology papers for a special Geoscience Canada volume. Most papers were already individually published and the volume hopefully will appear shortly. During the 2008 GAC/MAC meeting, the Volcanology Division and the Mineral Deposit Division jointly

organized a short course on "Submarine volcanism and mineralization: modern through ancient". The short course volume containing five papers is now available for purchase. The division coordinator was Brian Cousens. At the 2009 GAC/MAC meeting, the division sponsored a special session entitled "Secular changes in magmatism and tectonic implications". Papers from the session will be published in a special issue of *Lithos*. The deadline for submissions is March 1, 2010. If anyone has a manuscript on this topic contact either Brendan Murphy or me.

During the last business meeting the division decided that it will contribute up to \$1,000 to the undergraduate student who wins a bronze Gelinas medal for the best BSc thesis to pay for the student's attendance at the GAC/MAC annual meeting and our business meeting. The division will also establish an award for the best student poster in the field of igneous petrology during the annual GAC meeting. If the financial situation permits, the division will contribute up to \$1,000 for this award.

We are currently seeking nominations for the awards for best PhD, MSc and BSc theses in volcanology and igneous petrology as well as the Career Achievement medal (see last page for details). These medals will be presented to the winners at the 2010 GAC/MAC meeting.

Jarda Dostal



These two photos were provided by Ned Chown who took them on a recent trip to Rapa Nui (or Easter Island to the rest of us). Both are from Rano Kau the intermediate in age of the three volcanoes of Rapa Nui. While the lava tube is self explanatory the dome is one of three on the northeast side of the crater which were labelled as Benmoreite on the geological map.



## Iceland: Fire and Ice

Brian Cousens, Carleton University

In August of 2009, Brian Cousens (Carleton University) and Tony Fowler (University of Ottawa) led a two week igneous petrology field course to Iceland for 19 undergraduate and graduate students from the two universities. Neither instructor had been to Iceland before, so this was a “dream trip” for instructors and students alike.

The first week was spent doing day trips out of Reykjavik, using the Downtown Reykjavik Hostel as a base. Day 1 was the tour of the “Golden Circle”, led by David Wellsbury of Iceland Horizon Tours. After stopping to briefly look at overviews of recent geothermal activity along the Ring Road, a rootless cone near Reykjavik, and the Kerid explosion crater, we arrived at the Geysir field to watch the active geyser, Strokkur, erupt every five minutes. We then drove to Gullfoss, a magnificent waterfall cascading over basalt lavas and conglomerates. Our final stop was at

Thingvellir, where you can walk in the West Volcanic Zone (a.k.a. the mid-Atlantic Ridge) that separates the North American and Eurasian plates. This is also the site of one of the oldest parliaments in the world, the Althingi, established around 930AD.



The Mid-Atlantic Ridge exposed at Thingvellir.



View of the geyser Strokkur in eruption.



Gullfoss waterfalls

Day 2 was a grand tour of geothermal features and energy development east of Reykjavik at the Hengill volcanic field. Led by Gestur Gislason and Gretar Ivarsson of Reykjavik Geothermal, we first toured the Hellisheidi power plant and were introduced to how geothermal energy is used for electricity generation and hot water production. Our group had noticed the mild “rotten egg” smell of the hot water in the Reykjavik hostel, and this is the result of the addition of small amounts of  $H_2S$  to the water to prevent corrosion of pipelines heading into Reykjavik. We then were able to get a close-up look at a newly-drilled geothermal well that was being allowed to run wild for two weeks to clear out the well. The noise was deafening, as a huge plume of steam mixed with hot water gushed out of the well. We spent the rest of the day hiking across the



Uncapped geothermal well at the Hellisheidi geothermal area.





Carefully walking over a hot spring, Hengill geothermal system

Hengill geothermal field that stretches from the Hellisheidi plant to the Nesjavellir plant on the north side of the volcano. We got a close-up look at fumaroles, mud pots, and thermal pools surrounded by subglacially-erupted volcanic and volcanoclastic rocks. This was one of the greatest experiences we had on the trip.

Day 3 included a morning visit to ISOR, the Icelandic Geological Survey. ISOR had arranged for a series of talks to be given by local experts on the geology and geothermal activity on Iceland. Not only did we get more insight into Icelandic geology, but we had an opportunity to meet some well-known Iceland geologists and discuss Iceland geology over coffee. We discovered that recent deep geothermal drilling at Krafla volcano in northeastern Iceland had drilled into a magma body, just as a recent drill effort at Kilauea volcano had done. The rest of the day was spent in museums, shopping, or just relaxing in Reykjavik. That night, we attended a showing of Iceland volcano movies filmed by Villi Knudsen at the Red Rock Cinema, including superb footage of the Grimsvotn eruption, a jökulhlaup, the 1973 Heimaey eruption, and the 1963-67 eruption at

Surtsey. The film is a bit dated, but the events are wonderfully recorded.

Day 4 was another highlight, an excursion to Hekla volcano. We were led by David Wellsbury and a colleague from Go Travel Iceland. We dug into the rhyolitic tephra deposits exposed in quarries along the flanks of the volcano, then drove up the flank to look at young lava flows and tephra deposits from recent eruptions from the volcano. Hekla is due to erupt any time soon, based on the last eruption in 2000 and its 10-year repose time, so local officials no longer allow anyone to get too close to the summit fissure system. On the way down the volcano, one of the 4WD vans had a spectacular tire blowout at 70 kph, resulting in no damage or injuries, but it was a two-hour wait for a replacement tire from Reykjavik. But that afternoon we were able to visit the Stong archeological site and stopped at two spectacular exposures of wild columnar joints in basaltic lava flows. The textures in subglacially-erupted lavas are spectacular.



Tephra from ancient eruptions of Hekla volcano exposed in a quarry.

On Day 5 we flew to the Westman Islands, specifically the town of Vestmannaeyjar on the island of Heimaey, to see the products of the 1973 eruption that covered a good portion of the town and nearly blocked the harbour. The weather was typically Icelandic – horizontal rain – but we were able to wander around town and see the recent excavations of homes once buried under tephra and view buildings partially engulfed in lava flows. We also walked down to the harbour area to see how the advance of the lava flows was stopped by pumping huge quantities of seawater onto the flow front, and how this actually improved the protection provided to the local fishing fleet!

The rain stopped around mid-morning on Day 6, just in time for us to climb the new volcanic cone named Eldfell. The rim of the cone is highly hydrothermally altered, and several crevices in the rim are extremely hot! From the crater rim you get a spectacular view of “mainland” Iceland



Group photo at Hekla.





Waterfall flowing through columnar-jointed lava flows.

and the Mýsdalsjökull glacier, the town of Vestmannaeyjar, and a view south to Surtsey. We then wandered over the spatter vents from the original fissure formed at the outset of the eruption, and then discovered a terrific lava tube in one of the Eldfell lava flows. Then it was time to fly back to Reykjavik.



Building partially buried beneath lava flow from Eldfell volcano, Heimaey

On the morning of Day 7 we picked up three Land Rover Defenders from Hertz and set off for the Torfajökull region. Torfajökull is the largest rhyolite volcano on the island and is famous for flow-banded rhyolites, magma mixing textures, and the Landmannalaugar hotsprings. Unfortunately we had another horizontal rain day, making note-taking or even picture-taking impossible. It also made driving through the braided rivers challenging as we made our way back to the south Iceland coast at Skogar. However, undaunted by the weather, the students still got in a swim at the Landmannalaugar hotspring!

Day 8 began with some sunshine as we set out to look at volcanic features on the south coast of Iceland. Our first



Lava tube in the 1973 flows from Eldfell volcano.

stop was a vast field of rootless cones on the 934-940AD Eldgja flows. Rootless cones form when lava flows over wet ground, such as a marsh or shoreline. The base of the lava initially quenches against the ground, but then cracks and allows water to react with hot lava and cause phreatomagmatic eruptions. Unlike volcanic cones, rootless cones (also called pseudocraters) lack a feeder dyke. We were surprised to see that most of the cones are composed dominantly of spatter, some of which was entirely glassy.



Rootless cones on an Eldgja lava flow. Myrdalsjökull glacier in the background.



Tephra was only a minor component. Many of the cones have depressions at the top and have rims of spatter. The lava flow is rarely exposed, but spots where the flow was inflated and cracked poke up through the moss and tall grass. We then drove a short distance back towards Skogar to look at an isolated mountain called Hjorleifshofdi. Once part of the coastal cliffs, this volcanic mountain has been surrounded by a vast plain of sediments (sandur in Icelandic) shed from the Myrdallsjokull glacier and now sits well inland. The mountain formed when this part of the Icelandic coast was submarine, and is the remnant of a Surtsey-like volcano. Some of the upper cliff slopes exposed bedded pyroclastic deposits, although we did not have enough time here to thoroughly investigate the volcanology of the mountain.

Day 9 was a spectacular drive from Skogar to the Lake Myvatn area of northeastern Iceland. The recent heavy rains caused us to take the Ring Road east and north to Myvatn, rather than take the gravel road (with all its braided rivers) across the island. We had spectacular views of the Vatnajokull glacier, waterfalls, and mini ice floes along the coastal beaches where glacial ice is carried out to the ocean.



Arms of the Vatnajokull glacier and glacial lake.

We toured the Lake Myvatn area on a wet and windy Day 10, visiting the rootless cones at Skutustadir, the Hverfell cone and pyroclastic deposits, and the Dimmuborgir area. The rootless cones at Myvatn are much larger than those on the Eldgja flow near Vik and include much more tephra than spatter. The Hverfell complex include some surge deposit layers including tree molds that still have birch bark preserved inside the molds! Dimmuborgir is a collapsed lava complex with many lava tubes, several of which have multiple levels, retaining some weird and wonderful lava textures.

Our attention turned to Krafla on Day 11, where we focused on rhyolites associated with the Krafla caldera. The best exposure is at Gaesafjalllani, which is accessed



Tree mold with preserved birch bark, Hverfell.

by a gravel road that tracks across a truly lunar landscape. Here the rhyolite is columnar-jointed, suggesting that it was emplaced in contact with ice. Inside the caldera, we visited Viti crater (sticky mud!) and had an overview of the 1975-84 Krafla fissure basalts. The Krafla area is renowned for its geothermal activity, and we visited the Namafjall geothermal area and lounged for two hours at the hot spring spa. It is smaller than the Blue Lagoon near Keflavik airport, but just as enjoyable!



Columnar-jointed rhyolite at Gaesafjalllani.

We then drove across northern Iceland to the Snaefellnes peninsula on Day 12, where we had close-up looks at the Tertiary basalts and northern fjords. We stayed in the small village of Stykkisholmur, which has become a very popular tourist destination in Iceland. The Snaefellsnes peninsula is a region of "outlier" volcanism in Iceland, where Tertiary basalts are locally covered by Plio-Pleistocene through Holocene lavas that are interpreted to represent the "tail" of the Iceland plume. The most famous of the young volcanoes is Snaefellsjokull, the beginning of Jules Verne's Journey to the Centre of the Earth.



Day 13 started with the drive to Snaefellsjokull. Although the upper parts of the volcano were shrouded in fog, we saw nice examples of the alkaline lavas that characterize the volcano. The south side of the peninsula was bright and sunny, with spectacular views of young lava flows draped and cascading over Tertiary basalts. We also climbed the amazing Eldborg spatter cone, with steep crater rims coated in fountain-fed lava streams. The flow field around Eldborg includes nice examples of pahoehoe lava flows.



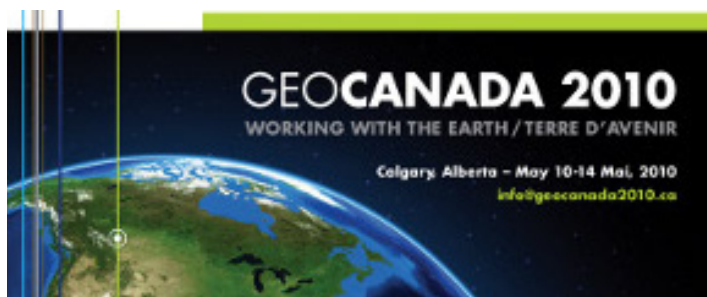
Youthful lavas cascading over Tertiary Basalts, south coast of Snaefellsnes peninsula.

Sadly, it was time to return to Reykjavik, return the Land Rovers, and get ready for the trip back to Canada. For Tony Fowler and I, the trip was a dream-come-true, since every corner we turned greeted us with a volcanic or geothermal gem that we will long remember. The Icelandic people were very friendly and always interested in what we were doing. Thanks especially to Vigdis Hardardottir and Gestur Gislason for their help in organizing the trip, and to the staff of the Downtown Reykjavik Hostel for making us feel at home.

*Brian Cousens*



## Meeting Announcements



The 2010 GAC/MAC meeting will take place in Calgary as part of the **GeoCanada 2010** meeting from May 10-14. The deadline for submitting abstracts is January 15, 2010

### Institute on Lake Superior Geology



The 56<sup>th</sup> Annual meeting of the ILSG will be held in International Falls, Minnesota from May 18-23, 2010 with field trips both before and after. Visit the [ILSG website](#) for more details.

### International Platinum Symposium



The 11th International Platinum Symposium will take place in Sudbury, Ontario from 21-24 June 2010. Visit the [website](#) for more details.

## VIP reminders

The deadlines for the various VIP awards are fast approaching so bear them in mind if you are thinking of nominating anyone.

The **Career Achievement Award** - the deadline is **31 January 2010** and nominations should be sent to Jarda (jarda.dostal@stmarys.ca)

The **Gold Gelinas medal** for an outstanding PhD thesis in the fields of volcanology and igneous petrology - the deadline is **28 February 2010** and nominations should be sent to Jarda (jarda.dostal@stmarys.ca)

The **Silver Gelinas medal** for an outstanding MSc thesis in the fields of volcanology and igneous petrology - the deadline is **28 February 2010** and nominations should be sent to Pete (peter.hollings@lakeheadu.ca)

The **Bronze Gelinas medal** for an outstanding Honours thesis in the fields of volcanology and igneous petrology - the deadline is **15 April 2010** and nominations should be sent to Glyn (glynwj@sfu.ca)

## Other news

VIP member who are also members of GSA may be interested to know that the new GSA Division for Mineralogy, Petrology, Volcanology, and Geochemistry (MPVG) is now up and running. Those interested in joining can do so [here](#).

