ASH FALL

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

#41 **July 1996**

EDITOR UP FRONT

Well, here we are at midsummer, a time of changes, not least to the Volcanology and Igneous Petrology Division. You now have a new executive - come to think of it; more like a Federal Cabinet shuffle with new blood introduced to the key positions to replace those tired old hacks Hickson and Metcalfe (*speak for yourself, Paul - CJH*). As our new Chairman, we have our erstwhile Councillor on Research, **Kelly Russell** from U.B.C. and as Secretary-Treasurer we have **Ned Chown** from the Universite de Quebec a Chicoutimi. My personal thanks and those of the Division go to both of them and to **Georgia Pe-Piper** of St Mary's University, who also agreed to stand and was duly elected vice-Chair. **Tom Pearce** and yours truly were sufficiently distracted, Tom by the impending and deservéd presentation (and yours truly by the newly arrived pizza) that they were nominated, seconded and elected Councillors Central and West, respectively, without a murmur, to join **John Stix** (Councillor East). If the punctilious have noticed a gap in our ranks (Councillor on Research, hitherto, Kelly's bag), I will note here that the matter passed unnoticed at the meeting and, upon reflection, we've decided to leave it vacant for a year, filling the vacancy by election at the proper time, in 1997.

I will also note that, for all my concerns about participation (I was hovering like a buzzard shortly before the meeting), the turn-out was remarkable, not far short of twenty, or about 15% of our membership, streets ahead of participation in the parent body and in many of our sibling sections and divisions. Our thanks to those who attended; we know many could not make it to Winnipeg '96. So there was an appreciative audience to see **Tom Pearce** receive the **1996 Career Achievement Award** and to describe his research in non-linear dynamics, which included a Leopold Gelinas - winning Master's thesis (**Shelley Higman, 1994**), carried out under his supervision. I'm repeatedly blown away by the very concept of chaos theory, doubly so by people who can actually get inside it. Congratulations, Tom.

Winnipeg '96 was an exceptionally well-run conference, exemplary in fact. For the first time ***ever*** I heard no whining about related and concurrent sessions at opposite sides of the campus. On one occasion, rather, leaving one session for another, I left by an intermediate door and found myself, in one step, not in the corridor but already at my intended session. Only one fly in the ointment, the lack of special sessions pertinent to, or sponsored by, our division. This matter was a grave concern and was discussed in some detail at the annual meeting. Subsequent rabble-rousing activities have resulted in a Special Session entitled"Physical processes of magma emplacement", to be held at the Ottawa '97 conference. Be there and submit your abstracts, ladies and gentlemen; we'll be dragooning more as the year goes on.

Lastly, as I intimated in the last few issues, the time has come when I must focus on other commitments and so this will be my last in this series of ***Ash Fall***. There is a feeling of loss - I've come to know many of the faces associated with the names on the Members' list - they're everywhere. My Saturday morning run up to the power line at the top of St. George's in North Vancouver, practically takes me past on member's door....so if you get an issue without a stamp on it, you'll know..... It is best, however, that ***Ash Fall*** take a different perspective and I look forward to its flourishing in Ned's capable hands. Look for me on the pages of ***GEOLOG*** - I'll be there for a while yet. My thanks to every body, particularly those who contributed. It's been a pleasure and a privilege.

'Bye everybody..... Or, rather: *au revoir*.....

ANNUAL MEETING OF THE VOLCANOLOGY AND IGNEOUS PETROLOGY DIVISION, GEOLOGICAL ASSOCIATION OF CANADA; MINUTES
May 29th, 1996

Attending: J. Nicholls, Interim Chairman; W.R.A. Baragar; E.H. Chown; L Corriveau; D.B. Dingwell; J. Dostal; B. Edwards; N.L. Green; S. Guernina; N. Green; T.H. Pearce; G. Pe-Piper; D.J.W. Piper; C. Roots; J.K. Russell; M. Stout; P. Metcalfe, Secretary-Treasurer.

1. The **meeting was called to order** by J. Nicholls at 12.05 noon, Wednesday May 29th, 1995 in Room 543-544 University Centre at the University of Manitoba, Winnipeg, Manitoba.

2. Agenda for the meeting was presented by the Interim Chairman. and approved, with the modification that the Career achievement Award be given last. (Moved T.H. Pearce, 2nd J.K. Russell)

3. Minutes of the previous annual meeting were distributed and approved as presented. (Moved W.R.A. Baragar, 2nd T.H. Pearce)

4. Business arising from the minutes

- ***Ash Fall*** and pertinent division information have not as yet been put on the World Wide Web, due to time constraints and the ongoing move of GSC Vancouver.

Action: Kelly Russell, assisted by other members of executive, to start a Web page at U.B.C. site

- Concern was expressed that a Division-sponsored function had not been convened for Winnipeg '96. Tom Pearce asked if a relevant short course could be implemented for Ottawa '97 in the time available. The Chairman announced that Ottawa '97 was to be run as plenary, with special sessions or symposia. Bob Baragar noted that the program was already in place and could not be changed or augmented at this point, adding that a decision had been made that this conference, in honour of the 50th anniversary of the Geological Association of Canada, had been arranged to be distinctively different. The deadline had passed and, in fact was unfeasible even for the following year in Quebec. Tom Pearce asked if amendments could be made even so, adding that he thought it impossible for any group to react with innovative and timely topics if these were required 2-3 years in advance.

Motion: (Bob Baragar, 2nd Don Dingwell): That the Ottawa '97 organizing committee be requested to consider co-sponsorship of the magma emplacement special session, possibly linking this to a field trip in conjunction with remote sensing. Carried unanimously.

Action: Bob Baragar to approach the Ottawa '97 organizing committee with the proposal.

5. Report of the chairman was summarized by the Secretary-Treasurer. Two field trips were sponsored by the Division at the Victoria'95 GAC/MAC. A pre-meeting trip to the Quaternary volcanoes of Wells Gray Park (Paul Metcalfe) and a post-meeting field trip to Mount Saint Helens (Catherine Hickson/Paul Metcalfe) were fully attended. No activities had been scheduled for Winnipeg '96

6. Report of the Secretary-Treasurer was presented and accepted (Moved G. Pe-Piper, 2nd T.H. Pearce).

- The division has 124 members, three more than in November of 1995 and up from a membership of 108 at the same point (April 17th) of last year. The membership flux is contrary to the current decline in the total membership of the GAC. The Secretary-Treasurer added that, as for last year, intensive advertising had not been pursued.
- Division funds are $3398.40 in the black, of which $257.28 is presently committed for production of ***Ash Fall*** and incidental expenses. A six dollar positive discrepancy had been noted by the Secretary-Treasurer and was unaccounted for. The Secretary-Treasurer thereby offered to resign, which offer was greeted with inexplicable and general laughter.

Action: The Secretary-Treasurer to re-examine the books and discover whence came the extra six bucks.

- The Secretary-Treasurer announced that the remaining issue of ***Ash Fall*** (#41) was due out, to fulfil his commitment to production of 4 issues in 1995-1996. He also noted that production costs of the newsletter had been carried in part by the Vancouver office of the GSC and estimated unsupported production for the coming year to be aprroximately covered by membership fees. He added a caution, regarding increased postal rates for heavy letters and the probable necessitiy of using a reduced font size for future editions. Kelly Russell proposed that conference information be kept on the net, rather than being posted in ***Ash Fall***; this suggestion met with general approval.

7. Scheduled activities.

- ***Ottawa '97*** Louise Corriveau asked if the Division would sponsor, in part the translation of a field trip guide book and brochure (64 pages) for another field trip designed to give teachers a taste of geology. The trip is to have a geological general theme with 10% volcanological content and will be used for the GAC-MAC. Tom Pearce enquired as to the necessity of retaining funds for striking of medals; the division has only two Career Achievement medals and one Leopold Gelinas medal remaining. The Chairman noted that some division funds will be required for the of new Leopold Gelinas Awards in silver, noting with thanks the generosity of Jerry Rémick in funding both the striking and manufacture of the first issues of this award. The Jerome H Remick III Fund has been generous to date, but the Division could not presume upon this. Kelly Russell noted that plans had been proposed previously to permit medal-winning students to attend conferences to receive their awards in person.
- The question of next year's venue for the Division's annual meeting was raised and the mperennial conflict with the MDD luncheon was raised. Tom Pearce proposed that the Division rent a room unilaterally at Ottawa for a meeting to exchange views and air any problems prior to a formal meeting.

  Action: Bob Baragar and Jim Nicholls to investigate the possibility of a Tuesday evening meeting at Ottawa
- Discussion returned to themes for symposia, special sessions, workshops and field trips Kelly Russell expressed a concern about the lack of themes addressing volcanism in western Canada. Louise Corriveau pointed out that the Division must look two years in advance rather than rebel against existing conditions; Tom Pearce was also of the opinion that the Division had not looked far enough ahead.

  Motion (Bob Baragar, 2nd Louise Corriveau): That executive empower a committee to report to executive on Québec '98, Sudbury '99, Calgary 2000 and possible non-AGM field trips and workshops. Carried unanimously.

  Action: Kelly to investigate the possibility of a special session on volcanology and igneous petrology at Quebec '98 and, within 6 weeks, have a title.

8. New business

- Disposition of Division funds.

  Motion: (Kelly Russell, 2nd Tom Pearce) that funds will be allocated on a discretionary basis to assist medal winners to meetings. Carried unanimously.
- Advertising of the Division by word of mouth was advocated by Tom Pearce
- Home page:

  Motion: (Louise Corriveau, 2nd Tom Pearce) That the Chairman -elect be empowered to form an ad hoc committee with members of the new executive, to create a home page on the World Wide Web, with links to members' home pages.
- Louise Corriveau, as short course coordinator for GAC proposed continuing education courses for members and sponsoring a course deliverable to workplaces and generating publicity.

9. Election of Officers:

Office	**Tenure**	**Candidate**	**Proposed**	**2nd**	**Close noms.**	**2nd**
Past Chairman	96-98	Hickson	No election necessary			
Councillors						
Central	96-99	Pearce	Baragar	Corriveau	Russell	Corriveau
West	96-99	Metcalfe	Chown	Baragar	Baragar	Pe-Piper
Sec.-Treas.	96-98	Chown	Metcalfe	Russell	Piper	Edwards
Chairman	96-98	Russell	Pearce	Metcalfe	Chown	Pearce
Vice-Chairman	96-98	Pe-Piper	Baragar	Russell	Corriveau	Dingwell

10. The **Career Achievement Award** was made to **Thomas Hulme Pearce**, the Chairman reading the citation (a copy will be included in the next issue of ***Ash Fall***). Tom presented a talk on his research after receiving the award amid enthusiastic applause. A synopsis of his acceptance is also planned for inclusion in the next issue of ***Ash Fall***.

11. Kelly Russell moved that the **meeting be adjourned**; 2nd by Ned Chown. Carried unanimously.

VOLCANOLOGY AND IGNEOUS PETROLOGY DIVISION FINANCES 1995-1996

Items	*Credits*	*Debits*	*Sums*	*Comments*
Balance May 17th 1995			***4031.91***	
Ash Fall 37 Xeroxing		0.00		Borne by GSC
Ash Fall 37 postage		0.00		Borne by GSC
AGM Pizza 1995		113.10		
Cheque #10		113.10	113.10	
			3918.81	
Photo prep. & mailing		200.00		
Money order		206.50	206.50	
			3712.31	
Ash Fall 38 Xeroxing		0.00		Borne by GSC
Ash Fall 38 Postage		178.73		
Office supplies		14.81		
Cheque #11		193.54	193.54	
			3518.77	
Ash Fall 39 Xeroxing		192.37		
Cheque #13		192.37	192.37	
			3326.40	
Late 1995 membership dues	72.00		72.00	
Present balance			***3398.40***	Presently 3404.40 in the bank - discrepancy of +6
Commitments				
Ash Fall 39 Postage		60.94		
Ash Fall 40 Postage		60.94		
Mailing of thesis		26.63		
Mailing of Money order		4.39		
Less 12.00 in new membership fees		-12.00		
Cheque #16		140.90	140.90	
Ash Fall 40 Xeroxing		91.30		
Cheque #14		91.30	91.30	
Medal engraving/plating		25.08		
Cheque #15		25.08	25.08	
Total commitments			257.28	
Balance May 29th 1995			***3141.12***	***N.B. Still awaiting membership fees***

P Metcalfe

Outgoing Secretary-Treasurer

VOLCANIC ACTIVITY
MT RUAPEHU, NEW ZEALAND

On 26th and 27th March, research parties, working in or around the summit crater of Mt. Ruapehu, observed a very small island in the Crater Lake near its south-western shoreline. Observations were hindered by steam and fume emissions, but indicate that the island is the top of a small lava extrusion, which is presently emerging onto the floor of the crater. Observers reported vigorous steam and gas emissions and sediment-laden geysering about the margins of this extrusion. Its visible extent, above lake level, is very small; estimated to be about 15m high and 20m across. The lake level remains about 80 m below overflow and the temperature 50°C. The extrusion process was passiveand it was inferred that it had been occurring since late February, concealed beneath the lake.

At about 13:10hr on Sunday April 21st, personnel working at Tukino Ski field became aware of a large flood of mud and boulders in the Whangaehu River, consisting of a mixture of 1995 eruption and weakened crater wall material. Observations on a flight between 1600 and 1700hr, together with seismic data, confirmed that at 12:57 pm a portion of the north east rim of the lake basin had collapsed into the Whangaehu Glacier and flowed down into the Whangaehu River valley. The collapse had also deposited debris into the lake basin and lake. There was also evidence of head wall erosion back up the Whangaehu Glacier towards the Dome. The water level of the lake appeared to be higher and the lava dome was no longer visible.

A significant local eruption of Ruapehu volcano started on June 17th. At 0650h, the first of several eruption plumes was seen above the volcano. Larger eruption pulses were observed at 0710h and 0825h. Volcanic tremor at Ruapehu began to increase at around 0600 hr that morning and continued to increase until about 1100h when it plateaued out at levels similar to those during the October 11-12 1995 eruptions. By about 1330h the level of volcanic tremor was starting to decline, and the style of activity changed to discrete explosive events. Observers near the mountain reported loud detonations and windows shaking. About 1500h the volcano started to erupt every 10-15 minutes, sending ash laden plumes to several kilometres height. The pulses contained voluminous amounts of coarse ash. Large blocks rising to heights of 500m metres fell at distances of 700m from the vent.

An overflight that afternoon confirmed a small lahar down the Whangaehu catchment but no pyroclastic flows out of the summit crater basin. Light ashfalls were experienced by much of the zone extending north from the volcano to the Bay of Plenty coast with margins at Tauranga and Whakatane at the coast. During the night of June 17th-18th, a significant lava (Strombolian type) eruption occurred between 2100-2200h, characterised by loud detonations and sprays of glowing rocks ejected above the crater and accompanied by strong seismicity. Through to about 0300h, several discrete eruption earthquakes were recorded. Observations made on overflights on the morning of June 18th (courtesy of TVNZ and TV3) confirmed that the new lake had been destroyed and the crater floor was dry. The active vent was an ice cream cone-shaped feature in the southern part of the crater floor. Apparently thick deposits of lava (bombs and lapilli) had accumulated on the crater floor. The bombs and blocks thrown out over night travelled further than those erupted earlier, to about 1.5 km from the vent. The level of volcanic tremor on the Chateau record suggested that molten material continued to move into the base of the volcano. Style and scale of activity remained similar to that in mid-October 1995.

By June 20th, the intensity of seismicity at Ruapehu had decreased to levels lower than recorded since prior to the September-October eruption. The crater now had a flat floor at about 120-150m below pre-1995 lake overflow level. Volcanic gases were freely streaming through the rubble on the crater floor, to feed the eruption column. As the gas velocity changes so does the amount of ash in the eruption column. The active vent continued to produce weak-moderate ash emissions, which were blown off down wind to reach over 100-150km from the volcano. A COSPEC flight to monitor the levels of sulphur dioxide in the plume was completed late on June 19th; data reduction indicated a SO_2 flux of 4100 T/day.

From accounts by BJ Scott (B.Scott@gns.cri.nz)

STOP PRESS June 27 1996, 1400 NZST (UT +12)

Since about 0400h larger discrete seismic events started, and ash eruptions were under way by 1000h. The vigour of the ash eruptions varied and became stronger after 1310h. An ash column reached to over 20 000ft with ash raining out down wind to the east and southeast of the volcano. An over flight was made between 1120 and 1140h, during which time weak ash emissions were occurring. The pulses of dark grey ash rose 100-300ft above the crater. There appeared to be two sources of emission from the south end of the crater, north of the former outlet area. The western vent was producing vivid white fume, while the eastern one was the source of the dark grey ash. Some of the thickest ashfall was over Mitre peak. The alert level remains at 3.

Brad Scott

Web site: **http://skye.gsfc.nasa.gov/volcanoes/ruapehu.html**

SW PACIFIC SUBMARINE ERUPTION AT EASTERN GEMINI SEAMOUNT

20°58.8'S, 170°17.1'E

A submarine eruption in the southern New Hebrides island arc (Vanuatu - SW Pacific) was first observed by a ship cruising in this area on February 18th around 1800 (in local time = GMT +10). It was described as : "continual steam and frequent vertical bursts of very dark water". The position given by the ship was : 20°58.8'S, 170°17.1'E, about half way between Yasur (Tanna Is.) and Matthew Island. No volcano is listed for this area in the catalog. A flight of a New Caledonia coastguards Guardian plane on February 19th described the activity as : "a white spot in the middle of a black patch with steaming of possibly floating pumices". A later report, from the New Caledonia Coastguard, stated that: "The white zone, from which steam is rising, has a diameter of about 400 m. This zone sets (*sic*) inside a wider ellipse brown-ochre, some 4000 m long, elongated down current. Each 9 to 3 minutes, an explosion sends black products approximately 20 m above sea level. After each explosion, the diameter of the white area diminishes drastically to rise again until the next explosion. The black products are diluted to form the brown-ochre ellipse. The initial report of floating pumices was wrong".

The location is that of Eastern Gemini seamount, one of the two Gemini seamounts which represent the southern submarine extension of the New Hebrides island arc. It is located about a 100 km south of Anatom island and culminates at about 80 m below sea level. Several basalt samples and one andesite were dredged on this seamount in 1989 (Monzier et al., 1993. Volcanol. Geothermal. Res., 57:193-217). There were described as glassy, vesicular and extremely fresh in the "Gemini cruise report" (Bargibant et al. 1989, ORSTOM Noumea Earth Sciences Report nber 12, 13 pages, unpublished). As all the samples were devoid of marine animal traces, the activity was described as very recent. The Western Gemini seamount is located near 21°00' S, 170°03' E, culminating at 30 m below sea level. Its activity seems to be older because the marine life is well developed around its summit observed by divers and dredged.

Jean-Philippe Eissen (eissen@orstom.fr)
Brad Scott (b.scott@gns.cri.nz)

LAVA LAKES IN VANUATU

I just returned from Vanuatu where I climbed the two volcanoes on Ambrym island with active lava lakes, Benbow and Marum. The lava lake in Benbow's crater is hard to see because it lies deep within two successive inner craters, but the one in Marum can be seen by simply looking over the edge and about a thousand feet down. Marum's lava lake was in constant violent motion, like orange surf crashing against the crater walls. Occasional explosions showered me with "Pele's hair." The natives said that the activity had recently increased, and the night glow from both craters can be seen for at least a hundred kilometers.

On Tanna island, Yasur volcano recently entered a new phase of very intense Strombolian activity, frequently throwing bombs to 300 m or more above the volcano. The natives said the last time it was this active was last January and February when 3 people were killed on the crater rim. Despite the very dangerous conditions when I was there, native guides continued to lead frightened tourists to the edge of the crater, staying there only a few minutes at a time to reduce the odds. Nevertheless, a few times an hour there was an intense explosion with air shock that felt like a slap in the face from a distance of a km or so, covering the cone with bombs. Fortunately no one was at the crater rim during these explosions. The booms were quite loud even 30 km away.

Michael Lyvers <mlyvers@pcmail.bond.edu.au

KOMAGA-TAKE, SW HOKKAIDO, JAPAN

42.07°N, 140.68°E; summit elev. 1,140 m

Hokkaido-Komagatake, or Komagatake (Hokkaido), Volcano is located 30 km north of Hakodate City, with a population of 320,000. This is an andesite stratovolcano (1,133 m high) whose summit has a 2 km-wide horseshoe-shaped caldera open to the E, resulted from large collapse 30-40 ka. Large-scale pumice-flow eruptions had occurred several times from craters within the caldera, including three historical major eruptions; 1640, 1856, and 1929.

In the 1640 eruption, the summit part collapsed and the avalanche entered into sea, resulting in the generation of tsunami, killing 700 people. In 1929, a one-day eruption issued 0.38 km^3 of ash falls and 0.14 km^3 of pumice flows; 2 killed and 4 injured. The eruption column height was 14 km. The pumice flows descended in all directions, reached about 8 km from the summit. Major eruptions at this volcano are characterized by very short activity duration (less than several days). The latest eruption took place in moderate-scale, such that eruption column reached 8 km above, in 1942.

Hokkaido-Komagatake, Japan, erupted at 18:10 JST on 5 March. A volcanic tremor of 5 minutes length with primarily phreatic ash-emission accompanied an eruption column up to several hundred meters high, according to the Usu Volcano Observatory, Hokkaido Univ. and JMA. Ash fall was observed on the southern flank of the volcano, more

than 10 km from the summit. Local people recognized white-colored eruption plume rising from a fissure of the 1929 eruption in the night. Japan Meteorological Agency (JMA) also reported around 150-m-high white plume rising above the summit in the 6 March morning.

Hokkaido-Komagatake was still active and with ash emission (but no volcanic tremors) as of the 8 March evening. Small-scale volcanic earthquakes have occurred several times a day. The Japan Meteorological Agency measured the height of the white-colored eruption cloud as 600 m above the crater on March 8th.

Clear airphotos; oblique and vertical views (7 Mar): **http://wave.chs.nihon-u.ac.jp/chiba/koma.html**
Volcano Research Center (Univ of Tokyo) Web site: **http://http://hakone.eri.u-tokyo.ac.jp/vrc/erup/erup.html**
Newest information ("Current Eruptions in Japan"): **http://hakone.eri.u-tokyo.ac.jp/vrc/erup/erup.html#komaga**

Setsuya Nakada, nakada@eri.u-tokyo.ac.jp

KARYMSKY VOLCANO

54°03' N 159°27' E; summit elevation 1536 m (5069 feet)

Karymsky volcano is one of the more active volcanoes in Kamchatka having erupted over 20 times in the past 200 years although it has been relatively quiet since 1982 following a decade of frequent eruptive activity. Periods of seismic unrest have occurred several times in the past 12 months and the volcano emits a continuous steam plume. The volcano is capable of explosive eruptions which can send ash to over 10 km (33,000 feet ASL) and continue sporadically for days or weeks; short lava flows are also a possibility. The volcano is located in a remote part of the Kamchatka Peninsula about 110 km (70 miles) northwest of Petropavlovsk-Kamchatsky and no towns or villages are threatened. The chief hazard at this time would appear to be encounters between airborne volcanic ash and aircraft.

An explosive eruption occurred at Karymsky volcano on the Kamchatka Peninsula beginning late on December 31st, according to seismic activity recorded by Russian scientists; Russian aviation sources reported an ash plume to 7,000 meters (23,000 feet) above sea level at approximately 1130 KST (2330 GMT). Vladimir Kirianov and Yuri Doubik of the Institute of Volcanic Geology and Geochemistry, who visited the area between 0130 and 0430 GMT on January 3, made the following observations. The eruption apparently began between about 0500-0700 GMT, January 1 in the north end of Karymsky Lake about 5 km south of Karymsky volcano proper. The initial stage of the eruption was apparently phreatic (steam-rich explosions) in character; Russian aviation sources reported an ash plume to 7,000 meters (23,000 feet) above sea level at approximately 2330 GMT. Based on a satellite image at 0200 GMT, the plume extended at least 200 km (120 miles) southeast and south of the volcano. When the volcano was visited on January 3, activity had shifted to Karymsky volcano where a new crater had formed on the south-southwest side of the cone adjacent to the old summit crater. The new crater was approximately the same size as the old crater. A thick black ash plume reached an altitude of about 2.5 km (7,500 feet) ASL and was being carried to the east; explosions were occurring every 1-5 minutes. Fresh ash fall was widespread throughout Karymsky caldera and for a considerable area to the east and north. Karymsky Lake, which occupies a late Pleistocene caldera and is about 5 km in diameter, was yellow-gray in color and mostly covered by steam and vapor. Karymsky River which flows out of the lake to the north was completely buried in ash and no longer visible; a new beach with numerous fumaroles marked the former source of the river.

Following the main eruption period in early January, 1996, Karymsky volcano produced one to several small explosions per day of mainly steam with minor ash, to heights of 1,500 m (5,000 ft) above the mountain. The lava flow produced during the January eruption stopped growing in early February and is now cooling. A volcanologist observing Karymsky volcano reported from the Institute of Volcanic Geology and Geochemistry (IVGG) this week that daily explosions were continuing, and the overall temperature of the lake adjacent to the volcano was 23°C with a hotter (32°C) area at the north end of the lake. The current level of mild explosive activity can be expected to continue for several months.

As of June 10, seismicity remains above background level and is indicative of continued low level Strombolian activity with occasional ash plumes to 3 km ASL. No visual observations of the volcano are currently available (last field party left the volcano 2 weeks ago). As of June 17, seismcity remained above background level and indicates that low-level eruptive activity continues, probably in the form of steam and gas explosions with a small amount of ash.

Vladimir Kirianov and Yuri Doubik kiri@volgeo.kamchatka.su tel. (415-022) 91953
Institute of Volcanic Geology and Geochemistry, Petropavlovsk-Kamchatsky (KVERT)
Tom Miller, Alaska Volcano Observatory

On Monday, June 10, 1996, the International Air Transport Association (IATA) announced that it had provided start-up funding to enable the Kamchatkan Volcanoes Emergency Response Team (KVERT) to begin operations following an 18 month hiatus - ed.

VOLCANIC EVENT ON THE NORTHERN GORDA RIDGE

Beginning at 0700 GMT on 28 February 1996, intense seismicity was detected in the northeast Pacific Ocean using the T-phase Monitoring System developed by NOAA/PMEL to access the U.S. Navy's SOund SUrveillance System (SOSUS) in the northeast Pacific. The current event is located on the northernmost segment of the Gorda Ridge; the general location was confirmed by SOSUS operators at NOPF Whidbey Island. The nature of the seismicity was very similar to that observed in June 1993 at the CoAxial Segment of the Juan de Fuca Ridge, which was later documented to be a lateral magma injection with subsequent eruption. The NOAA ship RV MacArthur was sent to the site, equipped primarily to look for a water column signal associated with the seismic events. This was a cruise involving both NOAA and university-based investigators, which successfully located a large event plume near 42°40'N, 126°47'W over the Gorda Ridge. Details at:

http://www.pmel.noaa.gov/vents/eruption.html or **http://ridge.unh.edu**.

Seismic activity continues and was, in fact, reinvigorated as of Friday, March 15, 1996. Based on this, NSF agreed to provide funding for a second response cruise on the UNOLS ship, RV Wecoma, out of Newport, Oregon, to the Gorda Ridge during the first two weeks of April, 1996.

RIDGE Office ridge@unh.edu (603) 862 - 4051

POPOCATEPETL, MEXICO

(All times local = GMT - 6)

At 03:49 on March 5th, an ash emission event was detected at Popocatepetl Volcano. A continuous seismic signal of variable amplitude started abruptly at that time, remained at relatively high levels for about one hour, and then decreased, keeping an almost constant amplitude.

Mild ashfalls were reported in the immediate area around the volcano, particularly in the north sector. During a helicopter reconnaissance flight, at 1200, ash deposits were confirmed, especially in the close neighbourhood of Tlamacas, and covering the snow cap. An ash and gas column about 800 m high rising vertically could be seen, height at which it dispersed in a long plume towards the northeast. A sulfur smell could clearly be perceived near the crater. The emission of gas, steam and ash appeared to be generated from the same three sources in the eastern internal side of the crater that produced the 1994-1995 activity. In general terms, the event seemed very similar to that of December 21, 1994, but perhaps about an order of magnitude lower, and comparable to the levels of activity observed on December 26, 1994.

From March 11, the overall level of activity of Popocatepetl volcano reached a steady state, suggesting an equilibrium condition between the internal energy sources and the volcano's capability to release it. Fumarolic activity alternated with short-duration ash emissions from the same vents as the 1994-95 episode, occurring four to six times a day. These emissions form short-lived ash columns that were carried away by the wind. Light ashfalls were reported from several towns around the volcano, particularly on the east and south sectors. Seismicity, as low-level tremor accompanied of minor A and B-type volcanic earthquakes, also showed almost stationary patterns and energy release rates. No deformations were detected by the 3-tiltmeter network set on the northern flank of the volcano.

A series of SO_2 flux measurements have been carried out since January 1994 at Popocatepetl volcano and especially after the event of December, 1994. The measurements of 1995 went up to nearly 8,000 t/d in March but gradually decreased down to 2,000 t/d in June. A persistent decrease of the gas emissions starting from July put the SO_2 flux in values of nearly 100 t/d by December 1995. During the March 5, 1996 event, the renewed ash emissions coincided with SO_2 fluxes of up to 15,000 t/d and by these days it has been decreasing down but the emission levels are still high (more than 5,000 t/d).

On March 29, during a COSEC flight, Lucio Cardenas, Juan Jose Ramirez and Hugo Delgado observed the appearance of a lava dome on the eastern side of the crater floor with an area of 400 sq. m emplaced on the rim of the inner crater (a destroyed lava dome that formed during the 1920-1927 eruption). This lava dome was observed coming out from a source outside that inner crater but flowing into it. On April 1st, the dome was observed filling up most of the inner crater (nearly 60 m deep) and increasing its area up to nearly 600 m^2. Emissions of ash along a NE-SW running fracture located at the SE inner wall of the main crater also continued intermittently. Apparently, the emission centre of the new domes was located between this fracture and the centre of the small inner crater formed during the eruption in the 1920s.

On April 10, 12, 24 and 29, the height of the dome was estimated as at least 50 m. The dome was in addition growing horizontally from the SE towards the NW with a steep terminal flow front in the NW. On the SE it was leaning in part directly against the inner crater wall of the main crater. The old inner small crater was by now totally covered by the new dome. By comparing pictures of the dome formed in the 1920 s with the present dome it was clear that the

present dome was already much larger than the dome in the 1920s.

On April 30 at 13.19 PM local time a major explosion occurred at the new dome. A shower of ejecta was dispersed towards the NE. Maximum clast diameter was 0.5 cm in the village of Xalitzintla, ca. 12 km NE of the crater; sand sized ash fell in the City of Tlaxcala at a distance of 60 km.

On May 2nd, five mountain climbers were found dead a few hundred metres below the NE crater rim. The climbers had ascended the mountain in the early morning of April 30. The possible cause of their death was due to lightning, because of severe burns. In addition to the severe 3rd degree burns, the corpses show severe injuries by contusions; the climbers could also have been killed by the explosion on April 30.

During a helicopter flight on May 3rd a depression at the surface of the new dome was observed, near the SE inner wall of the main crater. In addition streaks of gravel and boulders 10 to 20 m wide and a few hundred metres long, were running down the NE outer slopes of the cone, very close to the mountain's usual route of ascent.

Claus Siebe (csiebe@tonatiuh.igeofcu.unam.mx), Servando De la Cruz-Reyna, and Hugo Granados
Instituto de Geofisica, U.N.A.M.
Roberto Quaas Weppen, Enrique Guevara Ortiz, Bertha Lopez Najera, Alicia Martinez Bringas, Carlos Gutierrez
CENAPRED, Mexico

POPOCATEPETL VOLCANO HAZARDS MAP

Poster size 75 x 50 cm, color, plastic coated; Cost: $ 16 U.S. Price includes handling and mailing within tube. Send checks in $U.S. written to Claus Siebe to the following address:

Claus Siebe, Instituto de Geofisica, UNAM, Ciudad Universitaria, C.P. 04510 Coyoacan, Mexico, D.F. MEXICO
csiebe@tonatiuh.igeofcu.unam.mx

MONTSERRAT

At around 06:42 on 27 March, a series of rockfalls on the eastern flank of the dome occurred, and caused a large ash plume which reached a height of 6000 ft and drifted over Plymouth and the surrounding areas. A second, smaller event occurred at 07:00. Ash from the first event was channeled down the Hot River Ghaut, for about 1 km from the dome, and ignited dead trees. Bigger rock fragments were deposited within a small area much closer to the base of the dome. These rockfalls started from near the base of the tallest spine, to the northwest of Castle Peak, which had grown over the last few days. Frequent small rockfalls occurred in the same area during the rest of the day. Measurements from Whites showed that the tallest spine, which was currently the highest point on the dome, increased in height by about 30 ft. Dome growth in English's Crater continued. A further rockfall event occurred at 17:25 on March 27th, producing a large ash cloud.There is no evidence that the events had an explosive component."

The situation underwent a significant change at 06:52 on 3 April. A signal which was thought to have represented a small explosion started a period of near-continuous seismic activity and ash. A helicopter flight at 11:15am revealed the existence of a fissure on the eastern flank of the lava dome where the recent rock falls had been originating. Most of the day's ash issued from the area of the fissure and drifted towards the north. An ash cloud generated at 12:04 grew very quickly to a height of 6,000 to 7,000 feet.

Major eruptive events occurred at 18:08 on 03 April, and 00:10 and 02:20 on 04 April. The event of 18:08 generated a pyroclastic flow in the Tar River area which was slightly smaller than that of 15:18 on 03 Apriland which started fires. Most of the ash associated with these events was blown by the wind and deposited in the central and northern parts of the island. Several other smaller ash plumes were seen at 10:28, 10:39 and 15:20 and may have been associated with rockfalls off the eastern dome and/or explosive events. A new spine was seen on April 4th, close to the centre of the dome. Seismicity was beneath English's Crater at shallow depths and interpreted as the result of continuous dome growth.

Major seismic signals occurred at 00:10 and 02:20 on 04 April, both associated with ash clouds of unknown height or size. Other smaller signals were interpreted as evidence for an explosive component to the ash generation. Seismic events from 16:00 on 4 April to 16:00 on 5 April were interpreted as indicating continuing dome growth. Two larger events occurred at 20:24 and 22:23 on 4 April, possibly the result of small explosions in the crater. With daylight, some rockfalls were observed from Bramble Airport associated with small convecting ash clouds. A moderately strong explosive ash eruption took place at about 12:53 local time, producing a cloud which rose to about 5000 ft and a small pyroclastic flow into the Tar River valley. The most recent spine remained intact; at mid-morning, its height was measured at 2716 feet asl (828m), i.e. 35 m above the top level of the dome. During a helicopter inspection of the crater, small rock falls were observed to be almost continuous and there were areas of vigorous steaming on top parts of the

dome. There was no sign of change in the western parts of the dome, including that abutting the crater under Gage's Wall.

A series of explosive eruptions occurred from 16:00 on 5 April to 16:00 on 6 April, including the largest seen so far, which started at 14:45 on 6 April. These eruptions generated ash plumes with a maximum height of about 10,000 ft and also caused at least six separate small pyroclastic flows which carried material from the eastern dome into the Tar River Soufriere area. The largest eruption consisted of two main pulses, which sent ash to about 30,000 - 40,000 ft above sea level and generated a large pyroclastic flow. This flow, however, did not travel as far as the one at 15:18 on 03 April. The ash cloud drifted to the northwest. The height of the large spine was measured as 2975 ft, only 25 ft short of Chances Peak and was now visible from many points around the island.

Several small to moderate eruptions which produced ash columns and possibly small pyroclastic flows in the Tar river valley occurred at 16:17, 16:45 and 17:32 on 06 April 1996. Signals interpreted as possible eruptions or explosions were also recorded at 19:25, 21:27 and 23:15 on 06 April 1996 and 00:51, 01:31, 02:20, 03:35, 06:59 and 15:52 on 07 April 1996. The 06:59 event on 07 April 1996 was a moderately-sized explosion which was heard at the Bramble Airport control tower and caused a small ash column. Several explosive eruptions were recorded that night, and two events just after 3 a.m. on April 8 produced visible ash plumes. A series of explosive eruptions followed this event, including two large explosions at 13:54 and 13:57. During this period, near-continuous pyroclastic flows occurred into the Tar River valley, and several large ash clouds were generated. These eruptions were of a similar size as those of 6 April. The pyroclastic flow did not reach as far as the flows of 3 April, but some trees in the Tar River valley were set alight. In the morning, observers from the airport reported that the tall spine had broken in half but continued to grow from the base, so that once again it was higher than Chances Peak, and much broader than previously.

Many small explosions were recorded at 19:41, 21:04, 21:22 and 23:19 on 11 April 1996 and 04:34, 06:20, 06:21, 06:39, 07:41, 10:10, 10:15, 15:47, 15:57 and 15:59 on 12 April 1996. Most of the rockfalls and small explosions resulted in small ash clouds. The event at 15:59 on 12 April was the largest since the eruptions of Monday 08 April and generated a small pyroclastic flow in the Tar River Valley area. The associated ash column rose about 3000 ft above Chance's Peak and drifted westward, depositing ash in Upper Gages, Plymouth and surrounding areas. The tall spine which had majestically dominated the Soufriere Hills Volcano skyline collapsed with most of the material falling towards the southwest part of English's Crater. However, the remnant of this spine, which had several large cracks, was probably just slightly shorter than Chance's Peak. The base of the remnant spine was being constantly undermined by frequent rockfalls from the over-steepened southwestern part of the dome. Dome growth was concentrated in the southwestern, western and eastern parts of the dome as shown by numerous small rockfalls from these areas during the day. Small ash clouds were associated with these events. Continuous steam and gas emissions were observed from several areas of the dome.

During the period from 16:00 on 13 April to 16:00 on 14 April, several small explosions and occasional rockfalls occurred, with continuation of intense hybrid seismicity. The most notable events were a series of rockfalls and small explosions that started at 20:37 on 13th April, continuing for 25 minutes. Further small explosions occurred at 00:52, 03:38 and 08:00on the 14th. The event at 08:00 produced a moderate ash cloud, and several smaller ash clouds developed from rock falls later in the day. During the morning, some views were obtained from Whites, and it was confirmed that the recent spine was still present. However, some of the spine had collapsed, leaving a spiky top surface.

Since not much happened over the next few weeks in Montserrat, the next communication was significant. Good visibility enabled confirmation of significant changes to the status of the volcano from 8th to 9th June. Small rockfall signals continued to dominate seismicity, 54 during this period. Excellent viewing conditions enabled observations of the dome from the ground and the helicopter. The main point of note in these observations is the switch in activity on the dome from the northeast around to the northwest, causing hot rock to fall directly onto the inside of the Gages Wall, rapidly filling the gap which had been at a constant 60 ft or so for the previous 3 months. The gap was now less than 20 ft and if the current foci of dome gowth continued, it would only be a matter of a few days before hot material started to fall into the upper reaches of Fort Ghaut. Vertical growth of the dome continued, with two spines now present on the western side of the summit area, and a number of areas of vigorous steaming and gas production. COSPEC measurements of the SO_2 gas concentration indicated a flux of between 170 and 429 tonnes per day.

Web Sites : **http://www.geo.mtu.edu/volcanoes/ http://www.geo.mtu.edu/weather/aurora/**

http://www.geo.mtu.edu/volcanoes/west.indies/soufriere/govt/

Rick Wunderman, Global Volcanism Network

Michael Dolan <mtdolan@mtu.edu> Michigan Technological University, Montserrat Volcano Observatory

(Montserrat volcano pics by Kevin West are available for sale in the form of postcards for EC $5.00 each. Chris Mason (masonc@server2.candw.ag) 809 491 7787)

NYIRAGONGO, EAST ZAIRE

Elev. (3469m)

Nyiragongo is a stratovolcano (3469m) in East Zaire, about 18 km of Goma. A lava lake in the deep 1-2 km-wide summit crater was active from 1927-1977 and drained suddenly on 10 January 1977 from fissures on the north, south, and west flanks, killing 70 people and reaching within 600 m of the Goma Airport. Lava lake activity resumed on June 1982 with phreatic explosions and lava fountaining, but ceased in late 1982 or early 1983.

A team of the SVG-SVE climbed the Nyiragongo volcano (Zaire) during the second week of April 1996. Patrick Barois (SVE - Vulcano, Lille, France) reported that "....during observation, no activity was visible inside the summit crater. According to local residents, the last eruptive activity that began on June 1994 ended on September 1995. This last activity was characterized by a fissure eruption in the central part of the crater and intermittent Strombolian and effusive activity from two cones filling partially the crater floor)."

Dario Tedesco (rd15@columbia.edu) since wrote that his observations suggest the activity persisted well beyond the September date, citing a Goma Volcano Observatory report in which sustained seismic activity was reported beneath Nyiragongo in November 1995 and adding "At Nyiragongo, seismic activity is usually followed by intra-crateric activity. A recent informal communication from a UNHCR staff member in Goma reported that last November, as well as in February and March, the sky above the volcano was glowing during the night. Likewise, tourists spending some nights on top of the crater reported that effusive activity occurred at that time inside the crater. So, I infer that some activity has definitely been occurring since last September." He also questioned description of Nyiragongo's activity from June 1994 to the present as "fissure activity", appending his own observations:

"The activity of Nyiragongo from November to December 1994 until March 1995 was almost continuous. There was present only one spatter cone inside the crater, estimated to be 50 meters high with a diameter of 100 meters. In its interior, it was possible to see waves of lava moving in all directions (a small lava lake). At the base of the cone, the lava was spilling out in two main flows and expanding in a depression inside the crater (it could be defined, following Tazieff's definition, as a lava pond, 1994). Seismic activity recorded at the Goma Observatory was mostly related to volcanic tremor A few tectonic earthquakes were also recorded and localized a few tens of kilometers west and north of Nyiragongo. During these 4 to 5 months, notwithstanding the continuous lava flows, the crater floor did not rise closer to the crater rim. Theodolite measurements made by UN HCR and UN DHA staff confirmed this point.

"Since March and the beginning of April 1995, the activity completely changed. Two main seismic swarms occurred. It was possible to observe high lava fountains (never seen since November 1994), probably because new fresh undegassed magma was available. Suddenly, in mid-April the activity ceased for a couple of weeks. The spatter cone disappeared and there was only a small hole/lava lake (??) --much smaller than the dimensions of the previous spatter cone. The spatter cone and the very small lava lake were not located in the same place. Both, however, were closer to the northern wall of the crater, and not at the center. No movements of magma beneath the solid crust were visible inside the "hole". At the end of April, after a major tectonic-regional earthquake M=5.1 which was felt all over the region with its epicenter in the Masisi area (west of Nyiragongo), the eruptive pattern completely changed. From almost continuous activity, it became discontinuous, with an average of one eruptive episode a week lasting from one hour or less to a half a day. Inside the crater, at the same place of the other cone, two spatter cones were formed. Nevertheless, while this latter activity was taken by local scientists, UN and international organizations' staff as good news. Paradoxically the volume of magma erupted during this period, from the end of April to mid-August 1995, was much greater than the volumes erupted from November to April 1995. The crater floor in this period rose about 50 meters with a volume of lava emitted of about 56 million cubic meters or something like three times the volume of lava erupted during the 1977 eruption (estimations in Tazieff, 1978). With these volumes of magma actually stored inside the crater, it is easy to imagine the threat represented at the present time by Nyiragongo. From the hazard point of view, it is also important to point out that in 1977 only a few hundred people were living and working in the area buried by the thin lava flow. In addition to the refugee camps (of about 850,000) and local population of the city of Goma, today there are at least 25,000 more Zaireans living in the same area.

"In mid-April, an interesting workshop organized by Dr Cheminee (IPG-WOVO) was held in Paris. During this meeting, presentation on the ongoing activity, and discussions of the main problems arising from the renewed activity of Nyiragongo, and possible counter measures to be taken to avoid catastrophic events were discussed. Tensions in Zaire between different ethnic groups occurred in November to December 1995 when a series of land mines exploded, delaying a mission of two volcanologists to Goma. Currently, the situation is very quiet and a mission can easily be carried out on Nyuiragongo. A forum of discussion can be initiated on this volcano; it is still extremely dangerous and it could lead to one of the most catastrophic natural events of the 20th century.

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From contributions by: ***Dario Tedesco (rd15@columbia.edu), Goma Volcano Observatory***
Patrick Barois (SVE - Vulcano, Lille, France)

ETNA, SOUTHERN ITALY

Local Times = GMT + 2 hr

Etna has had another episode of violent eruptive activity from its Northeast Crater, reactivated last summer after 9 years of no major magmatic activity. The new episode began shortly after noon on 23rd December with powerful explosions that were heard up to 100 km away. Heavy ashfalls occurred on the E. side of the volcano. Press photos showed a tall eruption column with its lower 2-3 km heavily laden with ash and an upper portion mainly of steam that may have reached more than 5 km above the summit. Two press photos of the eruption are available at:

http://www.geomar.de/personal/bbehncke/ETNA.html.

A new (7th) episode of fire fountains at North-East Crater of Mt. Etna began between 4:30 and 5:00 AM GMT of January 25th and lasted about 6 hours. Pulsating lava jets reached 300-400 m of altitude above the crater rim. Scoria fallout covered a band (~2 km wide) from the vent to about 12 km apart on the NE flank of the volcano.

The 8th episode of fire fountains at Northeast Crater of Mt. Etna began at 23:35 GMT, 9th February, 1996 and ended its paroxysmal phase at about 1:15 GMT of 10-2-1996. Pulsating lava jets reached 200 m of altitude above the crater rim. Lapilli fallout covered a narrow band (from 1 to 3 km wide) from the vent to the shoreline (25 km away) on the SE flank of the volcano. A light ash fallout reached the town of Catania.

It is possible that the Northeast Crater of Etna has remained in intermittent eruption since the major eruptive episode on 9th-10th February. The crater, which had a 350 m diameter and 150 m deep central pit until late October 1995, is now completely filled with pyroclastic material. Several cones have grown on the new crater floor, and there are other striking morphological changes. So far, no lava flows seem to have been erupted from NE Crater since it resumed magmatic activity in the last summer. Recently, renewed magmatic activity was also reported from Bocca Nuova, lying about 1 km south of NE Crater.

The following observations were sent by Marco Fulle <fulle@ebe.oat.ts.astro.it>

26 May 1996 (8hr observations from 14h to 22h). Observations from west rim of Bocca Nuova

Bocca Nuova: Vent filled by thick steam. From 15h to 16h strongly increased activity, with many explosion. During mins of good visibility, a vent with a lava pond on the flat bottom of the crater was well visible, ejecting meter sized lava clots 20m high. On the SE side of the crater, another vent was ejecting steam jets every min with strong roars. Tanks to the darkness, the vent on the crater bottom was observed in the dense steam from 19h30m to 20h30m: the level of the lava pond was clearly varying, so that every min the vent disappeared, and after reappeared. When the lava pond was close to the crater bottom, strombolian explosions 50m high occurred.

Nord - Est: At 18h eruptions of thin ash and black bombs started. From 21h to 22h soft regular strombolian explosions every 10 - 50 sec of a few bombs towards the E rim (strong W wind), 50m high over the rim, no bomb outside the crater.

30 - 31 May 1996 (18hr observations from 17h to 11h); Observations from Pizzi Deneri and W rim of Nord - Est

Bocca Nuova: Not observed.

Nord - Est: Strong explosions with ejection of black bombs observed during the long path around the elliptical crater. Nord - Est crater was then observed from Pizzi Deneri from 21h of 30 May to 6h of 31. Big strombolian explosions lasting 1 - 2 sec, 100 - 200m high over the rim every 1 - 40 sec. On 31 May at 8h we were about 200m outside the W rim. Many meter sized bombs, red glowing in the daylight, were ejected well outside the SW rim of the crater (strong wind from NE), reaching apparent elevations in the sky of more than 60 deg, thus making imprudent to reach the crater rim. The explosions produced many characteristic steam rings. At 8h30m, the activity abruptly changed, with big ash eruptions, but no more explosions of bombs, thus allowing us to reach the W rim at 9h. Impressive view of the new

caldera, at least two times larger than former Nord - Est crater, and with the active vent south of the crater center. The intensity of the ash eruptions increased, giant lava clots were ejected on the caldera, and the intensity of the strombolian explosions increased, with dark bombs more than 60 deg high in the sky, so that we were forced to leave the rim at 10h, when the activity returned as before 8h30m (many bombs, strong explosions, no ash).

1 Jun 1996 (2hr observations from 19h to 21h); Observations from West rim of Bocca Nuova and Voragine

Bocca Nuova: Perfect visibility without steam. Two vents with active lava ponds were well visible on the bottom of the crater, aligned in the N-S direction. The N vent produced strombolian explosions every 10 - 30 min, 50m high, towards south. The S vent produced strombolian explosions 10 - 30 m high every 5 - 20 sec. A third vent in the SE side of the crater produced steam eruptions every 2 - 10 min with red glowing during the steam ejections. At 19h30m we observed the Voragine, half filled in the north side by the new big NE crater, with steam jets every sec.

Nord - Est: Inactive.

3 Jun 1996 (5hr observations from 17h to 22h); Observations from West rim of Nord - Est

Bocca Nuova: Not observed.

Nord - Est: From 18h to 20h, we observed the Nord - Est crater 200m outside the W rim. Strong strombolian explosions every 2 - 50 sec, 100 - 200m high over the rim, with bombs up to the N rim of the crater (strong wind from SSW). From 20h to 21h, we observed the explosions from the W rim. Impressive explosions, with bombs ejected with so high velocity to be observed as red straight lines 50m long. The vent was 300m far from the rim, and the bombs reached heights in the sky of more than 60 deg, but the strong wind dragged all of them inside the caldera up to the N rim, falling at least 100m from the W rim. During the explosions, blue gas was ejected with the bombs. From 21h to 22h similar explosions were observed from the edge of the elliptical crater.

Detailed information on the previous eruptive episodes are available on IIV web server at the pages: ***http://www.iiv.ct.cnr.it:80/files/curract.html***

Marco Fulle <fulle@ebe.oat.ts.astro.it>
Boris Behncke, GEOMAR, Kiel (Germany)<bbehncke@geomar.de>
Mauro Coltelli(colt@iiv.ct.cnr.it) and Massimo Pompilio <max@iiv.ct.cnr.it>

STROMBOLI

Local Times = UT + 2 hr

At 22:58 GMT of 16 February 1996 the seismic stations at Stromboli island of the permanent monitoring network of the Istituto Internazionale di Vulcanologia (IIV) recorded a succession of seismic events, characterized by a remarkable increase of tremor amplitude, lasting about 12 minutes. The seismic signal marked an intense eruptive phase at the summit craters of Stromboli. Eyewitnesses at Stromboli village reported a strong blast followed by a few red bombs fallout and glows, lasted a few minutes, on the volcano summit.

A field survey revealed that black scoriaceous bombs, covered by Pele's hair, also reddish fumarolized blocks fell northward on an area a few hundred metres wide. The source vent was probably inside the northern crater; unfortunately bad weather prevented further detailed observations of the summit. Strombolian activity after this eruptive event remained at very low level.

Mauro Coltelli (colt@iiv.ct.cnr.it), Massimo Pompilio(max@iiv.ct.cnr.it) and Salvatore Spampinato (spampis@iiv.ct.cnr.it); C.N.R Istituto Internazionale di Vulcanologia - Catania (Italy)

Eruption reports (Marco Fulle <fulle@ebe.oat.ts.astro.it>)

Night 15 - 16 Apr 1996; About 100 explosions recorded. All the vents continuously glowing (very intense from 1/2).

Vent 1/2N. Continuous fountain 50 m high lasting 1 - 2 hr of a few bombs. Vent 1/2S. Big explosions lasting 1 - 3 sec, 150 - 200 m high with bombs covering all the terrace (beyond vent 3/2).

Vent 3/1. Continuous pulsing of incandescent gas with emissions of a few bombs. Every 2 - 3 hr explosion 50 m high collimated vertical with bang.

Vent 3/2. Every 10 - 30 min, big simultaneous explosions from 2 vents, 150 - 250 m high, lasting 10 - 30 sec with big noise. Bombs covering all crater 3. Every 5 - 10 min explosions from a single vent collimated vertical 200 m high lasting 5 - 10 sec with lower noise.

Night 20 - 21 Apr 1996; About 50 explosions recorded, all active vents glowing.

Vent 1/3. Glowing ex-hornitos with steam pulses every min. Vent 1/2N. Continuous big fountain 50 - 100 m high

during all the night of many bombs, with a pulse every sec and loud noise. Vent 1/2S. Big explosions every 10 - 60 min lasting 1 - 2 sec 150 - 250 m high with bombs covering all crater 1.

Vent 3/1. Continuous incandescent gas pulses every sec without bombs. A single explosion in all the night 50 m high collimated towards vent 3/2 with noise and a lot of bombs.

Vent 3/2. Same activity as the night between 15 and 16 Apr, but with bigger explosions, covering of bombs all the terrace south of crater 3, and with bombs reaching the protective rings south of crater 3.

At 21:47 GMT of Saturday 1 June 1996, after more than 6 weeks of intense activity at Crater 1, the seismic stations of the permanent monitoring network of the Istituto Internazionale di Vulcanologia (IIV)at Stromboli Island recorded powerful seismic events lasting about three minutes. The seismic signal marked an intense eruptive phase occurred at summit craters of Stromboli volcano. Preliminary reports suggested that the explosion was more violent than the ones recorded in recent years. Stromboli guide N. Zerilli reported that the explosion, clearly heard and seen from the village of Stromboli, threw very large blocks at a considerable distance from the craters, especially in the zone of the "canneto", uphill from the village of Stromboli-San Bartolo. Several other eyewitnesses at Stromboli village reported a single strong blast followed by the fallout of red bombs on the northern upper slope of the volcanic cone. The incandescent bombs fell on the bushes causing a fire that was extinguished by Civil Defence aircraft in the late morning of Sunday 2 June. More than twenty tourists were caught in the explosion during their visit at the volcano summit. Some of them reported light burns caused by the hot lapilli fallout and minor injuries made during the escape on the steep slope. No missing people were reported.

The field survey carried out in the Sunday 2 early morning revealed that the paroxysmal explosion occurred at the Crater 1 (the northernmost). The chain of hornitos, that was inside the Crater 1, was blown out leaving a deep and large depression in the northern side of the crater bottom. The ejected material covered the volcano summit completely, falling more than 500 m far from the vent in the southern and eastern sector of the cone and reaching about 1000 m on the northern sector, where it fell on the vegetation. The deposit was made of black scoriaceous bombs, covered by Pele's hair, reddish fumarolized blocks and a small amount of fine material. On the Pizzo area, the place where people are used to stay to observe the Strombolian activity (250 m SE from the vent), the dimension of the falling bombs ranged between 10 and 50 cm, and their occurrence was 3-4 per squared meter. Strombolian activity after this paroxysmal event shortly returned to a medium intensity and a normal frequency (3-4 events per hour). In the days after we observed several hours long periods without any activity alternating to mild strombolian activity and from 5 June spattering activity lasting several minutes was occasionally observed.

At 4:52 GMT of 6 June 1996 another strong seismic event was recorded by the seismic stations at Stromboli island. Its magnitude was less than 1 June event and its length was about one minute. This event marked another strong explosion from Crater 1. The eruptive phenomenon was recorded by the surveillance video camera located on the Pizzo Sopra La Fossa, 120 m above the vent and 250 m apart, that was restored two days before. Only a few people observed the explosion and reported a few hundred meters high ash column and bombs fallout on the Sciara del Fuoco. The time-lapse video shows a very fast gray-brown jet that ascented at about 30 m/sec at the upper limit of the camera view field and a limited bombs and blocks fallout, because the most of material fell in the opposite side of the camera. The ash emission lasted about 2 minutes, but in the last tens of seconds only overpressured steam was emitted.

After the explosion, the strombolian activity continued at Crater 1. During the early afternoon fieldwork, the activity was characterized by low intensity explosions with bombs and brown ash emission, interrupted by sporadic strong explosions that produced a larger amount of bombs followed by an almost continuous spattering that lasted from a five to fifteen minutes. All pyroclastic materials fell close to the craters but during the larger explosion some bombs were thrown a few hundred meters from the vents. The strombolian activity continued until today showing periods of mild explosions interrupted by strong explosions and short period of continuous spattering.

Mauro Coltelli <colt@iiv.ct.cnr.it> and Roberto Carniel <carniel@dgt.uniud.it; http://www.dgt.uniud.it/carniel/>

Eruption reports (Marco Fulle <fulle@ebe.oat.ts.astro.it>)

9 Jun 1996 (6hr observations from 0h40m to 6h40m); observations from Pizzo sopra la Fossa

Vent 1/2: continuous fountaining 50m high with a pulse every sec, larger pulses every 5 - 10 min with ejection of meter sized lava clots (red even in the daylight) lasting 20 - 60 sec. Strongly glowing vent. Superimposed to this activity, the vent produced 35 big explosions lasting 1 - 2 sec, 100 - 200 m high, with bombs over the Sciara and the terrace up to crater 2, with meter sized lava clots inside crater 1.

Vent 3/1: Completely inactive (the first time since 1992)

Vent 3/2: 20 explosions lasting 2 - 10 sec 50m high with a lot of ash and bombs ejected inside the crater. No glow between explosions.

12 Jun 1996 (6hr observations from 0h50m to 6h50m); observations from Pizzo sopra la Fossa

Vent 1/2: continuous fountaining 50m high with a pulse every sec. Strongly glowing vent. Superimposed to this activity, the vent produced 46 big explosions lasting 1 - 2 sec, 100 - 200 m high, with bombs over the Sciara and the terrace up to all crater 3, with meter sized lava clots (incandescent even in the daylight) inside crater 1.

Vent 3/1: Inactive.

Vent 3/2: 37 explosions with big noise, lasting 2 - 10 sec, 100 - 250m high (well above the horizon) with a few ash. Red fountaining during the explosions even in the daylight. West-Vertical jets of bombs falling south of the crater rim (almost reaching the protective S stone rings) and over all vent 3/1. The active vent was well visible on the N flank of the crater, just up (by perspective) of the south crater rim, strongly glowing during all the observation time, with brighter glow every 10 - 30 min.

Stromboli WWW pages

http://www.dgt.uniud.it/seismol/strombol.htm
http://www.ezinfo.ethz.ch/volcano/strombolihomee.html
http://www.iiv.ct.cnr.it:80/files/news.html

GLOBAL VOLCANISM NET: CONTACTS IN EL SALVADOR AND HONDURAS

The Global Volcanism Network is seeking to locate potential information contacts for volcanic activity in El Salvador and Honduras. It has been about ten years since the last volcanic activity in El Salvador. We need to know who to contact for reliable information **before** a crisis occurs. Such contacts might be in various government agencies, universities, or corporations. They could include geologists, seismologists, meteorologists, air traffic controllers, or administrators. If anyone has any suggestions, please send us their name and address, phone & fax, etc.

Global Volcanism Network, Museum of Natural History, Smithsonian Institution
Washington, DC 20560, USA
Phone: 202-357-1511; Fax: 202-357-2476; E-mail: mnhms017@SIVM.SI.EDU

VIDEO OF OL DOINYO LENGAI CARBONATITIC VOLCANO, TANZANIA

The Ol Doinyo Lengai (2.751oS, 35.90oE, N Tanzania) is the unique active carbonatitic volcano of the World. During December 1995 a team from Volcanological Society of Geneva filmed during five days its exceptional activity inside the summit crater. The activity was described in the GVN, Vol 20, 11/12 1995. Strombolian explosions, building a small cinder cone, with phases of collapses liberating rapid aa flows, and pure effusive activity, giving very thin (about 5 cm) and fluid (ten times less viscous than basalt) carbonatitic flows were particularly well illustrated. Even a small ephemeral lava pond and strong bubbling (with giant bubbles of 6-7 metres) inside the cinder cone were also filmed. This has been done with a Hi8 PAL video of very good quality. Jon Fink is quoted as "..... highly recommending it to anyone who teaches a volcanology course or who is interested in the rheology and fluid dynamics of magmas". All interested in obtaining a VHS PAL copy (price 50.-US$) or NTSC (price 80.- US$) for a version of about 42 min contact:

P. Vetsch <pvetsch@iprolink.ch>; Fax ++41 22 786.22.46

NEW BOOK; VOLCANO INSTABILITY ON THE EARTH AND OTHER PLANETS

Edited by W.J. McGuire, A.P. Jones and J. Neuberg
ISBN 1-897799-60-8; Geological Society Special Publication No. 110, 389 p; Price GB£75/US$125
Geological Society Publishing House, Unit 7, Brassmill Enterprise Centre, Brassmill Lan, Bath BA1 3JN, UK
Tel: 44 1225 445046 Fax: 44 1225 442836

This volume contains a selection of papers, which together form a representative cross-section of contemporary research into volcano instability both on Earth and other terrestrial bodies in the Solar System. The papers are broadly grouped, with the first two summarizing contemporary issues and addressing the development of volcano instability within the Solar System. The following five papers focus upon the different ways in which a volcanic edifice may be destabilized and experience structural failure, while the succeeding four papers examine instability monitoring and hazard implications. The bulk of the volume is devoted to the description and discussion of instability- related processes and products at specific volcanoes or volcanic regions, both submarine, subaerial, and on Mars and Venus, while the final paper examines instabilities within the plumbing system of Stromboli volcano.

Mike Collins

CONFERENCES

FOURTH INTERNATIONAL CONFERENCE ON RARE GAS GEOCHEMISTRY

Roma, Italy, October 8-10, 1997

Convenors: Francesco Bella, Physics Department - University of Roma III, Italy and Giorgio Ferrara Earth Sciences Department - University of Pisa, Italy.

I: Rare gases related to earthquakes, volcanoes and environment.
II: Radon in radioprotection.
III: Rare gases in mantle fluids.
IV: Measurement techniques and instrumentation.

18th NEW ZEALAND GEOTHERMAL WORKSHOP

The University of Auckland, New Zealand 6-8 November 1996

Exploration: Geophysics, Geology, Geochemistry, Site Investigation, Epithermal Mineralisation, Field Development: Drilling, Reservoir Engineering; Reinjection, Mineral Deposition; Utilisation: Electric, Non-electric, Optimisation, Environmental Consequences, Preventive Maintenance.

Applications: Materials, Standards, Environmental, Economic, Legal. Case Studies: Geothermal Field or Plant; for example, Make-up Drilling and Reinjection Strategies.

Details from: Geothermal Inst., University of Auckland, Private Bag 92019, Auckland, New Zealand. Fax: 64-9-373-7436 or: Professional Courses, Centre for Continuing Education, University of Auckland, Private Bag 92019, Auckland, N.Z.; Ph: 64-9-373 7599 Ext: 7050; Fax: 64-9-373 7419; E-mail: professional.courses@auckland.ac.nz

GSA ARC MAGMATISM SYMPOSIUM

We are soliciting abstracts for a GSA theme session in Denver on convergent margin magmatism, including how magmas are generated in and above subduction zones, how these melts ascend and interact with the mantle and crust, and how they fractionate. Please email Bob Stern (rjstern@utdallas.edu) or Mark Feigenson (feigy@rci.rutgers.edu) if you are interested in contributing, or if you know of any other potential participants. Details of the theme session are in the April 96 issue of GSA Today

CHAPMAN CONFERENCE ON SHALLOW LEVEL PROCESSES IN OCEAN ISLAND MAGMATISM: DISTINGUISHING MANTLE AND CRUSTAL SIGNATURES

November 10-16, 1996 Tenerife, Canary Islands

Conveners: Wendy Bohrson (Dept. of Geological Sciences, UCSB, Santa Barbara, CA 93106; E-mail bohrson@magic.geol.ucsb.edu); Jon Davidson (Dept. of Earth and Space Sciences, UCLA, Los Angeles, CA. 90095; E-mail davidson@ess.ucla.edu); John Wolff (Dept. of Geology, Univ. Texas, Arlington, Box 19049, Arlington, TX, 76019; E-mail WOLFF@albert.uta.edu . Web Site: http://earth.agu.org/can_call.html

1. The state of the science in chemical geodynamics (keynote address Albrecht Hofmann)
2. The pressure-temperature-time constraints on ocean island magmatism (keynote address David Clague).
3. The physical process of magma-crust interaction (keynote address George Bergantz).
4. The geochemistry of magma-crust interaction (keynote address Matthew Thirlwall).

PRELIMINARY ANNOUNCEMENT OF GSA FIELD TRIP SOLITARIO DOME, LACCOLITH, & CALDERA SYSTEM, TRANS-PECOS, TEXAS

October 23rd (late afternoon) - October 27th (late afternoon flight to Denver)

Maximum: 28. Cost: $375, includes 4 nights lodging, all meals, and airfare from El Paso to Denver; possible alternative is $300 without airfare.

Christopher D. Henry, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Nevada 89557-0088, 702-784-6691, chenry@nbmg.unr.edu; **William R. Muehlberger,** Department of Geological Sciences, The University of Texas at Austin, Austin, Texas 78712, 512-471-4885, wmuehl@mail.utexas.edu

IAVCEI 1997 PUERTO VALLARTA, MEXICO

DURING MEETING FIELD TRIP; AERIAL EXAMINATION OF VOLCANOES ALONG THE FRONT OF THE WESTERN TMVB AND A VISIT TO PARICUTIN

Leaders: James F. Luhr; Hugo Delgado; plane capacity: 46 passengers.
Cost: 535 USD; includes: air fare, lunch, transportation in vans from and to Uruapan+s airport and field trip guidebook.

The purpose of this field trip is to have a birdseye view of several of the volcanoes along the front of the western Trans-Mexican Volcanic Belt, and to visit the famous Paricutin volcano.

For details: Hugo Delgado, Instituto de Geofisica, U.N.A.M., Circuito Exterior C. U. Coyoacan 04510, Mexico D. F. phone: (525) 622-4145, fax: (525) 550-2486, E-mail: hugo@tonatiuh.igeofcu.unam.mx
Web site: http://charro.igeofcu.unam.mx/iavcei97/iavcei97.html

PRE-CONGRESS SHORT COURSE ON VOLCANIC GASES
January 16 (Thursday) to January 18 (Saturday), 1997.

200 USD; this cost will include a set of copies of the course and certificate.

This short course is addressed to all professionals interested in field and sampling techniques, chemistry, isotopic features, theoretical and practical aspects of volcanic gases and volcano hydrothermal systems.

For details: Dra. Maria Aurora Armienta <victoria@tonatiuh.igeofcu.unam.mx>; Dr. Hugo Delgado Granados <hugo@tonatiuh.igeofcu.unam.mx>; Dr. Yuri Taran <taran@tonatiuh.igeofcu.unam.mx>; all at Instituto de Geofisica, U.N.A.M., Circuito Cientifico, C.U., 04510, Mexico D.F., Fax: (525) 550-2486; http:// charro.igeofcu.unam.mx/iavcei97/iavcei97.html

POST MEETING FIELD TRIP; VOLCANISM AND TECTONIC ENVIRONMENT OF SOUTHERN MEXICO CITY

Leader: Hugo Delgado Minimum: 14 people, Maximum: 35.
Approximate Cost: 480 USD in double room (add 100 USD if single room is required).

The purpose of this field trip is to visit the most recent volcanic manifestations in the southern sector of the Basin of Mexico observing closely the tectonic controls of volcanism, the regional magmatic evolution, and the impact of volcanism on the human settlements and vice versa.

For details: Jorge Nieto, Facultad de Ingenieria, U.N.A.M., Circuito Escolar, C. U. Coyoacan 04510, Mexico D. F. phone: (525) 622-0856, fax: (525) 550-0040, E-MAIL: nieto@redvax1.dgsca.unam.mx;
http://charro.igeofcu.unam.mx/iavcei97/iavcei97.html

FIELDTRIP NO. 4; CATASTROPHIC PREHISTORIC ERUPTIONS AT POPOCATEPETL AND QUATERNARY PHREATOMAGMATIC SILICIC VOLCANISM IN THE SERDAN-ORIENTAL BASIN
January 12-18, 1997. Pre-meeting

Leader: Claus Siebe, Instituto de Geofisica, UNAM; E-mail: csiebe@tonatiuh.igeofcu.unam.mx

Cost: 350 U.S. $. Maximum No. of participants: 30

Purpose: Visit and examine outcrops showing a wide range of Late Pleistocene to Holocene pyroclastic deposits and discuss implications for future hazards in a socially complex area. Prehispanic archaeological sites such as Cholula, Xochitecatl, and Cacaxtla, which were affected by prehistoric eruptions of Popocatepetl will also be visited.

PRE-MEETING FIELDTRIP 3; THE COLIMA VOLCANIC COMPLEX
January 12-17 1997

Part I: Quaternary Multiple Debris-avalanche Deposits
Part II: Historical Pyroclastic Sequences (Pre-1913, 1913, 1991, 1994)

The purpose of this fieldtrip is to examine the exceptional record of multiple debris avalanche deposits (DADs) from the Colima volcanic complex that resulted from recurrent edifice collapse over the last 45000 years (perhaps as many as 12 events and as recently as 2500 y. B.P.) and to discuss the factors that have influenced edifice instability. We will then examine the deposits characteristic of historical pyroclastic activity of Volcan de Colima including those from the last plinian eruption of 1913.

For details: Jean-Christophe Komorowski, Institut de Physique du Globe de Paris, Observatoires Volcanologiques, 4 Place Jussieu, Boite 89, 75252, Paris, Cedex 05, FRANCE; Tel: direct (33) 1-44-27-48-13; FAX: (33) 1-44-27-24-01; : komorow@ipgp.jussieu.fr; http:// charro.igeofcu.unam.mx/iavcei97/iavcei97.html

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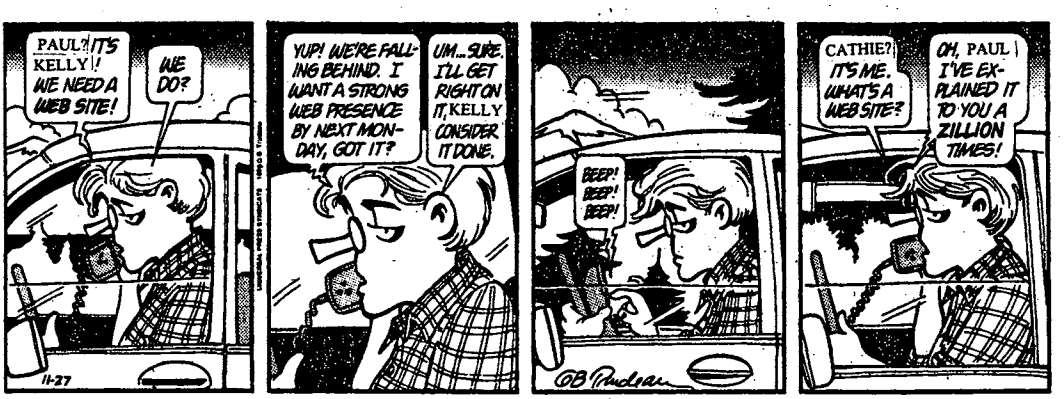

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