ASH FALL

Newsletter of the Volcanology Division
Geological Association of Canada

ASH FALL # 23

January, 1990

ACTIVITIES

Responses for the 1991 proposed field trip should be returned as soon as possible.

CONTRIBUTIONS

Contributions to Ash Fall are welcomed and should be sent to:

E. W. Grove, Editor, Ash Fall
4581 Boulderwood Drive
Victoria, B.C. V8Y 3A5
Phone (604) 658-2366
FAX (604) 658-5289

RESEARCH SURVEY

Please return your updated research project forms to Tark Hamilton.

CONFERENCES

VANCOUVER '90, GAC/MAC, May 16-18, 1990, Hotel Vancouver

SPECIAL SYMPOSIUM COMMEMORATING THE 10TH ANNIVERSARY OF THE ERUPTION OF MOUNT ST. HELENS

Organizers/Chairmen: Catherine J. Hickson, GSC; & Don W. Peterson, USGS

This symposium will provide an overview of Cascade volcanism, the events leading up to the eruption on May 18, 1980 as well as aspects of the eruption and continuing activity. Several other potential "problem" volcanoes in the Cordillera will also be examined. The oral sessions will be given by invited speakers who have worked in the Cascades, or at Mount St. Helens, however poster presentations on Neogene volcanism are invited and strongly encouraged. The symposium will be held during the GAC/MAC 90 VANCOUVER meeting in mid-May 1990.

1990 MEETING OF FRIENDS OF IGNEOUS ROCKS

The 1990 meeting of the FRIENDS OF IGNEOUS ROCKS will be held at Oregon State University, Corvallis, Oregon from August 25 to August 28, 1990. Invitations have been mailed to selected participants by Roger L. Nielsen, College of Oceanography of Oregon State University.

LEOPOLD GELINAS AWARD
VOLCANOLOGY DIVISION - G.A.C.

Prize: $250.00 for the best thesis submitted.

The rules for this award are now as follows:

1. Nomination for the 1989 award for a Ph.D. thesis defended in 1988 or 1989. The 1990 award will be for the best M.Sc. thesis defended in 1989 or 1990.
2. The thesis must be written by a Canadian, or at a Canadian University. The topic and author can be non-Canadian.
3. The thesis content must be at least 50% volcanology or volcanology-related.
4. The prize need not be awarded.

The nominations will be evaluated on originality, validity of concepts, organization and presentation of the data, understanding of volcanology and depth of research.

For evaluation please send 1 copy of the thesis **BEFORE FEBRUARY 28, 1990** to:

Roger LAURENT
Chairman, Volcanology Division
Dept. of Geology
Laval University
Ste-Foy, Qc G1K 7P4

ABSTRACT - 1989 LEOPOLD GELINAS AWARD WINNING M.SC. THESIS

Author: F. Brissette Universite de Montreal 1988 M.Sc. Thesis
Director of Thesis: Jean Lajoie

Interpretation sedimentologique de depots pyroclastiques des Monts Vulsini, Italie centrale

The sequence of primary structures in five eruptive units of the Vulsini Volcano, was studied in two stratigraphic sections near the villages of Pitigliano and Sorano, Central Italy.

The basal bed of all eruptive units originated from a turbulent suspension, whereas the overlying bed has "laminar" characteristics. Only one unit has all the characteristics of the model proposed by Sparks et al (1973). The other units lack the "typical" cross-laminations at their base, and all show evidence of a significant time gap between the emplacement of the two beds. The two-bed succession is the only common characteristic shared by all eruptive units, the other succession being random.

It is shown that the terminal fall velocity of the mean grain size best approximates the shear velocity of turbulent nuees ardentes, which permits the calculation of shear stresses, and mean flow velocities. Problems related to the transportation of dense pyroclastic flows in a semi-fluidized state can be solved by considering the action of the dispersive pressure.

ABSTRACT - EVALUATION OF MAGMATIC PROCESSES FOR THE PRODUCTS OF THE NEVADO DEL RUIZ VOLCANO, COLOMBIA FROM GEOCHEMICAL AND PETROLOGICAL DATA

N. VATIN-PERIGNON[1], P. GOEMANS[1], R.A. OLIVER[2] & E. PARRA PALACIO[3]
Williams (Editor), Nevado del Ruiz Volume. J. Volcnol. Geotherm Res.

Trace-element concentrations of the eruptive products from the Nevado del Ruiz volcano indicate that at least for the last 1 Ma, the major controlling factor in the evolution of the magma has been a simple fractional crystallization.

The Zr/Hf ratios suggest that the source material is mantle-like in origin and whilst subduction-related contamination of the source material has taken place, there is no evidence that assimilation of continental crust has affected the series.

No convincing geochemical evidence for magma mixing was found, and data on banded pumices of Pleistocene, Historic and the 1985 eruptions strongly support a crystal fractionation model to explain the compositional variation of their glasses. Therefore if mixing has taken place it can only be a mixing of layers within a stratified or partially stratified magma chamber.

Modeling of fractional crystallization using a stepwise program has been undertaken and least-squares approximations with small residuals are commensurate with analysed samples. Crystal fractionation models with plagioclase dominating two pyroxenes and iron oxides give good fits for all calculations. We conclude that simple crystal fractionation is the process most consistent with major and trace-element variations in the Ruiz series. This closed system-model requires at least 77% crystal fractionation of a basaltic parent to generate the observed compositions of dacites.

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PUBLICATION ANNOUNCEMENT: VOLCANOES OF NORTH AMERICA

Volcanoes of North America, edited by Chuck Wood is soon to be published by Cambridge University Press. There are 88 contributors and 260 separate accounts of individual volcanic centres or complexes. This work is a collection of short cv's on volcanoes with activity in the past 5 Ma. Each centre or complex is featured in a photo, topographic map, written description and references. Some regional overviews are also given. The complete volume is 360 pages, of which 36 pages is on Canadiann volcanism, describing and locating 21 complexes. Written accounts include (N to S): Volcano Mountain, Tuya Butte, Level Mountain Range, Mount Edziza, Maitland, Hoodoo Mountain, Iskut-Unuk River Cones, The Thumb, Nazco Cone, Chilcotin Basalt, the Itcha Mountains, Ilgachuz Range, Rainbow Range, Milbanke Sound Cones, Wells Grey-Clearwater Volcanic Field, Mount Silverthrone, Bridge River Cones, Meagher Mountain, Mount Cayley, Mount Garibaldi and Garibaldi Lake. Other Canadian centres are represented in a table and map by Cathie Hickson. Chuck has promised this fine work by spring (Spring in Texas, not spring in the Yukon!).

During 1989 members of the Volcanology Division visited three of the Aeolian Islands. A recent paper on the tectonic setting of the area was in Ash Fall # 22. The following four abstracts continue the theme.

THE AEOLIAN ISLANDS

De ROSA R.[1], LANZAFAME G.[2] and MAZZUOLI R.[1]

[1] *Dipartimento di Scienze della Terra, Università della Calabria, Cosenza*
[2] *CNR - Istituto Internazionale di Vulcanologia, Catania*

GENERAL FRAMEWORK

The Aeolian archipelago consists of seven islands, entirely made up of volcanic products, located in the southern Thyrrenian sea and lying on the inner edge of the Calabro-Peloritani crystalline belt.

Geochronological data indicate that the volcanic products outcropping on the islands were erupted during the last 0.5 m.y. (Gillot and Villari, 1980), while samples draged from the submerged part of the arc have been dated between 1.3 and 0.2 m.y. (Beccaluva et al., 1981).

As far as the islands are concerned, two main stages of activity can be distinguished, with a partial overlap in time:

— a first stage during which the islands of Panarea and Filicudi were entirely built up, together with the oldest parts of Salina and Lipari;

— a second stage, from upper Pleistocene to present, when the islands of Salina and Lipari were completed and Alicudi, Vulcano and Stromboli were formed. Historic volcanic eruptions occurred on Lipari, Vulcano and Stromboli, the latter being characterized by a persistent explosive activity (strombolian) which is still in progress.

According to a widely adopted classification scheme (Peccerillo and Taylor, 1976), calc-alkaline, high-K calc-alkaline and shoshonitic products can be found on the Aeolian islands.

Leucite basanites outcrop on Vulcano and Stromboli and have been interpreted either as low-pressure differentiation products of the shoshonitic basalts (Barberi et al., 1974) or as independent magmas (Klerkx et al., 1974).

The above mentioned Authors have also discussed the possible occurrence of crustal contamination affecting the shoshonitic rocks. Recent Sr and Pb isotopic studies (Cortini, 1981) suggest a more complex history. The shoshonitic basalts erupted at Stromboli would be genetically unrelated to the other Aeolian rocks. Sr isotopes would indicate that Vulcano, Vulcanello and Lipari had independent magma sources. They also suggest that crustal contamination could have raised the Sr isotopic composition of the Lipari rhyolites. In addition the Pb isotopes would indicate a mixing of at least two liquids.

Geophysical data reveal: a) the existence of intermediate and deep earthquakes foci defining a narrow inclined plane, plunging WNW with a dip of about 50-60°, down to a depth of about 450 km; b) relative gravity lows running along the Ionian coast of Calabria; c) to the NW of the islands, an area (Thyrrenian Abissal Plain) with high heat flow values, shallow anomalous mantle (Moho 12 km depth) characterized by a strong seismic wave absorption and floored by oceanic crust (Barberi et al., 1973; 1974; Keller 1980; 1982).

According to this interpretation the boundary between the converging plates probably corresponds to the Ionian coasts of Calabria (sediments filled trench); the metamorphic arc is represented by the Calabro-Peloritani crystalline belt whereas the Thyrrenian Abissal Plain corresponds, in this reconstruction, to a back-arc marginal basin.

Some geological data throw doubt upon this reconstruction: a) the Thyrrenian Abissal Plain began to take shape before the beginning of Aeolian volcanism (Scandone, 1979; 1982; Gasparini et al., 1983; Barberi et al., 1978); b) palinspastic reconstructions in the southern Apennines allow to establish that the present Benioff zone consists of a litospheric body which began to subduce before the generation of the Thyrrenian sea. The latter therefore, opened not in a back-arc position, but in a fore-arc one, being the volcanic arc during Oligocene-Lower Miocene located along the western margin of the Corsica-Sardinia block (Scandone, 1979; 1982); c) the size of the Aeolian arc and its temporal evolution is much smaller than that of the Pacific ones; d) the sediments filling the trench along the Ionian coasts of Calabria are too old to be related to the Aeolian arc (Scandone, 1982).

According to these geological and geophysical evidences Scandone (1979; 1982) proposed a new model of the Aeolian arc in which the Pleistocene volcanism in the southern Tyrrhenian sea is related to the existence of a litospheric slab with a WNW dipping plane, which could be the relict of the older Oligo-Miocene subduction which built the Apennine chain. Then the present Benioff zone can be interpreted as a remnant of a larger slab, chiefly consisting in African continental litosphere subducted during and after the continent-continent collision.

According to the actual data it seems evident that the geodinamic setting of the southern Tyrrhenian sea is quite complex, and that it is difficult to reconstruct the precollision's paleogeography. It is also clear that among the two above mentioned models of geodynamic reconstruction the continental crust subduction assumes vital importance for geological implications as well as for magma's genesis and evolution.

Stromboli and Its 1975 Eruption

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ABSTRACT

On November 4, 1975 in the evening, an eruption took place at Mt. Stromboli. On the following day lava flowed on the Sciara del Fuoco downward to the sea, accompanied by an intense explosive activity at the crater plane. Direct observations on the volcanic activity were carried out since November 6 while a seismic survey was made from Nov. 7 to 12. The total volume of the lava outpoured during this period of activity that lasted 21 days, was estimated to be about 10^6 m^3. This paper reports the results of direct observations, and of the petrological, radioactive disequilibria and seismic activity studies performed for this eruption.

The eruption was preceded by an insignificant change of seismic activity, which was monitored by a seismic station located about 2 km East of the crater. A shallow seismicity was strictly related to crater explosions accompanying the eruptive phenomenon. Radioactive disequilibria showed a lack of disequilibrium between ^{226}Ra and ^{230}Th explainable in terms of a fast rising of magma in the conduit.

Chemical analyses of lava samples and deep seismic sounding data indicate a correspondence between the depth (10-15 km) at which crystallization pressure of phenocrysts occurs and a low velocity layer.

INTRODUCTION

Stromboli is a strato-volcano that rises 3000 m from the floor of the southern Tyrrhenian Sea (Fig. 1). The summit is 924 m above sea level. Both the subaerial and submarine part are roughly elongated on NE - SW (Segre, 1968). The central crater is an elongated crater terrace 760 m above the sea level. It is surmounted by the remnants of an earlier and larger crater whose older rim is represented by Vancori. The north-western part of the volcano is furrowed by the « Sciara del Fuoco », a steep trough that generally conveys the ejecta and lava flows to the sea. Stromboli is considered one of the most active volcanoes in the world because of its persistent moderate explosive activity, known as strombolian activity.

Stromboli is the northernmost island of the Aeolian volcanic arc, located at the border of the Tyrrhenian bathial plane (Fig. 2). Recent deep seismic refraction studies (Morelli *et al.*, 1975) showed the crustal structure of the area. The Moho discontinuity, that rises toward the central Tyrrhenian bathial plane, is locally about 16 km deep. This discontinuity is characterized by a sharp increase of the seismic compressional velocity from 6.5 to 8.0 km/sec, indicating an anomalously thin continental crust. Two low velocity layers, which seem to be unified toward Stromboli, were recognized within the crust, the main one being at a depth of about 10 km. The lateral extent of these layers has not been determined, and their volcanological significance is still unclear.

Bull. Volcanol., Vol. 41-3 (1978)

Volcanic Hazards at Fossa of Vulcano: Data from the Last 6,000 Years (*)

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P. Y. GILLOT — *Centre des Faibles Radioactivités, Gif-sur-Yvette, France*
L. LA VOLPE — *Dipartimento Geomineralogico, Università di Bari, Italy*
M. F. SHERIDAN — *Dept of Geology, Arizona State University, Tempe, Arizona, U.S.A.*

ABSTRACT:

Stratigraphic reconstruction of the complete sequence of deposits that formed the Fossa cone of Vulcano has distinguished four principal eruptive cycles: Punte Nere, Palizzi, Commenda, and Pietre Cotte. At least three additional eruptive cycles, one of which ends with the Campo Sportivo lava, occur between deposits of the Punte Nere and Palizzi cycles. However, exposure is inadequate for their characterization. The assignment of the modern deposits that follow the Pietre Cotte lava is uncertain.

Deposits of each cycle follow a similar stochastic pattern that is controlled by a decrease in the effect of water/melt interaction. The normal sequence of pyroclastic products for each cycle starts with wet-surge beds, followed by dry-surge horizons, fall deposits, and finally lava flows. Absolute age determinations have been made on each cycle-ending lava flow.

Wet-surge deposits normally occur near the crater rim, whereas dry-surge deposits are more widespread, reaching the surrounding caldera wall in many places. Thick fall deposits are confined to a zone extending about 800 m from the crater rim. Lava flows normally reach the base of the cone. The greatest hazard at Fossa is related to surge eruptions. The thickness of dry-surge deposits on the flanks of the cone increases away from the crater, but they pinch out toward the source near the crater rim. SEM analysis of the surface textures of juvenile glass clasts from dry-surge deposits confirms that the dominant control on the eruptive mechanism is water/melt interaction. Only slight modifications are induced on grain surfaces during transport. Particles from the Palizzi dry-surge beds lack surface textures characteristic of fall pyroclasts which suggests that ballistic fragments were not incorporated into the dense portion of the turbulent surge cloud. A quantitative analysis of the dispersal of products from the Palizzi cycle allowed creation of a computer-generated map for this eruption.

INTRODUCTION

An understanding of the past activity of a volcano is the best guide for the prediction of future events. Detailed stratigraphy of the deposits combined with historical records of activity provide the essential data necessary to determine the patterns of activity and periods of repose of a volcano. Knowledge of the frequncy of activity of the volcano, the eruptive styles, and the emplacement mechanisms of the products are needed to access volcanic risk. Many volcanoes follow a regular pattern that may systematically change with time. Therefore, if data are available, a complete history of the volcano from the initial events to the most recent eruptions should be considered. With this in mind, we undertook a study of products representing the entire eruptive history of the Fossa cone of Vulcano from its inception about 6,000 years ago up to the present.

(*) Paper presented at the IUGG Inter-disciplinary Symposium on Volcanic Hazard, Hamburg, August 1983.

Bull. Volcanol., Vol. 47-1, 1984

Journal of Volcanology and Geothermal Research, 27 (1986) 117—133
Elsevier Science Publishers B.V., Amsterdam — Printed in The Netherlands

VOLCANIC HISTORY OF LIPARI (AEOLIAN ISLANDS, ITALY) DURING THE LAST 10,000 YEARS

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(Received August 21, 1984; revised and accepted May 1, 1985)

ABSTRACT

Cortese, M., Frazzetta, G. and La Volpe, L., 1986. Volcanic history of Lipari (Aeolian Islands, Italy) during the last 10,000 years. *J. Volcanol. Geotherm. Res.*, 27: 117—133.

Examination of the volcanic stratigraphy of deposits younger than 10,000 years on Lipari indicates four principal periods of volcanic activity related to specific centers. The products from each different volcanic center are defined as volcano-stratigraphic unit (VSU). From the oldest these are: the Canneto Dentro, Gabellotto—Fiume Bianco, Forgia Vecchia and Monte Pilato—Rocche Rosse VSUs. The study of textures and dispersal of the deposits permitted the vents to be localized and the recent volcanic history of Lipari to be reconstructed.

The oldest event formed a small explosion breccia cone with a final obsidian lava in the Canneto Dentro area. Immediately afterward, a complex series of explosions produced the widespread dry-surge deposits of the Gabellotto—Fiume Bianco sequence. This activity ended with the extrusion of a domical lava flow. The renewal of activity occurred in the Pirrera area with an explosive eruption that produced explosion breccia deposits. The last eruptions from this vent were coeval with the first eruption of M. Pilato. The rim of the explosion breccia cone was partially destroyed by the Forgia Vecchia lava flow. M. Pilato cone grew in a very short period of time due to a continuous swarm of explosive events. After a short repose time, a series of more energetic and superficial explosions occurred through a vent slightly to the south. The extrusion of the Rocche Rosse lava flow (about 729 A.D.) ended this cycle of activity.

All the volcanic centers follow a quite similar stochastic pattern starting with a fall or surge eruption and ending with effusion of viscous rhyolitic lavas. The four centers are aligned along either NW—SE or NE—SW fault systems according to the structural pattern of the island. They can be placed into two groups: the Canneto Dentro—Gabellotto centers and the Forgia Vecchia—M. Pilato centers. A long quiescence (≃ 3,500 years) separates the activity of these two groups while inside of each the activities were nearly contemporaneous or in rapid succession.

June, 1989

Mount Vesuvius a garbage dump

Reuter

NAPLES, Italy — An Italian scientist who explored the crater of Mount Vesuvius was horrified to find discarded soft-drink cans, old tires and even the rusting hulk of a Fiat 500 car.

Ines Albergamo, who descended 350 metres into the mouth of the dormant volcano, told the Rome newspaper *Il Tempo*: "People throw things just to hear the noise. They risk transforming the volcano into an enormous rubbish heap."

Vesuvius has been quiet since an eruption in A.D. 79 which buried the Roman town of Pompeii.

St. Helens ash settles near Yakima

The Associated Press

Mount St. Helens belched volcanic ash that settled over a south-central Washington community Saturday.

The U.S. National Weather Service reported a light dusting of ash near Yakima, about 120 kilometres east of Mount St. Helens.

"It was gritty and it was still falling out of the sky," said David Foster of Toppenish, who found his two cars coated with dust.

Steve Malone, a seismologist with the University of Washington, said seismographs and other equipment within the crater of Mount St. Helens recorded a small eruption at 5:37 a.m. PST.

The eruption lasted about two minutes and was followed by small earthquakes that lasted about two hours.

Malone said further details on the Mount St. Helens eruption would not be available until crews could take a closer look at the readings.

Mount St. Helens erupted May 18, 1980, levelling 596 square kilometres, leaving 57 people dead or missing and creating an ash cloud that circled the globe.

Dec., 1989

Volcano output not fresh ash

The Associated Press

VANCOUVER, Wash. — In the wake of the biggest outburst from Mount St. Helens in nearly four years, there are no signs that the volcano is entering a more explosive phase, scientists said Monday.

Foul weather again kept scientists from the Cascades Volcano Observatory from flying into the crater by helicopter to take measurements, gather more ash samples and replace monitoring equipment that was lost in the ash burst Saturday morning, said scientist Dan Dzurisin.

Ash taken about 19 kilometres east of the peak Sunday was examined under a microscope and found to be pulverized rock from previous eruptions rather than freshly erupted matter, Dzurisin said.

Jan., 1990

Cloud cover

Steam still rises from Alaska's Redoubt Volcano after several weeks of explosive activity. The volcano, southwest of Anchorage, started its eruptions in mid-December after lying dormant for 25 years.

Ash from Alaskan volcano drifts down West Coast

AP and Reuter

ANCHORAGE

Volcanic ash and dust drifted down the West Coast of Canada and the United States on the weekend after Alaska's Mount Redoubt erupted for the fifth time in three days.

U.S. government scientists said the 3,108-metre volcano erupted five times from Thursday to Saturday after lying dormant for 21 years.

The 220,000 residents of Anchorage, 160 kilometres northeast of the mountain, were told to remain indoors to avoid respiratory problems.

Most flights in and out of Anchorage International Airport were cancelled because of fears that aircraft engines would suck in grit from the volcano, a spokesman for the U.S. Federal Aviation Administration said.

A KLM Royal Dutch Airlines jet, en route from Amsterdam to Tokyo with 231 people on board, was forced to make an emergency landing Friday when its engines failed while passing through the volcanic cloud. The crew was able to restart the engines and the passengers, uninjured, were transferred to other flights.

The community hardest hit by the volcanic outburst was Kenai, an oil and fishing town 65 kilometres east of Mount Redoubt.

"I was just outside. The grey, gritty sediment of the ash is probably an eighth of an inch deep over the snow," Kenai Mayor John Williams said.

Mr. Williams said the community of 6,600 people had been without television and was suffering power failures as power-generating turbines became clogged with the corrosive grit.

Scientists have warned that the volcano could continue to spew out a foul-smelling plume for weeks.

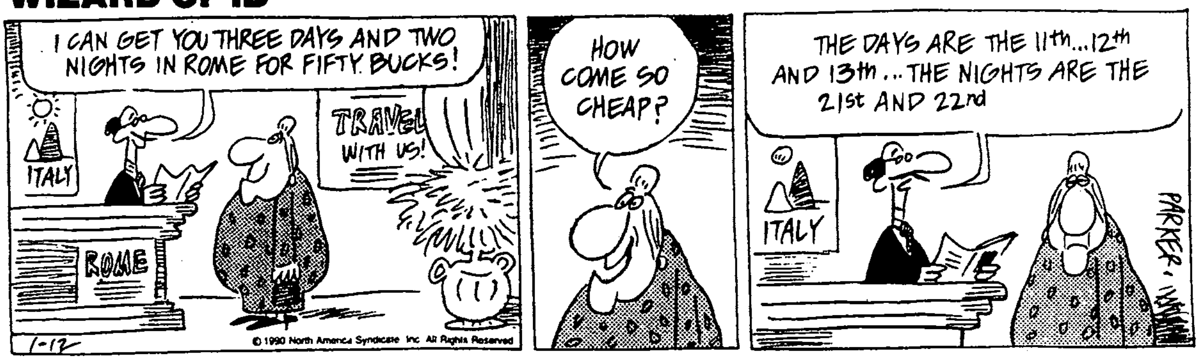
Redoubt blows again

ANCHORAGE — In its largest eruption since reawakening last month, Redoubt Volcano hurled an anvil-shaped plume of steam and ash more than 10 kilometres into the air Monday.

Most of the ash was carried east and south over the Kenai Peninsula and out over the Gulf of Alaska. The ash plume bisected the peninsula, missing for the most part the major settlements around Kenai and Homer.

Skies darkened briefly, but only a light dusting was reported in Kenai, "just enough to turn the snow brown," one resident said.

WIZARD OF ID



Scientists discover lakes of brimstone

By Robert Cooke
Newsday

OLD-TIME preachers who warned of fire and brimstone weren't so far off the mark — scientists have discovered the first known "lakes" of molten sulphur bubbling vigorously in the crater of a volcano in Costa Rica.

"To our knowledge, this is the first reported occurrence of sulphur lakes," geologists Clive Oppenheimer and David Stevenson report in the British journal *Nature.*

Brimstone, an archaic name for sulphur, was traditionally considered the fuel of hellfire.

The two scientists, from the Open University in England, said two small sulphur lakes appeared in April, soon after water boiled away in the crater, which is known as Volcan Poas.

"The sulphur deposits bubbled vigorously because of the flux of hot gases from below, which kept them molten" at a temperature of 116° C, they reported.

Volcanologist Richard Stoiber, at Dartmouth College, commented in a telephone interview that it might be the first time molten sulphur lakes were seen.

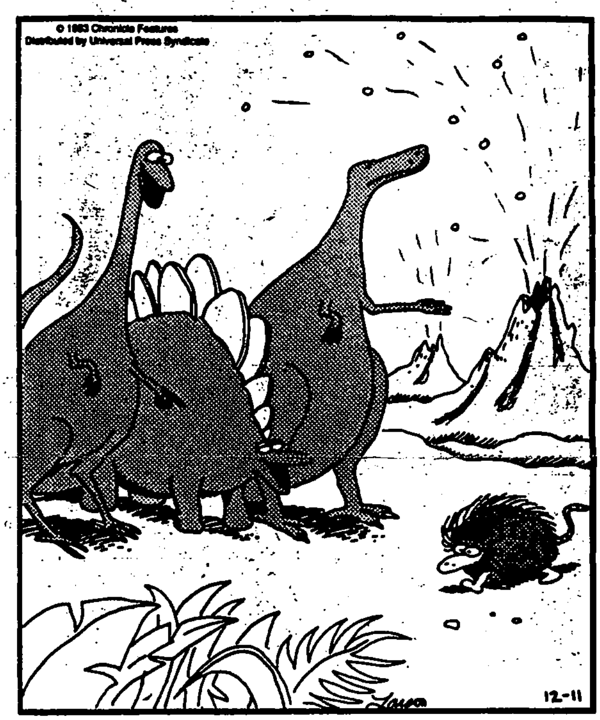
"It's an unusual accident of topography. We've seen sulphur come out of volcanoes, and we've seen melted sulphur, but it wasn't in a configuration that gave you a depression," so the hot liquid could collect in pools.

Oppenheimer and Stevenson added that sulphur's low viscosity, the ease with which it flows when molten, "is likely to have been critical in enabling its migration through the lake sediments to collect" downward into ponds.

They reported that a water lake that was in the volcano's hot crater evaporated during a two-year period, leaving a hot floor marked by bubbling mud holes. As the mud pools dried, they said, yellow sulphur cones up to three metres high were seen.

After these cones collapsed into pits in March, the scientists saw a "bubbling pool of brown liquid." Analysis "confirmed the purity of the sulphur, although significant traces of selenium and arsenic were detected."

THE FAR SIDE By GARY LARSON



BIZARRO By DAN PIRARO

GEOLOGICAL HOWLERS

VOLCANOES ARE NORMALLY QUITE GENTLE

An Ardente Nuée was experienced at St. Pierre which wipped out all the inhabitants. *J.H.McD.W.*

Mt. Etna, Scilly. *J.H.McD.W.*

Island of Chertzy. *J.H.McD.W.*

Volcanoes have large wide mouths. *J.H.McD.W.*

Gallons of molten lava and boiling mud poles. *J.H.McD.W.*

Calderela. *J.H.McD.W.*

The lack of support for the volcano would mean that it would collapse into the withdrawn area. *J.H.McD.W.*

Pompeii a city in central Italy was completely wiped out by a volcanic eruption in the 20th century. *J.G.McD.*

Krakatoa the 1,000' mountain became a 1,000' hole, in a few minutes. *C.D.G.*

A plug is formed in a volcano. The pressure underneath builds up until the plug is finally shot out like a spear, to land quivering in the ground, hundreds of yards away. e.g. Pûy de Dôme in France. *C.D.G.*

Active volcanos are continually expelling lava and hot gases and are not very dangerous in as much as they are known and given an adequate berth by people. *J.G.McD.*

A volcano vomits from the bowels of the Earth. *J.G.McD.*

Mt. Kilimanjaro, a Pacific island, blew itself to pieces. *C.D.G.*

[*Describing a cylindrical core sample of Millstone Grit:*] This is part of a volcanic plug. *F.H.S.*

When the volcano has built up sufficient steam and gases in its bowels, these gases and steam and molten material are forced to the outside through the blowhol. *G.B.*

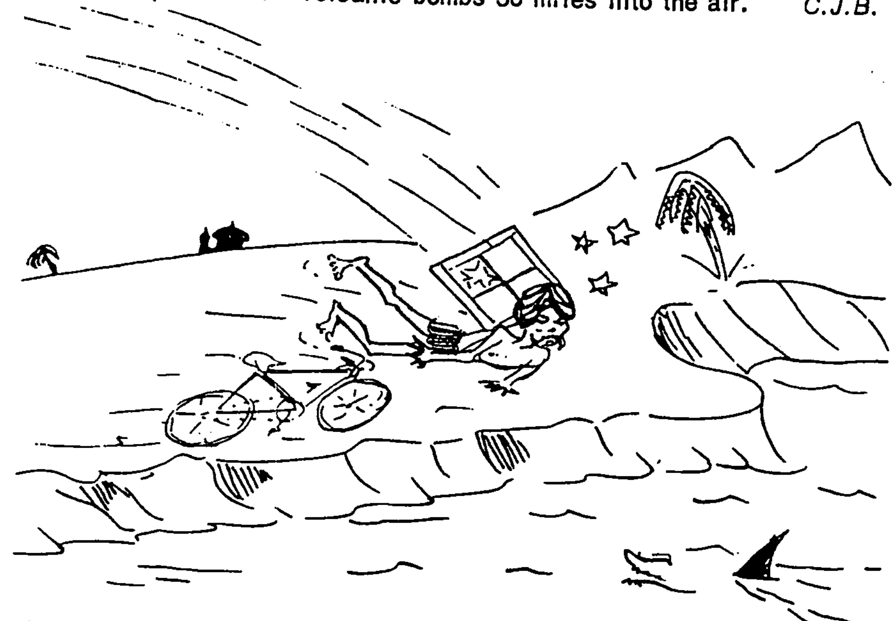
Molten lava flows out of the Mid-Atlantic rift from time to time and covers the surrounding sea floor with sea floor spread. *C.J.B.*

An example of a great Caldera is the formation of Lough Neogh, Co. Antrim where the part of the volcano that occupied that space was blown into the channel to form the Isle of Man. *J.A.*

Sinter is blasted out of a volcano, blown to bits, and never seen again. The particles are very fine in grain because of the volcanic explosion, and their absence can only be discovered under the microscope. This was one of the most important discoveries made in the nineteenth century and established the science of petrology, but even now there are very few experts who have ever seen sinter. *T.N.G.*

Greenland Volcano in Eruption
By arrangement with *The Times* *D.P.*

Peléan eruptions blow volcanic bombs 30 miles into the air. *C.J.B.*



The explosion of Krakatoa was heard as far away as Australia, it blew windows out in Bolivia and the force knocked a man off his bicycle, cycling on the east coast of India. *C.D.G.*

If it's a big crate, it's known as a caldera. *J.H.McD.W.*

The Stromboli type is quiet and noisy. *J.H.McD.W.*

On a touring holiday in Italy, being a geologist, I just had to go a little out of my way to see the entrails of Mount Etna. *ConG.*

Pumice is used as an abrasive, often in bathrooms. *A.M.E.*

The lava has flown out from fissures. *J.H.McD.W.*

ed. W.D. Ian Rolfe

GEOLICAL SOCIETY OF SCOTLAND