INSIDE VOLCANOES

IX INTERNATIONAL SYMPOSIUM ON VULCANOSPELEOLOGY OF THE I.U.S.

UNDER THE PATRONAGE OF THE

INTERNATIONAL UNION OF SPELEOLOGY

ROUND TABLE DISCUSSION
ON
«SPELEOLOGY AND ENVIRONMENTAL CONSERVATION IN VOLCANIC PARKS»

CATANIA, 11-19 SEPTEMBER 1999

PRE-PRINT

«DENTRO I VULCANI»

IX SIMPOSIO INTERNAZIONALE DI VULCANOSPELEOLOGIA

CON IL PATROCINIO DELLA
UNION INTERNATIONALE DE SPÉLÉOLOGIE

TAVOLA ROTONDA
SU
«SPELEOLOGIA E PROTEZIONE AMBIENTEALE NEI PARCHI VULCANICI»

CATANIA, 11-19 SETTEMBRE 1999

PROGRAMMA GENERALE

PRE-SIMPOSIO

CENTRO FIERISTICO POLIVALENTE «*le Ciminiere*», PIAZZALE ASIA

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10 SET (ven) 09:00 - 12:00 – Apertura Segreteria; arrivi e registrazioni.
15:00 - 18:00 – Apertura Segreteria; arrivi e registrazioni.
21:00 - 23:00 – Accoglienza ritardatari presso la sede del CSE, via Cagliari 15, tel. 095437018.

11 SET (sab) 07:00 – Partenza per l'escursione vulcanospeleologica facoltativa **A** (Grotta Cutrona in Valle del Bove)
09:00 - 12:00 – Apertura Segreteria; arrivi e registrazioni.
15:00 - 18:00 – Apertura Segreteria; arrivi e registrazioni.
18:30 - 20:00 - Inaugurazione, alla presenza del Presidente della Provincia e del Prefetto di Catania, della Mostra «Le Grotte dell'Etna», che rimarrà aperta al pubblico fino al 31/10/99. Rinfresco.

12 SET (dom) 08:30 – Partenza per l'escursione vulcanospeleologica facoltativa **B** (grotte di Piano Immacolatella, in Comune di San Gregorio di Catania)
09:00 - 12:00 – Arrivi e registrazioni.
15:00 - 18:00 – Arrivi e registrazioni.

SALA RIUNIONI DELL'ASSESSORATO COMUNALE AI QUARTIERI E POLITICHE GIOVANILI - VIA TOMASELLI 29

19:00 - 20:00 - Presentazione, alla presenza del Sindaco di Catania e dell'Assessore alla Cultura, del volume «Le Grotte dell'Etna», prodotto dal Centro Speleologico Etneo e edito dal Parco dell'Etna. Rinfresco.

13 SET (lun) 09:00 - 12:00 – Apertura Segreteria; arrivi e registrazioni.
15:00 - 18:00 – Apertura Segreteria; arrivi e registrazioni.
09:00 - 10:40 – Aula; presentazione lavori
10:40 - 11:10 – Pausa caffè
11:10 - 13:00 – Aula; presentazione lavori
13:00 - 15:00 – Intervallo
15:00 - 16:40 – Aula; presentazione lavori
16:40 - 17:00 – Pausa caffè
17:00 - 18:50 – Aula; presentazione lavori
20:30 - Proiezione su «Eruzione etnea 1991-93», a cura e con commento del Dott. Romolo Romano, ricercatore vulcanologo dell'I.I.V.

Accompagnatori, 08.30: Partenza per l'escursione turistica facoltativa **J** (Riviera dei Ciclopi, Acireale e Taormina)

14 SET (mar) 09:00 - 12:00 – Apertura Segreteria; arrivi e registrazioni.
15:00 - 18:00 – Apertura Segreteria; arrivi e registrazioni.
09:00 - 10:40 – Aula; presentazione lavori
10:40 - 11:10 – Pausa caffè
11:10 - 12:50 – Aula; presentazione lavori
13:00 - 15:00 – Intervallo
15:00 - 16:40 – Aula; presentazione lavori
16:40 - 17:00 – Pausa caffè
17:00 - 19:00 – Aula; presentazione lavori
20:30 – Pizza sociale (facoltativa) in un ristorante cittadino.

Accompagnatori, 10:00-13:00: Escursione **K** (a piedi) offerta dagli organizzatori con la collaborazione della Soprintendenza ai BB.CC.AA. di Catania (visita guidata al centro storico di Catania ed ai suoi monumenti). Al termine seconda colazione (facoltativa) in una tipica «*putia*» della Pescheria (Trattoria La Paglia).

15 SET (mer) 08:45 - Partenza per l'**escursione generale** sul versante Nord del vulcano: incontro con il Sindaco di Linguaglossa e rinfresco offerto dal Comune; visita al museo etnologico della Pro-Loco e degustazione di vini locali; sosta al Rifugio Pirao per la seconda colazione al sacco nei locali messi a disposizione dal Corpo Forestale, con degustazione di prodotti locali), escursione alle aree sommitali dell'Etna con i mezzi 4WD della STAR e visita guidata all'Osservatorio Vulcanologico Etneo di Monte Pizzi Deneri; rientro a Catania intorno alle ore 21:00.

16 SET (gio) 09:00 - 12:00 – Apertura Segreteria; arrivi e registrazioni.
15:00 - 18:00 – Apertura Segreteria; arrivi e registrazioni.
09:00 - 10:40 – Aula; presentazione lavori
10:40 - 11:10 – Pausa caffè.
11:10 - 13:00 – Proiezione diapositive; Assemblea generale; mozioni conclusive.

TAVOLA ROTONDA
CENTRO FIERISTICO POLIVALENTE «*de Ciminiere*», PIAZZALE ASIA

15:30 - 19:00 - Tavola rotonda su «SPELEOLOGIA E PROTEZIONE AMBIENTALE NEI PARCHI VULCANICI». Interventi, dibattito, conclusioni.
21:00 - banchetto di chiusura al ristorante-pub «al 17», in Piazza Duca di Genova (quartiere Porto).

POST-SIMPOSIO
SEDE DEL CSE, VIA CAGLIARI 15 – TEL./FAX 095437018

17 SET (ven) 07:15 – Partenza per l'escursione facoltativa **C** (3gg - Isole di Lipari e Vulcano),
07:40 – Partenza per l'escursione facoltativa **D** (1g - Giro turistico dell'Etna in Circumetnea)
08:00 – Partenza per l'escursione facoltativa **E** (1g - Visita alla Grotta di Serracozzo)
18 SET (sab) 07:00 – Partenza per l'escursione facoltativa **F_1** (1g - Grotta dei Tre Livelli, Grotta KTM)
19 SET (dom) 08:00 – Partenza per l'escursione facoltativa **H** (1g - Grotta dell'Intraleo).

PER L'ISCRIZIONE ALLE ESCURSIONI FACOLTATIVE POST-SIMPOSIO RIVOLGERSI ALLA SEGRETERIA
L'ORGANIZZAZIONE TECNICA PER TUTTE LE ESCURSIONI È CURATA DALL'AGENZIA MANU VIAGGI DI CATANIA

«INSIDE VOLCANOES»

IX INTERNATIONAL SYMPOSIUM ON VULCANOSPELEOLOGY

UNDER THE PATRONAGE OF THE

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ROUND TABLE DISCUSSION
ON
«SPELEOLOGY AND ENVIRONMENTAL CONSERVATION IN VOLCANIC PARKS»

CATANIA, 11-19 SEPTEMBER 1999

GENERAL PROGRAM

PRE-SYMPOSIUM

CONVENTION AND FAIR CENTER «*le Ciminiere*» (Piazzale Asia)

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10 SEP (fri)

09:00 - 12:00 – Opening of the Secretary; arrivals and registrations.
15:00 - 18:00 – Opening of the Secretary; arrivals and registrations.
21:00 - 23:00 – Registration of late arrivals at CSE's seat, via Cagliari 15, ph. 095437018.

11 SEP (Sat)

07:00 – departure of the optional vulcanospeleological excursion **A** (Grotta Cutrona in Valle del Bove)
09:00 - 12:00 – Opening of the Secretary; arrivals and registrations.
15:00 - 18:00 – Opening of the Secretary; arrivals and registrations.
18:30 - 20:00 - The President and the Prefect of the Province of Catania inaugurate the Exhibition «Le Grotte dell'Etna», which will be open to the public until 31/10/99. Refreshment.

12 SEP (Sun)

08:30 – Departure for the optional vulcanospeleological excursion **B** (Caves of Piano Immacolatella, in the territory of San Gregorio di Catania)
09:00 - 12:00 – Opening of the Secretary; arrivals and registrations.
15:00 - 18:00 – Opening of the Secretary; arrivals and registrations.

MEETING HALL OF THE CITY ASSESSORSHIP FOR BOROUGHS AND YOUTH POLICIES - VIA TOMASELLI 29

19:00 - 20:00 - Presentation to the public of the volume «Le Grotte dell'Etna», produced by Centro Speleologico Etneo and published by the Park of Etna. The Mayor of Catania and the Alderwoman for Culture will attend to the event. Refreshment.

13 SEP (Mon)

09:00 - 12:00 – Opening of the Secretary; arrivals and registrations.
15:00 - 18:00 – Opening of the Secretary; arrivals and registrations.
09:00 - 10:40 – Lectures in the Conference Hall
10:40 - 11:10 – Coffee break
11:10 - 13:00 – Lectures in the Conference Hall
13:00 - 15:00 – Interval
15:00 - 16:40 – Lectures in the Conference Hall
16:40 - 17:00 – Coffee break
17:00 - 18:50 – Aula; presentazione lavori
20:30 - Slide projection on «Etna eruption 1991-93», by Dr. Romolo Romano, volcanologist and researcher of the I.I.V.

Accompanying persons, 08:30: Departure for the optional tourist excursion **J** (Ciclopes' Riviera, Acircale and Taormina)

14 SEP (Tue)

~~09:00~~ 0830 - 12:00 – Opening of the Secretary; arrivals and registrations.
15:00 - 18:00 – Opening of the Secretary; arrivals and registrations.
09:00 - 10:40 – Lectures in the Conference Hall
10:40 - 11:10 – Coffee break
11:10 - 13:00 – Lectures in the Conference Hall
13:00 - 15:00 – Interval
15:00 - 16:40 – Lectures in the Conference Hall
16:40 - 17:00 – Coffee break
17:00 - 19:00 – Aula; presentazione lavori
20:30 – Optional social pizza at some restaurant downtown.

Accompanying persons, 10:00-13:00: Complimentary excursion **K** (on foot), offered by the Organising Committee in collaboration with the Superintendent of the Province of Catania for Cultural, Archæological and Environmental Estates (guided visit to the historic centre of Catania). Optional lunch at a typical Sicilian «*putia*» (inn) in the fish market (Trattoria La Paglia).

15 SEP (Wed)

08:45 - Departure for the **general excursion** to the northern flank of Etna: meeting with the Mayor of Linguaglossa and complimentary drink; visit to the Ethnologic Museum of Linguaglossa, where the Chairman of Pro-Loco will offer a complimentary wine tasting with roasted chick-peas; stop at Rifugio Pirao, where the Forest Dept. will host the party and collaborate for a rustic lunch with local specialties; excursion to the crater area by STAR Co.'s 4WD mini-buses and guided visit to Etna Volcanologic Observatory at Monte Pizzi Deneri. Expected return back to Catania at about 21:00.

16 SEP (Thu)

09:00 - 12:00 – Opening of the Secretary, arrivals and registrations.
15:00 - 18:00 – Opening of the Secretary, arrivals and registrations.
09:00 - 10:40 – Lectures in the Conference Hall
10:40 - 11:10 – Coffee break
11:10 - 11:30 – Slide projection «Glimpses of Etna», by H. Mueller
11:30 - 13:00 – General Assembly of the IUS Commission; debate, motions, conclusion.

ROUND TABLE DISCUSSION

CONVENTION AND FAIR CENTER «*le Ciminiere*» (Piazzale Asia)

15:30 - 19:00 – Round Table discussion on «SPELEOLOGY AND ENVIRONMENTAL PROTECTION IN VOLCANIC PARKS». Official lectures, replies, debate conclusion.
21:00 - Farewell banquet at the restaurant-pub «al 17», Piazza Duca di Genova (Porto borough).

POST-SYMPOSIUM

CSE'S SEAT, VIA CAGLIARI 15 – PIL/FAX 095437018

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17 SEP (Fri) 07:15 – Departure for the optional excursion **C** (3dd - Islands of Lipari and Vulcano),
07:40 – Departure for the optional excursion **D** (1d - Tourist tour of Etna by Circumetnea train)
08:00 – Departure for the optional excursion **E** (1d - Visit to Grotta di Serracozzo)
18 SEP (Sat) 07:00 – Departure for the optional excursion $\mathbf{F_1}$ (1d - Grotta dei Tre Livelli, Grotta KTM)
19 SEP (Sun) 08:00 – Departure for the optional excursion **H** (1g - Grotta dell'Intraleo).

FOR REGISTERING IN THE OPTIONAL EXCURSIONS (SUBJECT TO AVAILABILITY) PLEASE REPORT TO THE SECRETARY
ALL TOURIST EXCURSIONS ARE IMPLEMENTED UNDER MANU VIAGGI'S TECHNICAL SURVEY

PROGRAMMA
DELLE
ESCURSIONI TURISTICHE

ESCURSIONE «C» - ISOLE EOLIE (LIPARI e VULCANO)

VENERDÌ 17 SETTEMBRE 1999

07:00 Incontro dei partecipanti a Piazza Abramo Lincoln; distribuzione dei sacchetti.
07:15 Partenza in pullman privato alla volta di Milazzo.
10:00 Arrivo al porto di Milazzo.
10:15 Imbarco sul traghetto veloce SIREMAR «ISOLA DI STROMBOLI».
10:30 Partenza per Lipari.
11:40 Arrivo a Lipari, sbarco nel porto di Marina Lunga e consegna dei bagagli al furgone dell'albergo. Trasferimento a piedi in albergo e sistemazione nelle camere assegnate. Tempo a disposizione.
14:20 Incontro con la guida, Sig.ra Helga Jung.
14:30 Partenza in pullman per il giro turistico dell'isola, offerto dal Comune di Lipari. Si visiteranno i villaggi del versante occidentale, le Terme di San Calogero, di epoca micenea, le cave di pomice di Canneto.
17:30 Rientro in albergo e trasferimento a piedi in Municipio.
18:00 Incontro con il Sindaco di Lipari, che darà il benvenuto alla comitiva ed offrirà un rinfresco e pubblicazioni sull'isola.
19:00 Tempo a disposizione per un gelato, una passeggiata in centro, la cena libera in una delle numerose trattorie o pizzerie del capoluogo eoliano. Pernottamento.

SABATO 18 SETTEMBRE 1999

08:00 Trasferimento a piedi al porto di Marina Corta e incontro con la guida autorizzata, Sig.ra Elisabeth Curie (*); distribuzione dei sacchetti.
08:30 Imbarco sull'aliscafo SIREMAR per Vulcano
08:40 Sbarco a Vulcano, Porto Levante, e visita guidata al grande cratere detto «*la Fossa*»; al ritorno visita ai numerosi fenomeni di vulcanismo minore (emanazioni fumaroliche di vapori d'acqua e zolfo, sorgenti sottomarine bollenti, fanghi bollenti) e alla piccola Grotta dell'Allume, interessante per le sue mineralizzazioni secondarie. Tempo a disposizione per la seconda colazione.
15:00 Riunione alla banchina aliscafi SNAV del Porto di Vulcano.
15:15 Imbarco per Lipari.
15:25 Arrivo a Lipari, Marina Corta. Trasferimento a piedi in albergo. Tempo a disposizione per riposo, attività ed escursioni individuali, shopping. Cena libera, pernottamento.

DOMENICA 19 SETTEMBRE 1999

08:30 Consegna dei bagagli all'albergatore, e trasferimento a piedi in Piazza Municipio per l'incontro con la guida, Sig.ra Elisabeth Curie (*).
09:00 Visita guidata alla Cittadella di Lipari e al Museo Archeologico Eoliano.
11:30 Trasferimento al porto di Lipari, Marina Lunga, lungo la caratteristica Via Maligunis.
11:45 Ritiro dei bagagli (trasportati al porto dal furgone dell'albergo) e distribuzione dei sacchetti; imbarco sul traghetto veloce SIREMAR «ISOLA DI STROMBOLI».
12:00 Partenza per Milazzo.
13:10 Arrivo al porto di Milazzo, sbarco, trasferimento sul pullman privato.
13:30 Partenza per Messina.
14:15 Arrivo a Messina, Piazza della Repubblica (Stazione Centrale FS; Bus Terminal). Proseguimento del viaggio in treno, o con pullman della Ditta Cavalieri per coloro che ripartono dall'aeroporto di Reggio Calabria. Il resto della comitiva prosegue per Catania col pullman privato.
16:00 Arrivo a Catania, Piazza Abramo Lincoln. Fine dell'escursione.

(*) La Sig.ra Curie illustrerà l'itinerario e la visita alla Cittadella e al Museo Eoliano in lingua Italiana, Francese e Tedesca; la guida autorizzata di lingua Inglese non è disponibile nei giorni di Sabato 18 e Domenica 19.

Ristoranti consigliati a Lipari: «Kasbah» (Via Maurolico), «al Vicoletto» (Vicolo a Via V. Emanuele), «Filippino» (Piazza Mazzini); spesa media dalle 40.000 alle 60.000 lire per cena a base di pesce (senza vino o con vino locale sfuso).

ESCURSIONE «D» - GIRO DELL'ETNA CON IL TRENINO DELLA *CIRCUMETNEA*

VENERDÌ 17 SETTEMBRE 1999

07:40 Incontro con la guida turistica, Sig.ra Giovanna Farruggia, al bar della Stazione FCE «BORGO».
07:50 Partenza per Adrano con il convoglio Catania-Randazzo.
08:55 Arrivo alla Stazione CE di Adrano, e incontro con l'archeologo, Dott. Francesco Privitera. Trasferimento al Castello Normanno e visita del Museo Archeologico Etneo, con importanti reperti pre e protostorici di Hybla Mayor e del territorio etneo.
12:15 Partenza alla volta di Randazzo.
13:10 Arrivo a Randazzo.
13:20 Seconda colazione al Ristorante Scrivano, a base di funghi porcini e di grigliate. Coloro che non hanno prenotato la colazione, ri-incontreranno il gruppo alle 14:00 sulla Piazza Santa Maria (Duomo Normanno). Coloro che desiderano aggregarsi al gruppo per la colazione possono richiedere il voucher alla guida (Lit. 30.000 a persona).
14:00 Visita a piedi al borgo medievale con le sue Chiese Madri di Santa Maria (Normanna), San Nicola (Greca) e San Martino (Lombarda), il Municipio (ubicato in un monastero del XVIII secolo, con un suggestivo chiostro), il Castello che ospita il Museo Vagliasindi, il Palazzo Reale, Casa Clarentano, la statua del gigante Piraemone, mitico fondatore della città, gli angusti vicoli pavimentati con basole di lava, i graziosi cortili.
16:30 Partenza col trenino FCE alla volta di Giarre.
17:30 Arrivo a Giarre. Tempo a disposizione per un caffè.
18:10 Partenza alla volta di Catania col treno FS # R.12765.
18:45 Arrivo alla Stazione Centrale di Catania. Fine dell'escursione.

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ESCURSION «J» alla RIVIERA dei CICLOPI, ACIREALE e TAORMINA

LUNEDÌ 13 SETTEMBRE 1999

08:15 Incontro con la guida turistica, Sig. Giacomo Mazza, a Piazza Abramo Lincoln.
08:30 Partenza da Catania con mini-bus. Si procede lentamente lungo la riviera, con breve sosta ad Aci Castello (Castello Normanno) ed Aci Trezza (Faraglioni dei Ciclopi).
09:15 Arrivo ad Acireale. Visita alla Cattedrale, alla Biblioteca Zelantea, e ad altri importanti siti e monumenti cittadini.
12:00 Arrivo a Taormina, Porta Messina. Una passeiata lungo il Corso condurrà il gruppo a Piazza IX Aprile, per ammirare il panorama dell'Etna e della Baia degli Dei, sorsegiando l'aperitivo al Wunderbar, uno dei migliori e più antichi locali di Taormina.
13:00 Seconda colazione nel giardinetto della Trattoria "*la Buca*", con eccellenti piatti a base di pesce preparati dallo Chef Antonino Intelisano. Coloro che non hanno prenotato la colazione al ristorante, si ricongiungeranno al gruppo a Piazza Santa Caterina (angolo Palazzo Corvaja) alle 14:30. Coloro che desiderassero consumare la colazione in ristorante potranno richiedere il voucher alla guida (Lit. 35.000 a persona).
14:30 Visita guidata ai monumeni di Taormina: il Teatro Greco-Romano, l'Odeon, il medievale Palazzo Corvaja, la chiesa di Santa Caterina, il Gymnasium Romano (impropriamente denominato "*le Naumachie*"), il cinquecentesco Municipio, la Cattedrale del XV secolo. Tempo a disposizione per una coppa di gelato, riposando in qualche sala da tè, o per lo shopping o una semplice passegiata lungo il Corso.
17:30 Riunione a Porta Messina e partenza in mini-bus alla volta di Catania.
18:20 Arrivo a Catania, Piazza Abramo Lincoln. Fine dell'escursione.

ESCURSIONE «K» - VISITA GUIDATA AL CENTRO STORICO DI CATANIA

MARTEDÌ 14 SETTEMBRE 1999

09:30 Incontro a Piazza Duomo (Palazzo dei Chierici all'angolo con Porta Uzeda) con la guida turistica, Sig.ra Giovanna Farruggia, e con l'Archeologo, Dott. Francesco Privitera.

La visita (a piedi) inizia dalla Cattedrale di Sant'Agata, un edificio barocco realizzato sui ruderi del duomo medievale recuperati dopo il terremoto del 1693 (transetto e absidi Normanni); quindi il palazzo dell'Università Centrale (Rettorato) ed altri edifici e monumenti di rilievo (Anfiteatro Romano, Chiesa di San Francesco con la tomba di Eleonora d'Angiò, il Teatro Greco-Roman, l'Odeon, il Monastero Benedettino a Piazza Dante, la Via dei Crociferi, le Terme della Rotonda, il Castello, le Terme dell'Indirizzo, la Pescheria.

12:45 La passeggiata termina in pescheria dove, coloro che hanno prenotato, potranno consumare una seconda colazione a base di pesce, preparata secondo la tradizione cucinaria catanese, nell'antica «Trattoria La Paglia». Coloro che desiderassero trattenersi col gruppo per la colazione in ristorante potranno richiedere il voucher alla guida (Lit 40.000 a persona).

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ESCURSIONE VULCANOSPELEOLOGICA «E» - GROTTA DI SERRACOZZO

VENERDÌ 17 SETTEMBRE 1999

18:00 SULLA VIA DEL RIENTRO VERSO CATANIA, IL GRUPPO SARÀ RICEVUTO DALL'AMMINISTRAZIONE COMUNALE DI MILO, PER UN INDIRIZZO DI BENVENUTO E PER UN ASSAGIO DI VINI LOCALI.

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CAPI-GRUPPO DELLE ESCURSIONI (VULCANOSPELEO & TURISTICHE) IN PROGRAMMA

ESCURSIONE "**A**" - SAT. 11/09/99	- Marco LIUZZO (Vulcanospeleologo)
ESCURSIONE "**B**" - SUN. 12/09/99	- Angelo LEOTTA (Vulcanospeleologo)
ESCURSIONE "**J**" - MON. 13/09/99	- Giacomo MAZZA (guida turistica)
ESCURSIONE "**K**" - TUE. 14/09/99	- Giovanna FARRUGGIA (guida touristica); Francesco PRIVITERA (Archeologo)
ESCURSIONE "**GEN**" WE 15/09/99	- Centro Speleologico Etneo
ESCURSIONE "**C**" - Fri/Sun 17-20/09 -	Giuseppe M. LICITRA (accompagnatore)
	- Helga JUNG (guida turistica)
	- Elisabeth CURIE (guida turistica)
ESCURSIONE "**D**" - FRI 17/09/99	- Giovanna FARRUGGIA (guida turistica); Francesco PRIVITERA (Archeologo)
ESCURSIONE "**E**" - FRI 17/09/99	- Marco LIUZZO (Vulcanospeleologo)
ESCURSIONE "**F_1**" SAT 18/09/99	- Giuseppe GAROZZO (Vulcanospeleologo) Sonia CALVARI (Volcanologa)
ESCURSIONE "**H**" - SUN 19/09/99	- Angelo LEOTTA (Vulcanospeleologo)

Le escursioni "**F_2**" e "**G**" sono state cancellate per mancanza di prenotazioni.

SCHEDULES
OF THE
TOURIST EXCURSIONS

EXCURSION «C» - ÆOLIAN ISLANDS (LIPARI and VULCANO)

FRIDAY 17 SEPTEMBER 1999

07:00 Meeting at Piazza Abramo Lincoln; delivery of lunch-bags.
07:15 Departure toward Milazzo by private coach.
10:00 Arrival to Milazzo.
10:15 Embarkation on the SIREMAR «ISOLA DI STROMBOLI» hydrojet ferry.
10:30 Departure toward Lipari.
11:40 Arrival to Lipari, disembarkation at Marina Lunga port and delivery of luggage to the hotel van. Transfer on foot to the hotel and accommodation. Time at leisure.
14:20 Meeting with the guide, Mrs Helga Jung.
14:30 Departure by coach for the complimentary island tour, offered by Lipari Municipality. The tour will touch the fishermen's villages of the western coast, San Calogero's Spas, dating back to Micenean age (3500 ybp), the pumice quarries at Canneto.
17:30 Return to the hotel, and transfer on foot to the City Hall.
18:00 Meeting with the Mayor of Lipari, who will welcome the party in the island and will offer a drink and complimentary brochures concerning the Æolian archipelago.
19:00 Time at leisure for a stroll downtown, an ice cream, an optional dinner or pizza in the numerous inns of Æolian headtown. Overnight.

SATURDAY 18 SEPTEMBER 1999

08:00 Transfer on foot to Marina Corta port, and meeting with the licensed guide, Mrs Elisabeth Curie (*); delivery of lunch-bags.
08:30 Embarkation on SIREMAR's hydrofoil to Vulcano.
08:40 Disembarkation at Vulcano, Porto Levante, and guided visit to the large crater named «*la Fossa*» (the Hole); visit to the numerous phenomena of minor volcanism (fumarolic emissions of sulphur and water steam, submarine boiling water-springs, boiling mud springs) and to the small Grotta dell'Allume, hosting secondary mineralisations. Time at leisure for the lunch.
15:00 Meeting at SNAV's hydrofoil wharf at the port of Vulcano.
15:15 Embarkation toward Lipari.
15:25 Arrival to Lipari, Marina Corta port. Transfer on foot to the hotel. Time at leisure for rest, individual activities and/or optional excursions, shopping. Optional dinner, overnight.

SUNDAY 19 SEPTEMBER 1999

08:30 Delivery of luggage to the hotelkeeper, and transfer on foot to Piazza Mazzini; meeting with the licensed guide, Mrs Elisabeth Curie (*).
09:00 Guided visit to the Citadel of Lipari and to the Archæological Æolian Museum.
11:30 Transfer on foot to Lipari, Marina Lunga port, through the characteristic Via Meligunis.
11:45 Withdrawal of luggage (carried to the port by the hotel van) and delivery of lunch-bags; embarkation on SIREMAR's «ISOLA DI STROMBOLI» hydrojet ferry.
12:00 Departure toward Milazzo.
13:10 Arrival to the port of Milazzo, disembarkation, transfer to the private coach.
13:30 Departure toward Messina.
14:15 Arrival to Piazza della Repubblica in Messina (Central State Railway Station; Bus Terminal). Prosecution of individual journey by train, or by Ditta Cavalieri's liner coach for those departing from Reggio Calabria airport. The remainder party reaches Catania by the private coach.
16:00 Arrival to Catania, Piazza Abramo Lincoln. End of the excursion.

(*) Mrs Curie will describe in Italian, French and German language, the itinerary at Vulcano, and the visit to the Citadel and to the Æolian Museum; no licensed English speaking guide is available on Saturday 18 and Sunday 19.

Suggested restaurants in Lipari: «Kasbah» (Via Maurolico), «al Vicoletto» (Vicolo at Via V. Emanuele), «Filippino» (Piazza Mazzini); average cost 40.000 to 60.000 ITL for fish based menu (without wine or with local lose wine).

EXCURSION «D» - RAILWAY TOUR OF ETNA BY *CIRCUMETNEA* TRAIN

FRIDAY 17 SEPTEMBER 1999

07:40 Meeting with the licensed English speaking guide, Mrs Giovanna Farruggia, at the Cafeteria of the FCE Railway Station «BORGO».
07:50 Departure toward Adrano by the train Catania-Randazzo.
08:55 Arrival to Adrano Station, and meeting with the Superintendence Archæologist, Mr. Francesco Privitera. Transfer to the Norman Castle and visit to the Ætnean Archæological Museum, with prehistorical findings of Hybla Mayor and the territory of Etna.
12:15 Departure toward Randazzo.
13:10 Arrival to Randazzo.
13:20 Lunch at Scrivano Restaurant, with pore fungus and grill based courses. Non-subscribers for lunch will re-join the party at the Railway FCE Station. Those wishing to join the party for lunch may apply the guide for the vouchers (ITL 30.000 per person).
14:00 Visit on foot to the medieval borough with its churches of St Maria (Norman), St. Nicholas (Greek) and St. Martin (Lombard), the City Hall (a XVIII century monastery and cloister), the Castle with Museo Vagliasindi, the Royal Palace, Clarentano Mansion, the narrow stone paved lanes, the cosy courts.
16:30 Departure by FCE train toward Giarre.
17:30 Arrival to Giarre. Time at leisure for a cup of coffee.
18:10 Departure toward Catania by FS Railways train # R.12765.
18:45 Arrival to Catania Central Railway Station. End of the excursion.

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EXCURSION «J» to the CICLOPES' RIVIERA, ACIREALE and TAORMINA

MONDAY 13 SEPTEMBER 1999

08:15 Meeting with the licensed guide, Mr Giacomo Mazza, at Piazza Abramo Lincoln.
08:30 Departure from Catania by mini-bus. Slow ride along the seaside road with stop at Aci Castello (Norman Castle) and Aci Trezza (the Cyclopes' Faraglioni).
09:15 Arrival to Acireale. Visit to the Cathedral, the Biblioteca (library) Zelantea, further remarkable monuments and highlights.
12:00 Arrival to Taormina, Porta Messina. A stroll on foot through the Corso will bring the party to Piazza IX Aprile, for admiring the panorama of Etna and the God's Bay, while sipping a complimentary drink at Wunderbar's, the most traditional cafeteria and tea-room downtown.
13:00 Lunch at the garden of "*la Buca*", with excellent fish-based courses prepared by the Chef Antonino Intelisano. Participants that don't want to attend to the restaurant lunch, will meet the party again at Piazza Santa Caterina (Palazzo Corvaja corner) at 14:30. The non-subscribers wishing to join the party may apply the guide for the vouchers (ITL 35.000 per person).
14:30 Guided visit to Taormina monuments: the Roman-Greek Theatre, the Odeon, the medieval Palazzo Corvaja, St. Catherine's Church, the Roman Gymnasium (improperly named "*le Naumachie*"), the City Hall, the XV century Cathedral. Time at leisure for a cup of ice cream, resting at some downtown cafeteria, or for shopping or strolling along the Corso.
17:30 Meeting at Porta Messina with the mini-bus and departure toward Catania.
18:20 Arrival to Catania, Piazza Abramo Lincoln. End of the Excursion.

EXCURSION «K» - GUIDED VISIT TO CATANIA HISTORIC CENTRE

TUESDAY 14 SEPTEMBER 1999

09:30 Meeting with the English speaking licensed guide, Mrs Giovanna Farruggia, and the Superintendence Archæologist, Mr. Francesco Privitera, at Piazza Duomo (Palazzo dei Chierici corner at Porta Uzeda.

The visit (on foot) will start from the Cathedral of St. Agate, a baroque realisation on medieval remains survived to the 1693 earthquake (Norman transept and apses); then the Central University Palace, and many more highlights (Roman Amphitheatre, Church of St. Francis, Roman-Greek Theatre, Odeon, Benedictine Monastery at Piazza Dante, Via Crociferi, Terme (Spas) della Rotonda, the Castle, Terme dell'Indirizzo, the Fish Market.

12:45 The walk ends at the Fish Market, where subscribers will have a fish based lunch, Catania style cuisine, at the old typical inn «Trattoria La Paglia». Those wishing to join the party may apply the guide for the vouchers (ITL 40.000 per person).

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VULCANOSPELEOLOGICAL EXCURSION «E» - GROTTA DI SERRACOZZO

FRIDAY 17 SEPTEMBER 1999

18:00 ON ITS WAY BACK TO CATANIA, THE PARTY WILL BE HOSTED BY THE CITY ADMINISTRATORS OF MILO, FOR A WELCOME SPEECH AND A RUSTIC WINE TASTING.

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TOUR LEADERS OF THE PLANNED (VULCANOSPELEO & TOURIST) EXCURSIONS

EXCURSION "**A**" - SAT. 11/09/99	-	Marco LIUZZO (Vulcanospeleologist)
EXCURSION "**B**" - SUN. 12/09/99	-	Angelo LEOTTA (Vulcanospeleologist)
EXCURSION "**J**" - MON. 13/09/99	-	Giacomo MAZZA (Licensed tourist guide)
EXCURSION "**K**" - TUE. 14/09/99	-	Giovanna FARRUGGIA (Licensed tourist guide);
		Francesco PRIVITERA (Archæologist)
EXCURSION "**GEN**" WE 15/09/99	-	The whole Centro Speleologico Etneo
EXCURSION "**C**" - Fri/Sun 17-20/09	-	Giuseppe M. LICITRA (Tour leader)
	-	Helga JUNG (Tourist guide)
	-	Elisabeth CURIE (Licensed tourist guide)
EXCURSION "**D**" - FRI 17/09/99	-	Giovanna FARRUGGIA (Licensed tourist guide);
		Francesco PRIVITERA (Archæologist)
EXCURSION "**E**" - FRI 17/09/99	-	Marco LIUZZO (Vulcanospeleologist)
EXCURSION "**F_1**" SAT 18/09/99	-	Giuseppe GAROZZO (Vulcanospeleologist)
		Sonia CALVARI (Volcanologist)
EXCURSION "**H**" - SUN 19/09/99	-	Angelo LEOTTA (Vulcanospeleologist)

The excursions "**F_2**" and "**G**" were cancelled for lack of subscriptions.

PROSPECT OF TOPICS AND RELEVANT ANNOUNCED PAPERS

VULCANOSPELEOLOGY on Etna and in Italy	VULCANOSPELEOLOGY in the world	NEW CONCEPTS in Vulcanospeleology	HISTORY, ARCHÆOLOGY, ARTIFICIAL CAVES	BIOLOGY	CONSERVATION	*IN ABSENTIA*, POSTERS
A) Bonaccorso R., Maugeri R. - Top ten caves on Mt. Etna. Cadastrial files	**J) Forti Paolo et al.** - Minerogenesis in some volcanic caves of Kenya	**S) Honda Tsutomu** - Classification of lava tree molds wit/without remelted inner surace...	**AA) Patti A. et al.** - On the ancient Mother Church of Mompilieri, Etna, Italy	**AH) Caruso Domenico** - Fauna of Etna caves: description and considerations	**AJ) Caffo S., Marino A.** - Monitoring of Grotta del Gelo (Frost Cave)	**Benedetto Carlos** - Volcanic Caves in Argentina *IN ABSENTIA*
B) Calvari S. et al. - Formation of a complex tube network: the 1999 Etna eruption	**K) Gaàl Ludovit** - Syngenetic volcanic caves in the West Carpathians	**T) Calvari S., Pinkerton H.** - Morphology of Etna lava tubes: insights for lava flow emplacement mechanisms	**AB) Politano F., Santonocito F.** - The Ruins of the ancient "*Campanarazzu*", buried...	**Al) Author + Title to be determined**	**AJ1) Marino A.** - Grotta del Gelo and its glacial phenomenon	**Forti P., Perna G.** - Fingal's Cave in the Island of Staffa, Hebrides, Scotland - **POSTER**
C) Corsaro R. et al. - Features of Etna Lava Stalactites	**L) Honda Tsutomu et al.** - Results of survey on Ganno-ana system: example of co-existence...	**U) Coltelli M. et al.** - Cross-section measurement of 1991 93 eruption lava tube	**AC) Privitera F.sco** - Archeological findings in the caves of Mt Etna		**AK) Halliday William R.** - Volcanic Show Caves in the World	**Grassi L. et al.** - Devil's Pit at Monte Venere, the only Latial volcanic cave... *IN ABSENTIA*
D) Marino Antonio - Secondary mineralizations at Grotta del Fumo	**M) Jònsson S. et al.** - 2nd Speleological expedition to Surtsey	**V) Halliday William R.** - Conduit flow of water in volcanic pseudokarsts	**AD) Puglisi G., Santi G.** - Studies on volcanic caves during the past centuries		**AL) Middleton Gregory** - Conserving the Lava Caves of Maurítius: the Caves of...	**Perna Giuliano** - Marine caves in basalts - **POSTER**
E) Giudice G., Privitera A. - The Grotta del Fumo-Macchia Gialla-Grotta dell'Arco system	**N) Kempe Stephan et al.** - Geology of the Huehue Tube (eruption 1801) and the Puhia Pele channel...	**W) Honda Tsutomu** - Investigation on Hydrodynamic interaction between tree and lava...	**AE) Santi Giancarlo** - Etna caves and XVIII century visitors		**AM) Wood Christopher** - A rationale for the protection of volcanic caves	**Piciocchi Alfonso** - Volcanic Caves of Vesuvius - *IN ABSENTIA*
F) Leotta A., Liuzzo M. - Fracture caves on Mt. Etna	**O) Jònsson S. et al.** - Checklist and distribution of Icelandic lava caves	**X) Kempe Stephan** - Mapping lava flows by surveying lava tubes; example: Aila'au...	**AF) Politano Franco** - Artificial caves in lava flows			**Szakacs Aleksandru** - Vulcanocarst: a Romanian contribution to Speleology, *I.A.*
G) Liuzzo Marco - Study on volcanic cave concretions formed during the 1991-93 eruption of Mt. Etna	**P) Jònsson S. et al.** - New minerals from Icelandic lava caves and selected...	**Y) Kempe Stephan** - The Genesis of isolated lava caves on Hawai'i	**AG) Santi Giancarlo** - Myths and legends on Etna caves			
H) De Waele J., Muntoni A., - On some volcanic caves of Sardinia, Italy	**Q) Middleton Gregory** - Lava Caves of Grande Comore, Indian Ocean: further investigations...	**Z) Stephenson Jon** - Emplacement of tube fed lavas and tube development...				
I) Madonia P., Casamento G. - Basaltic canyons on Mt. Etna	**R) Martin Esquivel J.** - The Viento Cave. A volcanic lava tube of Canary Islands					
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SCHEDULE OF SESSION, LECTURES AND ROUND TABLE DISCUSSION

SESSION	MONDAY 13/09/99	TUESDAY 14/09/99	THURSDAY 16/09/99
morning 1	Chairman: Prof. Hubert **TRIMMEL**	Chairman: Dr. Harry **PINKERTON**	Chairman: Dr. Jan Paul **VAN DER PAS**
	Topic: Etna + Italy	Topic: New concepts in Vulcano...	Topic: Conservation
	09:00 **A**) Maugeri Roberto	09:00 **S**) Honda Tsutomu	09:00 **AJ, AJ1**) Marino Antonio
	09:25 **B**) Calvari S. + Pinkerton H.	09:25 **T**) Calvari Sonia	09:25 **AK**) Halliday William R.
	09:50 **C**) Corsaro Rosanna	09:50 **U**) Coltelli Mauro.	09:50 **AL**) Middleton Gregory J.
	10:15 **D**) Marino Antonio	10:15 **V**) Halliday William R.	10:15 **AM**) Wood Christopher
10:40 / 11:10	COFFEE BREAK		
morning 2	Chairman: Prof. Hubert **TRIMMEL**	Chairman: Dr. Harry **PINKERTON**	Chairman: Dr. Jan Paul **VAN DER PAS**
	Topic: Etna + Italy	Topic: New concepts in Vulcano...	11:10 Müller's slides on Mt. Etna
	11:10 **E**) Giudice Gaetano	11:10 **W**) Honda Tsutomu	from 11:30 - General Assembly of the Commission on Volcanic Caves of the IUS, under Chairman Van Der Pas' direction. Debate, Motions, Conclusion
	11:35 **F**) Leotta Angelo	11:35 **X**) Kempe Stephan	
	12:00 **G**) Liuzzo Marco	12:00 **Y**) Kempe Stephan	
	12:20 **H**) De Waele Jo	12:20 **R**) Martìn Esquivel José	
	12:35 **I**) Madonia Paolo	12:50 / 13:00 - Time left for discussion	
13:00 / 15:00	BREAK		
afternoon 1	Chairman: Dr. William R. **HALLIDAY**	Chairman: Prof. Renato **CRISTOFOLINI**	ROUND TABLE DISCUSSION ON SPELEOLOGY AND ENVIRONMENTAL CONSERVATION IN VOLCANIC PARKS
	Topic: Vulcanospeleology in the World	Topic: History, Archæology, Artificial caves	
	15:00 **J**) Forti Paolo	15:00 **AA**) Patti Andrea	Chairman: Paolo **FORTI**
	15:25 **K**) Gaàl Ludovit	15:25 **AB**) Santonocito Fabio	**Official speakers:**
	15:50 **L**) Honda Tsutomu	15:50 **AC**) Privitera Francesco	Francesco **VINCI** (Etna Park)
	16:15 **M**) Jònsson Sveinn Sigurður	16:15 **AD**) Puglisi Giuseppe	Nicola **BARONE** (Centro Speleo. Etneo)
16:40 / 17:00	COFFEE BREAK		Alfonso **PICIOCCHI** (Vesuvius Park)
afternoon 2	Chairman: Dr. William R. **HALLIDAY**	Chairman: Prof. Renato **CRISTOFOLINI**	William R. **HALLIDAY** (Hon.Ch.Comm.IUS))
	Topic: Vulcanospeleology in the World	Topic: History, Archæology, Artificial caves	Christopher **WOOD** (Conservation Teacher)
	17:00 **N**) Kempe Stephan	17:00 **AE**) Santi Giancarlo	Time per Speaker: 20 minutes
	17:25 **O**) Jònsson Sveinn Sigurður	17:25 **AF**) Politano Franco	Time per debater: 10 minutes
	17:40 **P**) Jònsson Sveinn Sigurður	17:50 **AG**) Santi Giancarlo	Debate, Conclusion
	18:00 **Q**) Middleton Gregory J.	Topic: Biology in volcanic caves	
	18:25 **Z**) Stephenson Jon	18:15 **AH**) Caruso Domenico (*)	Starting time 15:30 - Expected end 19:00
		18:40 **AI**) To be designated	

(*) Paper lectured by GRASSO Rosario, on behalf of Domenico CARUSO

Paper A

TOP TEN CAVES ON MT. ETNA. CADASTRIAL FILES

Renato Bonaccorso, Roberto Maugeri

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Abstract

This paper describes the cadastrial data of ten of the most interesting caves on Mt. Etna. They were chosen on the basis of size, shape, geological features, archaeological findings or other peculiar characteristics. Some of them display more than one single interesting feature, like Grotta del Santo, that was chosen for it's labyrinthical shape but is important for the archaeological findings too, or Profondo Nero, that is the longest volcanic cave in Mt. Etna, though it is a remarkable fissure cave as well. Grotta del Lago hosts a water deposit that freezes in winter. Only Grotta del Gelo, among more than 250 explored caves on Mt. Etna, hosts another liquid water deposit, whereas snow deposits are more common. Grotta dei Tre Livelli is the longest lava tube on Mt. Etna and has the bigger difference in level between the top and the bottom of the gallery. Grotta Catanese I is not very long, though a segment of same is the largest lava tube among etnean caves. Grotta Petralia is perhaps one of the most important archaeological cave sites and also the longest lava tube near the sea level. Grotta dei Ladri, that was used as a snow deposit during the summer, is an example of commercial exploitation of a volcanic cave. For this reason it was also modified in order to achieve a better use. Grotta degli Archi is one of the best example of a lava tube starting from the base of a crater. It is also a partially covered lava channel, associated with a lava tube that lies underneath, whereas Grotta di Serracozzo is one of the best examples of cave starting from a eruptive fissure. Grotta Cutrona had a very Interesting secondary mineral deposit with some very rare minerals, that were formed during the cooling of the cave after its formation. However these minerals were destroyed when the cave cooled and the rainwater entered inside.

Further interesting caves were excluded, because other papers give a better description of their features.

Paper B

FORMATION OF A COMPLEX TUBE NETWORK: THE 1999 ETNA ERUPTION

Sonia Calvari [*], *Marco Neri* [**] *and Harry Pinkerton* [***]

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Abstract

The 1999 Etna eruption began on the 4th February, and is still going on as of August 26, 1999. The eruption started with strombolian activity at the South-East Cone (SEC), and with the opening of a fissure on the southeastern flank of this cone. Lava discharged from the lower part of the fissure flowing E and SE towards the Valle del Bove (VDB). The 35-65° slope of the western VDB wall decreased the advance rates of the lava flows. Flow fronts into the VDB propagated until the 10th March, when they attained 1970 m asl and the maximum length of 2.8 km.

The resulting lava flow field can be subdivided into two parts: the upper flow field, from the base of the SEC to the VDB rim, and the lower flow field, beyond this margin. The emplacement of the lava flow field during the 1999 eruption can be subdivided into at least five phases on the basis of the observed morphological changes.

The first phase was between February 4 and March 10, 1999, and was essentially characterised by lengthening of the lava flow field. During this phase there were few ephemeral vents in the upper and middle flow field, and tube systems developed along arterial aa lava flows.

The second phase lasted between March 11 and April 15, causing widening and little thickening of the flow field. Flows were active both on the upper and lower flow field. Flow fronts in the lower part widened, and the entire flow thickened through overflows. Many ephemeral vents formed in the upper and lower flow field.

During the third phase, which lasted between April 16 and May 15, the active lava flows were confined to the Valle del Bove, causing a considerable increase in thickness of the lower flow field. Lava tubes remained apparently stable without increasing in length.

This trend was interrupted by the start of the fourth phase, between May 16 and June 6, when activity resumed on the upper flow field through new breakouts along the chain of hornitos. Thickening of the upper flow field and lower flow field was marked by formation of many tumuli both on the upper flow field and along the western wall of the Valle del Bove. Due to a decrease in effusion rate, previous tubes have been deactivated and new, smaller tubes formed at an upper level into the flow field giving a stacked tube system.

A probable decrease in the effusion rate produced the start of the fifth phase, from June 7 onwards. Flows and vents beyond the western wall of the Valle del Bove disappeared completely. Only the upper flow field was active, producing many new tumuli, which increased the thickness of the upper flow field. Effusion rate decreased from previous 3-5 m^3/s to 0.07 m^3/s.

Paper C

FEATURES OF ETNA LAVA STALACTITES

Rosanna Corsaro, Sonia Calvari, Massimo Pompilio

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Abstract

Lava stalactites are one of the most spectacular features observed into lava tubes. While some stalactites form from mineral precipitates at the end of eruptions (1), the majority form in response to thermal and mechanical processes during flow and subsequent drainage. Stalactites on Etna have shapes and sizes that differ significantly from some of their Hawaiian counterparfs. For example, the delicate, worm-like structures found on the roofs of lava tubes on Hawaii (2) have not been observed on Etna.

On Etna, Calvari and Pinkerton (3) have distinguished four kinds of stalactites, of which there are excellent examples on the walls and roof of the Tre Livelli and Cassone tubes. Stalactites with very smooth surfaces form on ridges that are elongated in the flow direction. These stalactites are typically red in colour, and they are considered to form by remelting by gases accumulating below the roof (2, 3, 4). On Etna they are typically up to a few centimetres long and at most 2 cm wide at the base, and they are conical in shape. Another type is rough, grey in colour and spiky, and it is usually found in constrictions of the tube. This second group of stalactites was also recognised by Jaggar (2). They are generally less than 0.5 cm wide, a few centimetres long, and they are considered to have formed where lava completely filled a tube and then drained, either partially or completely. The resulting stalactites record the dribbling of lava from the roof. The spiny nature of these stalactites is due to the presence of crystals (mainly plagioclase) and small amount of interstitial glass. The third group of stalactites are morphologically similar, and they form when parf of the roof or wall lining drops or rolls off, leaving rough 'pull-apart' stalactites. The final type of stalactite, which is not very common, is characterised by bulbous shapes. Thin sections reveal that they are composed of multiple layers with an external boundary marked by a very thin film of oxides. We interpreted these as stalactites that have been repeatedly coated by lava. Here we present some measurements performed on three different kinds of lava stalactites sampled inside the Tre Livelli Tube which formed during the 1792-1793 Etna eruption.

References

1 - Giudice G. and Leotta A., 1995. Le alchimie di un vulcano: la Grotta Cutrona. Speleologia 33, 14-20.

2 - Jaggar T. A., 1931. Lava stalactites, stalagmites, toes, and "squeeze-ups". The Volcano Letter 345, 1-3.

3 - Calvari S. and Pinkerton H., 1999. Lava tube morphology on Etna and evidence for lava flow emplacement mechanisms. Jour. Volc. Geoth. Res., 90, 263-280.

4 - Kauahikaua J. et al., 1998. Observations on basaltic lava streams in tubes from Kilauea Volcano, Hawai'i. Jour. Geoph. Res., 103, 27303-27324.

LE MINERALIZZAZIONI SECONDARIE NELLA GROTTA DEL FUMO (eruzione del 1991-93)

Antonio Marino

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Riassunto

La Grotta del Fumo, parte iniziale della colata lavica dell'eruzione etnea del 1991-93, a distanza di oltre sei anni dalla fine del fenomeno vulcanico mantiene ancora, nella sua parte a monte del pozzo d'ingresso, una temperatura superiore ai 40 °C e una continua emissione di vapore che scorre nella parte alta della galleria, mentre si mantiene una temperatura e umidità più bassa in prossimità del pavimento. In questo ambiente, nella parte che lo precede e nella galleria di scorrimento a valle dell'ingresso, dove invece la temperatura interna è già ai valori medi annuali esterni (± 5 °C), si trovano ancora mineralizzazioni saline secondarie, caratteristiche della fase terminale dell'eruzione.

Sono stati analizzati tre campioni prelevati: il primo nella zolla della galleria fumosa, il secondo nel tratto di galleria precedente e il terzo nella galleria a valle, immediatmnente sotto l'ingresso. È stata riscontrata la presenza dei minerali che si trovano normalmente in questi ambienti post eruttivi cioè Thenardite, Halite e Gesso. Tuttavia nel primo campione è stata accertata anche la presenza di minuscoli cristalli di Celestina (30-40 μ) associati ad Halite che fino ad ora non erano stati trovati in altri depositi. Se si avrà la possibilità di studiare più a fondo questi depositi forse si potranno ottenere altre informazioni sulla composizione delle emissioni gassose che ancora oggi continuano a fuoriuscire dalla frattura eruttiva.

Paper E

THE GROTTA DEL FUMO - MACCHIA GIALLA - GROTTA DELL'ARCO SYSTEM

Gaetano Giudice, Angela Privitera

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Summary

This paper describes the exploration of the galleries located in the upper part of the 1991-93 eruption. Three caves were discovered in 1994, along the main feeding channel of the lava flow, the Grotta del Fumo (2375 m asl), the Macchia Gialla (2275 m asl) and the Grotta dell'Arco (2220 m asl). Nevertheless the lava tube was entered through the shaft of Macchia Gialla only in the spring of 1995, because of the previously ascertained high values of Rh and temperature. The Grotta del Fumo was partially explored later on. Salt depositions were observed on the floor, and a regular steam flow of about 330°K on the roof, that restrained further explorations. Grotta dell'Arco was the last explored cave, though a shaft in the lower part could not be descended because temperature and Rh were still too high. The three caves were joined already in 1995, after some digging, though the bottom of the system was reached only in the spring of 1997, by descending the shaft and finding the final room, totally closed, with more than 303°K and 100% Rh. The upper limit of the system was surpassed more recently, in summer 1999, in the Grotta del Fumo. The zone connecting the lava tube with the eruptive fracture was almost surely reached, and the first part of the fracture itself was also descended for a few metres. During the last recognition, the persistence of the steam flow was observed, as well as an increase in salt deposition. These field evidences lead us to attempt a first hypothesis on the dynamics of the phenomena, considering that the eruption ran off more than 6 years ago.

Riassunto

Questo lavoro descrive le esplorazioni effettuate all'interno delle gallerie formatesi nella zona sommitale dell'eruzione del 1991-93. Sono state scoperte nel 1994 tre grotte nel canale principale di scorrimento, la Grotta del Fumo (2375 m slm), la Macchia Gialla (2275 m slm) e la Grotta dell'Arco (2220 m slm), ma solo nella primavera del 1995 è stato possibile accedere alla galleria di scorrimento lavico dal pozzo della Macchia Gialla, a causa delle alte temperature e dei vapori presenti in gran quantità fino a quel momento. In seguito è stato possibile esplorare in parte anche la Grotta del Fumo, dove si è osservata la presenza di depositi salini sul pavimento e di un regolare flusso vaporoso sul soffitto della cavità., che ha impedito la prosecuzione verso monte a causa della sua elevata temperatura (circa 330°K). Infine è stata esplorata, sempre parzialmente, la Grotta dell'Arco, ancora invasa nella parte a valle da vapori caldi, ma percorsa fino ad un dislivello in cui le condizioni ambientali diventavano proibitive. Dei brevi lavori di scavo hanno permesso di collegare fra loro le cavità già nel 1995, ma il fondo del sistema è stato raggiunto solo nella primavera del 1997, dopo il superamento di un pozzo ancora saturo di vapore ad oltre 303°K. Più recentemente, nell'estate del 1999, è stato oltrepassato il limite superiore dell'esplorazione alla Grotta del Fumo, raggiungendo probabilmente la zona di innesto della galleria di scorrimento con la frattura eruttiva e addirittura effettuando una rapida discesa nei primi metri della stessa frattura. Avendo osservato durante questa ultima ricognizione sia la persistenza del flusso vaporoso, che l'incremento dei depositi salini ad oltre 6 anni dalla fine dell'eruzione, viene tentata una prima ipotesi sulla dinamica del fenomeno.

Paper F

FRACTURE CAVES ON MT. ETNA

Angelo Leotta, Marco Liuzzo

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Summary

This paper reports the results of the explorations implemented by Centro Speleologico Etneo in fracture caves on Mt. Etna, during the last decade. The specific morphologies of each cave were compared with the homologues of other explored caves, and analogies were ascertained both in shapes and sizes. Further comparisons were also carried between fracture caves and relevant contained speleothems, on one hand, and the specific features of the flows originated by such fractures, on the other hand.

The eruptive fractures on the northwestern flank of Etna were also analysed, in the light of the structural regional trends and of the resulting flow typologies.

Riassunto

In questo lavoro sono presentati i risultati delle esplorazioni realizzate dal Centro Speleologico Etneo nelle grotte in frattura, negli ultimi dieci anni. Le morfologie tipiche di ciascuna grotta sono state correlate con quelle omologhe delle altre cavità esplorate, riscontrando tra esse analogie sia nelle forme sia nelle dimensioni. Sono state altresì confrontate le geometrie delle grotte in frattura e degli speleotemi in esse presenti, con le caratteristiche delle colate che da loro hanno tratto origine.

Sono state analizzate, infine, le fratture eruttive del versante nordoccidentale del complesso etneo, sulla base dei trend strutturali regionali e delle tipologie delle colate.

Paper G

STUDY ON VOLCANIC CAVE CONCRETIONS FORMED DURING THE 1991-1993 ERUPTION OF MOUNT ETNA

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Abstract

The 1991-1993 eruption on Mtr Etna formed a number of lava tube caves throughout the whole flow lenght. These caves were explored by Centro Speleologico Etneo members, as well as the inner temperatwe lowered enough for allowing them to enter the tube. The first investigated cave was "Grotta Cutrona", in which lots of mineral concretions were found, some of them observed for the first time - in the world (Forti et al., 1994).

After that, two further caves were investigated, in order to find different type of concretions and to better understand the genetic processes that originated the mineralisations. Samples were analysed by X-Ray power diffraction and IR spectroscopy. The concretions considered in this paper are mainly constituted by Halite, according to previous studies. The impressive concretion development in ule 1991-1993 lava-flow caves could be due to pneumatolitic phenomena inside the lava-flow, connected to rootless fumaroles.

Riassunto

La colata lavica del 1991-1993 sul M. Etna ha dato origine a numerose grotte di scorrimento in tutta ta sua lunghezza, che sono state esplorate dagli speleologi del Centro Speleologico Etneo non appena le condizioni termiche ne hanno consentito l'accesso al loro interno. La prima grotta ispezionata è stata la Grotta Cutrona nella quale sono state riconosciute concrezioni di diversi minerali alcuni dei quali per la prima volta al mondo segnalati (Forti et al., 1994); ciò ha dato impulso alla ricerca, in altre due grotte della stessa colata, di eventuali concrezioni in esse esistenti al fine di campionare diffusamente le specie mineralogiche ed ipotizzare i processi genetici che ne sono all'origine. L'analisi delle concrezioni è stata condotta in due diversi modi: con il consueto metodo delle polveri tramite diffrattometria ai Raggi X, e con il metodo della spettroscopia Infrarossa. Le concrezioni rilevate sono costituite in netta prevalenza da Halite, in accordo con studi precedenti. Per quanto concerne le manifestazioni di imponente concrezionamento nei tunnel lavici della colata del 1991-1993, si ritiene che siano strettamente connesse ai fenomeni pneumatolitici che agiscono all'interno delle stesse lave, cioè legate alle fumarole prive di radice.

Paper H

ON SOME VOLCANIC CAVES OF SARDINIA (ITALY)

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Abstract

Volcanic Tertiary activity in Sardinia has started in the South about 60 Ma ago, but the most important volcanic period goes from 32 Ma to 13 Ma, and is related to the Oligo-Miocene rifting of the Sardinian-Corsican microplate. From 13 Ma to about 5,5 Ma no important volcanic events occur, but due to the opening of the Southern Thyrrenian Sea, a new volcanic cycle starts (5,5-0,1 Ma), with the formation of the so-called "Giare", basaltic highflats, and of the Campidano Graben.

More than 50 volcanic caves are known on the island, mostly of secondary origin, but some of these are of rheogenetic and pneumatogenetic origin.

In this article the Authors present the geological study of the most important primary lava caves of Sardinia. These caves, because of their origin and of their rarity, represent one of the less known speleological particularities of the island, and therefore these should be appropriately protected.

Riassunto

Negli ultimi anni tutto il complesso vulcanico terziario è stato oggetto di studio approfondito, con la determinazione delle età assolute, del paleomagnetismo, della stratigrafia e della petrografia; il compito di questo lavoro è quello far conoscere le grotte vulcaniche della Sardegna, cercando di dare alcune nozioni di base sulla loro morfologia, formazione e evoluzione.

In Sardegna, infatti, non è frequente incontrare cavità in rocce differenti da quelle carbonatiche; benché una cinquantina di cavità rilevate (ma poco studiate) si impostino in rocce vulcaniche, la quasi totalità di queste è generata esclusivamente da fenomeni erosivi meccanici e chimici apportati dagli agenti esogeni alle rocce cristalline o semplicemente dall'azione della tettonica, specialmente quella plio-pleistocenica, che si è manifestata tramite l'apertura di frequenti diaclasi negli espandimenti basaltici.

In questo lavoro vengono descritte alcune cavità che hanno avuto origine da fenomeni vulcanici, che spesso presentano caratteristiche molto importanti e singolari.

Paper I

THE BASALTIC CANYONS OF MOUNT ETNA

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Abstract

Present work deals with the description of the two basaltic canyons of Alcantara river and Simeto river, respectively located NE and W the Mount Etna Volcano.

The author describe the main hydrological, geological, morphological and naturalistic features of the canyons; a final section is specifically dedicated to water pollution and environmental protection problems.

The discussion of the above mentioned themes highlights two important conclusions:

1. The morphology of the Simeto canyon is very similar to other karst canyons of Sicily (Pollina river or Faguara creek, in the Madonie Mounts);
2. Water pollution of the Alcantara and Simeto rivers is very dramatic and absolutely incompatible with the presence of two natural reserves that theoretically should protect these two areas

Riassunto

Il presente lavoro concerne la descrizione delle due gole basaltiche dei Fiumi Alcantara e Simeto, ubicate rispettivamente a NE ed W del Monte Etna.

Vengono descritte le principali caratteristiche idrologiche, geologiche, morfologiche e naturalistiche delle due gole, mentre una sezione finale è dedicata ai problemi di inquinamento delle acque ed ai problemi di protezione ambientale.

La discussione sui temi prima indicati ha permesso di trare due fondamentali conclusioni:

1. La morfologia della Gola del F.Simeto mostra grosse somiglianze con altre gole di origine carsica presenti in Sicilia;
2. L'inquinamento delle acque dei due fiumi Alcantara e Simeto ha raggiunto livelli assolutamente incompatibili con la presenza delle due riserve che teoricamente dovrebbero proteggere queste aree.

MINEROGENESIS IN SOME VOLCANIC CAVES OF KENYA

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Abstract

Kenya is one of the few countries in which karst cavities are scarce with respect to volcanic ones, which are widespread throughout the whole country. The great variability in lava composition allowed the evolution of very different cavities, some of which are amongst the largest lava tubes of the world.

As normal for such a kind of caves, the hosted speleothems and cave minerals are scarce but important from the minerogenetc point of view. Anyway up to present no specific mineralogical research have been carried out therein.

During the 8th International Symposium on Vulcanospeleology, held in Nairobi in February 1998, some of the most important volcanic caves of Kenya have been visited and their speleothems and/or chemical deposits sampled: most of them were related to thick guano deposits once present inside these cavities.

Speleothems mainly consisted of opal while the deposits related to guano often resulted an admixture of sulphates and phospates.

The analyses confirmed the great variability in the minerogenetic mechanisms active inside thevolcanic caves, which consequently allow the evolution of several different minerals even if the total amount of chemical deposits is scarce.

The achieved results are compared with the available random data from previous literature in order to allow an updated overview on the secondary cave minerals of Kenya.

Paper K

SYNGENETIC VOLCANIC CAVES IN THE WEST CARPATHIANS

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Summary

Northern and western part of the Carpathians arch, known as Western Carpathians, extends in the territories of Slovakia, southern Poland, Northern Hungary and the eastern part of Czech Republic. That is a result of the Alpine orogene cycle. Therefore its main building elements are the sediments of Tethys geosyncline. The older rocks, mainly crystallic and magmatic ones, occure in inferior in core mountains and residue of denudation.

After orogenesis was activised deep faults in the backside part and in consequence was a volcanism in Tertiary and Quaternary. In Miocene the andesite and rhyolite prevails in Middle Slovakia and Northern Hungary, while in Pliocene and Pleistocene has the volcanism a basical character with basalts in Southem (rarely in Middle) Slovakia and Northem Hungary.

Although the syngenetic volcanic caves are adduced also in andesite (e.g. caves Kamori-ròkalyuk, Vidroczki-barlang and others from Northem Hungary - ESZTERHAS in ESZTERHAS - GAAL - TULUCAN, 1996), its syngenetic origin is not proven explicitly, because its primary features are wiped out by weathering processes.

On the other hand young volcanic structures of pliocene-quatemary basalts are sufficiently well-preserved for existence of syngenetic volcanic caves in them and its microforms. These caves in morphogenetical point of view we can dissect to 2 goup: a. exhalation chimneys, b. exhalation caves.

Exhalation chimneys

They are known from twolocalities: from scoria-cone of Ragac in Cerova vrchovina (Southern Slovakia) and

from diatrema of Kis-kò (Northem Hungary). They were formed by exhalations of volcanic gases and vapours in basalt volcanoclastics (agglomerates, ignimbrites) during volcanic extrusions or little after them. Fumarolas was probably high temperature (100-900 °C). From ascending vapours sometimes were sublimated various minerals, the most often sulphur. Evidence of this is a sulphur precipitated along the wall of the chimney with the depth of 5 m (its name is Ragacska studna). In this locality occures also the other chimney Ragacsky komin with two entrances with the lenght of 6,2 m (GAAL - ESZTERHAS, 1990).

Unicatelly is preserved the exhalation chasm Kis-kOi-bazaltbarlang in the diatrema of Kis-kO in Northern Hungary near Salgotarjanr In the wa11 of chasm with the dedth of 15,6 m occure traces of lava flows, lava coatings andlava stalactites (SZENTES. 1971, OZORAY 1960). The chasm, extended to the depth, is accesible through artificial tunnel from the year of 1910. The cave represented probably the original central ascending channel of volcanic gases and vapours in the crater.

Exhalation caves

In this group are caves with short horizontal underground corridors from which are developed vertical channels for ascending gases and vapours. There are known two caves of this tyte: Sezam in Stiavnicke vrchy (Central Slovakia) with the totallenght of 26,4 m (the depth of the vertical channel is 10 m) and Ebeczkeho jaskyna in Cerova vrchovina (Ragac hill, Southem Slovakia) with the lenght of 17 m (PILOUS, 1982, GAAL, 1996). The both caves are originated by ascending gases and vapours in Pleistocene aglutinates (ignimbrites) of basalt. The vapours and gases probably exploded near surface of volcanic cone in consequence of suddendly falling of hydrostatical tension. This might be a cause of origin of relativelly greater underground spaces with width of 2-3 m and height of corridors of 2-4 m. In the cave Ebeczkeho jaskyna are occures of crusts of calcium, sublimated from hot vapours.

Paper L

RESULTS OF SURVEY ON GANNO-ANA CAVE SYSTEM, EXAMPLE OF CO-EXISTENCE OF LAVA CAVES AND TREE MOLDS

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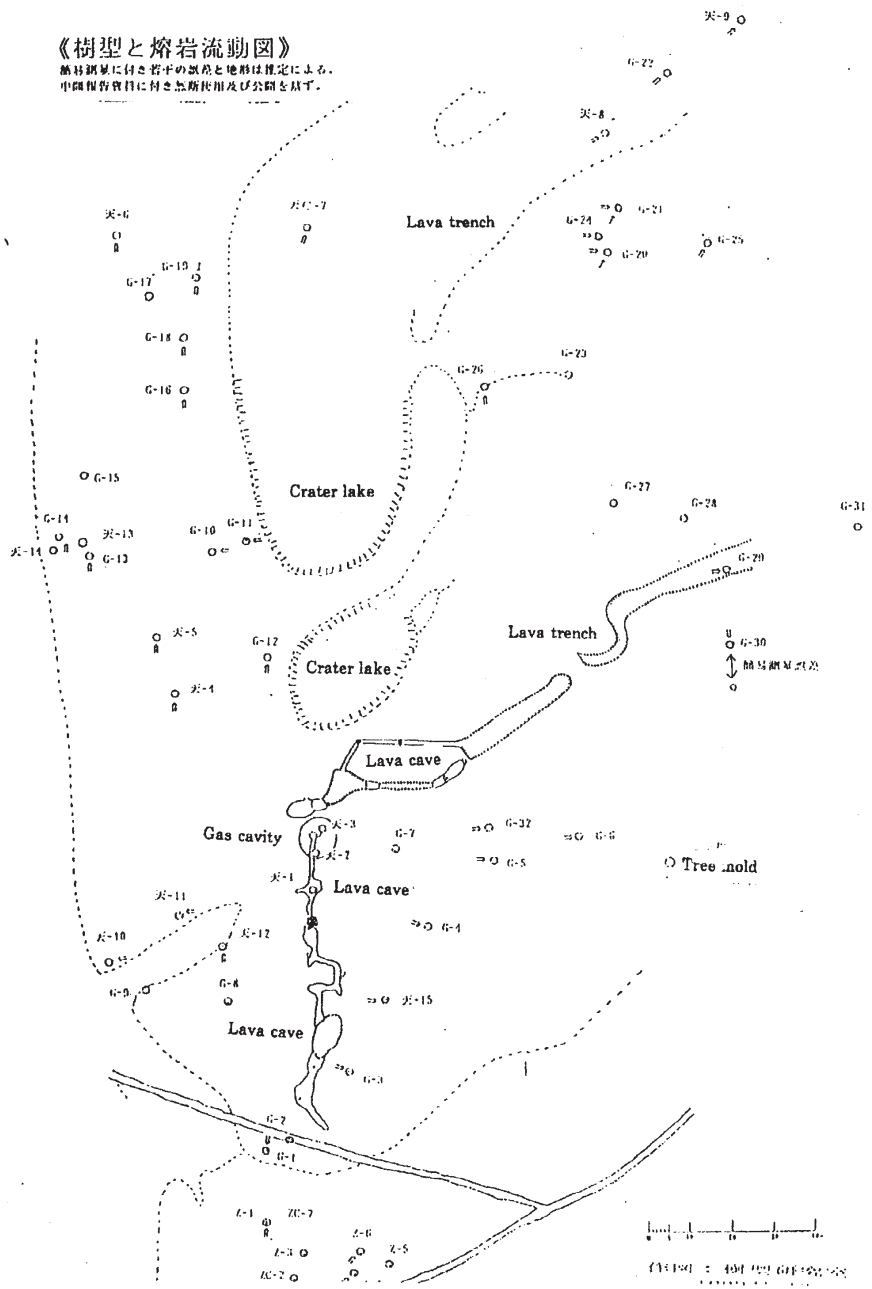
Abstract

On the northern flank of Mt.Fuji, located Ganno-ana cave area in the lava flow of Ganno-ana which is beleived empted more than 1000 years ago. In this area, a lot of lava tree molds and lava caves have been found and investigated as pioneer by Ishihara (1925-29) at first, however not with fully systematic way. Recently, Commission on vulcanospeleology of Speleological Society of Japan (Ogawa/Tachihara's group,1996-1998) have surveyed this area systematically for environment protection, and found lots of tree-molds, two crater lake and lava trench in this area, and made a map of distributions of these.

Fig.1 shows distribution of tree molds and location of crater lake, gas cavities and lava trench. Arrows indicated near tree molds are directions of lava flow iudged from tree molds stmcture which are results and

registered traces of interaction between tree and lava flow. Tree molds are indicatifs of lavaflow direction, flow speed and lavaflow thickness.

Fig.2 shows the cross section of Ganno-ana cave and adiacent area observed by topological survey. Ganno-ana cave have a continuous structure with other caves and tree molds. These tree molds and lava cave and gas cavities may be resulting from lava flow from these two crater lakes. The detail inner and outer structure of tree molds are measured and the detail investigation on formation mechanism of this cave system is under being performed.



g.1 Distribution of tree molds and location of crater lakes, gas cavities and lava trench.

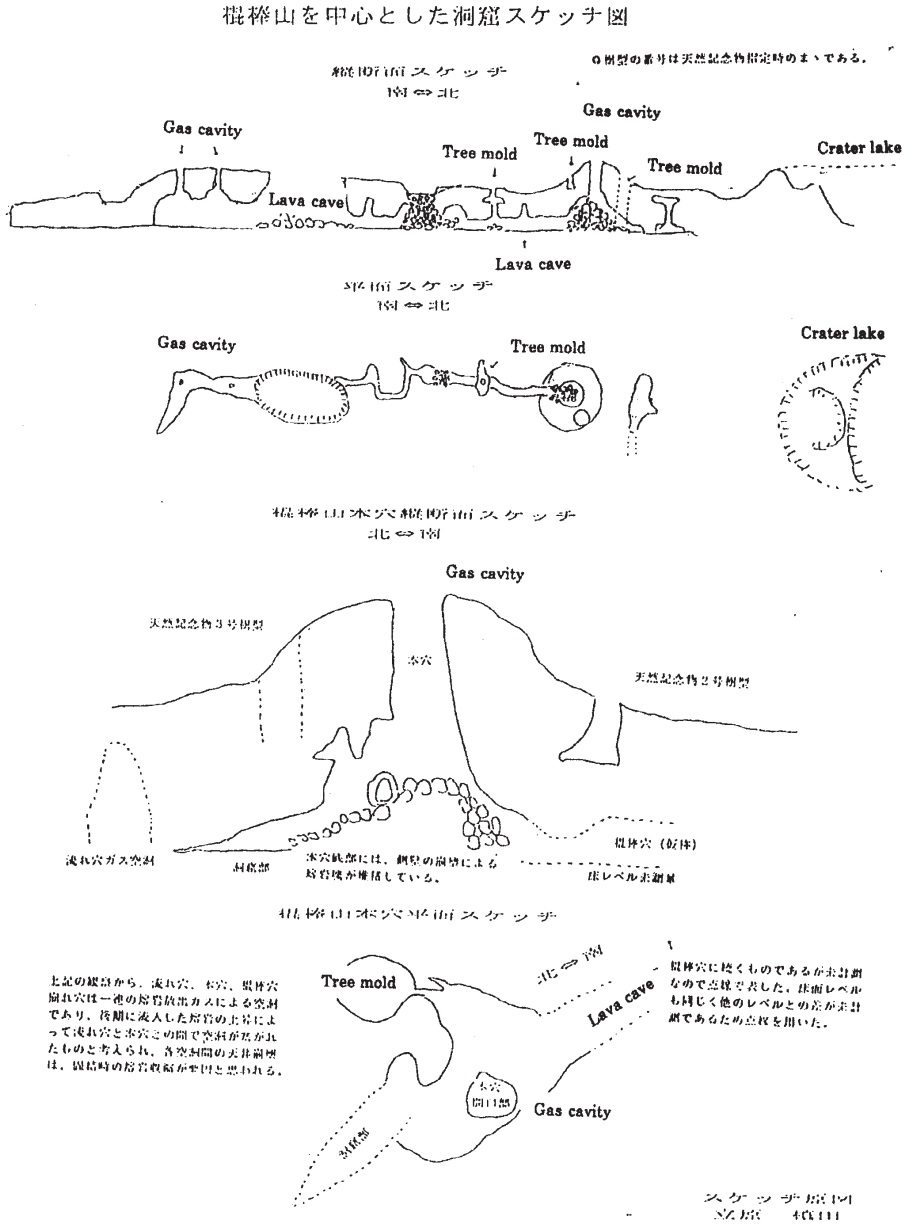


Fig.2 The cross section of Ganno-ana cave and adjacent area by topological survey

Paper M

SECOND SPELEOLOGICAL EXPEDITION TO SURTSEY

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Summary

The second ISS expedition to the volcanic island Surtsey off the South-coast of Iceland was organised in late summer 1998. Participants from the ISS were six and the expedition's planned duration was for four days.

Results of the first speleological investigations in Surtsey have been described by Jonsson & Hroarsson (1992). Seven caves were discovered of which three were surveyed and a map published of the largest cave.

Very severe weather conditions seriously inhibited the work of the second speleological expedition to Surtsey. Surveys of two caves were nearly completed but with less accuracy than could have been accomplished if conditions had allowed.

The first cave that was discovered in Surtsey, SU-01 was re-surveyed but Jonsson surveyed the cave in 1994 (unpubl.).The cave opens in to a sea cliff and by comparing the two surveys the destruction rate of the cave can be estimated. SU-01 is the only cave in Surtsey that opens out to the open sea.

One new cave was discovered inside the western crater and an unexpected connection made between the newly discovered cave and a previously known but unexplored pit, also inside the crater. A preliminary draft of the system is presented but an accurate survey awaits next expedition to Surtsey.

The underlying shaft of the hornito/crater on the northern side of the hyaloclastite crater rim was descended and explored. The shaft is 18 metres deep and ends in a semi-closed elongated eruptive fissure. The western end of the fissure is overhung by a lip of lava, sheltering the site from incoming precipitation and thus preserving an enormous quantity of mineral encrustations, some of which are water-soluble. Protruding small spiral-like crystals of mirabilite are abundant as well as crusts of gypsum with specks of fluorite and ralstonite. A preliminary draft of the volcanic conduit and fissure is presented.

Samples of mineral encrustations were collected from the largest cave, SU-03 and the cave was photographed.

Ten caves are now known in Surtsey. All have now been explored and five have been surveyed to a different level of accuracy. Further studies are needed to complete the investigations

Paper N

GEOLOGY OF THE HUEHUE TUBE (ERUPTION 1801) AND THE PUHIA PELE CHANNEL SYSTEM, HUALALAI, HAWAII

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Abstract

Historic records suggest that the Hualalai, the only active volcano in its terminal alkali basalt phase on Hawaii, erupted last in 1801. The precise boundary of this flow, the Huehue flow, was previously confused with another flow similar in age, the Puhia Pele Flow. The flows can now be separated because an extensive tube system, with a length of 10.8 km in total, has been mapped in the Huehue Flow in the past few years by teams of the Hawaii Speleological Survey (Medville and coworkers and Kempe and coworkers).

The tube shows that the 1801 lava issued from an inconspicuous vent at an altitude of ca. 540 m a.s.l. and continued all the way to the sea, keeping to the south of the earlier Puhia Pele flow and partly covering it. The tube covers an altitude difference of 495 m and ends in a lava seal at ca. 30 m a.s.l. The main passage has a length of 6.17 km end-to-end and a sinuosity of 1.2. The Huehue Tube has 29 pukas (collapse holes), part of those already formed when the cave was still active (hot pukas). These allowed ventilation through the incising tube, causing the freezing of extensive secondary ceilings in the upper part of the tube. Puka 17 served as a rootless vent, issuing hot pahoehoe lava to the surface, straddling the Puhia Pele Flow, thereby confusing the surface picture further. In fact the upslope boundary of the smooth Puka 17 lava, where it borders at the hummocky main flow lava, was thought to mark the end of the 1801 flow originally.

Contemporary with the Huehue flow, i.e. active at the same time, was a second small vent, within 50 m of the point where the Huehue tube starts. This vent (possibly a rootless vent above a tube parallel to the Huehue tube) forms a small shield-like dome from which hot pahoehoe lava issued. This lava, termed Mystery lava, covers the upper part of the Huehue lava and interacted in various ways with the lava flowing below in the tube. The Mystery lava gradually changed downslope into prominent aa flows, which, in part, form the roof of the Huehue tube. Two small scale cave systems have been mapped in the mystery flow, Zoe's Puka, 428 m long, and Puka 4 Cave, 292 m long, both caves are rather narrow and not very mature.

Below the Huehue/Mystery lava lies the Puhia Pele Flow. It is very different from the Huehue Flow, having a much higher gas content. This led to the buildup of a spectacular series of spatter cones and spatter ramparts at an altitude of 499 m a.s.l.. At least three of the vents are still open to a depth of over 100 m (ongoing exploration by J. Rosenfeld). Below of the spatter ramparts a spacious tube system started, the beginning of which is now collapsed into a trench. The lower part forms an about 400 m long cave, interrupted by several pukas, before it issued into an open trench. At this point the channel is filled with Mystery aa, obliterating the lower end of the cave system. The entire trench System was now mapped by our group with DGPS (Differential Global Positioning System). It extends down to about 80 m a.s.l.. In this section the trench was blocked several times, leading to the formation of short caves and causing extensive overflows. Two overflow side channels to the north were established. Twice the trench was invaded by Huehue lava from the south. Below an altitude of 80 m a.s.l. a wide lava delta formed, which again featured a central tube. This tube overflowed several times issuing wide and flat lava fields. Today only those parts of the feeding system can be seen, which evolved by breakdown above the original tube. The tube itself seems to be filled entirely by ponded lava. This is especially evident in Giant Room Cave, which is essentially one large 145 m long chamber closed at both ends by lava seals. Apparently the Puhia Pele delta must have flooded the area by at least 10 to 15 m of lava. This large mass of hot lava cooled over a longer time period, allowing steam venting and causing the deposition of brown mineral deposits along prominent contraction cracks.

At places where thin Huehue lava fingers cross the center of the Puhia Pele flow, these brown mineralizations are seen also on the Huehue lava. This observation suggests that the distance in time between the two flows may not have been more than fifty years, possibly even less than ten years. Clearly the activity of the Puhia Pele Flow had terminated when the Huehue/Mystery lava erupted, but apparently there was still enough heat in the ponded lava to influence the weathering of the transgressed Huehue lava. We therefore suggest that the Puhia Pele Flow must have erupted at around 1780 AD ± 20 a. This date is consistent with archeological finds which we made in the Puhia Pele Cave, indicating that it has been used for a variety of purposes.

Paper O

CHECKLIST AND DISTRIBUTION OF ICELANDIC LAVA CAVES

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Abstract

Since the founding of the Icelandic Speleological Society in 1989, systematic collection of cave-data has been conducted by the society. The pioneer work of Hroarsson (1991) lay the foundations for that database and additions have been quite a few every year.

The island is 103.000 km^2 and the potential cave areas are confined to the neovolcanic zone from the Reykjanes peninsula in the southwest through Langjökull, and north to the Melrakkaslétta peninsula from Vatnajökull, with offshoot from the centre-line between Langjökull and Vatnajökull to the south towards the Vestmannaeyjar archipelago. The area covered with postglacial lava-flows; (younger than 10-13.000 years) is about 10.000 km^2. In the book *Hraunhellar á Íslandi* (Hroarsson, 1991) the author mentions about 150 caves. Today the total number of caves is 225. The total added length of all known lava-caves in Iceland is about 37 km. Numerous small caves are not listed, some caves on the list are "lost" and Icelandic speleologists like to think that there are many more out there to be discovered.

Since 1995 the ISS has tried to mark all the known caves, when visited, with a specially prepared plastic ribbon with pre-printed marking. The serial number of the cave to be tagged is marked on the ribbon using a waterproof felt-tip marker and hung up inside, in the dark zone of the cave.

A checklist of all known Icelandic lava caves is presented.

NEW MINERALS FROM ICELANDIC LAVA CAVES AND SELECTED SPELEOLTHEMES

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Abstract

Many Icelandic caves exhibit abundant mineral encrustations but a lot of work is still to be done in that field. The Icelandic caves are prone to a large quantity of precipitation nearly all year round and thereby water-soluble minerals vanish very quickly after they have formed. In several caves special conditions prevail like for instance in Surtsey, due to the low age of the lava flow, many unstable water-soluble minerals are still present. During the second ISS expedition to Surtsey, samples resembling *mirabilite* were collected. The mineral has very loosely bound molecular water, which is readily lost, when samples are removed from the cave environment. Due to the confirmed presence of the anhydrous sodium sulphate *thenardite*, a suspicion arose about the possible presence of *mirabilite*. A sample was carefully packed in a container with moist paper towel to preserve the humidity of the cave environment. Upon arrival from Surtsey the sample was immediately analysed with the Icelandic Energy Authority's XRD equipment, with several hours intervals. The presence of *mirabilite* was confirmed. A rate of the transformation from *mirabilite* to *thenardite* was also quantified to some extent.

In the cave Arnahellir on the Reykjanes peninsula, bright-green coatings on stalagmites were noted several years ago. Samples were taken from the cave and analysed with XRD. The results were rather surprising as it turned out to be *volborthite*, a copper-vanadate normally found in different environment. Later the presence of both copper and vanadium in the mineral was clearly confirmed using the Icelandic Technological Institute's Scanning Electron Microscope's EDS.

Icelandic lava caves display a vast array of speleothemes which Icelandic speleologists have had difficulty putting in global perspective. The caves Arnahellir and Jörundur in South Iceland are the two best examples of caves with extensive decorations, mostly stalagmites and stalactites, made from segregational liquid. Several examples of odd and unusual speleothemes are presented.

Paper Q

LAVA CAVES OF GRANDE COMORE, INDIAN OCEAN: FURTHER INVESTIGATION

Gregory J. Middleton

Abstract

The author initiated speleological investigations on Grande Comore in September 1997 when some fifteen lava cave entrances were located and, to varying degrees, explored and surveyed (Middleton 1999).

The results of this initial work encouraged a second visit in July 1998. Exploration of most known caves was completed and a number of additional caves were located and surveyed. 28 caves have been documented with a total length of over 4,000 metres. The first known roost of the endemic fruit bat, the cave-dwelling Rousettus obliviosus, was located. Efforts to reach the island of Anjouan were unsuccessful, as was a search for caves on the smaller island of Moheli.

Paper R

THE VIENTO CAVE. A VOLCANIC LAVA TUBE OF CANARY ISLANDS

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Abstract

The Viento Cave is a very long lava tube localised in Icod de los Vinos, at the North Slope of Tenerife (Canary islands, Spain). The cave is formed inside a lava flow coming from Teide mountain, probably in the last thousand years. It has important morphologic and biologic feature for conservation, and because of this the regional government is promoting its protection.

The cave is known since 17th century, when was made the first survey, but it began to be intensively studied from since the 60' decade of this present century. Especially important were the joint expeditions of local speleologists and the Shepton Mallet Caving Club, from UK. They allowed discovering several new underground galleries, until to get in total the now 22 km subterranean passages known.

Under biologic point of view, the cave is significant. It has the major concentration of troglobite species of the Canary Islands. Right now it has been found more than thirty cave-dweller, many of them have remarkable adaptations to underground life. This fauna include species belonging to several rare groups as blataria or homoptera, although the more abundant group are the coleoptera.

The Canary Government has elaborated a Management Plan to guarantee the conservation of this unique ecosystem. One of the goals of it is the declaration of the cave as Special Natural Reserve, a category of protection equivalent to the level IV of UICN. Similarly, at the surface it has been established a control system to be based in the impact assessment of any action that may transform its natural conditions. New building on the surface is forbidden and, at the same time, a sewage plan for the existence shelter is being implemented. Near the entrances it has been projected a Visitor Centre with sleeping rooms for visiting scientist. Now, the European Union is developing a conservation program of several caves of Canary Islands, were the Viento cave is the main objective.

Resumen

La Cueva del Viento es un tubo volcánico de 22 km de desarrollo subterráneo que se encuentra en la localidad de Icod de los Vinos, al norte de la Isla de Tenerife (Islas Canarias, España). La cueva se encuentra inserta en una de las coladas de lava proveniente de erupciones volcánicas del cercano Pico de Teide. Por sus características geomorfológicas y su interés biológico tiene un alto interés desde el punto de vista de su conservación, motivo por el cual en la actualidad se está procediendo a su declaración como espacio protegido por la Administración Canaria.

La cueva es conocida desde finales del siglo XVIII, cuando se hicieron los primeros levantamientos topográficos, pero es principalmente a partir de la década de los sesenta, en el presente siglo, cuando los estudios se han intensificado. Destacan en este sentido los trabajos realizados por espeleólogos canarios y del Shepton Mallet Caving Club del Reino Unido. A medida que se iban topografiando nuevas galerías se iban descubriendo conexiones y ramales antes desconocidos que han ido incrementando su desarrollo hasta los más de 22 km de la actualidad.

Desde el punto de vista biológico en la Cueva del Viento se encuentra la mayor concentración de fauna troglobia de todas las islas. Hasta la fecha se han descubierto unas treinta especies con las típicas adaptaciones a la vida subterránea, algunas pertenecientes a grupos tan raros como los blatarios o los homópteros.

Para asegurar la conservación de este ecosistema tan particular se ha elaborado un Plan de Ordenación de Recursos Naturales donde se propone el establecimiento de una Reserva Natural subterránea que permita regular los accesos a la cueva, al tiempo que en la superficie se establece un régimen de control de actuaciones basado en la elaboración de estudios de impacto sobre cualquier actuación que se quiera desarrollar. También se han propuesto varias medidas tendentes a evitar la urbanización en la superficie y a canalizar los vertidos de algunas de las casas existentes a fin de evitar la afección al subsuelo. En las inmediaciones de las entradas hay previsto igualmente la construcción de un Centro de Visitantes con posibilidad de estancia de investigadores. En la actualidad, la Unión Europea a través de sus programa de inversiones LIFE tiene en marcha un programa de conservación para diferentes cuevas de Canarias entre las que la del Viento es la más destacada.

Paper S

CLASSIFICATION OF LAVA TREE MOLDS WITH/WITHOUT REMELTED INNER SURFACE ACCORDING TO ITS FORMATION PROCESS

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Abstract

Lot of classifications of lava tree mold have been proposed by variouis investigators such as Ishihara (1929), Hamano (1993), Tanaka (1995) and Ogawa (1996) according to its features and structures. Makita (1997) made a table of comparisonn of these classifications. Recent investigation on lava tree mold of Kashiwa-bara area on the flank of Mt. Fuji pedormed by the groupe of Ogawa and Tachihara (1997) brought a lot of new

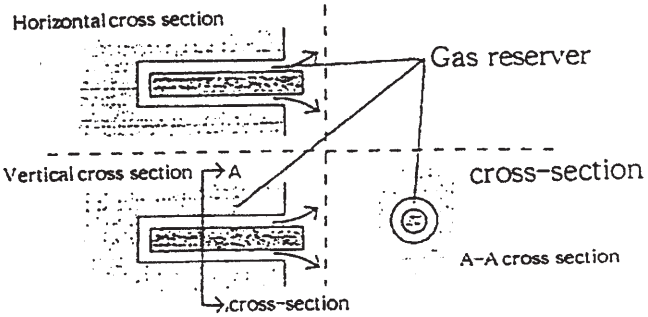
discaveries and findings on the structure and formation process of lava tree mold and remelted inner surface of hollow related to lava tree mold. Tachihara (1998) is then proposing more improved classification according to their observation, however, still based on features and structures of lava tree molds.

The author would like to propose different classification concept based on its formation process, which was presented in the previous paper (1998). The complete process of lava tree mold with remelting layer formation are 1)crut formation arround the tree, 2)destruction of crust by pressure of water vaporization in the tree, 3) hydrogen and carbon mono-oxyde production by chemical reaction between vapor and carbonised tree, 4) and again a destruction of crust boundary with atmophere, 5) and finally gas burning by mixing of oxygene in air, leading to remelting of surface of hollow.

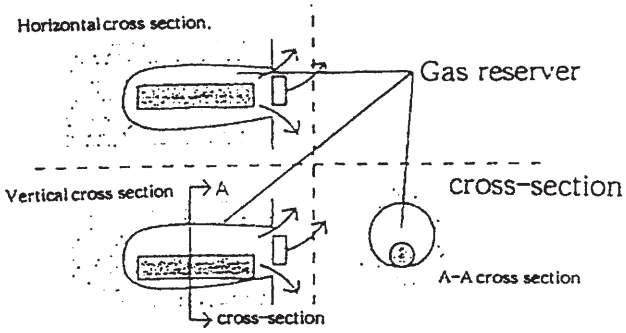
Classification of tree molds types was carried out according to this process with incomplete termination or with some parasitic phenomena as shown in Fig.1.

Further, other possible effects such as lava cave formation initiated by gazeification of living tree, etc., extraporated from this basic process were discussed .

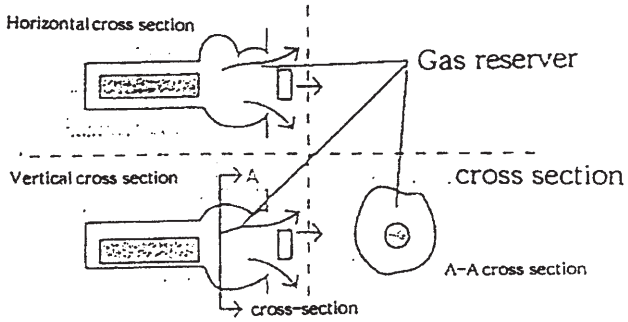
Horizontal lava tree molds



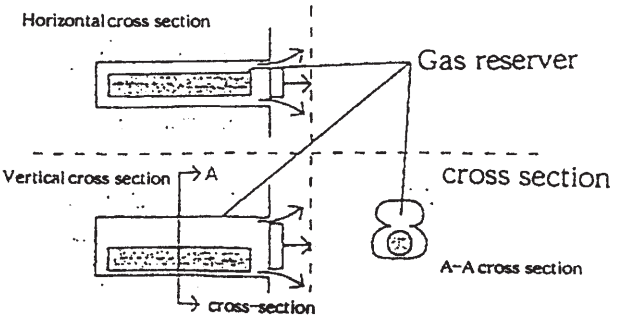
①Open to atmosphere type



②All-directional space confinement type

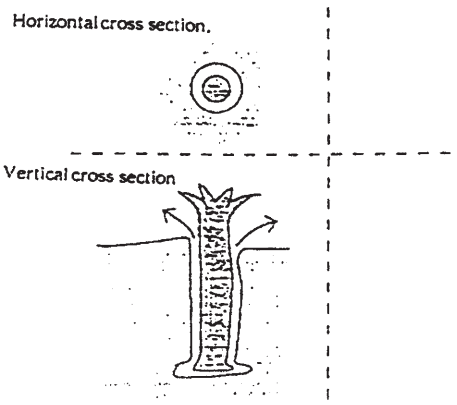


③Front space confinement type

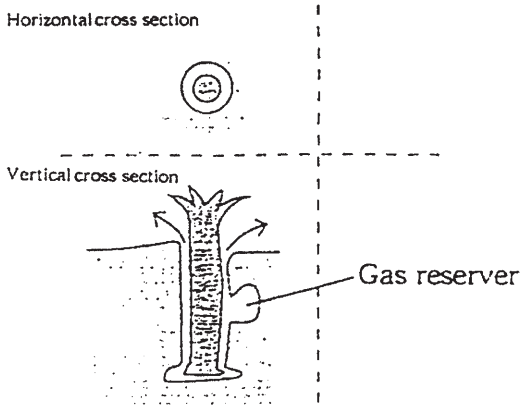


④Upper space confinement type

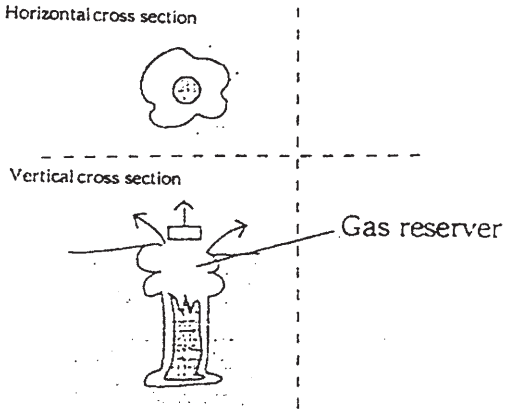
Vertical lava tree molds



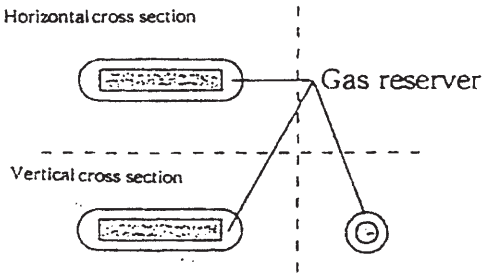
⑤ Open to atmosphere type



⑥Local space confinement type



⑦ Upper space confinement type



⑧Confinement gas diffusion type

Fig.1 Classification of lava tree molds by its formation process

Paper T

MORPHOLOGY OF ETNA LAVA TUBES : INSIGHTS FOR LAVA FLOW EMPLACEMENT MECHANISMS

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Abstract

Lave tubes play a pivotal role in the formation of many lava flow fields. A detailed examination of several compound 'a'a lava flow fields on Etna confirmed that a complex network of tubes forms at successively higher levels within the flow field, and that tubes generally advance by processes that include *flow inflation* and *tube coalescence*. *Flow inflation* is commonly followed by the formation of major, first-order ephemeral vents, which, in turn, form an arterial tube network. *Tube coalescence* occurs when lave breaks through the roof or wall of an older lava tube; this can result in the unexpected appearance of vents several kilometres downstream. A close examination of underground features allowed us to distinguish between ephemeral vent formation and tube coalescence, both of which are responsible for abrupt changes in level or flow direction of lava within tubes on Etna.

Observations of actlve 'a'a lava flows emplaced during the 1991-93 eruption suggested that inflation of the flow fronts of mature 'a'a lava flows was an important aspect of tube formation (1). This statement is confirmed by features that we observed underground. A striking feature in many etnean lava tubes is the association of large chambers with narrow passages. We interpret these features as the product of flow inflation in the frontal zone, followed by openfng of first-order ephemeral vents on the snout region. This suggests that the production of multiple flows connected by secondary vents is an essential mechanism of tube growth on Etna. This process can be observed on the surface where new, long-lived vents open at the margins of previously inactive 'a'a lava flows, and underground as multiple linings and lateral benches.

Tube coalescence is an important process during the emplacement of long-lived flows. This occurs when an upper tube drains into a previous, lower tube because of roof collapse. The re-occupation of a deeper and possibly longer tube may cause a re-activation of distal parts of the flow field, and a consequent increase in flow field length. The possibility of new flows breeking through the roofs of previously inactive tubes has important consequences in hazard assessment. Our surveys indicate that a crust thickness of 0.5 m is the minimum required for 'a'a lava flows, and we propose a simple formula to calculate roof stability for a typical etnean 'a'a lave flow.

In conclusion, our underground surveys help to confirm (1) that subterranean effusive processes play en important role in the development of 'a'a flow fields. They show how tube inflation and coalescence can result in considerable lengthening of lava flow fields beyond the distance that can be attained by channel-fed lava flows. This work has clear implications for hazard assessments during future effusive eruptions on Etna. Finally, in view of the ease with which lava can break through the roofs of lava tubes, we consider that the process of tube coalescence may be an integral part of tube development, not only on Etna, but also on other basaltic volcanoes.

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Paper U

CROSS-SECTION MEASUREMENT OF THE 1991-93 ERUPTION LAVA TUBE

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Abstract

An electromagnetic survey on Etna was performed in June 1992, to study the features of the lava tube feeding the lava flows in Valle del Bove.

Measurements were carried out along profiles established on a smoothed area above the lava tube at 2000 m a.s.l. Ground probing radar, very low frequency electromagnetic inductive and magnetometric techniques were employed. The aim of the experiment was to measure the cross sectional area of melt in lava tube. The interpretation of electromagnetic data furnishes a lava tube geometry in agreement with volcanological evidences. The model proposed was performed on the base of a "calculated" magnetization. It presents a completely demagnetized body, about 9 m^2 in cross sectional area, located at 2 m depth. The body centre coincides with the VLF cross-over and is laterally marked by two GPR diffraction points located on the buried channel upper corners, between the melt and the host rock.

The experiment result suggests that electromagnetic surveys could be useful for monitorillg the temporal evolution of lava tubes.

Paper V

CONDUIT FLOW OF WATERIN VOLCANIC PSEUDOKARSTS

William R. Halliday

Abstract non pervenuto

Paper W

INVESTIGATION ON HYDRODYNAMIC INTERACTION BETWEEN TREE AND LAVA FLOW AND RESULTING STRUCTURE OF TREE MOLD.

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Abstract

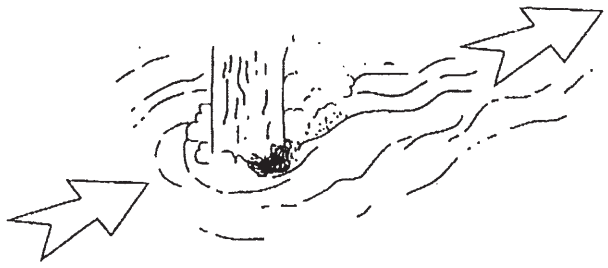
On the northem flank of Mt.Fuji, a lot of groups of lava tree molds have been found and investigated by Ogawa and Tachihara (1997,1998). Tree molds are results and registered traces of interaction between tree and lava flow.

Tree molds are resulting from hydrodynamic interaction between living standing tree and lava flow (Honda,1999) as shown in Fig.l. This phenomena are strongly depending on lava viscosity, lava flow speed, diameter of livingtree and its resistive strenght against lava flow.

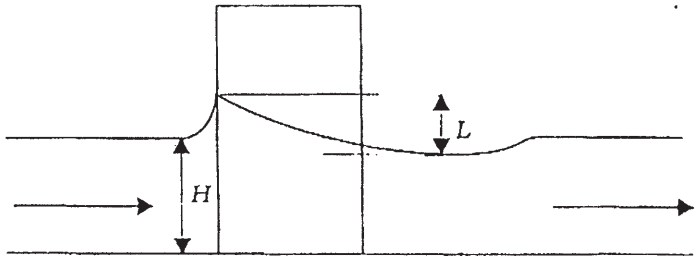
Broken tree inside of lava flow is also suffering the hydrodynamic force of lava flow its self. As lava flow has vertical velocity gradient to main flow direction, lifting force will be acting on broken tree inside of lava flow. However it depends on its mean density including crust arround the broken tree and its rotating speed as shown in Fig. 2 and Fig. 3.

The author has investigated l) Internal and external feature of tree mold depending on Re Number of lava flow, 2) the maximum diameter of standing tree resistive against lava flow by using flow resistive coefficient arround the flow of vetical column and maximum bending stress of living tree, 3) Resitivity (against lava flow) of crust arround the tree which has been burned out later, and finally 4) Magnus effect of broken tree with cmst located inside of lava flow, which lifts up the tree mold to the surface of lava flow.

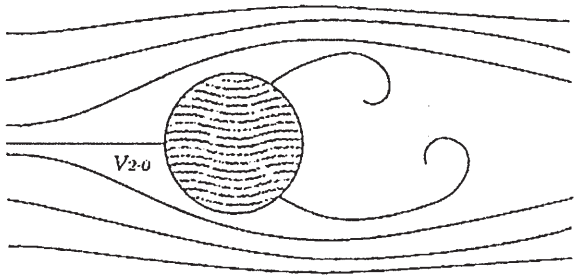
These analysis and effects were compared with the results of observations performed by Ogawa and Tachihara(1997) and these observations were found to be well explained by this interpretation and analysis of hydrodynamic interaction between lava flow and tree.



(a)



(b)



(c)

Fig.1 Flow arround the standing living tree

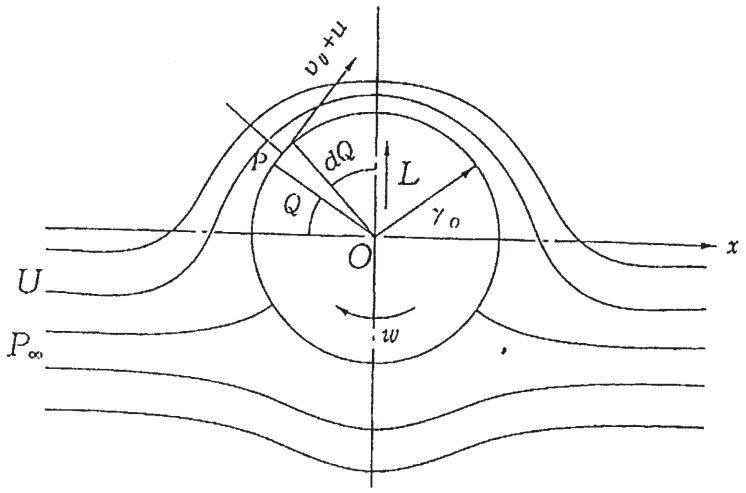


Fig.2 Lifting force acting on the rotating cylinder

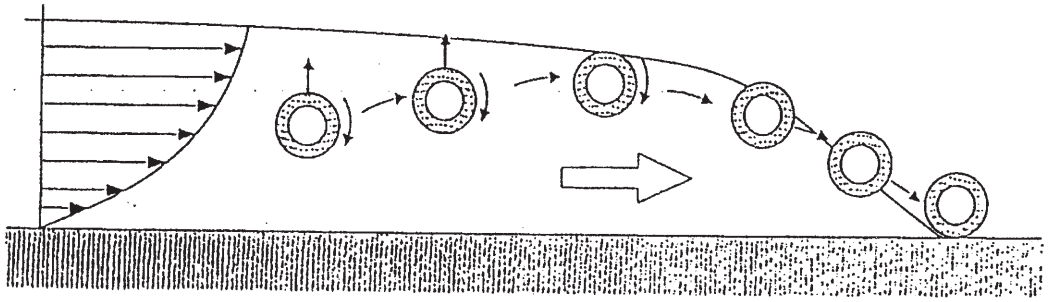


Fig.3 Lifting movement of tree mold located inside of the lava flow

Paper X

MAPPING LAVA FLOWS BY SURVEYING LAVA TUBES EXAMPLE: AILA'AU/KEAUHOU FLOWS, KILAUEA / HAWAII

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Abstract

The 500 to 350 years old Aila'au and Keauhou lava flow field of the Kilauea contains several of the longest lava caves yet explored. These are - among others - : Kazumura Cave, Pahoa Cave System, Keala Cave, Ainahou Cave System, J. Martin/Pukalani Cave System, Keauhou Trail System, Epperson's Cave (approximate ordered according to length). Of these Keala Cave (8.60 km) and the Keauhou Trail System (3.066 km in 5 caves excluding Jens' Puka which measures 0.401 km) were mapped by my students. The tubes offer a prime possibility to differentiate the lava flow fields into individual lava flows. This is an improvement compared to the first such attempt published by Holcomb, 1987, which relied entirely on aerial pictures. Much of the two flow fields are covered by intense vegetation or by grass, hiding flow boundaries from view. The trace of the tubes on the topographic maps in most parts follows a noticeable flow ridge, but not everywhere, making morphological mapping difficult. The mapping shows that clumps of trees are not only associated with the cave's pukas (collapse holes of tube roof) but also occur on top of the cave where the roots can penetrate the roof and tap the moist air below.

The geological map of the middle Aila'au Flow shows that the Keala Tube is an older branch of the flow which has been superceded by the Kazumura flow. Kazumura lava invades both the upper and the lower ends of Keala. In between of the two flows is an older kipuka (area surrounded by younger lava).

In case of the Keauhou Trail area, we were able to differentiate between three flows, one containing the Ainahou Ranch System to the west and one containing the Keauhou Trail System to the east. In between is a younger flow, superceding both Ainahou and Keauhou. It also invades the upper end of Keauhou, covering its upslope section. It is not clear which of the flows, Ainahou or Keauhou, is older. Keauhou may in fact be a discontinued branch of Ainahou. Ainahou certainly was active a longer time than Keauhou, featuring much deeper erosion and advanced development of secondary ceilings. Because the upslope area of the Keauhou flow field has been covered by later lava and by ash of the Mauna Ulu eruption, 1969, there is no chance of finding the upslope continuation of the Keauhou tube. Both Ainahou and Keauhou tubes end at the Poliokeawe Pali, a face of the lystric fault system displacing the southern shoulder of the Kilauea seaward. Ainahou ends in a portal, where the lava once issued to the open air, while the Keauhou tube is closed by collapse at the fault.

Paper Y

THE GENESIS OF ISOLATED LAVA CAVES ON HAWAII

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Abstract

The recent exploration of very long lava tubes on Hawaii has somewhat left isolated, smaller caves in the leeway of interest. Nevertheless there is much to learn from these as well. Here I present four lava caves which we have mapped on Hawaii over the past few years (Kempe, Halliday, Werner, Oberwinder). They occur somewhat isolated from others and are closed at both ends by lava seals. These are: Shield Cave, Big Room Cave, Giant Room Cave, and Kahiko Pele Cave.

Shield Cave is located in the Hawaii Volcanoes National Park (access only by permission). It is accessed through one of the right-lateral fault cracks dissecting a small, about 10 m high shield volcano belonging to the SW-Rift of Kilauea. The roof consists of a single 4 to 6 m thick lava sheet, much thicker than the lava sheets comprising normal lava tube roofs. To the east a 12*20 m wide and up to 4 m high chamber is entered. It has a solid floor with a concentric upwelling structure. Apparently this is a chamber developed above the once active vent for the shield volcano itself. To the west a semicircular, later gothic passage leaves the chamber, curving gently to the SW. At about 35 m the solid, flat floor is reached, which extends all the way to the very end of the cave where the descending ceiling touches the floor. The total length amounts to 112 m. This apparently was the lava conduit, which was fed by the vent and which was closed by ponding towards the end of the eruption.

Big Room Cave is situated at the south eastern coast of Hawaii in Kilauea E-Rift flows. Genetically the cave appears to be quite an enigma. It is entered through a central breakdown hole and essentially consists of one chamber 16 m wide, 20 m long and originally 5 m high. Upslope the cave's ceiling meets the floor, while downslope the passage becomes narrow and is blocked by breakdown. At high surf some water apparently can enter the cave, carrying fragments of marine shells into the cave. The walls are covered with a lining and where the central breakdown cone is situated the structure of the roof is exposed. The lower part is composed of lava laminae and the upper part is composed of small surface Pele's Toe type flows, apparently a later flow not directly associated with the formation of the cave. At best one can interpret this cave as a breakup cupola over a much larger tube, which at a time late in the eruption filled entirely with lava (hence the lining) which then subsided only partially, so that the original upslope continuation of the tube is blocked.

Giant Room Cave is even larger. It is situated in the lava delta of the Hualalai Puhia Pele Flow north of the Kona Airport. The cave has a length of 145 m, a width of up to 25 m and a height of up to 8 m. It is also entered through a central hole in its ceiling by rope or ladder. The floor is 11 m below the entrance and is composed of large slabs of lava, suggesting, that lava ponded to a great depth and then shrunk while cooling. At the upslope end, one can see spatter on the wall, as if lava had risen from below, bubbling up gas and throwing up spatter. Again the only explanation is, that the cave is not representing the lava conduit itself, but rather an early breakout cupola, albeit of enormous size, over the original tube, which now is inaccessibly by ponded lava. In case of Giant Room Cave other segments of the original tube-system are accessible as trenches above (Lava Curtain Trench) and below (Centashaft Trench and Cave) the cave.

Kahiko Pele Cave is another isolated section of cave. In this case no section of the same conduit is known either above or below of the cave. It is situated in the Aila'au Flow Field of the Kilauea west of the Pahoa Road. It also is entered through a central puka. It is 80 m long, forming one long hall, up to 12 m wide and 6 m high, petering out at both ends where the ceiling touches the floor. The original floor appears at both ends below breakdown and seems to be completely level, at least we could not measure a slope over the length of the cave with the handheld inclinometer. Again, the best explanation we can give for the genesis of this cave is that it is a breakdown cupola over a much deeper rooted conduit, which ponded in the final phase of the activity. Alternatively, the floor could

also be a secondary ceiling, consolidated above the lava conduit because of the opening up of the puka. However, the puka does not seem to be a hot puka, since much of the central part of the cave is covered by breakdown. Furthermore, there is a spectacular column of lava from a later flow, which invaded the cave forming a 15 m wide lava base around the 3 m wide stalagmitic column. It is conceivable, that the transgressing lava loaded the roof to a point causing the collapse of the puka. In view of this, the formation of a hot puka and the consolidation of a secondary ceiling seems unlikely.

It appears, that still much needs to be learnt about lava caves and that the wealth of processes which can form and shape caves in lava is by no means limited.

Paper Z

EMPLACEMENT OF TUBE-FED LAVAS AND TUBE DEVELOPMENT, NORTH QUEENSLAND, AUSTRALIA

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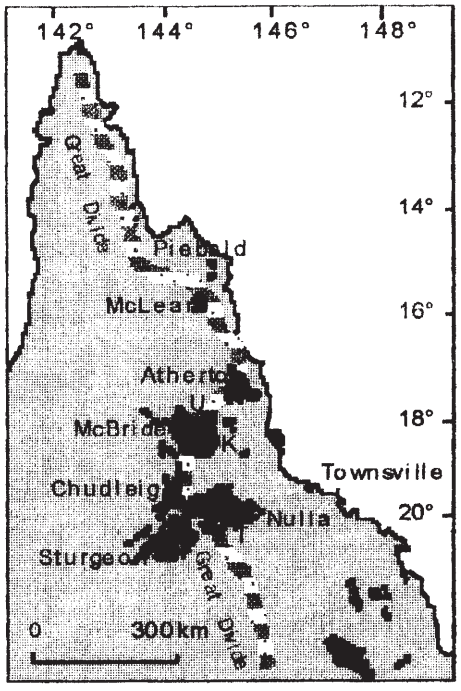
Summary

North Queensland has eleven Cainozoic basaltic lava field provinces, ranging in age from 8 Ma to Holocene, with minor earlier activity. Their total area of 23,000 km^2 contains about 460 known volcanoes. Measured ages (K:Ar) indicate long quiescent intervals between short-lived monogenetic volcanism.

Twenty long lava flows, and seven lava cave localities are known in the region. Where it can be confirmed, flows were pahoehoe. 'A'a lavas are uncommon. Chemically, the lavas are hawaiite, alkali olivine basalt, and basanite.



Four lava provinces (McBride, Chudleigh, Sturgeon and Nulla) contain long lava flows (> 50 km) with slopes of less than half a degree. Three provinces, McBride, Chudleigh and Nulla (Fig. 1) contain lava-tube caves, but filled lava tubes are probably also widely distributed. STEPHENSON et al. (1998) described three long flows (Undara, Toomba and Kinrara). Flow emplacement involved sustained eruption, gentle topographic control and development of lava tubes.

Undara, Toomba and Kinrara erupted at about 1150° C, with typical basaltic viscosities (12-105 Pa s). Inflation structures (WALKER 1989; HON et al. 1994) are common: tumuli, broader lava rises and lava-rise ridges. Lava-rise ridges are up to 40 km long, 20 m high, and 500 m wide and are believed to be located above former fluvial channels (WHITEHEAD & STEPHENSON, 1998; STEPHENSON et al., 1998).

Seven lava tube cave localities are documented in north Queensland. The Undara lava field (McBride province) contains extensive caves. The north-west tube system extends for 30 km as a series of aligned caves and depressions; many of its classic, large caves appear to have involved the same conduit, which probably extended much further, but was undrained. At Toomba (Nulla province) a number of short caves occur on the slopes of the volcano. On Kinrara (McBride province) there are numerous caves within 6 km of the volcano. All these caves formed as drained tubes with slopes broadly consistent with gradients greater than 0.5° (cf. HATHEWAY & HERRING, 1970) .

Tubes are required to insulate long flows (KESTHELYI, 1995 and SAKIMOTO & ZUBER, 1998). Extended systems are likely to be largely undrained making the mapping of ancient tubes a challenge for science.

Mechanisms for tube formation have raised controversy. PETERSON et al., (1994) documented lava channel processes and pahoehoe lobe distributaries in Hawaii. Alternatively, OLLIER & BROWN (1964) had argued some tubes form as sub-crustal 'mobile cylinders' in cooling host lava, and erode across their layered host. HON et al.(1994) concluded both mechanisms operated in active tubes on Kilauea, Hawaii. At Undara, cave roof structures were cited as providing evidence for channel roofing (ATKINSON et al., 1975). Reexamination of these localities questions their conclusions, and suggests common sub-crustal tube formation.

Detecting old tubes (drained and undrained) poses challenges. Several methods hold promise: airborne magnetic, surface gravity, magnetic, resistivity and ground-penetrating radar. A major scientific question remains unanswered: how is hydraulic pressure transmitted down the flow to form lava rises, in an "artery-like" system ?

A fuller knowledge of undrained lava tube patterns may help in understanding that process.

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Paper AA

SULL'ANTICA CHIESA MADRE DI MOMPILERI

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Riassunto

Scopo del presente lavoro è quello di addivenire ad una migliore conoscenza storica della Chiesa dell'Annunziata, ricoperta dalla lava del 1669, sita nel comune di Mascalucia.

Sulla base delle ricerche e degli studi condotti in "situ", il lavoro si propone di effettuare una descrizione storica corredata da una ipotesi di ricostruzione grafica tridimensionale dell'edificio e dalla localizzazione cartografica delle principali cavità artificiali ad esso collegate.

Il sito in questione è la chiesa madre di Mompileri, dedicata a Maria SS. Annunziata, che ha origini molto antiche: se ne hanno notizie certe a partire dalla metà del '400.

La sua storia è strettamente legata alle eruzioni dell'Etna: in particolare l'edificio sacro è stato lambito dalla colata lavica del 1537 e successivamente ricoperto dall'eruzione del 1669 insieme al paese di Mompileri.

Già dai primi anni del '700, in seguito ad una serie di ricerche volte a recuperare i simulacri, furono create gallerie artificiali tra cui la "Grotta dell'Eremita" che hanno permesso di raggiungere i resti dell'antica chiesa.

Degno di menzione è il ritrovamento di una statua di culto dedicata alla Madonna delle Grazie rinvenuta, in ottimo stato di conservazione, al disotto di uno spesso strato lavico.

Parole chiave: speleologia urbana, chiesa, sotterranei, eruzioni laviche, Mompileri.

Paper AB

RUINS OF THE ANCIENT "CAMPANARAZZU", BURIED BY ETNA ERUPTION OF 1669

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Abstract

A description is given of a speleological site, named "Campanarazzu" by Misterbianco inhabitants. The name of the site, in the neighbourhood of Catania, was probably due to the huge dimensions of the bell tower, much higher than the other buildings of the ancient country.

Authors' purpose is to contribute by this paper to the knowledge of structures that were partly destroyed after lava invasions, though some complete underground environments were entirely preserved. Some of them are connected to the surface, thus making possible the access and subsequent study of same, in the field of urban speleology.

The paper is not limited to a mere description of the site from a speleological point of view, it also concerns a photographic survey of almost unknown parts, such as an appraisable column, and a 3D model of the ancient church, graphically reconstructed through CAD (Computer Aided Design) elaboration. Some explanatory heights were assigned (also to the bell tower), in order to diffferentiate the existing built up parts from those by now destroyed.

Some further examples with similar peculiarities, located in Etna territory, play a role of international rather than national importance, for their unusual location and constitution.

Key words: urban speleology, vulcanospeleological archaeology, eruption 1669, lava invasion, underground environments, Misterbianco.

Riassunto

Il lavoro si propone di descrivere un sito di interesse speleologico, denominato dagli abitanti di Misterbianco: *"Campanarazzu"*. Tale sito si trova in provincia di Catania e trattandosi di una chiesa è molto probabile che il termine *"campanarazzu"* sia dovuto alle imponenti dimensioni del campanile che spiccava altimetricamente rispetto al resto dei fabbricati dell'antico paese.

Gli autori intendono così dare un contributo alla conoscenza di strutture edificate dall'uomo che sono state in parte distrutte in seguito ad invasioni laviche, e che hanno conservato ambienti sotterranei parzialmente integri, con collegamenti in superficie che consentono l'accesso e il successivo studio nell'ambito della speleologia urbana.

Nel redigere tale lavoro gli autori non si sono limitati ad una descrizione del sito speleologico, bensì hanno eseguito un rilievo fotografico di parti poco conosciute (come una pregiata colonna), ed hanno ricostruito graficamente un modello tridimensionale dell'antica chiesa tramite elaborazione CAD, assegnando delle altezze esplicative (anche al campanile) in modo da far risaltare le parti costruttive esistenti, rispetto a quelle ormai andate distrutte.

A tutt'oggi, nel territorio Etneo si conoscono diversi esempi con tali peculiarità che, per la loro singolare ubicazione e costituzione, rivestono un'importanza non solo nazionale, ma anche a livello internazionale.

Parole chiave: speleologia urbana, archeologia vulcanospeleologica, eruzione 1669, invasione lavica, ambienti sotterranei, chiesa madre, Misterbianco.

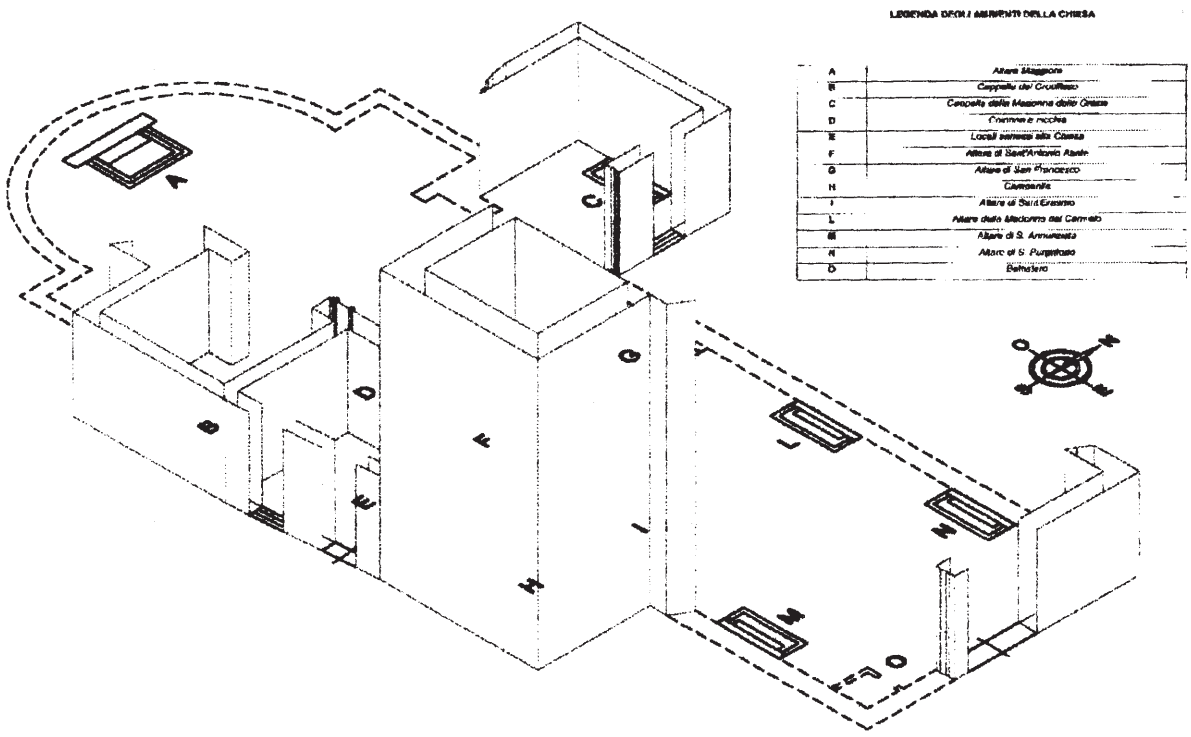

Figura 1 *- Rappresentazione grafica tridimensionale con tecniche CAD della Chiesa con altezze esplicative in scala 1:200. Disegno di Fabio Santonocito 1999.*

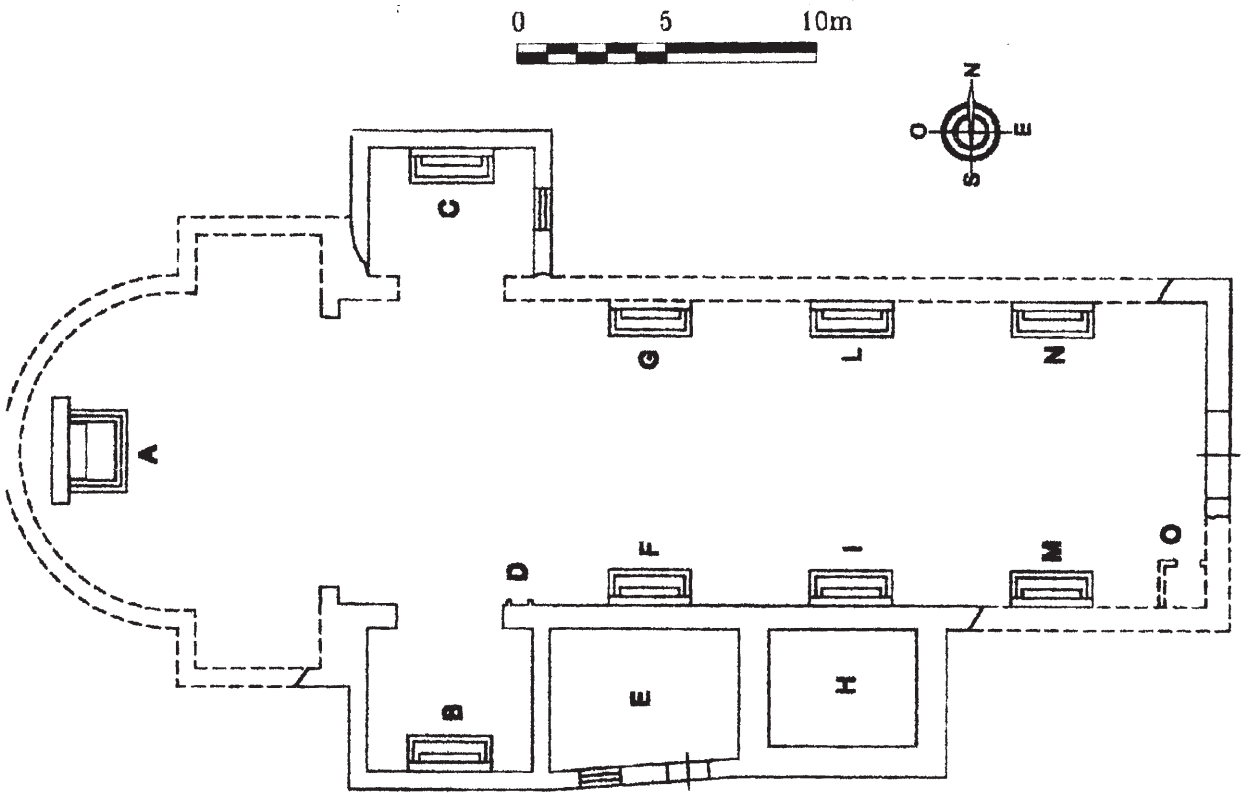

Figura 2 *- Rappresentazione planimetrica della Chiesa in scala 1:200 con relativa mappatura degli ambienti. Disegno di Fabio Santonocito 1999.*

Paper AC

ARCHEOLOGICAL FINDINGS IN THE CAVES OF MT. ETNA

Francesco Privitera

Abstract non pervenuto

Paper AD

STUDIES ON LAVA CAVES DURING THE PAST CENTURIES

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Summary

This paper scours the evolution of the scientific thought dealing with volcanic caves. This aim will be achieved taking into account studies carried out mainly on Etna caves in the past centuries by several scholars. The main result is that, thanks to Hamilton's and Dolomieu's studies, the watershed between two different approach methods to the study on volcanic caves, and to their role in the general framework of volcanic phenomena, is to be placed at the end of the XVIII century.

Riassunto

In questo lavoro si vuole presentare l'evoluzione del pensiero scientifico riguardo alle grotte vulcaniche. Questo sarà fatto considerando gli studi fatti principalmente sulle grotte dell'Etna da parte di vari studiosi dei secoli passati. Da questo lavoro si evince come la fine del secolo XVIII, con le ricerche di Hamilton e Dolomieu, rappresenta lo spartiacque tra due diversi metodi di affrontare lo studio delle grotte vulcaniche ed il ruolo delle cavità nell'ambito del fenomeno vulcanico più in generale.

Paper AE

ETNA CAVES AND XVIII CENTURY VISITORS

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Abstract

The paper comments the reports left by the great European voyagers, from Brydone to Spallanzani, from Vivant Denon to Dolomieu, who climbed on Mt. Etna at the end of the XVIII century, and left descriptions of its main known caves at that time: Grotta delle Palombe (Doves Cave), near the Red Hills, Nicolosi; the small Grotta delle Capre (Goats Cave), obliged stop on the way uphill to the central crater; the very nice Grotta della Neve (Snow Cave), a *neviera* (snow storage) portrayed by Jean Houel, owned by Malta Knights.

Riassunto

Da Brydone a Spallanzani, da Vivant Denon a Dolomieu, si rivisitano i diari dei grandi viaggiatori europei che, scalando l'Etna sul finire del XVIII secolo, si soffermarono a descrivere alcune delle sue più note cavità allora conosciute: la grotta delle Palombe nei pressi dei monti Rossi; la piccola grotta delle Capre, tappa obbligata sulla via del cratere centrale; la bellissima grotta delle Neve, una *neviera* appartenente ai Cavalieri di Malta che fu dipinta da Jean Houel.

Paper AF

ARTIFICIAL CAVES IN LAVA FLOWS

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Summary

The Author, on the ground of his experience concerning studies and documentations about artificial structures buried in the underground of Catania town and of its mostly lava originated surrounding areas, describes the main typologies of the above mentioned structures. The author mainly focus on the grave's quarries and he mentiones the existence of ruins of preexistent buildings to the lava flow.

Keywords: Urban speleology, Lava flow, Grave quarries

Riassunto

L'Autore, sulla base della sua esperienza di studio e documentazione di ambienti artificiali nel sottosuolo di Catania e delle zone circostanti, in maggioranza di origine lavica, descrive le loro principali tipologie. Si sofferma in particolare sulle cave di ghiaia, e menziona l'esistenza di ambienti con ruderi di edifici preesistenti alla colata lavica.

Parole chiave: Speleologia urbana, Colata lavica, Cave

Paper AG

MYTHS AND LEGENDS ON ETNA CAVES

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Riassunto

In questo lavoro sono raccolte, narrate e commentate le più significative leggende ambientate nelle grotte etnee: leggende classiche (Aci e Galatea, il ratto di Proserpina); leggende demoniache e plutoniche riguardanti le cosiddette *truvature*, i tesori incantati; pie leggende sugli eremiti che abitarono le grotte del vulcano; leggende Mariane riguardanti il ritrovamento di immagini sacre o altri eventi miracolosi. Si esamina anche una leggenda di origine normanna: la storia di re Artù sull'Etna.

Summary

The Author collected, and comments in this paper, the most significant legends related to Etna caves: classic legends (Aci and Galatea, Proserpine's rape), or demoniac and Plutonian legends, dealing with the so-called *truvature* (findings), i.e. enchanted treasures; devout legends on hermits living in caves on the volcano, or Marian tales, concerning findings of holy images or further prodigious events. A Norman legend is also reported: the tale of King Arthur on Mt. Etna.

Paper AH

LA FAUNA DELLE GROTTE DELL'ETNA: DESCRIZIONE E CONSIDERAZIONI

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Riassunto

L'autore illustra le condizioni che caratterizzano gli ambienti sotterranei e mette in evidenza come, per quanto riguarda i parametri ambientali (Temperatura, Umidità, ecc.) e le sorgenti di cibo, non esiste una sostanziale differenza tra grotte carsiche e vulcaniche. Descrive le principali modificazioni morfologiche, fisiologiche e comportamentali che gli animali di grotta hanno acquisito per vivere in un ambiente così severo.

Esamina la fauna e sottolinea che, pur essendo ancora poche le grotte vulcaniche etnee studiate a questo proposito, trenta su centinaia conosciute, sono già note 59 specie di cui soltanto due trovate solo in grotte vulcaniche: si tratta di un *ragno Araeoncus sicanus* Brignoli e di un Dittero *Limosina ventruosella* Venturi entrambe di scarso interesse spleleologico. Nessuna delle rimanenti specie è Troglobia, discreto è invece il numero di quelle Troglofile; tra queste particolarmente interessanti sono risultati i Crostacei Isopodi: *Trichoniscus matulicii* Verhoeff per la sua distribuzione geografica, *Haplophthalmus avolensis* Vandel finora nota solo per la regione Iblea e *Buddelundiella cataractae* Verh. presente in Sicilia in una grotta vulcanica, questa stazione costituisce l'estremo limite meridionale dell'areale della specie che è fortemente disgiunto.

Di un certo interesse sono i Ditteri *Limosina ventruosella* Venturi e *Psicoda minuta* Banks, quest'ultima specie ha un'ampia distribuzione ma in Italia è nota solo per la grotta vulcanica "Gr. S.Gregorio", situata sulle basse pendici meridionali dell'Etna. Di indubbio interesse sono le sei specie di pipistrelli presenti in varie grotte, una di queste, *Myotis myotis* Borkhausen, forma grandi colonie con conseguenti cospicui accumuli di guano (sono stati osservati nella gr. Immacolatella).

Ulteriori indagini nelle numerose grotte che rimangono ancora da studiare a questo proposito potranno portare ad una migliore comprensione dell'evoluzione dei popolamenti animali in queste cavità e ad altre interessanti scoperte.

Non è escluso infatti che non emergeranno specie Troglobie come è già successo in grotte vulcaniche di altre regioni geografiche; Hawaii, Stati Uniti, Giappone, Is. Canarie, ecc..

Paper AI

Author and title to be determined.

Paper AJ

IL MONITORAGGIO DELLA GROTTA DEL GELO

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Riassunto

Viene presentato un breve resoconto dell'iter seguito per realizzare il primo e a tutt'oggi unico esperimento di monitoraggio ambientale, mediante l'utilizzo di microacquisitori automatici, per la raccolta di dati di Temperatura e Umidità, eseguito dagli speleologi del Centro Speleologico Etneo di Catania ai sensi della collaborazione intrapresa con l'Ente Parco dell'Etna e per esso con il Vulcanologo. I dati sono relativi al biennio luglio 1997 - luglio 1999. In tale lavoro sono stati impegnati a vario titolo una decina di speleologi che volontariamente hanno eseguito i rilevamenti climatologici e l'elaborazione dei dati. Tale esperimento ha consentito di chiarire le cause generali della riduzione di volume del ghiaccio presente all'interno della cavità e sopratutto ha permesso di appurare che una sana e corretta fruizione della Grotta del Gelo non altera significativamente l'ambiente ipogeo.

Paper AJ1

LA GROTTA DEL GELO E IL SUO FENOMENO GLACIOLOGICO

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Riassunto

La Grotta del Gelo ha avuto, negli ultimi anni, una particolare attenzione da parte degli speleologi del C.S.E. e del Parco dell'Etna che sono riusciti a prendere una serie di dati climatologici utili per conoscere i motivi delle continue variazioni del livello della massa glaciale all'interno della cavità.

I risultati sono stati soddisfacenti tuttavia si ribadisce l'utilizzo di un maggior numero di strumenti rilevatori per una più dettagliata indagine sul fenomeno.

Paper AK

VOLCANIC SHOW CAVES IN THE WORLD

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Honorary President, IUS Commission on Volcanic Caves

Abstract

More than 100 show caves of volcanic origin are currently identified throughout the world, in Iceland, Azores (Graciosa, Pico, Terceira and Sao Miguel islands), Madeira, Canary Islands (Fuerteventura, Lanzarote, La Palma and Tenerife islands), Galapagos Islands, Samoa (Savai and Upolu islands), New Zealand, Hawaii (Kauai, Maui and Hawaii islands), Mauritius, Reunion, Kenya, Rwanda, Uganda, Zaire, Mexico, U.S.A. (California, Idaho, New Mexico, Oregon and Washington states), Korea, Japan, Australia and Italy.

The present list undoubtedly is incomplete.

To qualify, a volcanic cave must be sufficiently celebrated that more than a few persons seek it out. Littoral and other erosional or solutional caves in volcanic rocks (Fingal's Cave, Kitum Cave, etc) are not included. Three categories are identifiable: developed, semi-developed, and self-guided. More than half the known examples are essentially undeveloped caves in national forests and national monuments of the western United States.

Paper AL

CONSERVING THE LAVA CAVES OF MAURITIUS: THE CAVES OF MAURITIUS PROJECT 1998

Gregory J. Middleton

Sydney Speleological Society, IUS Commission on Vulcanospeleology

Abstract

The Caves of Mauritius Project 1998 was conducted by the author and Jörg Hauchler for the Mauritian Department of Environment. It raised the number of lava caves documented on the Indian Ocean island to 114, with a total 12.8 km of surveyed passage. Information collected was placed into a computer database, including maps of 106 of the caves. The project highlighted the values of the caves and the threats to them and their fauna. It assessed the particular values of the more significant caves and recommended measures for their protection, particularly a "Plaine des Roches National Park" for the largest assemblage. Management agreements were suggested for privately-owned caves.

Paper AM

A RATIONALE FOR THE PROTECTION OF VOLCANIC CAVES

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Abstract

On an international scale, the protection of volcanic caves is extremely limited. Whilst it is true that some of the world's most important caves lie within internationally-recognised protected areas, many others do not, and even in the protected areas there is scant evidence of any specifically-directed conservation management policies. One important handicap to the protection of these features is the lower priority generally applied to geological conservation. Another is poor perception, there being a common view among conservation managers and their geological advisors that volcanic caves are inconsequential landforms, ranking of minor importance or merely as curiosities.

This paper lays out the case that volcanic caves have important scientific, economic, cultural and aesthetic values and are important, both as landforms in their own right, and as a part of a wider assemblage of volcanic landforms. Existing protective designations will be reviewed and justifications for protection of these remarkable features laid out. A point of debate will be the extent to which the world's volcanic cave estate is under threat and whether or not this justifies the development of protective guidelines. Such guidelines might follow the model of the IUCN's Guidelines for Cave and Karst Protection, and could be approached either by including volcanic caves within the remit of that document (speleological approach), or by considering them as a member of the wider assemblage of landforms that consitute particular volcanic terrains (volcanological approach).

Posters

Fingal's Cave in the Island Of Staffa, Hebrides, Scotland

Paolo Forti, Giuliano Perna

Marine caves in basalts

Giuliano Perna

In absentia

VOLCANIC CAVES IN ARGENTINA

Carlos Banedetto

Instituto Argentino de Investigaciones Espeleologicas (IN.A.E..) -Mercedes T. de San Martin 752 - Barrio Parque, 5613 MALARGUE. Mendoza, Republica Argentina

Abstract

The SE part of the province of Mendoze, Argentina,. consists of a basaltic area known as "Payunia", after the name of Payun Matru, its main volcano. A very active volcanism affected this area during Pleistocene, and its surface features retain evidence ot this ectivity. Such features are also reckoned underground, where several lava caves were located. The most important among them is Cueva Dona Otilia, with 838 m development. The cave environment is featured by a high humidity percentage and by a remarkable organic inflow, which could infer to an aventual biospeleological importance. Further lava caves were also found in two more provinces of Argentina, La Pampa and Neuquén, with an average development of 300 m.

Traslated into English by Giuseppe M. Licitra

IL POZZO DEL DIAVOLO DI MONTE VENERE (Caprarola, Viterbo, Italia)
Inquadramento e descrizione dell'unica cavità vulcanica della Regione Lazio

Maria Luisa Battiato, Giulio Cappa, Alberta Felici, Lorenzo Grassi, Gianni Mecchia, Maria Piro

Federazione Speleologica del Lazio

Abstract

This report show information about "Pozzo del Diavolo", that is the only volcanic cave in Latium (Italy). This little cave - near the top of the cone of Monte Venere in the natural reserve of Lago di Vico (Caprarola, Viterbo) - is very interesting also for archeological discovery.

The volcanic history of Vico spans the period from 0.8 Ma until about 85-90 ka ago. The final phase of volcanism was strongly influenced by the presence of a lake filling the newly formed caldera, and thus was violently hydromagmatic. Only in its very final stage the character of the eruptions became magmatic again, building the cone of Monte Venere that lies eccentrically in the N part of the caldera basin. The activity of this fourth period lasted from 140 to about 90 ka ago.

Riassunto

Questa relazione descrive e inquadra geologicmnente l'unica cavita di origine vulcanica attualmente conosciuta nella Regione Lazio (è stata scoperta dal punto di vista speleologico solo di recente, tanto che è stata iscritta a Catasto solo nel 1996): si tratta del Pozzo del Diavolo (La 1289), una piccola grotta che si apre ad 800 metri di quota poco al di sotto della sommita del cono di Monte Venere (836 m), nel territorio del Comune di Caprarola (Viterbo), all'interno della Riserva naturale regionale del Lago di Vico.

Seppure di dimensioni assai modeste (47 metri di sviluppo planimetrico e solo 8 di dislivello negativo), il Pozzo del Diavolo - alla sua unicità - aggiunge altri motivi di interesse legati sia ad importanti ritrovamenti archeologici, che all'approfondimento dello studio del distretto vulcanico Vicano e, più in generale, dei distretti vulcanici della Tuscia (Lazio settentrionale).

Il complesso vulcanico Vicano è stato attivo soprattutto nel Pleistocene (tra 800.000 e 90.000 anni fa); nell'ultima fase - tra 140.000 e 90.000 anni fa - l'attivita eruttiva è stata condizionata dalla presenza delle acque lacustri che hanno dato vita a tremende eruzioni idromagmatiche che si sono concluse proprio con l'edificazione del cono di Monte Venere, dove è ubicata la grotta.

All'interno del Pozzo del Diavolo, tra il terriccio e i massi di crollo, sono stati rinvenuti numerosi frammenti di vasi ceramici del Neolitico la cui tipologia, data l'originalità dei reperti, è stata definita "aspetto di Monte Venere". Successive analisi al Carbonio 14 hanno datato l'età degli strati tra 4.000 e 5.000 anni fa. Queste testimonianze hanno fatto ipotizzare che il Pozzo del Diavolo - complice l'aurea di mistero del luogo - sia stato sede di un antico culto: nei vasi venivano deposte le offerte per le divinità. Ancora oggi esponenti di movimenti esoterici tengono nella zona raduni di raccoglimento e meditazione. Attualmente il Monte Venere - e con esso la grotta - è salvaguardato dalla Riserva naturale del Lago di Vico, istituita dalla Regione Lazio nel 1982 e ampliata nel 1985 sino a coprire una superficie di 3.300 ettari.

VULCANOKARST: A ROMANIAN CONTRIBUTION TO SPELEOLOGY

Alexandru Szakacs

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Abstract

The term vulcanokarst has been introduced in the scientific literature by Naum and coworkers (1962) in a pioneering article published in Romanian entitled "The vulcanokarst in the Calimani Massif (East Carpathians)". The sense of the term "karst" has been broadened towards the domain of volcanic rocks by this conceptual contribution. The authors describe geomorphologic features observed on volcanic rocks (lava flows and pyroclastics) which they identify with karst. Features belonging to both exokarst ("surface karst" in author's terminology) and endokarst ("deep karst") have been recorded. The "surface karst" develops on ancient (ca. 7Ma old) weathered pyroxene andesite lava flow surfaces and along platy cooling joints by enlargement of fissures and other mechanical discontinuities. Alveolar voids lending a cellular appearance to the rocks - actually gas-escape vesicles of the lava - are mistakenly interpreted as a result of alteration and removal of feldspar crystal. It is disputable to what extent gas-vesicles in lava are enlarged by dissolving action of water. Other surface karst features include "dolinas" 5-7 m across, 2-3 m deep, developed on pyroclastic rocks affected by strong silicic and argillic hydrothermal alteration processes as a result of collapse of the roofs of subsurface voids. "Deep karst" consists of caves encountered in pyroclastic rocks strongly affected by hydrothermal alteration processes. Three main caves - Chaos Cave (48 + 77 m long, up to 6 m high), Chocolate Cave (33 m long, up to 2.5 m high) and Ruins Cave (>60 m long, 3-30 m wide, 2-2 m high) - and their formations have been described in great detail. Spectacular constructional features such as limonite crusts, stalactites, stalactites and draperies, were present in the Chocolate Cave. The origin of the limonite formations is explained by leaching of Fe-rich minerals of the andesite by CO_2-charged infiltration waters, oxidation of Fe^{2+} and its dissolution in the bicarbonate waters, and subsequent deposition of Fe-hydroxide gel by oversaturation and evaporation.

Although more descriptive than explanatory, the paper by Naum et al. (1962) correctly identifies the possibility of karst process development in volcanic rocks. At our present-day knowledge one can explain more accurately the formation of voids by dissolution of volcanic rocks, either lava or pyroclastic in origin, by hydrothermal solutions through acid leaching, using original rock permeability.

Unfortunately, the caves, as the most important testimony of the vulcanokarst at its type locality, described by Naum et al. (1962), have been destroyed during sulfur exploration work in the Calimani Mts. during the 70' s.

Reference: Naum T., Butnaru E., Giurescu M. (1962) Vulcanokarstul din masivul Calimanului (Carpatii Orientali). An. Univ. Bucuresti, Ser. St. Nat., Geologie-Geografie, 32, p. 143-179

VOLCANIC CAVES OF VESUVIO

Alfonso Piciocchi

Abstract non pervenuto