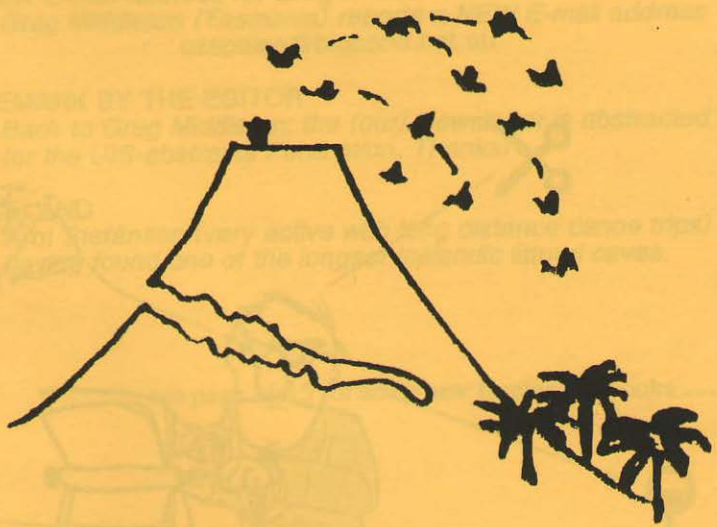
International Union of Speleology
Union Internationale de Spéléologie

Commission on Volcanic Caves



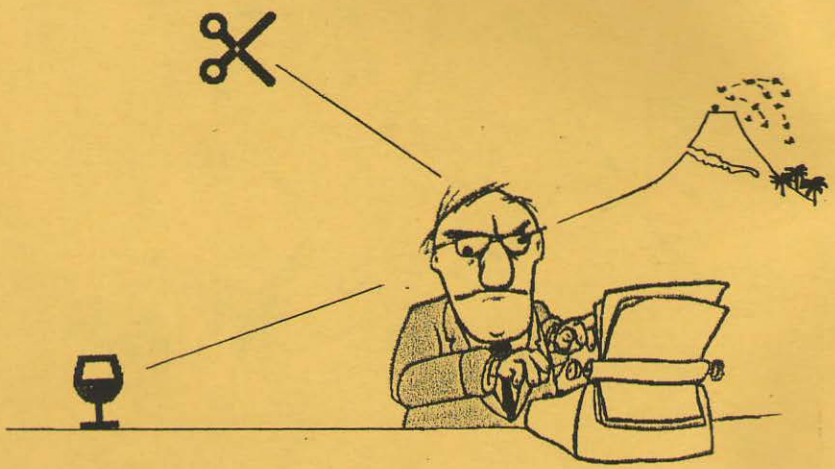
MARCH 2006

47

U.I.S. is affiliated with UNESCO

The Newsletter is send free to members of the Commission, and others who are interested in lava-tube caves.
It is not possible to subscribe - but news and information is always appreciated ....

Honorary President: Dr. W.R. Halliday
bnawrh@webtv.net



Chairman & editorial address: a.i.

J.P. van der Pas
Vauwerhofweg 3
6333 CB Schimmert
Netherlands

jpgvanderpas@hetnet.nl

..... due to circumstances this issue is some 6 weeks (too) late .....

MEXICO 2006

The Mexico 2006 Vulcanospeleology Symposium is very well going on. Several members of the commission already stated they will attend. Look on

www.saudicaves.com/symp06

KOREANS WILL VISIT MEXICO 2006

Dr. In-seok SON reports a large delegation will visit Mexico 2006. It might be a group of two governmental officials and 7 to 8 skilled cave explorers.

NEW E-mail address for Greg Middleton

Greg Middleton (Tasmania) reports a NEW E-mail address

ozspeleo@bigpond.net.au

REMARK BY THE EDITOR

Back to Greg Middleton: the (our) Newsletter is abstracted by him for the UIS-abstracts Publication. Thanks!

ICELAND

Arní Stefánson (very active with long distance canoe trips) reports having found one of the longest Icelandic littoral caves.

..... see page 11/15 for some new fascinating books .....

New/changed addresses:

New postal address for Ken Grimes:
RRN 795 Morgiana Rd., Hamilton
Vic. 3300 - Australia

Björn Hróarsson
Strytusel 18
109 Reykjavik
ICELAND
bjorn@ritverk.is

As mentioned before Dr. Halliday (Bill) has suddenly met problems with the access to the Kilauea Caldera due to sudden 'CO2' problems. Here all the arguments this is just rubish .....

In reviewing my reports to the National Park Service for 2004 and 2005, I found some very important points that I had overlooked previously.

After 7-16-04 (when the caldera started degassing 2 to 3 times as much CO2 (and twice as much SO2) as in the past) I led 27 trips that entered caldera caves 97 times.

Dangerous levels of CO2 are redily detected clinically and I have special training and experience in this field as previously documented. And on NONE of these 97 entries did I or anyone else detect any clinically significant level of CO2 (about 1%, which is where breathing starts to become faster and deeper).

Further, my notes on winds in the caldera showed that these trips were made in a wide variety of wind conditions, with several of them made during south ("Kona") winds. You may remember that the new Scientist-in-Charge speculated that these south winds trap CO2 in the caldera caves. My notes show:

8 trips in NE winds (trade winds)
2 trips in S winds (Kona winds)
1 trip in light, variable winds
6 trips in variable winds changing to trade winds
3 trips in trade winds changing to variable winds
2 trips in Kona winds changing to trade winds
2 trips in variable winds changing to Kona winds
2 trips in Kona winds winds changing to variable winds
1 trip in initially windless conditions changing to Kona winds, and later to trade winds.

Thus disproving his speculation.

It would be very helpful if Fadi brought this disgraceful assessment to the attention of the scientific council of UNESCO and notified the Acting Director of our US Geological Survey that he is going to do so. One bad USGS hazard assessment like this will render dubious all future assessments unless vigorous corrective action is taken..

I suggest that both of you take a few minutes and look at the recommendations of the (US) National Commission on Risk Assessment and Risk Management; Fadi might want to mention these. They are easily found by the Alta Vista web search engine, under the topic "Commission on Risk Assessment".

These recommendations are somewhat buried in masses of irrelevant material in the commission's two-volume final report, but include:

1) involvement of "stakeholders" from beginning stages (Stakeholders are people who are administered upon by government agencies).

2) Search for relevant multidisciplinary information in determining the weight of opinion and evidence.

3) Transdisciplinary peer review including stakeholders.

4) Avoidance of "command-and-control" decisions and also default decisions.

5) "Iterative" hazard/risk management, i.e., changing decisions as new information becomes available.

Working together, the new Scientist-in-Charge at HVO and the new Superintendent of Hawaii Volcanoes National Park ignored all these recommendations, and I am now facing a default decision that will leave me unable to finish my 11 year project.

..... much more about the CO_2 problem on page 16/26 .....

W.R. Halliday
bnawrh@webtv.net

After the bad news of Guiseppe having left us Dr. Corsaro (Catania/Sicily) took over. Here already her first report about the local situation.

A fantastic remark: a new cave is named after Guiseppe! So find here the latest information.

RECENT EXPLORATION OF 2004-2005 LAVA FLOW FIELD AT MOUNT ETNA (SICILY, ITALY) BY THE ETNA SPELEOLOGICAL CENTRE (CENTRO SPELEOLOGICO ETNEO, CSE)

There are several interesting lava tubes inside the lava flow field formed during the September 2004-February 2005 eruption at Mount Etna (Burton et al., 2005; Corsaro and Miraglia, 2005) and speleologists from the *Centro Speleologico Etneo* undertook their exploration, from March to October 2005.

We found three main lava tubes. One of these has been named *Grotta Licitra* in memory of our late lamented member Giuseppe M. Licitra who died recently. It is located at 2600m a.s.l. and has a difference in elevation between the top and bottom of 115 m and an overall length of about 350m. Another tube, at about 2300m a.s.l., has been named *Bocca Bassa* and is 432m long with a sifference in elevation of 197 m. The third lava tube, named *Cauru Mannu,* is -located at 2100m a.s.l. and has a difference in elevation between the top and bottom of 60m and an overall length of about 190m.

We tried to begin the exploration in March when we reached *Grotta Licitra* but since the temperature was higher than 100 °C, we were prevented from going in. In April, the temperatures were about 30° at the entrance of the tube and 70°C at its end, so we were able to enter inside. We discovered many matastable saline concretions that generally complete their cycle of deposition, growth, re-hydration and dissolution in a few months, in rather limited temperature and humidity conditions. We already observed these kinds of concretions inside *Grotta Cutrona*, even if they were more extended. It was a very exciting experience to explore still hot caves where it was possible to observe concretions that were very similar in shape to calcareous ones, but forming in such a short time.

In April we discovered the entrances to other caves too hot for exploration and the big pit about 6m in diameter and 15m in depth named *Cauru Mannu* (or *Pozzone*), whose temperature at the bottom was estimated about 180°C with an infrared thermometer. Furthermore, we carried out the thermal survey of *Grotta Licitra* with an infrared camera together with researchers of INGV-CT, INGV-PA, University of Torino and our friends of GSP from Torino. In October we repeated measurements at *Cauru Mannu* and surprisingly the cooling from April to October was very sustained because the temperature at the bottom was about 16°C, as confirmed by measurements carried out with the infrared thermometer used in April. The temperature of the ground around the pit was higher than 350°C.

During a field survey we also visited the cave named *MSC1* (Ma Su Cauru), which formed inside the 1991-1993 lava flow field and whose temperature up to 1994 was higher than 100°C. We entered through a bottleneck, went over a difficult drop and then we were surprised by the presence of a nice gallery developing for about 215m in length and up to 6m high. The lava tube continued uphill for about 80m, where a small entry formed for a breakage in the roof of the lava tube.

In July we explored *Bocca Bassa* by entering through a pit of about 12m deep. Here attractive concretions mantled the wall of the cave for about 10

square meters and white, orange and especially yellow coloured stalactites had formed, one of which reached 1.5m in height. Many eccentric white stalactites formed along the tube whose maximum diameter was about 3m. At the end of the cave, the 60°C temperature prevented any further exploration.

During the same month we began to work together with Parco dell'Etna staff which authorized us to use vehicles to reach the summit area of the volcano. We then began to prospect the lava flow field at an altitude between 2600 and 1800m a.s.l. The field survey was very difficult because we generally walked on a very deep slope formed of loose and very sharp lava blocks that put the speleologists to the test.

In September we finished exploring the three main lava tubes and carried out photo records together with speleologists from Piemonte, Tuscany and France. Furthermore, we found entrances to new lava tubes (*Grotta di Elvira, Buca Orribile*) not yet visited owing to their high temperature.

After winter we hope to continue our exploration and, even if we know that many concretions will be destroyed, we will recall the delight of sharing our emotion with other speleologist friends.

REFERENCES

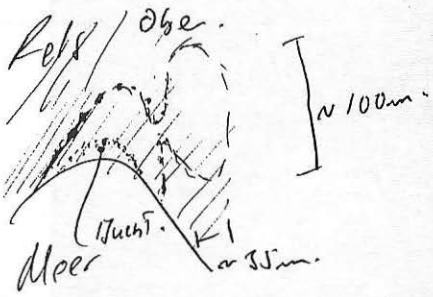
Burton, M.R., Neri, M., Andronico, D., Branca, S., Caltabiano, T., Calvari, S., Corsaro, R.A., Del Carlo, P., Lanzafame, G., Lodato, L., Miraglia, L., Salerno, G., Spampinato, L. (2005)

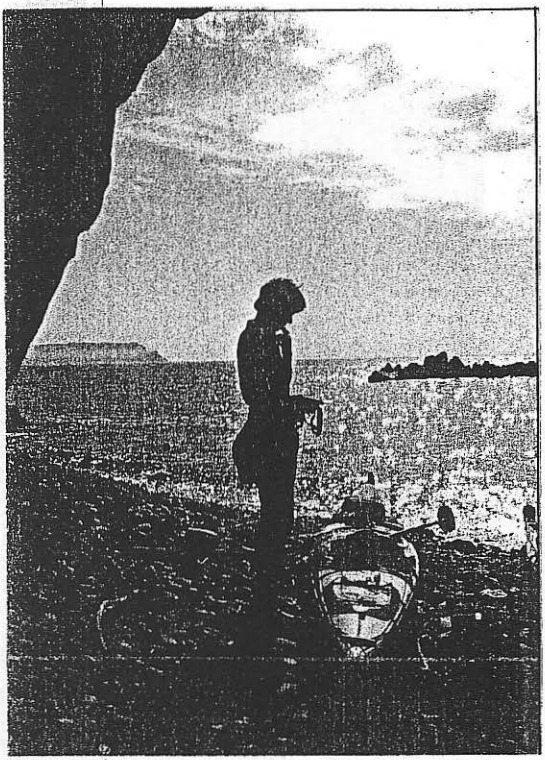
Etna 2004-05: an archetype for geodynamically-controlled effusive eruptions, Geophysical Research Letters, 32, L09303, doi:10.1029/2005GL022527

Corsaro R.A., Miraglia L. (2005)

Dynamics of 2004 Mt. Etna effusive eruption as inferred from petrologic monitoring of glass compositions, Geophysical Research Letters, 32, L13302, doi:10.1029/2005GL022347.

From Arní Stefánson came some beautiful pictures, which reproduce badly in this publication. Also a basic plan of a huge littoral cavety. It was found during a long canoe-trip and if I read the writing properly it is located at Skrúdur.





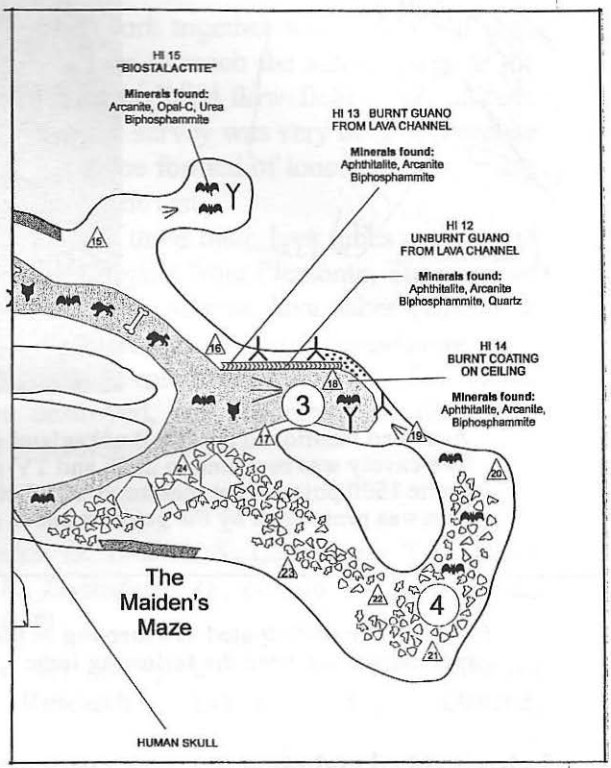
Arní also mentioned the 'Thríhnúkagígur' project is doing well. The cavety was revisited in 2005 and TV-pictures were taken. Some 1500 points were measured with Leica equipment, and a large sum was promished by the government to support the project.

Bill Halliday participated in a meeting of the Geological Society of America, and reported the following item:

I also mapped and photographed a very spacious near-spherical cave in rhyolite (almost 10 m in diameter) in easternmost California; the largest I have seen in rhyolite. Less than 1% is in total darkness. I briefly thought I had found a second example in westernmost Arizona but instead it is a dissolution cave in a small body of limestone intruded by dikes, with attractive calcareous speleothems. Also lots of superb tafoni in western Arizona (especially in ignimbrites), but none of cavernous size.

ALL about GHAR al HIBASHI LAVA-TUBE

- Open-file report:
  SGS-OF-2004-12
- By John Pint, Paolo Forti et al.
- 68 pages, size 29½x21 cm, weight 350 grams.
- 43 pictures, virtually all in colour.
- some maps + one huge plate (90x60 cm) with plan of the cave (small part depicted here).
- availability:
  try to contact the given address.



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GHAR AL HIBASHI, HARRAT NAWASIF/ AL BUQUM, KINGDOM OF SAUDI ARABIA

By

JOHN J. PINT, MAHMOUD A. AL-SHANTI, ABDULRAHMAN J. AL-JUAID, SAEED A. AL-AMOUDI, AND PAOLO FORTE

With the collaboration of

RAMI AKBAR, PETER VINCENT, STEPHAN KEMPE, PENELOPE BOSTON, FAYEK H. KATTAN, ERMANNO GALLI, ANTONIO ROSSI, AND SUSANA PINT

هيئة المساحة الجيولوجية السعودية
SAUDI GEOLOGICAL SURVEY

OPEN-FILE REPORT
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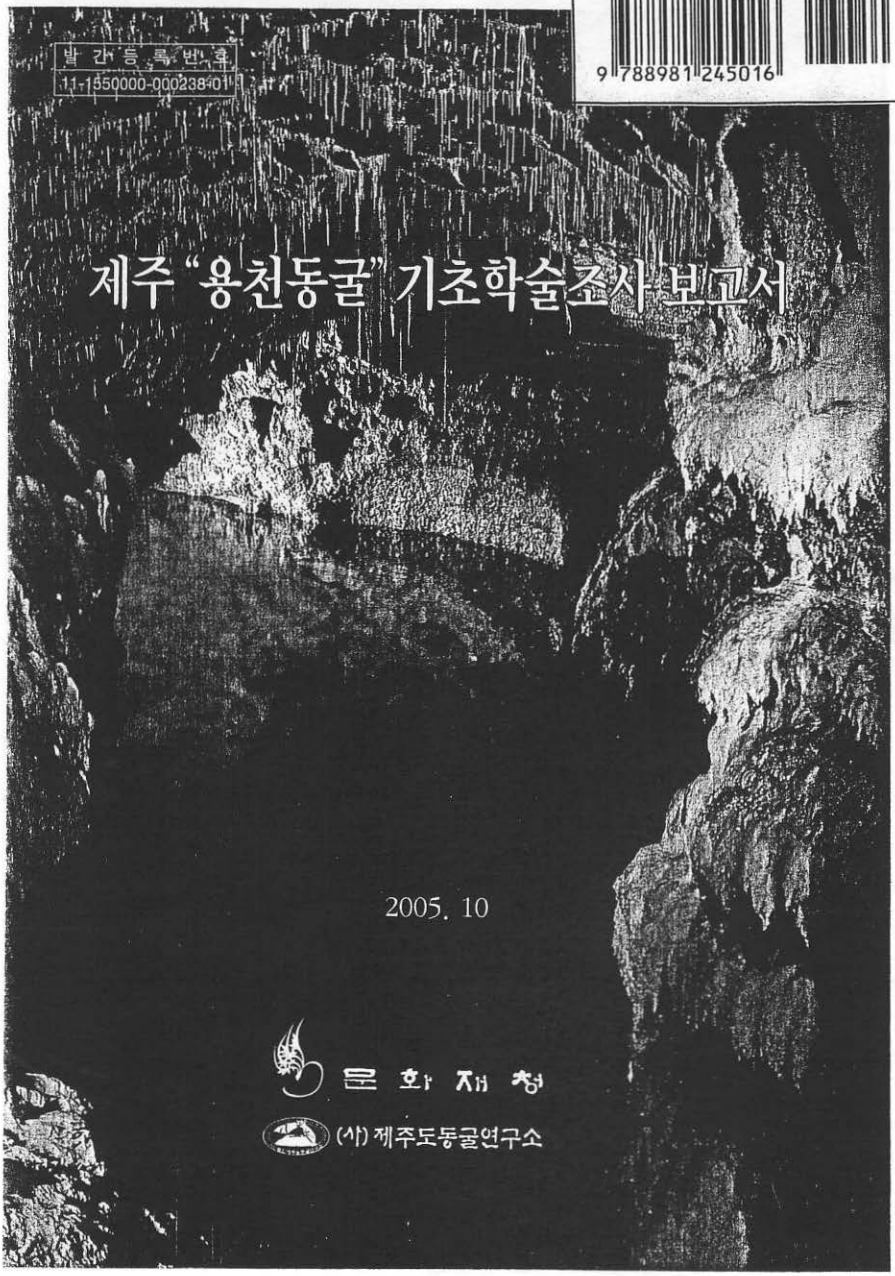

제주 "용천동굴" 기초학술조사 보고서

2005. 10

문화재청

(사) 제주도동굴연구소

제 출 문

문화재청장 귀하

문화재청에서 의뢰한 "제주 용천동굴 기초학술조사용역"을

완료하고 그 결과를 종합하여 이 보고서를 제출합니다.

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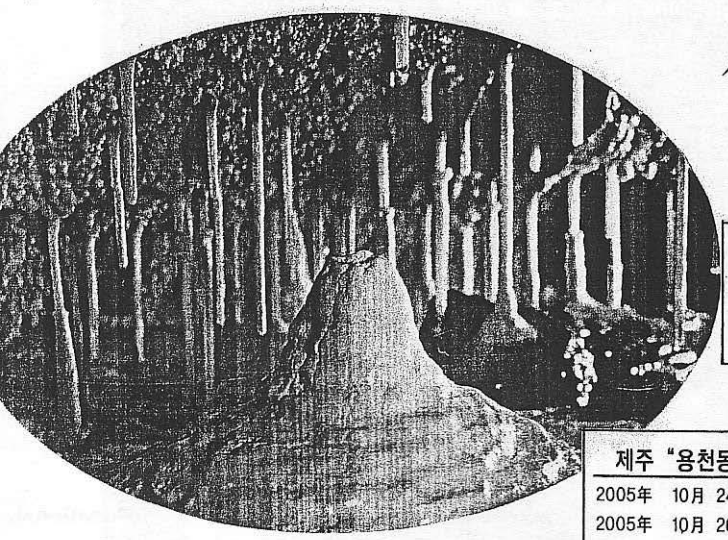

by IN-SEOK SON

for information about this book see the address next page.

제주 "용천동굴" 기초학술조사 보고서

2005年 10月 24日 印刷

2005年 10月 26日 發行

調査依賴 : 文 化 財 廳

調査 : (社)濟州島洞窟硏究所

(주)범영엔지니어링(측량분야)

印刷 : 새 미 출 판 기 획

- part I: 160 pages and 83 colour pictures, 11 maps (many pictures of artifacts, shells and formations),
- part II: 78 colour pictures, 3 pages on biology,
- two reports about Yongcheon Cave by Chris Wood and Andy Spate. This are the only English pages, the rest of the book in Korean!
- size 21x29 cm, weight 700 grams.
- page 64to101 maps of the Yongcheon Cave with formations and artifacts and their location(s) in the cave.

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제주도의 천연동굴

The Underground World of Jeju Volcanic Island in Korea

by IN-SEOK SON

저자 소개

손 인 석

이학박사(화산동굴 · 일본군진지동굴 · 화산지질)

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- 제주도의지질과암석 (1983. 공저)
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- 제주도의 천연동굴 (2005)
- 제주도 천연동굴 · 지질 · 일본군진지동굴에 대한 논문 및 보고서 30여편.

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  ,, ,, to karst,
- some 10 pages with maps (+ GPS-locations),
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- weight 2 kg's (over 4 lbs).
- availability: see address below

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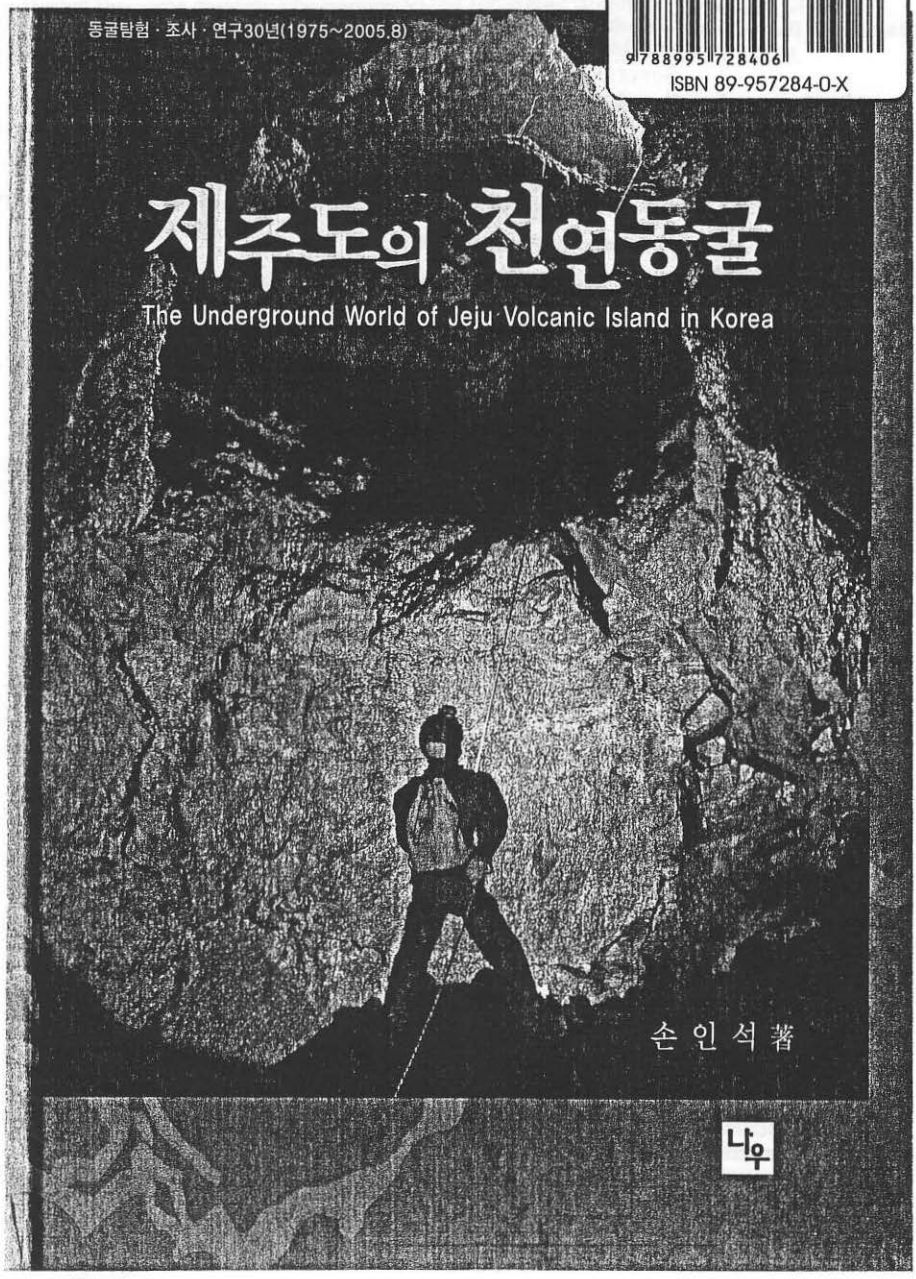
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제주도의 천연동굴
The Underground World of Jeju Volcanic Island in Korea
손 인 석 著
나우

C,

The following pages are all concerned with Bill Halliday and the sudden non-access to the Kilauea Caldera.
Bill supplied this Newsletter with photocopies of all documents sent around to solve the problem.
This ended-up with more than 200 pages, too much to publish.
Several actions have been taken, but when this Newsletter is published (end February) it is not know what the result has been. Bill's E-mail does not answer - it is full .....
But just to give an idea what has been going on - here some of all these documents.

Address until 17 January and after 28 February 2006:
6530 Cornwall Court
Nashville, TN 37205

Address 18 January - 28 February 2006:
101 Aupuni St. #911
Hilo, HI 96720

12 January 2006
Hon. Gale A. Norton
Secretary of the Interior
1849 C St. NW
Washington, D. C., 20240

Dear Madam Secretary: **re: Superintendent, Hawaii Volcanoes National Park**

I hereby request that you instruct the Superintendent of Hawaii Volcanoes National Park, Ms. Cynthia Orlando, to immediately issue me a research permit to complete the last few days of my 11-year study of volcanic caves in Kilauea Caldera. The application number for this field work is #26188.

This extraordinary request is necessary because time is of the essence. The time window for my completion of this study will have closed in about 50 days. This is documented in the enclosed correspondance and attachments thereto. But the Superintendent chose to give me only one week's notice of a new requirement that, according to printed instructions she enclosed, presupposes 90 days' processing time.

This use or misuse of time constraints leading to "default decisions" is a pattern of Ms. Orlando's behavior. On July 28, 2005 she slandered me in a meeting (falsely accusing me of not having submitted a series of reports on previous field work of this project). At that time, she knew that at my age of 79+ (DOB 9 May 1926), I would likely be dead before I could obtain justice in federal court. I didn't even try. I am confident that you know that the National Commission on Risk Assessment and Risk Management repeatedly decried such default decisions.

Ms. Orlando's pattern of behavior has included other attempts to intimidate me (as a white-haired senior citizen) and defamation of respected governmental and private institutions and individuals. During the meeting of 28 July 2005 she described the National Commission on Risk Asssessment and Risk Management as "just a bunch of people who got together one afternoon and wrote something up." I am confident that members of Senator Clinton's staff will assure you that this is not true.

During the same meeting she impugned the respected American College of Chest Physicians by stating forcefully that qualifications of its Fellows (like myself) didn't make any difference in clinical judgment of elevated levels of carbon dioxide (CO_2).

Twice she told the three of us who attended this meeting that we were wasting her time and wholly dismissed highly relevant information we were trying to explain to her. The three of us were:

myself (Honorary President of the Commission on Volcanic Caves of the International Union of Speleology)

Ole Fulks (Chairman of the Hawaii Speleological Survey, a scientific project of the National Speleological Society)

Harry Shick, Jr. (proprietor of Kazumura Cave and long-time field assistant and guide for HSS and University of Hawaii fieldwork in Kilauea Caldera)

Enclosed is a photocopy of notes I made of this meeting, minutes after it ended. In my opinion, no American taxpayer should be treated this way by any government employee. It is my opinion that she would not have dared do so had I been young enough to employ the federal court system to obtain proper redress.

I have repeatedly attempted to develop a win-win outcome of this unfortunate situation, but without success. Ms. Orlando continues to use lame excuses for not allowing me to complete my 11-year study. She continues to dismiss relevant information now favorably reviewed by leading authorities around the world (see enclosures). In addition to providing me the opportunity to complete my 11-year study, you may want to consider transferring her to some other national park where her elder abuse and bulldozer approach to conflict resolution may be more appropriate.

Very sincerely yours,

William B. Halliday

William R. Hallliday, M.D., F.C.C.P., Geological Society of America member # 9053954
Honorary President,
Commission on Volcanic Caves of the International Union of Speleology

cc: IUS
Hawaii Speleological Survey
National Park Service, att. Mainella, Kerbo
American College of Chest Physicians
AARP
Senators Frist, Clinton, Inouye

enclosures

..... this note arrived on 30 Jan. '06 from Bill .....

I have complied with new Park Service requirements for research permits and am awaiting the results.

Also they sent me a draft of some proposed conditions for cave entry in the Caldera which disregard all the medical info I sent them - they woud allow 15 minutes in a cave with 0.5% CO2 and require immediate depart;ure at 1.5%. And also require leaving someone at the entrance "for safety". I have suggested that they change these to comply with medical science. It will be interesting to see what develops.

They also are thinking of requiring all cavers to wear a clip-on continuous CO2 monitor "a little larger than a pack of cards". But I am having trouble verifying that such a monitor exists. I've told them I'll be happy to comply if it exists and is available, and that one per team should be sufficient. Aloha, Bill H.

THE ISSUES

The principal issue is whether hazardous levels of CO2 exist in any or all of the caves I proposed to enter in Summer 2005 and now propose to enter in January and February 2006 in Kilauea Caldera.

Enclosed are maps showing (1) the location of these caves, and (2) the location of caves which my teams entered in the period between 7-16-04 and 4-22-05. Comparison of these two maps clearly shows that the caves I propose to enter in 2006 are similar in distribution to those my teams entered in the specified period in 2004-2005. Observations in Caldera caves in 2004-2005 thus should be relevant to conditions in the caves I propose to enter in 2006.

Between 7-16-04 and 4-22-05 I led 31 trips in the caldera under a wide variety of wind conditions and detected no clinically significant CO2 in any of its caves. Attached is a summary list of wind conditions on field days when members of my teams entered caves. 98 cave entries occurred during this period. In none was a clinically detectable level of CO2 present (about 1% CO2), As a Fellow of the American College of Chest Physicians I have had special training and experience in clinical detection of clinically significant levels of CO2.

It is well documented that healthy adults can and do work in levels of CO2 up to 6%; see attached documentation. 0.5% is the industrial threshold level at which some workers can clinically detect the presence of the gas; this level is not clinically significant. Nearly everyone can detect the presence of CO2 at 1%; this is the level when respiration becomes faster and deeper. 3% is the maximum permissable industrial concentration. This figure provides protection for some workers partially disabled by unrelated lung pathology.

The highest level of CO2 ever detected in a Kilauea Caldera cave was 0.8% in Lava Rise E-3 Cave. A reading over 1% was obtained in the Postal Rift System in 1998, but HVNP Superintendent Jim Martin informed me that the sensor was placed several cm deep in a crack in the wide-open entrance of one of the Postal Rift caves and therefore this reading was not considered relevant to the caves.

The period from 7-16-04 to 4-22-05 is significant because it was part of the time when Kilauea summit CO2 output was significantly elevated. Beginnning 7-16-04, the USGS estimate of total output of CO2 from the caldera increased from a base line of about 8000 tonnes per day to an initial 18,250 tonnes per day. It remained well above 8000 tonnes per day at least through 8-31-05. On 4-22-05 it was 17,400 tonnes per day. As shown on two attached maps, these estimates were based on vehicular instrumental readings along a section of the Crater Rim Drive at the south end of the caldera, along a length of road intersected by the summit emission plume during trade wind conditions. Assumptions inherent in extrapolation of these readings to (1) estimates of daily caldera summit CO2 output and (2) concentrations of CO2 in caves throughout the caldera have not been supplied even in response to a FOIA request. It appears that no detailed description of this methodology and uncertainties and variables in its applications has been published in any readily accessible geological publication.

Temporarily, an additional issue was raised by a CO2 reading of 8% in the USGS' north pit seismometer vault, shown on two of the attached maps. This dangerous, symptomatic concentration was found after an industrial incident in May 2005 in which a USGS employee worked in the vault long enough to exhaust much of its oxygen and develop consequent hypercarbia and hypoxia. No O2 analysis was conducted, but an 8% CO2 in confined work spaces like the vault means a dangerous reduction of O2 concentration to 13% (see Table 3, attached). When volunteer healthy adults entered the vault on two occasions on August 2005, CO2 no longer was detectible clinically. Initially, the new HVO Scientist-in-Charge extrapolated the 8% vault concentration to caves throughout the caldera, temporarily expressing the incorrect belief that they had no natural ventilation. In contrast to the caves, the vault and its steep entrance stairway are lined with masonry. No air movement is detectible at its small entrance at the bottom of this stairway. On one occasion, a soil concentration of 1% CO2 was found near this vault, but it appears that extrapolation of CO2 in and near this vault no longer is part of the issue.

If addition of volcanic CO2 to the vault's atmosphere had been the cause of the worker's symptoms rather than his own respiration, it would have required a dilution to 24% CO2 to produce clinical hypoxia (15% O2), not 8%. See Table 2.

A corollary to the principal issue consists of the unsettled question as to whether extrapolations of CO2 levels should be applied to basements of buildings in the caldera (e.g., the HVNP Visitor Center) if they are to be applied to caves.

Still another issue is whether relevant recommendations of the National Commission on Risk Assessment and Risk Management should have been applied to the announcement about this supposed volcanic hazard, the resulting closure order of 8-1-05 by Hawaii Volcanoes National Park and related events. These recommendations are easily accessed on the web. They include early involvement of "stakeholders", multidisciplinary search for relevant information for decision-making including review of uncertainties, variability and unstated assumptions in methodologies, use of peer review panels when time permits, and avoidance of both default decisions and command-and-control decisions whenever possible.

ANNOTATED INDEX TO ATTACHED DOCUMENTATION

1) Example of erroneous signs placed on trails in Kilauea Caldera in August 2005 as a result of controversial volcanic hazard assessment of 2 June 2005.

2) Statement of issues in this controversy.

3) Map of Kilauea Caldera showing caves to be visited January/February 2006. Base map from USGS Geologic Investigations Series I-2759, by Christina Neal and John P. Lockwood.

4) Narrative of sequence of events.

5) Map of Kilauea Caldera showing caves visited July 4 - March 2005 during period of increased Kilauea summit CO2 output. Same base map as item (3); please compare cave distributions shown on these two maps to verify their similarity. 97 cave entries were accomplished during this period without detection of clinically significant elevation of CO2 in any of them.

6) List of wind conditions during these trips. The new Scientist-in-Charge has asserted that Kona (south) winds are the times when CO2 accumulates in caves in this caldera. See item 29. Please note the number of trips made wholly or partly during Kona winds. No clinically significant elevation of CO2 was detected in any cave during these or any other wind conditions.

7) Map showing principal degassing plumes of Kilauea Caldera during prevailing trade winds. Base map from USGS Open-File Report 02-460. The national park visitor center is located on a well-known platform in the north end of the caldera, where the Crater Rim Drive is shown erroneously in the base map. No plume is shown for Sulphur Banks, Steaming Bluff or the unnamed degassing cracks near the visitor center.

8) Map showing important degassing sites in and near the southern portion of Kilauea Caldera. Base map from USGS Open-File Report 98-462. Note the location of "COSPEC summit traverse", the site of vehicular instrument recordings used to estimate total summit CO2 and SO2 emissions. Most of it is on the floor of the caldera, with a northwestward extension along the rim as far north as the SW rift zone.

9) "Table 1, Effect of CO2 in the cave atmosphere", from George, 1993.

10) "Table 2, Theoretical gas concentrations in cave atmosphere. using scenario 1", from Smith, 1997. "Scenario 1" is dilution of cave air by addition of volcanic CO2. Note that 24% CO2 is required to reduce the oxygen level to dangerous hypoxia (15%).

11) "Table 3, Theoretical levels of gases in cave atmosphere, using scenario 2", from Smith, 1997. "Scenario 2" is replacement of oxygen (usually in industrial incidents) by CO2 in the process of respiration. Note that only 8% CO2 is required to reduce the oxygen level to dangerous hypoxia (15%).

12) Section on CO2 in Sollman's "A Manual of Pharmacology". Note especially page 806: "....even 20% is not dangerous in an hour to animals, and probably not to (healthy, adult) man".... and page 807: ....(carbon) dioxide is solely responsible for the early symptoms (of asphyxia), the dyspnea and distress; but the fatality is due entirely to the oxygen deprivation."

13) Commendation by HVNP Chief of Resource Management dated 1-3-95. More recently HVNP cave managers have requested individual trip narratives instead of formal reports.

14) My application of 6-27-05. No action was taken on this application for more than one month. Note that "One Eye Cave" and others nearby were included by error.

15) Hazard/Risk Assessment of 6-2-05. Note that this was prepared by the new Scientist-in-Charge without peer review or stakeholder input. It was followed by forceful memos and telephone calls to the staff of Hawaii Volcanoes National Park. See below.

16) Moniz-Nakamura memo of 6-6-05. The writer was aware that my teams work in spaces as little as 10 inches high, without room for the bulky monitors cited in the memo. I obtained this memo only recently, as a result of a FOIA request.

17) Moniz-Nakamura memo of 7-13-05 which contains several serious misunderstandings and errors. I obtained this memo only recently, as a result of a FOIA request.

a) Regarding her 1), 5000 ppm sounds like a lot, but is really only the threshold figure of 0.5%.

b) Regarding her 2), I did NOT report feeling symptoms of hypoxia. I reported symptoms of possible hypercarbia, the alternative being a combination of fatigue and mild hyperthermia. The CO2 level was found to be 0.8%, and the cause of the symptoms was the combination of fatigue and mild hyperthermia. In other words, it was a false alarm, and occurred as a result of a commendably high level of suspicion of CO2.

c) Regarding her 3), the cited figure of 1.5% was the result of my faulty recollection; the actual figure was 0.8%. Note the speculation by the new Scientist-in-Charge recorded before any of us looked up the actual record. And even 1.5% CO2 is clinically trivial. See Tables 2 and 3.

d) Regarding her 4), this is utter nonsense, and Don Swanson went out of his way to tell me that he had told the new Scientist-in-Charge that it was "bad science". SO2 is an even heavier gas than CO2 and he did not claim similar pooling of it in caves and cracks in the caldera. Further, increased CO2 in the vault was scenario 2 (see above) and pooling of volcanic CO2 in caldera caves would have been scenario 1. Still further, no clinically significant elevation of CO2 was observed in 97 cave entries in the period when CO2 was increased in the summit degassing plume (see above).

e) Regarding her 5), this also is nonsense. Again, 5000 ppm is only 0.5% which is nowhere near a high level. The door to the vault indeed is wide open, but it is narrow and at the bottom of a steep flight of masonry steps. Unlike the Caldera caves, the vault and stairwell are lined with masonry, and no air movement is perceptible in the doorway, unlike the entrances of most Caldera caves.

18) Kauahikaua memo of 7-6-05. I obtained this memo only recently, under FOIA request. This is a mixed bag.

a) He is correct in applying OSHA standards to workers in industrial workplaces like the vault (and possibly also the basement of the visitor center) where Scenario 2 applies. As he states, there are clear hazards for workers in the vault. It functions as an industrial CO2 trap, with CO2 rising to 8% with worker respiration, and decreasing slowly to its normal low level in August 2005 after workers were excluded. The former ventilation system should be reinstalled, and the high-level CO2 monitor he mentions is commendable there. But this has nothing to do with my application.

Please note that OSHA standards are industrial standards designed for protection of American workers in general, and thus contain a considerable safety factor to protect workers with pulmonary function impaired by other factors.

On the other hand, Tables 2 and 3 were developed for healthy adults who do not need such additional safeguards. Further, ethicists point out that, because of the element of compulsion inherent in the employer-employee relationship, volunteers ethically may accept a higher level of risk than may employees. See for example, "Of Acceptible Risk", by William Lowrance.

b) as indicated above, he is not correct in applying OSHA standards to:

1) volunteers like our HSS teams,

2) Scenario 1 conditions such as any caldera caves with increased volcanic CO2,

3) caldera caves with no clinically detectible CO2 (less than about 1%).

c) he is not correct in his statement about CO2 readings in "Postal Rift Tube" in 1998. Former Superintendent Jim Martin told me that the 1+% reading was obtained by inserting the sensor into a degassing crack in a wide-open entrance of the Postal Rift System, where the 1+% concentration was immediately diluted and dissipated. Because of this, he took no action when it was reported to him, and no sample was taken back to HVO for analysis.

d) he is correct about the components of "a rigorous CO2 hazard assessment" in caldera caves. However, a clinical CO2 hazard/risk assessment can be accomplished much more easily and at no cost by allowing healthy adult speleologists to continue to breathe the air of the caves they are studying.

e) the html website he cites is British, and it is not clear how broadly it is accessible.

f) please note that he does not specify the concentration of CO2 which would be "acceptible" to him. This is part of the problem.

g) I request your special consideration of whether the documentation supplied here meets the standards which he specified in his last paragraph for safety in Caldera caves.

19) Summary of 18 July 2005 meeting with Jim Kauahikaua and two HVNNP archeologists.

a) Please note that his refusal to perform gas analyses in any cave affected by his hazard assessment has been criticised by the IUS Commission on Volcanic Caves.

b) Please note that he subsequently reversed himself on his points 3(2) and 3(3).

c) Regarding speleological studies in 6% CO2, please refer to Tables 2 and 3 and to the Howarth-Stone article included herewith.

d) Regarding point 5, please note that he subsequently declined to provide this information in volumes percent or in ppm. He provided it only in estimated tons per day.

20) Orlando memo 7-29-05.

Please note that the mention of "unauthorized cave entry taken in June" refers to University of Hawaii-NASA biologists and that they were authorized by the Park's Dispatch Office. No page of that office's log was furnished in response to a specific FOIA request; it is not clear whether this page has been destroyed. The significance of this incident is that it is one further demonstration that the caldera caves are clinically free of clinically significant CO2 despite the increase in total summit degassing.

21) Kauahikaua memo 7-29-05.

I obtained these two memos of 7-29-05 only recently, by FOIA request. Please note use of the term "spelunker", widely considered demeaning. And his insistence that the vault is a cave reveals his lack of understanding of basic speleological principles. Note the differences cited above.

Concerning the seismometers going nuts, the vault has been open to the public for years and has been visited by many hikers on the Uwekahuna trail which passes beside it. Don Swanson long ago assured me that USGS staff could easily differentiate footsteps from seismic events.

22) Orlando letter of 8-1-05.

Please note the hollow assurance of possible completion of my project at some indefinite date should CO2 emissions return to acceptible levels and remain constant. Neither the new Scientist-in-Charge nor the new Superintendent of HVNP has been willing to specify any level which would be acceptible to them.

For the harassment inherent in "personal monitoring equipment", please see item 16 above.

23) 11 August 2005 letter to the new Scientist-in-Charge.

Please note (on page 3) the existence of highly relevant data highly accessible to him. Clearly he made no use of this in his volcanic hazard assessment and I am unaware that he has ever consulted it. In my opinion, this is negligence.

Subsequent to this letter, he abandoned his assertions that (1) caldera caves are not well ventilated and (2) that there is no compartmentalization of degassing in the caldera.

24) Published version of e-mail from Commission on Volcanic Caves to the new Scientist-in-Charge, criticising his unwillingness to perform gas analyses in any cave affected by his hazard analysis. He has ignored this.

25) 22 August 2005 letter to the new Scientist-in-Charge.

This reported that the air in the vault had returned to clinically insignificant levels in August 2005. It also renewed my request for CO2 concentrations used to formulate daily estimates of summit CO2 degassing.

26) Alan McNairie article in Hawaii Island Journal. The article is a forthright discussion of very real dangers in caldera caves which we have encountered and overcome in our decade of investigations. Please note that it was written before I obtained the above documentation on cave studies in 6% CO2. Otherwise his statement would have ridiculed the CO2 assessment - and properly so.

27) My letter of 9-16-05 to the new Scientist-in-Charge, seeking a win-win outcome.

28) My report to HVNP on our 8-28-05 surface trip, returned to me in compliance with a FOIA request (the only one of five such 2005 reports which was part of the response).

The return of this report indicates that the staff at HVNP knew that the CO2 level in the vault had returned to subclinical levels.

The lack of return of the other four reports may indicate that many of these reports are being discarded rather than filed. In a meeting on 28 July 2005, the new Superintendent of HVNP falsely accused me of submitting very few reports on all the years of these studies, and former Superintendent Jim Martin told me that all the cave reports he had filed in his years as Ranger at the Park had been removed. However file copies of our Kilauea Caldera studies still existed in HSS files at HVO as of 8-29-05.

29) Undated letter received 9-29-05 from the new Scientist-in-Charge. As it refers to my letter of 9-16-05, it must have been written in the last half of September 2005. The imprint of the postal meter was illegible.

This condescending letter proposed two courses of action which would have taken more months or years than I have left, at my age of 79. Otherwise it is a stonewalling repetition. It lectured me on winds in the caldera, which I have been studying for years, and proposed Kona (south) winds as being conditions especially likely to trap CO2 (but not SO2) in caldera caves. See item 6 above.

It also asserted that the vault's former ventilation system was because of heat, not CO2. I have been unable to find anyone else who can recall any abnormal heat in the area of the vault, but we have observed other areas in the caldera which heat up and cool down, so this must be given the benefit of the doubt.

It also referred to necessarily abiding by federal standards. But it cited a British website in support, and wholly ignored the federal standards for risk assessment promulgated by the National Commission on Risk Assessment and Risk Management. In my opinion, had he complied with these federal standards, this controversy never would have happened.

It also lectured me on pulmonary physiology, a medical field in which I have much special training and experience. Clearly this letter was not designed to seek a win-win outcome

30) My letter of 1 October 2005 in response.

In retrospect, it is easy to see that the above undated letter annoyed me. In response, I submitted several FOIA requests. I also requested that he appoint a Deputy Scientist-in Charge authorized to take action during the long periods when he is away from HVO. Also I requested that he appoint a peer review committee to consider the issue. These requests were mostly ignored. See below.

31) 10-31-05 letter from USGS FOIA Officer, demanding $250 down payment for the information requested in my letter of 1 October 2005. I interpreted this as attempted intimidation. All individual responses to my FOIA questions were evasive and meaningless and some were ignored.

32) My 9 November 2005 letter to Senator Bill Frist. This letter was written before I was able to develop information on my 97 entries into Kilauea Caldera caves during the time the daily summit CO2 and SO2 output estimates supposedly were at dangerous levels, and the wind conditions during those visits.

Among the many supports for the work by Bill Halliday was also this letter .....

Dear Ms. Loh:

This letter is to support the application by Dr. William Halliday to complete his study of lava tubes on the floor of Kilauea caldera. I have known Dr. Halliday since the early 1970s when he supported my research on lava tubes at NASA-Ames Research Center. His contributions then and in subsequent years have enabled an understanding of the role of lava tubes in the evolution of the surfaces of the Moon, Mars, and Venus. Dr. Halliday's current work in Kilauea is particularly important for our analysis of new high resolution data for the giant volcanoes on Mars, both for geological context and as potential habitats for life on that planet.

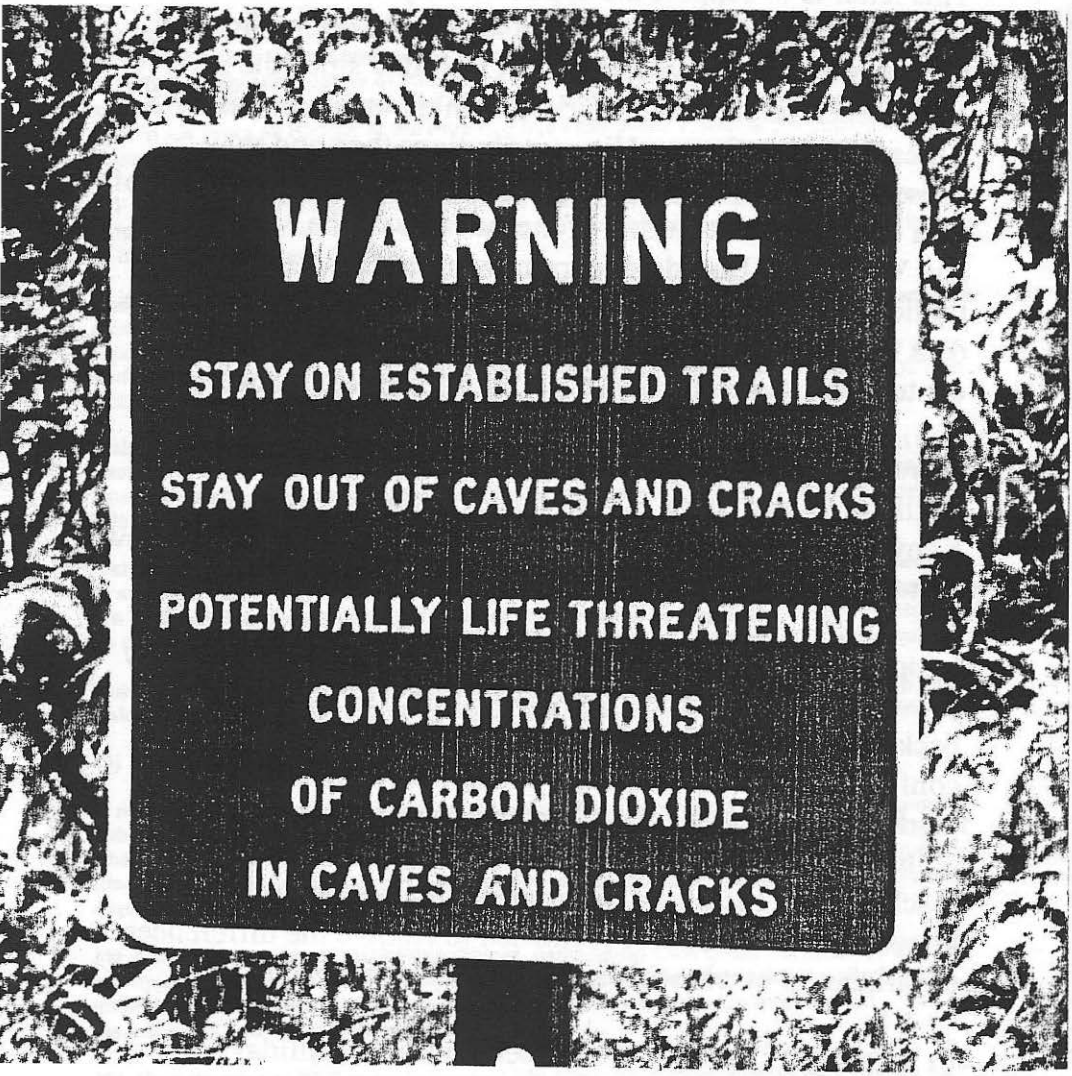
I have had the good fortune to conduct field work with Dr. Halliday in lava tubes in many parts of the world, including Kenya and the Canary Islands, as well as in Hawaii, and know him to be a careful worker, both for science and safety.

I understand that there is an on-going debate about the safety of working in his project area. Given Dr. Halliday's medical background and safety record of decades of field work, I am confident that he would not foolishly carry out unsafe field work. However, because of the apparent polarization of opinions regarding his applications, should an impasse be reached, then I strongly recommend that an impartial, knowledgeable group be identified to resolve the differences of opinion to reach a fair and judicious conclusion.

In summary, I strongly recommend that Dr. Halliday be permitted to complete his study.

Sincerely yours,

This letter was sent by Ronald Greeley, Regent' Professor, director of NASA Regional Planetary Image Facility.


WARNING
STAY ON ESTABLISHED TRAILS
STAY OUT OF CAVES AND CRACKS
POTENTIALLY LIFE THREATENING
CONCENTRATIONS
OF CARBON DIOXIDE
IN CAVES AND CRACKS


Jeju Island Cave Research Institute
사단법인제주도동굴연구소

MISSION STATEMENT

of the UIS Commission on Volcanic Caves

The Commission on Volcanic Caves is an integral unit of the International Union of Speleology and upholds the high standards of its parent organization. It meets during international congresses of speleology, during international and regional symposia and all appropriate occasions. It solicits and approves sites for such symposia, held to date in the USA (2x), USA-Hawaii, Italy (3x), Japan, Spain (Canary Islands) and Kenya.

The basic mission of the Commission is to advance the scientific exploration, study, and preservation of lava tube caves and related features in volcanic rock, throughout the world. It seeks to bring together all persons, organizations, and agencies with legitimate concerns with volcanic caves, their features, and their environments. Its members are leading vulcano-speleologists from each country or area with especially important lava tube caves or related figures. Members are expected to keep the Commission informed about progress and problems in vulcano-speleology and to disseminate vulcano-speleological information to other speleologists in their country or study area.

The Commission collects and disseminates information through its Newsletter, through sponsorship of internal symposia and conferences and through exchange visits, through meetings of its Chairman/President with individual Commision members and cooperators, and through data compilation in a world data base on lava tube caves at Arizona State University (USA). Currently this world data base contains information on more than 2000 lava tube caves in 40 countries. Further, the Commission provides reports and recommendations to national and regional organizations as the American Geological Institute. Its Newsletter is published at least two or three times each year. In addition to current information it contains reports and abstracts. It is archived at two U.S. Geological Survey libraries, in the UIS library (Switzerland and is abstracted in Volcano Quarterly.

The Commission intends to continue and expand all current projects. Especially it intends to expand its cooperation (as requested by the UIS Committee during the XII-th International Congress of Speleology in Switzerland - 1997) with other Commissions and Working Groups of the International Union of Speleology and with national and regional speleological organizations working in the field of vulcano-speleology.