

## SCIENTIFIC MEANING OF 2002 SAMCHEOK INTERNATIONAL CAVE EXPO

Kyung Sik Woo

Cave Research Institute of Korea, Kangwon National University

### Introduction

When I was first told that the Samcheok City was going to have an international cave exposition a few years ago, I was pretty skeptical about this event because I could not understand what could be exhibited in a CAVE EXPO. In fact, not many cave scientists are actively working in Korea at that time, thus we simply did not have enough international collection on caves. Even though I have investigated some wild caves and a few show caves in Korea past 15 years, I did not think that I had enough information to provide enough material for the big exhibition centres planned for International CAVE EXPO. Several people came to my office to discuss and plan for the EXPO exhibition in the spring 2001, and I began to realise that this EXPO was not just to be a temporary event but it could make a significant scientific contribution to many young students and cavers as well as cave scientists in the world as well as to the general public.

As soon as I started to collect the data on wild and show caves from all over the world through the web, I began to worry about the preparation of materials because there were too many caves (also too many kinds) in the world of which I was not aware. I was very pessimistic that there was no way for me to collect photos and other data on caves in the world within less than a year. Korean people do not have enough experience in the construction of scientific exhibition centers. Most of the people who were involved in the construction of the exhibition center considered that the shape, design and size of the building, the quality of opening or closing ceremonies and the profits of the EXPO were the most important items. I was really hesitating at that time whether I should take this project or not, because I knew that I had only seven to eight months to prepare everything that should be displayed at the EXPO. Even though I felt that it was not physically possible, I decided to take this mission, not because I felt that I could do the job, but because I knew that somebody had to do it for the EXPO, and it had to be me.... At that time, I could not think of anybody else that I can shuffle off the duty on to! Therefore I decided to take this project on in June 2001, and went to the United States of America to collect data.

Probably, it was one of the busiest periods of my life from July of 2001 to August of 2002. I began to travel all over the world from USA to Brazil, the

Czech Republic, Slovakia, Hungary, Austria, Slovenia, Italy, Spain, Switzerland, Australia, Indonesia, Vietnam and Romania. I could meet many scientists and cavers, most of whom were willing to provide their invaluable data for the EXPO. Also, I felt quite lucky in that I would make many friends from the trips and would develop close relationships with the cave scientists and managers.

I flew to Hawaii with two of my graduate students on 29 June, and visited several lava tubes such as Ka'eleku Cavern, Kula Kai Cavern, Thurston Cave and Hawaii Volcano National Park. Chuck Thorne at Ka'eleku Cavern and Ric Elhard at Kula Kai Cavern willingly provided me with some of their photographs. We went on to Seattle to visit Ape Cave, Mt Rainier and Mt Saint Helens. We drove down to Oregon and visited Lava River Cave and National Forest Department. At the Oregon-California border, we visited Oregon Caves National Monument and Lava Beds National Monument in California. Roger Brandt at Oregon Caves National Monument helped us to visit the cave and Kelly Fuhrmann at Lava Beds National Monuments provided us with many nice photos of the lava tubes. We flew to Arizona to visit the Kartchner Cavern. Kenneth Travous and Ellen Bilbrey at the Arizona State Park lent us the BETA film together with some slides. At Phoenix, Bob Zimering and Tracy Stump guided us to the Onyx Cave. We flew to El Paso and drove to Carlsbad to visit the Carlsbad Cavern. T. K. Kajiki and Bridget Eisfeldt kindly provided the BETA film on Carlsbad Cavern with some slides.

After that, I went to Brazil to attend the UIS meeting. At that meeting, I met many cave scientists and cavers and asked for help. I met Dr Paolo Forti from Italy who kindly lent me his original slides of Italian caves. He also made an arrangement for me to use two BETA films from Italy later on. Elizabeth Winkler from USA kindly sent some of her slides to me later. Also, Dr J. Ueno, a Japanese cave biologist, kindly sent me some slides (actually Dr Sone Shinzabro's photos) later. I met Mr Goto and Miss Kobayashi at the meeting and asked them to come over to Korea during the EXPO. They did participate in the EXPO together with many of their colleagues. Dr Derek Ford from Canada provided me with some slides and kindly carried out the dating of the speleothems in Korea for the EXPO. Dr Lin Hua Song from China promised me to send some photos of Stone Forest, and he kept this promise later. Many

people were interested and amazed (?) about the EXPO, and they were willing to help me out.

I went back to USA to attend the National Speleological Society annual meeting. I visited the American Cave Museum and Dave Foster (who is a honorary citizen of the Samcheok City) provided very precious photos and guided me to the Horseshoe Cave and Diamond Cave. At the NSS meeting, I met Dave Bunnell, Peter Jones and Ann Bosted who provided many of the beautiful photographs from all over the world. David Socky also sent me some of his films later on. I met some cavers from Saudi Arabia (John Pint and Mahmaud Alshanti). They sent me some of their photos later. I also met Rick Olson from Mammoth Cave National Park, and he brought some slides for me. This was a wonderful reunion, as he worked at the University of Illinois at Urbana-Champaign when I was a graduate student there. After the meeting, I visited the Natural History Museum in Cincinnati as there was a special section on caves.

After I came back from this long trip I went to Europe. At the time, I did not have any information or slides on ice, gypsum or halite caves. I arrived in Prague (Czech Republic) and met Dr Pavel Bosak. Dr Bosak kindly arranged several meetings and visits to some caves in the Czech Republic, and also introduced me to several people in Slovakia and Hungary. I visited the Moravian Karst including Konepruske Cave and the Beroun Museum with Pavel Bosak, and visited Sloupsko-sosuvské Cave and Punkevní Cave near Blasko later. After that I drove down to visit Slovak Caves Administration, and met Jozef Havac and Peter Gazik. Peter Gazik kindly arranged the visits to several show caves in Slovakia and visited a few museums that I thought were very fine. Lubica Nudzikova guided us to Denanouske Cave, Dorsinska Ice Cave and Dotuca Cave. Slovak Caves Administration kindly provided some high-resolution files of the caves in Slovakia later. We went to Hungary, and visited Baradla Cave and Rakoczi Cave with Kinga Szekely and Tolnay Zsuzsa. At Buda, we met Katalin Bolner who kindly guided us to the Szemlohegy Cave.

In Austria, without knowing anybody, we drove to the Dachstein Ice Cave, following the map that Dr Trimmel had drawn for me in Brazil. I went to the management office and explained about the EXPO to the director Siegfried Gamsjäger who then provided some slides of ice caves. We drove on to Slovenia to visit Postojana and Skocjan Caves. Gordana Beltram, whom I met in the UNESCO-IUCN meeting at Mulu in May 2001, kindly arranged the visits. At the Postojna, Alojz Crnigoj and Ivan Vekar provided us with the BETA film and other materials for the EXPO. Albin Devevic at the

Skocian Cave provided some of the beautiful photos later.

Then we went on to Italy and met Dr Paolo Forti. He kindly showed his book collection and took us to several gypsum caves in Bologna. I am very grateful to Dr Forti for his bringing some invaluable books and other historic items for the exhibition of the EXPO. We visited the Onferno Cave and Dino Scaravelli kindly showed us the museum and the Onferno Gypsum Cave. Then, we drove to Frasassi Cave having made prior arrangements with Dr Arrigo Cigna. We met the president of the Frasassi Cave and Renata Marinelli who kindly guided us through the Frasassi Cave. Onwards to Spain where we met Dr Jose-Maria Calaforra who guided us to several gypsum caves in Sorbas. I feel particularly grateful to Jose-Maria Calaforra as he flew to Barcelona to show us some halite caves in Cardona. Ferran Cardona also kindly lent us some of his nice slides of halite caves.

In late August, I decided to visit Switzerland to attend the sedimentological conference held in Davos. In the meeting, I met Fadi Nadar, who is a caver from Lebanon. I visited St. Beatus Cave and a small museum in Interlaken. Han Schild, who was a director at the St. Beatus Cave, guided me to the cave. I visited the Col-des-Roches Cave with Roman Hapka and Fadi Nadar. Then I visited Speleo-Projects and met Urs Widmer.

After two long trips, I was trying to sort out the material I had from many people, and I did not have enough information on cave animals.

I sent emails to Andy Spate and Elery Hamilton-Smith saying that I would like to visit Australia. When I arrived in Sydney with Mr Yong-gun Choi, Andy Spate already made all the arrangements for us. He took us to the Hilltop Sandstone Cave where I met Annalisa Contos who brought a few nice photos from the Nullarbor. Andy then took us to the Blue Mountain National Park including Jenolan Caves. Andrew Fletcher, whom I had met in Mulu, Malaysia, gave me some slides of Jenolan Caves. Stephen Reilly kindly guided us through some of the Jenolan Caves. Then Andy then took us on to the Wombeyan Caves where Mike Chalker showed us to the caves.

Mr Choi and I flew to Melbourne, and Dr Elery Hamilton-Smith took us to some lava tubes in Victoria. Ken Grimes guided us through several lava tubes. We all went on to Naracoorte Caves. Brian Clark and Steven Bourne showed us to several limestone caves. Later, Steven Bourne sent interesting photos of the Naracoorte Caves. We returned to Melbourne and then flew on to Perth. There, Mr Choi and I met Dr Bill Humphreys and

Douglas Elford. They were kind enough to send us very important photos of cave creatures many of which were used for the EXPO.

In February 2002, I visited Halong Bay to take photos of the wonderful tower karst. Mr Tuan, Director of Halong Bay, guided me to the several caves around the Halong Bay. My last trip was made to Romania in May 2002. I attended the TAK (Theoretical and Applied Karstology) symposium and am grateful to many cavers and karst scientists who helped to collect information on Romanian caves.

## **2. Exhibition Halls in the EXPO**

In the EXPO, four exhibition centers were constructed, two of which are permanent exhibitions. These are the Cave Mystery and Cave Exploration Halls.

The Cave Mystery Hall includes displays that show:

- Definition of natural caves,
- Classification of caves,
- Formation and speleothems of limestone caves,
- Karst features in limestone and non-limestone areas,
- Micro-topography within limestone caves,
- Meaning and value of caves,
- Beautiful caves in the world,

## **3. Acknowledgements**

I would like to show the list of countries and caves that are shown at the exhibition halls. The photographs used for the EXPO are from all over the world. Andy Spate in Australia kindly spent much

The caves and countries shown at the EXPO are as follows:

Antarctica; Ice cave

Australia; Jenolan Caves, Barralong Cave, Abercrombie Cave, Thylacine Hole, cave animals

Austria; Dachstein ice cave

Bahamas; Coral reef

Brazil; Quartzite cave (Araras Hole)

Canada; Polje

China; Tower karst in Guilin, tower karst in Stone Forest, limestone cave in Guilin

Czech Republic; Konepruske Cave, Balcarka Cave, Teplica Sandstone Cave, Javoricko Caves, Katerinska Cave, Sloupsko Cave

Hungary; Rakoczi Cave, Szemlohegy Cave

Indonesia; Cone karst

Iran; Halite cave

- Cave formations in gypsum, halite and ice caves,
- Formation and speleothems in lava tubes,
- Formation of sea caves,
- Cave and man,
- Color of speleothems,
- Special speleothems,
- Texture of speleothems,
- Cave environments,
- Definition, characteristics and evolution of cave creatures,
- Cave food web,
- Paleolithic cave sites in Korea,
- Conservation of natural caves,
- Stories and legends about caves,
- Scientific meaning of caves, and
- Special corner on bats.

In Cave Exploration Hall, the dioramas of limestone cave, lava tube, gypsum cave, sea cave, ice cave, sandstone cave and halite cave were reconstructed. Also, archaeological evidence such as cave painting, bas-relief and other portable accessories that were found in caves from many countries are shown. There was a "Guinness" corner, which showed many unique characteristics of some caves in the world such as the longest cave in the world, the largest chamber in the world, the largest passage in the world, etc.

time correcting English translations. Dr Bin Li and Yunqui Xie translated the titles in Chinese and Dr Sang Hoon Han in Korea translated material into Japanese.

Italy; Buco dei Buoi gypsum cave, Frasassi Cave, Novella Gypsum Cave, Santa Barbara Cave, San Giovanni Limestone Cave, Paradise Cave, Valdemino Cave, Spipola Gypsum Cave, cave animals

Jamaica; Jackson's Bay Cave

Japan; Limestone caves in Akiyoshi-dai, doline, limestone caves in Okinawa, cave animals

Korea; Kwaneum Cave, sea cave in Woo Island, Dangcheomul Cave, Gosu Cave, Yongyeon Cave, Yongdam Cave, Hwanseon Cave, Okgye Cave, Chodang Cave, sea cave in Jeju Island, Manjang Cave, Jeonnyeo Cave, Chogiwat Cave, Seodae Cave, Seopdong Cave, Gossi Cave, Namdae Cave, Dongdae Cave, Baegryeong Cave, Eden Cave, Hwaam Cave, Seongryu Cave, Dongryong Cave, Samil Cave

Malaysia; Deer Cave, Great Cave and other limestone caves in Borneo

Mexico; Limestone cave

New Zealand; Waitomo Cave and other limestone caves in Waitomo area

Russia; Geophysicheskaja Cave, Promedzutochuaja limestone cave, gypsum cave

Saudi Arabia; Limestone caves

Slovakia; Domica Cave, Gombasecka Cave, Ochtinska Aragonite Cave, Dotuca Cave, Domonovska Cave, Dobinska Ice Cave

Slovenia; Scocjan Cave

Spain; Karst in Sorbas, Karst in Cardona, halite cave, gypsum cave

Switzerland; St. Beatus Cave, Col-des-Roches Cave

Vietnam; Halong Bay

U. S. A.; Crystal Cave, Diamond Cave, Virgin Cave, Konawater Cave, Carlsbad Cavern, Subway Cave, Lechuguilla Cave, Onyx Cave, Slaughter Canyon Cave, sea caves in California, Sea Lion Cave, Valentine Cave, Emesine Cave, Kula Kai Cavern, Hana Cave, Roppel Cave, New Mexico Cave, other lava tubes in Hawaii

Numerous scientists, cavers and photographers from many organisations of many countries kindly donated their slides or photographs. Dr Paolo Forti brought precious antique books for this EXPO. Without their help, it would not be possible to complete the exhibition. I really would like to show my deep appreciation to the following donators.

Austria; Siegfried Gamsjager (Dachstein Cave)

Australia; Andy Spate (ACKMA), Douglas Elford & Bill Humphreys (Western Australian Museum), Steve Bourne (Naracoorte Caves), Peter Rogers (Monash University)

Canada; Derek Ford (McMaster University)

China; Bin Li (Karst Institute of China), Lin Hua Song (Chinese Academy of Sciences)

Czech Republic; Petr Zajicek, Jiri Bruthans, Josef Wagner

Italy; Paolo Forti (University of Bologna), L. Donini, F. Testi, F. Facchinetti

Japan; Tadashi Kuramoto (Akiyoshi-dai Museum), Heisabro Yamauchi, Sone Shinzabro

Korea; Kyung Sik Woo, Yong Keun Choi, Mi-Young Hong, Byung Jin Choi, Yoong Jo Lee, Jong Hwan Ahn, Bo Kyoon Ko

Malaysia; Chan Koon Lim (Wildlife Conservation Society)

New Zealand; Dave Smith (Department of Conservation)

Russia; Bulat Mavlyudov (Russian Academy of Sciences), Remy Wenger

Saudi Arabia; John Pint (Saudi Geological Survey)

Slovakia; M. Elias

Spain; Ferran Cardona (Caver)

Ukraine; Alexander Klimchouk

United Kingdom; Tony Waltham (Nottingham Trent University). Paul Bahn, Ian Glover (University College London), Chris Wood (Bournemouth University)

U. S. A; Dave Bunnell, Peter Jones, Ann & Peter Bosted, John MacGregor, Elizabeth Winkler (National Speleological Society), Robert Ginsburg (University of Miami)

As follows is a list of organisations that kindly supplied their films and photographs.

Carlsbad Cavern National Park, USA

Frasassi Cave, Italy

Hawaii Volcanoes National Park, USA

Jenolan Caves, Australia

Kartchner Caverns State Park, USA

Ka'eleku Cavern, USA

Kula Kai Caverns, USA

Lava Bed National Monument, USA

Park Scocjan Caves, Slovenia

Postojna Cave, Slovenia

Sea Lion Cave, USA

As follows is a list of people who helped me to collect invaluable information during my visit to many countries in the world.

Austria; H. Trimmel

Australia; Elery Hamilton-Smith (ACKMA), Ken Grimes (Regolith Mapping), Brian Clark, Steven Bourne (Naracoorte Caves), W. F. Humphreys (Western Australian Museum), Annalisa Contos

(University of Sydney), Geoff Gillard, Stephen Reilly, Geoff Lang (Jenolan Caves), M. Chalker (Wombeyan Caves)

China; Xie Yunqiu (Institute of Karst Geology)

Czech Republic; J. Hromas, M. Janicek, D. Biolkova (Agency for Nature Conservation and Landscape), I. Jancarikova (Beroun Museum)

Hungary; K. Szekely (Ministry for Environment), Gabor Salamon, T. Zsuzsa (Aggtelek National Park)

Italy; Renata Marinelli (Frasassi Cave), Dino Scaravelli (Onferno Cave), Arrigo Cigna

Japan; J. Ueno (National Science Museum), N. Kashima (Ehime University), S. Goto (Tokyo Speleo Club), K. Ayumi

Korea; S. L. Choi (Eden Cave), (Interocean), Sang Hoon Han, Jae Don Lee

Lebanon; F. Nader (UIS)

Russia; Vadim Doljanski

Saudi Arabia; Mahmoun Alsharti (Saudi Geological Survey)

Slovakia; P. Gazik, L. Nudzikova, J. Hlavac (Slovak Caves Administration)

Slovenia; T. Slabe (Karst Research Institute), F. Drole (Karst Research Institute), A. Crnigoj

(Postojinska Cave), I. Vekar (Postojinska Cave), A. Debevec (Park Scocjan Caves), Gordana Beltram (RAMSA)

Spain; Jose-Maria Calaforra (Univ. of Almeria), J. R. Gonzales (Art-SAL)

Switzerland; R. Hapka (UIS), U. F. Widmer (Speleoprojects), Hans Schild (St. Beatus Cave), P. Deriaz (Swiss Speleological Society)

Vietnam; N. V. Tuan (Halong Bay)

USA; David Foster (American Cave Conservation Association), Ray Keeler, David Socky, Tracy Stump, Bob Zimering (National Speleological Society), Richard Toomey (Kartchner Cavern), Ellen Bilbrey, Ken Travous (Arizona State Park), Gary Berdeaux (Diamond Caverns), H. Carle, Rick Olson, Vickie Carson (Mammoth Cave National Park), Bob Jenson (Lava River Cave), Roger Brandt (Oregon Caves National Monument), T. K. Kajiki, Bridget Einfeldt, Dale Pate (Carlsbad Cavern National Park), Kelly Furhmann (Lava Bed National Monument)

#### **4. Conclusions**

2002 Samcheok International Cave EXPO was the first EXPO on cave and may be the last one in the world. This EXPO will be held from July 10 to August 10, 2002, however, this cannot be regarded as a temporary event because there will be two permanent exhibition halls. As a scientist who was in charge of collecting all the materials for the EXPO, I would like to make a few suggestions.

1. The permanent exhibition halls have to be managed properly after the EXPO. The panels and other data should be updated regularly. All the people in the Samcheok City have to regard the permanent exhibition halls as the educational centres in the future, not just attractive places for tourists.
2. The Samcheok City seriously has to consider whether to hire cave scientists to maintain the exhibition halls properly. All the information

displayed in the exhibition halls needs to be better explained scientifically to the tourists, especially young students, in the future.

3. This EXPO should be a starting point for all Korean people in should regard natural caves as invaluable natural heritage that requires protection.
4. The Samcheok City, as well as other provincial governments, who manage show caves, should be more concerned about the management of show caves in the long run. The show caves in Korea should be better protected based on the systematic scientific investigation.
5. Finally, I hope that this EXPO will be a turning point for the growth of the cave scientific community and the expansion of cave sciences in Korea.