# WACOM ABSTRACTS

Proceedings of 12th Conference on the AWT, 1979

| | SUNDAY 31/12/78 | MONDAY 1/1/79 | TUESDAY 2/1/79 | WEDNESDAY 3/1/79 | THURSDAY 4/1/79 | FRIDAY 5/1/79 |
|---|---|---|---|---|---|---|
| 0900 | | REGISTRATION | Poulter | Gillieson | .Bunton Hamilton-Smith | A.S.F. |
| 0930 | | A.S.F. | Davey | Williamson | Pavey | COMMITTEE |
| 1000 | | COMMITTEE | Hart | Lowry | Smith | MEETING |
| 1100 | | MEETING | Michie | Gillieson | Matthews | # 2 |
| 1130 | | # 1 | Webb | Williamson & Bell | Warrild | DEPARTURE |
| 1200 | | | Hart | Davey / Bell | Robertson | FOR FIELD |
| 1230 | | | Hamilton-Smith | Dunkley | | TRIPS |
| 1400 | REGISTRATION | OFF. OPENING | Paisley | SPELEO | Ikin & Campbell | |
| 1430 | DESK | Davey | Bateman | SPORTS | Goede | |
| 1500 | OPEN | Pure | White | | Frank | |
| 1600 | | ~~Spate & Ward~~ Ney Hart | WORKSHOP # 3 | | Peter Brown | |
| 1630 | | Michie | (SRT) | | | |
| 1900 | NEW YEAR'S EVE | WORKSHOP # 1 (GEN. HARDWARE) | | BARBECUE SLIDE COMPETITION RESULTS | CONFERENCE DINNER | |
| 2100 | BARBECUE | WORKSHOP # 2 (S & R) | WORKSHOP # 4 (MAP. & DOC.) | | | |

WACCON TIMETABLE

CONTENTS

TECHNIQUES AND EQUIPMENT - Thursday, 4 January 1979



BIOLOGY, PALAEONTOLOGY AND ARCHAEOLOGY

# CAVE CONSERVATION AND MANAGEMENT

## MONDAY, 1 JANUARY 1979, 2.30 - 5.00 p.m.

### THE FUTURE OF AUSTRALIA'S CAVES

Adrian Davey

The conservation status of Australia's karst resources is reviewed in the context of three main themes: planning, management, and use.

Discussion of planning problems centres around the land use conflicts affecting caves and karst features, and the adequacy of decision-making processes. Examination of management problems will look critically at the level of management in cave areas, and questions of legislative and practical protection.

One of the most difficult challenges in karst conservation is to reconcile use of caves with their conservation; some of the most serious and insidious of the damage being done to our scarce cave resources is caused by cavers and speleologists.

### CAVE CONSERVATION IN AUSTRALIA : FIGHTING FOR THE IMPOSSIBLE

Glenn Pure

An examination will be made of problems facing cave conservation in particular and conservation generally in Australia. Attention will be focussed on avenues open to conservationists for tackling issues and their effectiveness. Some discussion will centre on the lack of access to the courts and exclusion from governmental decision-making processes which face many Australian conservation issues today. Examples will be cited where possible. A comparison with the United States will be made.

In conclusion, there appear to be some promising trends appearing on the Australian scene although the overall situation is still pretty poor.

### THE BLACK SPELEOTHEMS OF JERSEY CAVE, YARRANGOBILLY

A.P. Spate and J.K. Ward

Black to grey flowstones and other speleothems occur commonly in Jersey Cave and, to a lesser extent, in other tourist caves at Yarrangobilly. Preliminary investigations indicate a carbonaceous nature for the material that produces the dark coloration. The deposits occur both as a surface layer and deep within the calcite masses. An account is given of the investigations into the nature of these deposits and hypotheses are advanced for the mode of formation. Reference is made to the possible impact of cave visitors on the quality of speleothem appearance at Yarrangobilly.

### ENVIRONMENTAL MONITORING IN CAVES : PART 1

Neville Michie

This paper discusses a number of the measurements that are made of factors affecting the micro-climate and chemistry of caves.

# CAVE CONSERVATION AND MANAGEMENT

## TUESDAY, 2 JANUARY 1979, 9.00 a.m. - 1.00 p.m.

### RESTORATION, STABILISATION AND GATING OF THE CHRISTMAS STAR EXTENSION OF CRYSTAL CAVE (WI 62), WITCHCLIFFE, W.A.

Norm Poulter

Crystal Cave WI 62 is located in the Witchcliffe region of the Leeuwin-Naturaliste Ridge some 290 km south of Perth, W.A.

The Christmas Star Extension was first entered in 1968 and by 1972 considerable sand-staining damage had occurred to the flowstone floor throughout the Extension despite the use of plastic pathway. Most damage was around the clothes-changing area where a sand bank had been spread across the floor and into a dry crystal pool.

During 1973, SRGWA undertook a major restoration program in the Extension consisting of scrubbing the floor, laying new pathways and the construction of several walls.

Time out was taken through the program to stabilise the entrance area where a strategic rock, if dislodged, threatened to initiate a major rockslide.

At a later date a gate was installed over the entrance to the Extension.

This paper will describe the restoration methods, design and construction of various walls as well as the design and construction of the gate.

### RESOURCE MANAGEMENT OF THE NULLARBOR CAVES

Adrian Davey

This paper will review the remarkable resources of the Nullarbor, especially of the caves, and identify some of their values. The challenge of achieving conservation and active management of these resources is considerable. Some of the conflicts and management problems will be discussed.

### RECREATIONAL CAVING IN W.A. : SOME HARD DATA

Ray Hart

The annual number of visits to caves in W.A. has been estimated for paying tourists, the adventurous public and speleologists. The high number of visits to wild caves by the public presents some serious problems of management. This is contrasted with the problems of less intensive but more extensive use of caves by speleologists.

### ENVIRONMENTAL MONITORING IN CAVES : PART 2

Neville Michie

Some techniques of measurement and the equipment used are discussed. An instrument system developed for cave work will be demonstrated.

## THE METHODOLOGY FOR THE USE OF INERT TRACER GASES IN RELATION TO CAVE METEOROLOGY

Rauleigh Webb

An outline of the various procedures for using the inert tracer gases, Freon 11, 12 or sulphur hexafluoride, to determine air movements in caves is discussed.

Practical examples proving air connection between two previously separate cave systems are given.

Problems inherent in using these tracer gases in caves are discussed and compared with the advantages of the system.

## OVERUSE OF CAVES - AVOIDING AND REPAIRING : A CASE STUDY

Ray Hart

Moondyne Cave (Augusta, W.A.), a former tourist cave, was studied to assess the potential for avoiding and repairing damage due to "normal wear and tear." The potential for repair is limited and it is necessary to avoid damage before the repair stage is necessary. This conclusion is applied to the more difficult problems of cave menagement in wild caves.

## MANAGEMENT OF CAVE AND KARST PARKS IN YUGOSLAVIA

E. Hamilton-Smith

A series of slides and a presentation on the management of cave and karst parks in Yugoslavia.

# AREA AND EXPEDITION REPORTS

## TUESDAY, 2 JANUARY 1979, 2.00 - 3.30 p.m.

## THE FLINDERS RANGES - A PERSONAL VIEW

Dot Paisley

The first time I travelled to the Flinders Ranges I fell in love with the area. It was for a caving trip and I've returned many times, visited most of the caves and enjoyed the breathtaking scenery. This love of the area inspired me to learn more of both its history and geological formation which I found both fascinating and rewarding.

This area is unique and is the dominant feature of South Australia. Geologically ancient, it has a short history as far as white settlers are concerned. It is a semi-arid region with a sparse population but attracts thousands of visitors each year - artists, students, teachers, or just tourists. This huge influx has affected the delicate balance of nature.

As an amateur caver and frequent visitor I would like to present my personal overview of the Flinders from above and below ground.

## ATEA '78

Judith Bateman

The Atea Kanada is located in the rainforest of the southern highlands of Papua-New Guinea. The cave was partly explored in 1976 but further investigation by 1978 expedition extended the mapped length to thirty kilometres, making it the longest cave in the southern hemisphere and Asia. Initial hopes for the southern hemisphere depth record were not realized.

## BAT RIDGES (DUNE LIMESTONE)

Nicholas White

# GEOLOGY AND GEOMORPHOLOGY

## WEDNESDAY, 3 JANUARY 1979, 9.00 a.m. - 12.00 noon

## KARST REGIONS OF PAPUA-NEW GUINEA - A MULTISPECTRAL VIEW

Dave Gillieson

The LANDSAT program and its application to karst geomorphology in New Guinea.

## STREAM CAVES IN THE MOIST SOUTH-WEST OF WESTERN AUSTRALIA

Kerry Williamson

Current ideas on the formation of stream caves in the higher rainfall areas of SWWA (Yanchep south) are reviewed. The effects of stream flow regime and rate of flow, topography, the underlying basement rocks, pre-limestone marine transgressions and collapse on the three parts of the stream cave hydrologic system (the insurgence area, the between cave, the exsurgence area) and on the resulting karst landscape are discussed.

## KARST STYLES IN WESTERN AUSTRALIA

David C. Lowry

Western Australia contains several very different karst terrains. The differences can be related to contrasts in lithology, structure and climate. These three factors interact in complex ways so that often two or three of the factors are involved in the interpretation of each feature. The karst areas described are Devonian Reef Limestones of the West Kimberley; Tertiary Open Shelf Limestone of the Nullarbor and Barrow Island; and Quarternary Eolianite of the south-western coast.

## THE INFLUENCE OF A SOIL COVER ON LIMESTONE EROSION IN CONE KARST TERRAIN, PAPUA-NEW GUINEA

Dave Gillieson

## THE AUGUSTA AREA, S.W. OF W.A. - THE REASONS FOR ITS KARST MORPHOLOGY

Kerry Williamson and Peter Bell

Within a several square km belt of Coastal Limestone south-east of Turner Brook are found the only known extensive nothephreatic shallow watertable maze caves in the Coastal Limestones of Australia. The physiography, soils, vegetation and distribution of karst features in the area are described, and an hypothesis proposed to explain the occurrence of maze caves in this restricted area.

# TECHNIQUES AND EQUIPMENT

## THURSDAY, 4 JANUARY 1979, 9.00 a.m. - 12.30 p.m.

## VERTICAL CAVING EFFICIENCY : A CASE STUDY

Stephen Bunton

This paper uses a recent exploration of a world-renowned, sporting, vertical cave in New Zealand as a case study to illustrate the factors to be considered in vertical caving. Single rope techniques were used. No account is given of personal techniques but rather this paper treats the exploration party as a team operating to maximize exploration efficiency. Outlined in the paper are the necessary considerations to be taken into account in explorations of this nature.

## CAVING EQUIPMENT - THEORY, DESIGN AND TESTING

Andrew Pavey

A careful analysis of the published literature has revealed both sophisticated analyses of caving equipment, its function and design parameters on one hand and an abysmal grasp of this on the part of many speleo journalists.

Application of physical analysis to modern caving equipment leads to specification of design criteria which can then be evaluated via laboratory and field testing. This procedure is applied to several basic pieces of caving equipment - rope, karabiners and descenders being the principal hardware upon which lives depend.

Following evaluation of published test data and methods, international standard testing methods seem called for. Draft outlines are proposed.

## SIMULTANEOUS MULTIPLE LOOP CLOSURES FOR CAVE SURVEYS - A COMPUTER PROGRAM

Neil I. Smith

Various methods are in common use for adjustment of survey station coordinates when loops fail to close (due to measurement inaccuracies). Most methods are based more on convenience than mathematical analysis (e.g. distributing errors equally between legs, or in proportion to leg lengths). Furthermore, when several interconnecting loops exist the closures are usually adjusted consecutively, hence second and subsequent loops may have errors artificially introduced into them by earlier closures.

The problem is amenable to fairly simple mathematical analysis, which is described in this paper. Regard each measurement of distance, bearing and slope as being the best estimate available of a "true" value implied by the final adjusted station coordinates; coordinates are calculated in such a way as to minimise the sum-of-squares of the differences between these implied and measured values.

Weight factors may be included to reflect the fact that some measurements were performed more accurately than others. The survey is looked at as a whole - the number of closed loops is immaterial. Each loop merely introduces constraints into the minimisation problem.

The computation (simultaneous linear equations) would be very time consuming by hand but is routine for a computer. A program is described for cave survey data based on the above.

## A PRELIMINARY REPORT ON A SYSTEMATIC AND MODULAR METHOD OF SURVEYING AND MAPPING

Peter Matthews

Problems with incompatible and unwieldy maps caused the search for a better system. The solution being tried, and still under development is a practical implementation of the so-called "street directory" method, perhaps better called modular mapping.

The system produces all routine maps as modules 200 mm square on A4 sheets, and at a range of standard scales chosen to suit both the particular area and the type of caves. The boundary of each sheet is fixed, and is determined strictly from a metric grid standardised on for the area, and not on the present wanderings of any cave. The grid is preferably the Australian Map Grid or close to it, but may in fact be a grid decided upon if no AMG control points can be established in the area. Maps at different scales are used either as a close or an overall view of the caves or the area, and also to act as key sheets for the next scale down.

The set of sheets can be thought of as an "atlas" for the area. Each new survey fills another gap in the overall mosaic. Non-standard maps for special purposes are still drawn as required.

## EQUIPMENT SURVIVAL UNDER EXPEDITION CONDITIONS

Alan Warrild

As well as being mentally and physically taxing on individuals, any expedition is also the ultimate test of caving equipment. The ATEA '78 expedition which spent two months in the mud of New Guinea's Muller Plateau was no exception.

This paper will attempt to show some of the weaknesses and strengths of the gear which was used on the ATEA '78 Expedition.

## SEISMIC CAVE DETECTION MADE SIMPLE

Peter Robertson

A practical method of cave detection using simple seismic methods and equipment. Investigations have proved that the equipment developed recently and used by the author will detect caves in various types of limestone. It has in many cases indicated passage widths and position accurately and with further investigation it may be possible to calculate depth as well.

# BIOLOGY, PALAEONTOLOGY AND ARCHAEOLOGY

## THURSDAY, 4 JANUARY 1979, 2.00 - 3.30 p.m.

### CAVE DWELLING DECAPOD CRUSTACEANS FROM AUSTRALIA AND PAPUA-NEW GUINEA

Peter Ikin and Glenn D. Campbell

Three families of decapod crustaceans are represented in the cave faunas of Australia and Papua-New Guinea. One family, the Sundathelphusidae, occurs in caves in both countries while the remaining two families are recorded from the Australian cave fauna. The distribution of the families in the region is compared with the distribution of karst areas. The Australian cave decapod fauna is compared with the much better documented American fauna. Some hypotheses are advanced to explain the evolution of this element of the Australian cave fauna.

### PALAEOCLIMATIC INFORMATION FROM CAVES

Albert Goede

Palaeoclimatic information can be obtained from caves by analyzing the oxygen isotope composition of calcite and aragonite deposited as stalagmites.

A palaeotemperature record is useful only if it can be dated. In the last decade considerable progress has been made in the radiometric dating of speleothems by means of the uranium-thorium method. Material from 2000 to 300 000 years old can be dated by this method.

Two oxygen isotopes $^{16}O$ and $^{18}O$ are used in palaeotemperature work. In nature there are small natural variations in the ratio between the two ($^{18}O/^{16}O$) and the value of the ratio is temperature dependent. The values can be measured by means of a stable isotope mass spectrometer and are expressed as parts per thousand ($^{o}/_{oo}$), and designated as $\delta^{18}O$. Measurements are made on sealed samples of carbon dioxide gas prepared from calcium carbonate.

If closely spaced samples are taken from a longitudinal section of a stalagmite and the value of $\delta^{18}O$ determined for each sample a curve of temperature change against time can be plotted if the age of different layers within the stalagmites can also be determined.

Tasmania, the south-east of Australia and the south-west of Western Australia offer considerable scope for this field of research.

### ARCHAEOLOGICAL FEATURES OF AUSTRALIAN CAVES

Rudy Frank

Many important archaeological sites occur in caves and rock shelters. These mainly include art sites (paintings or engravings) and occupation sites (sites used for habitation or other activities, e.g. flint mining). It is likely that with careful observation more sites will be found. Often such sites will have been visited over a long period of time before they are recognised. This paper endeavours to describe and illustrate the features of archaeological sites found and most likely to be encountered in Australian caves. Hopefully, so that people most using and visiting caves might become aware of what to look for and thus give sites proper curation and management sooner than might otherwise have been the case. A brief outline of the sort of information speleos could usefully record and some recording techniques are given. Site protection and preservation is also discussed.