

Panel Discussion

PDV Protected Volcanic Areas and Volcanological Heritage (IAVCEI, UNESCO, IUGS)

A contribution by Bernard Joyce

University of Melbourne

Australia

**Geoheritage and Geotourism in the Protected
Volcanic Area of the Kanawinka Geopark:
part of the monogenetic Newer Volcanic Province
of SE Australia.**

Bernard Joyce

University of Melbourne

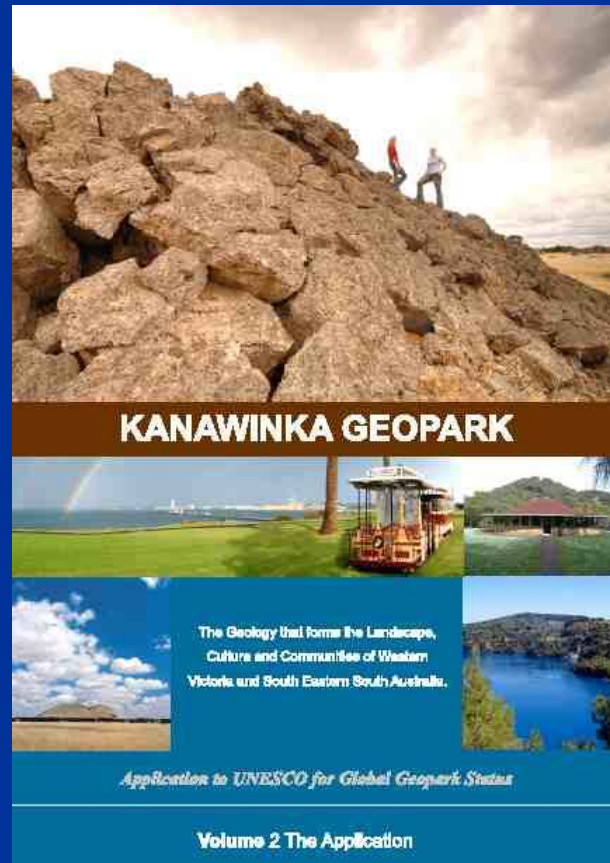
Australia

Founder Member of the new
Standing Committee for Geotourism
of the Geological Society of Australia

**UNESCO and volcanic heritage:
there are many new volcanic Geoparks around the
world, often inhabited areas such as the
Kanawinka Geopark of southeastern Australia.**

**How can we work with indigenous and other local
inhabitants in managing such natural sites?**

Kanawinka Geopark application to UNESCO in December 2006



VOLCANOES DISCOVERY TRAIL



THE MOUNT GAMBIER-MOUNT BLUFF VOLCANIC REGION

Location and Profile
A long, thin strip (175 x 40 miles approx.) across Southern Australia is known as the Mount Gambier-Mount Bluff Volcanic Region. The area is bounded by the coastline to the north, the coast to the south, the sea to the east and the mountains to the west. The region is bounded by the coastline to the north, the coast to the south, the sea to the east and the mountains to the west.

Volcanic Activity
The volcanic region extends across the mountain to the south coast which is part of the volcanic belt, extending across the coast to the south coast. The volcanic belt extends across the coast to the south coast.

Early Mining in the Mount Gambier-Mount Bluff Volcanic Region
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

Mount Gambier as an Active Volcano
Mount Gambier is an active volcano. The volcanic region is a volcanic region.

Mount Bluff as an Active Volcano
Mount Bluff is an active volcano. The volcanic region is a volcanic region.

BUNGANDI STORY

In 1861, a 1000-year-old Aboriginal burial mound was discovered near the volcanic region. The volcanic region is a volcanic region.

The Old Mount Gambier
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

A volcanic water supply
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

Water
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

The Damaged Dam
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

THE UNDERGROUND WATER SYSTEM

The Mount Gambier-Mount Bluff volcanic region is a volcanic region. The volcanic region is a volcanic region.

A volcanic water supply
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

Water
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

The Damaged Dam
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

MOUNT GAMBIER... A LONG TIME IN THE MAKING!

Mount Gambier formed in two volcanic phases over its 100,000-year history. The volcanic region is a volcanic region.

Phase 1
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

Phase 2
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

Water
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

The Damaged Dam
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

EUROPEAN HISTORY OF THE CRATER LAKES

Settlements around the Mount Gambier area... The volcanic region is a volcanic region.

1800s
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

1800s
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

1800s
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

1800s
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

EUROPEAN HISTORY OF THE CRATER LAKES

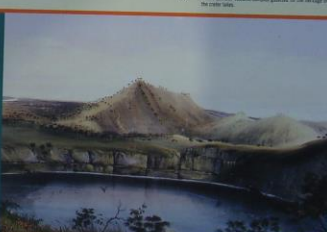
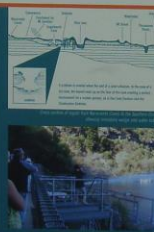
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

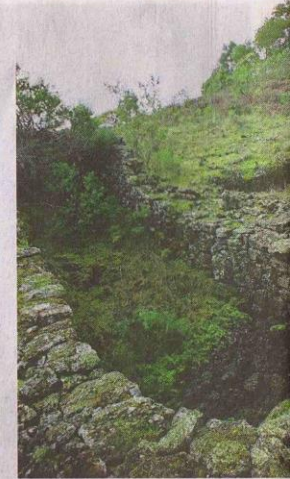
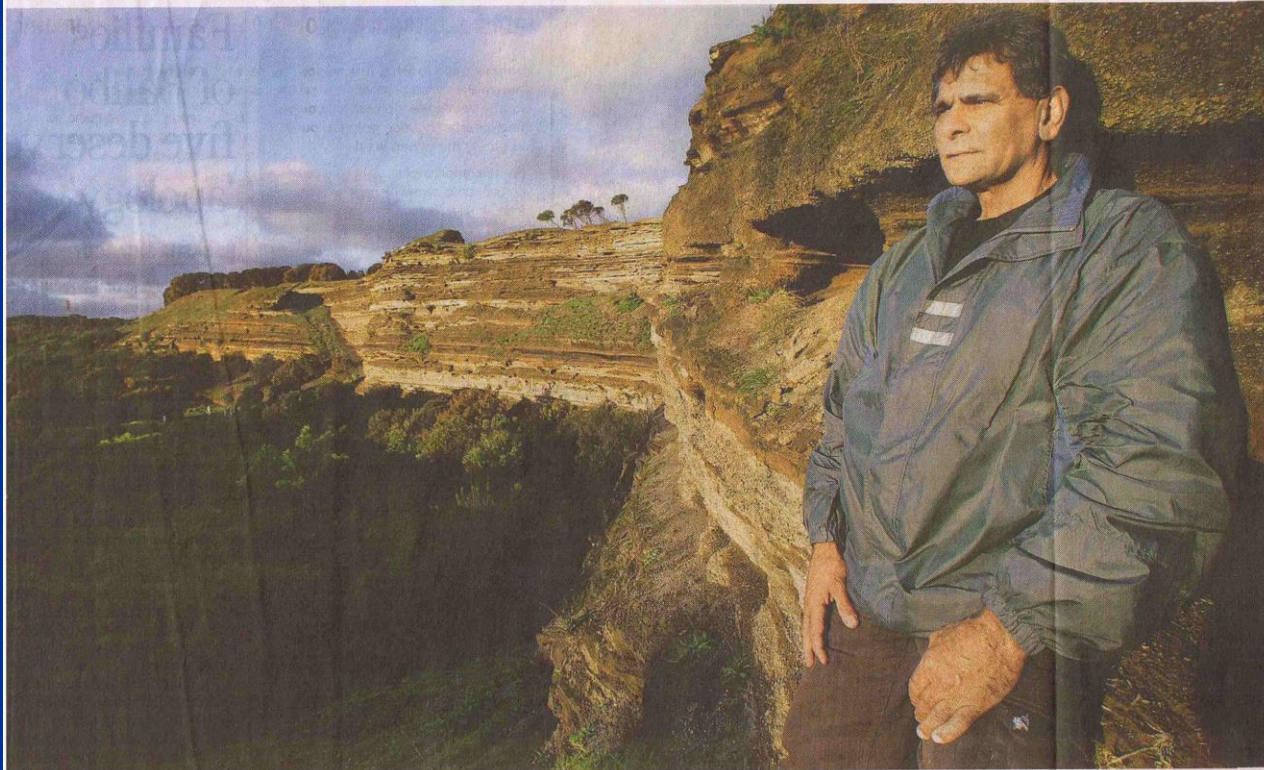
1800s
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

1800s
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

1800s
The volcanic region is a volcanic region. The volcanic region is a volcanic region.

1800s
The volcanic region is a volcanic region. The volcanic region is a volcanic region.





John Collyer (above) surveys the volcano at Tower Hill, an area that is home to indigenous wildlife and is the traditional land of the Koroiitch Gundidj people. Damein Bell (above right) at Lake Gorrie, a property now owned by the Gunditjmarra people.

World listing for Victoria's volcanic animal sanc

Western Victoria could soon be home to the country's first geopark, writes **Orietta Guerrera**.

park. For two years, locals from nine shires have united to have their neighbourhood, rich in volcanic features, recognised internationally.

development and tourism for local communities, 50 areas have been granted global geopark status, including 30 in Europe and 18 in China.

Sue Turner, believes the "magic of the UNESCO name" will instil renewed pride in communities and governments and motivate them to care for the wonder in

cover the Tyrendarra indigenous protected area, north-east of Portland, which is managed by the Winda Mara Aboriginal Corporation on behalf of the w

Aboriginal stone hut - Mt Napier flows





Lake Condah
Sustainable
Development
Project

Budj Bim

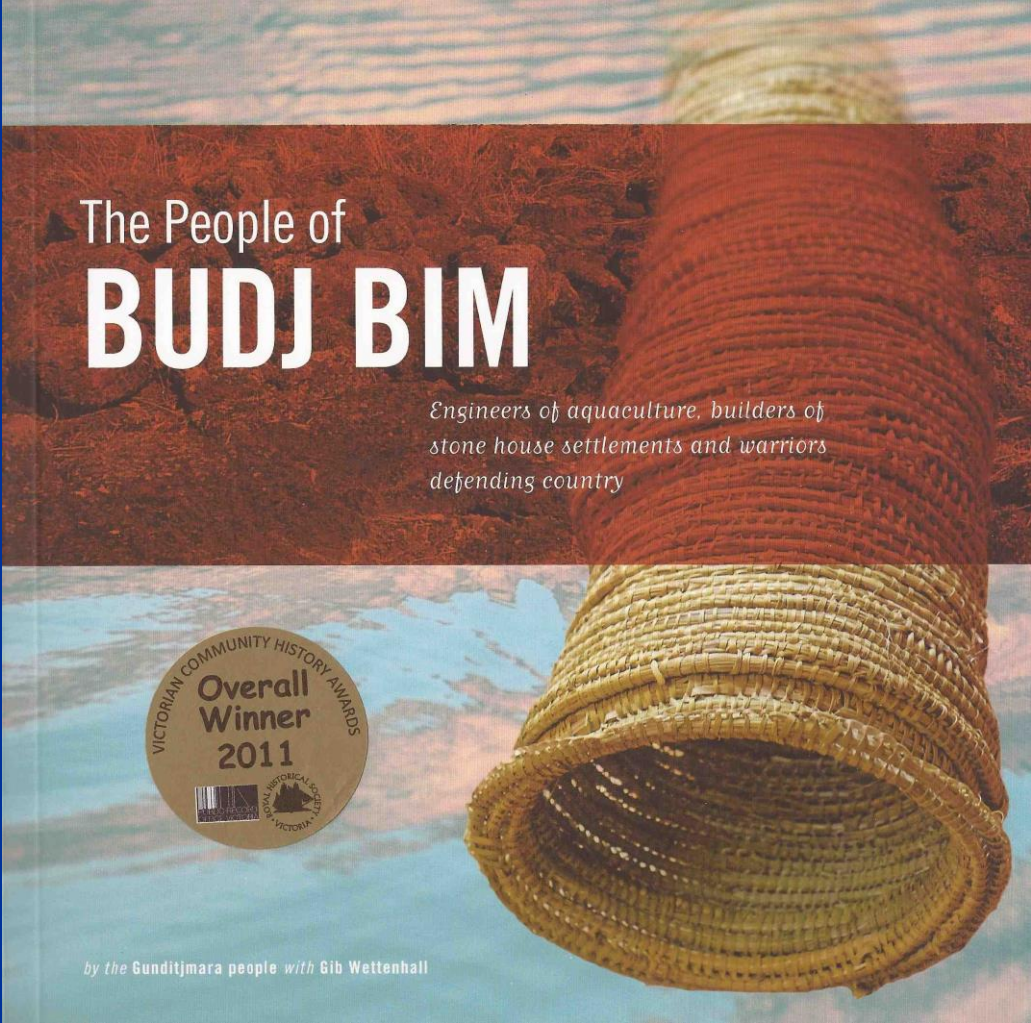
World Heritage Symposium



Tuesday 16 Wednesday 17 & Thursday 18 June 2009

Gunditjmara Country
Southwest Victoria, Australia

www.lakecondah.com



The People of **BUDJ BIM**

*Engineers of aquaculture, builders of
stone house settlements and warriors
defending country*



by the Gunditjmara people with Gib Wattenhall

On the new National Heritage Register



Budj Bim, Western Victoria – a bid for World Heritage



Traditional
aquaculture system
and is part of the
Budj Bim site.
Photo: Damian White

World Heritage push for ancient Aboriginal settlement

■ Tony Wright

An ancient Aboriginal settlement on a volcanic lava flow in south-west Victoria – the setting for a bloody war between Indigenous people and white settlers in the mid-19th century – appears likely to become Australia's latest UNESCO World Heritage site.

Federal Environment Minister Greg Hunt has told Fairfax Media that he believes the Budj Bim landscape – stony rises from Mount Eccles near Macarthur to a prehistoric aquaculture system on Lake Condah and

south to Tyrendarra wetlands – is an outstanding site that has the potential to achieve World Heritage status.

He has invited the Victorian government to complete an independently audited assessment to prove compliance with World Heritage values.

If that showed there were "recognised outstanding universal values, then I would be delighted to propose this as a tentative item for listing by the World Heritage Committee", he said.

"Victorian Premier Daniel Andrews has written to Mr Hunt stating the state government's full support for list-

ing Budj Bim, and has forwarded a peer-reviewed study by leading scientists and archaeologists that finds the landscape is of international significance and that the criteria for listing is fully justified.

Budj Bim – the Indigenous name of Mount Eccles, which produced the lava flow that was settled by the Gunditj-mara people thousands of years ago – is already on the Australian National Heritage Register.

World Heritage listing would elevate it to the status of the Great Barrier Reef, one of the 19 Australian sites that


Insight
Kerry Wallaby's
ancient country: a
world treasure
Page 27

currently receive international protection.

The Gunditj-mara are considered unique. They lived in large villages of stone huts and harvested eels and fish in a sophisticated network of weirs and traps, dated to at least 6000 years ago, that meant they had no need for a nomadic lifestyle.

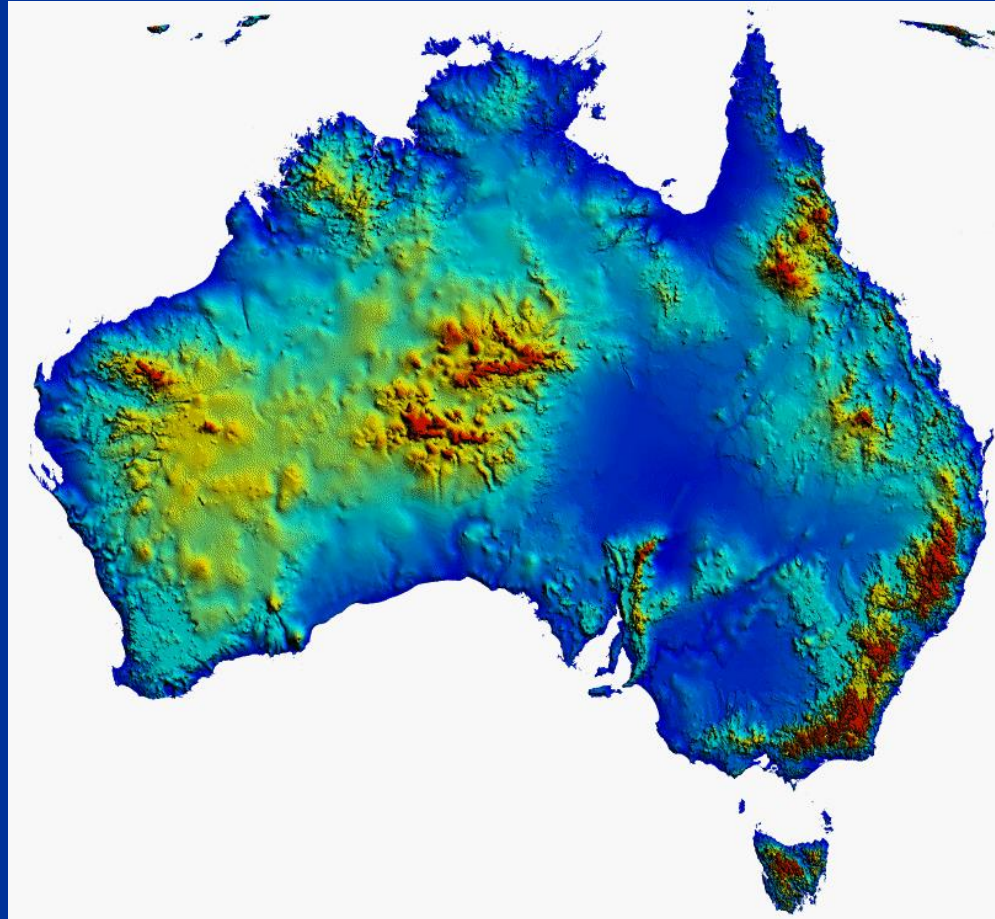
The Gunditj Mirring Traditional Owners Aboriginal Corporation, backed by archaeologists and historians, has been gathering evidence for a decade to support the nomination for UNESCO World Heritage listing.

What is a Geopark?

A territory with well-defined limits that has a large enough surface area for it to serve local economic development. That comprises a certain number of geological heritage sites (on any scale) or a mosaic of geological entities of special scientific importance, rarity or beauty, representative of an area and its geological history, events or processes. It may not solely be of geological significance but also of archaeological, ecological, historical or cultural value.

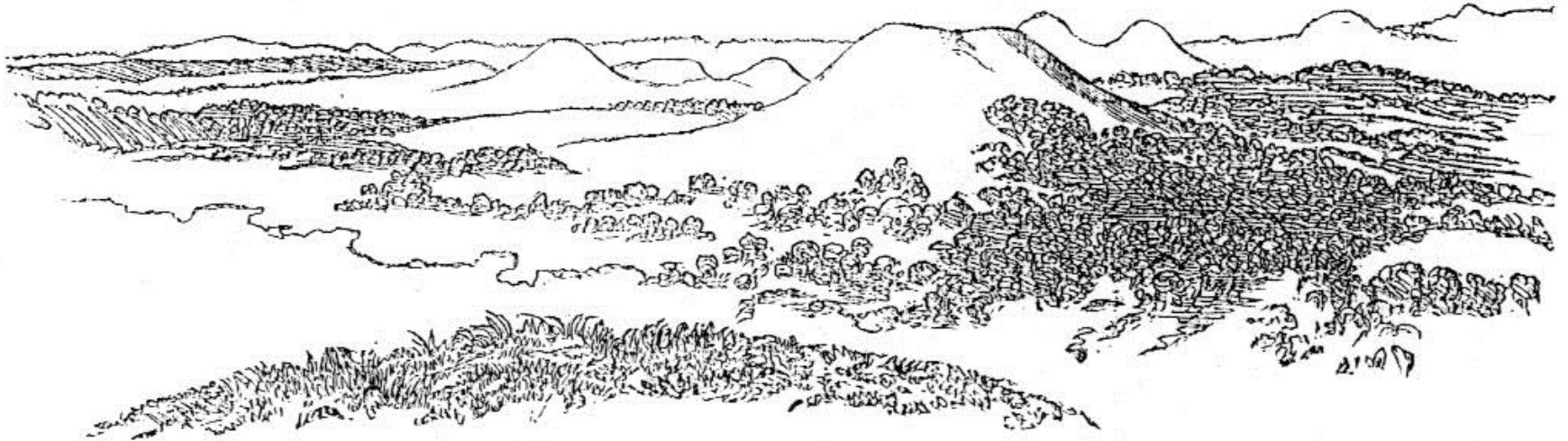


Newer Volcanic Province of SE Australia



Explorer Mitchell's 1836 field view

Mt. Byng Pass.



Mameloid Hills from Mount Greenock.

Newer Volcanic Province of SE Australia

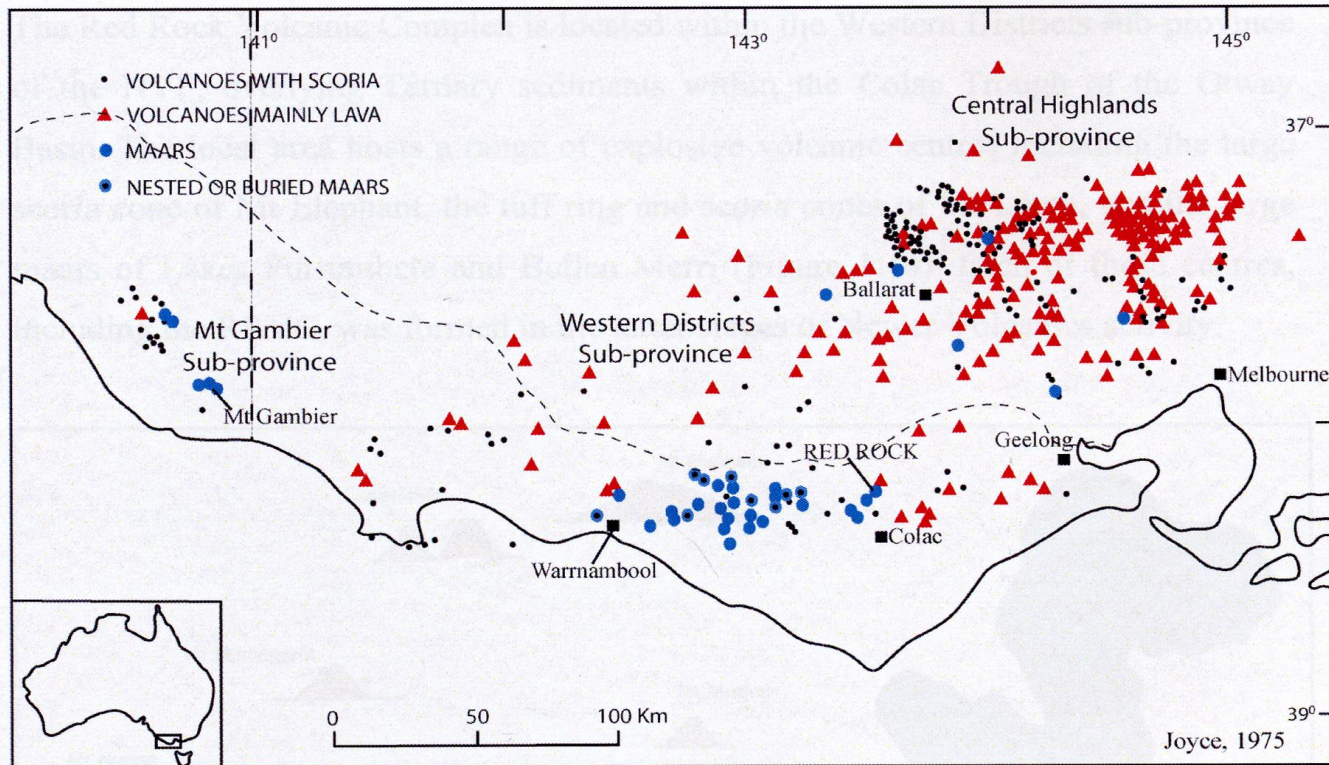
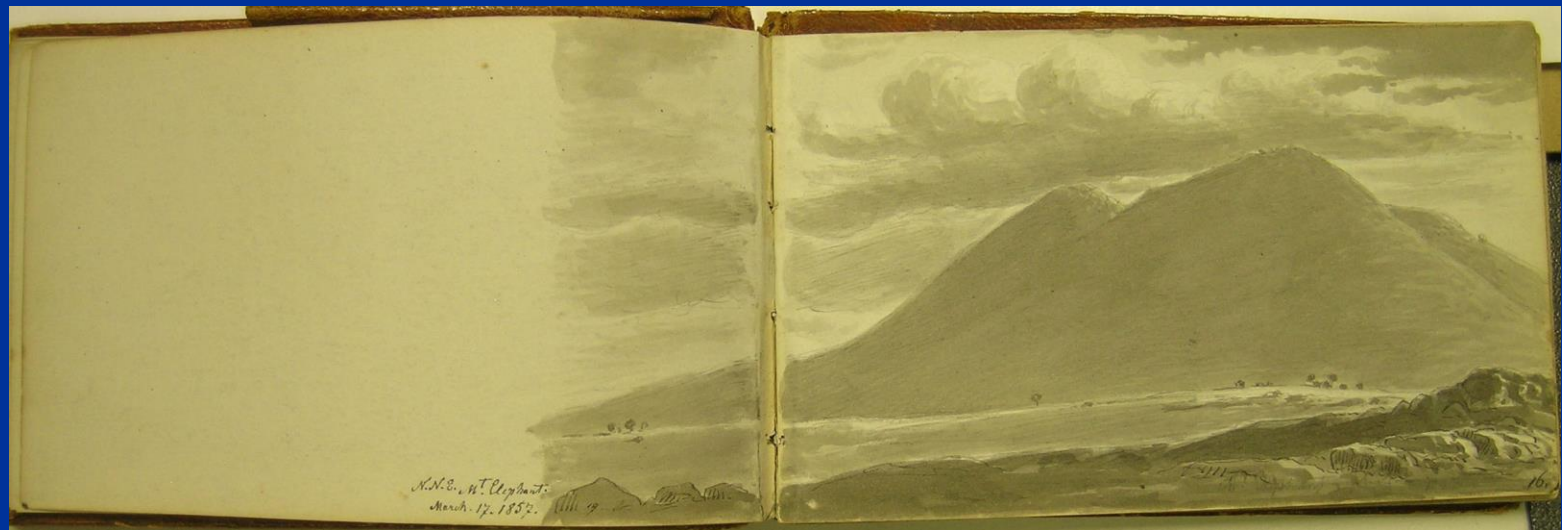
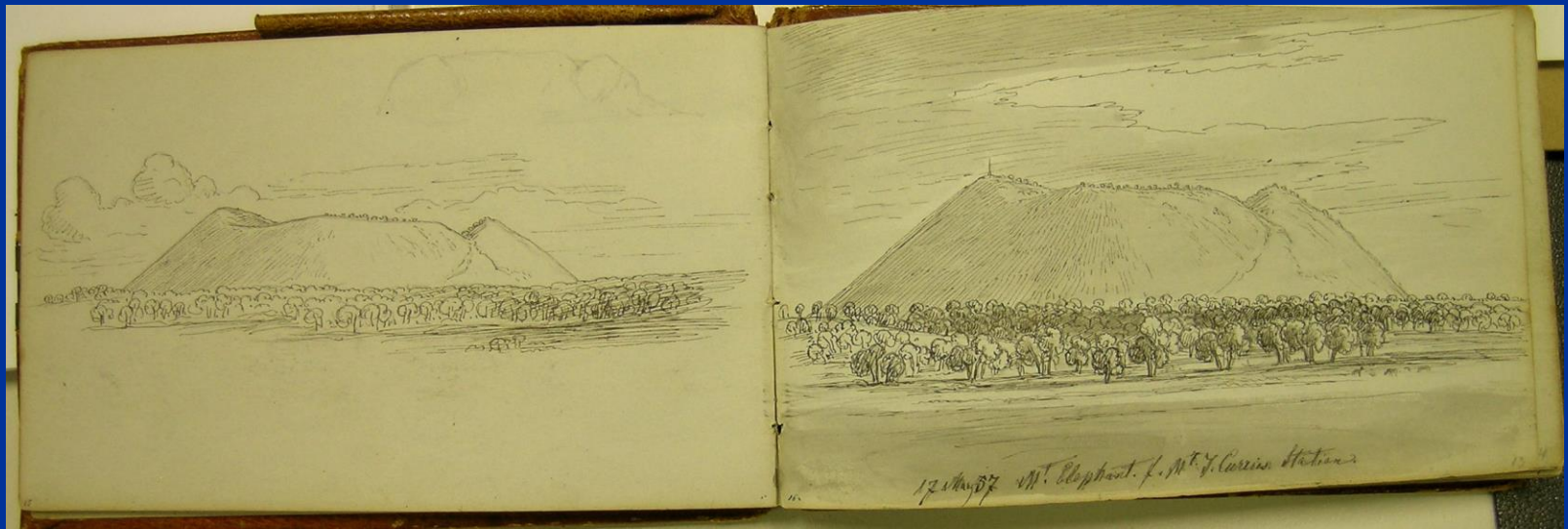


Figure 1.13 Volcanic centres and lava fields of the NVP showing abundance of maars south of the northern margin (dotted line) of the Otway Basin (Adapted from Joyce, 1975)



Eugène von Guérard *Larra* 1857

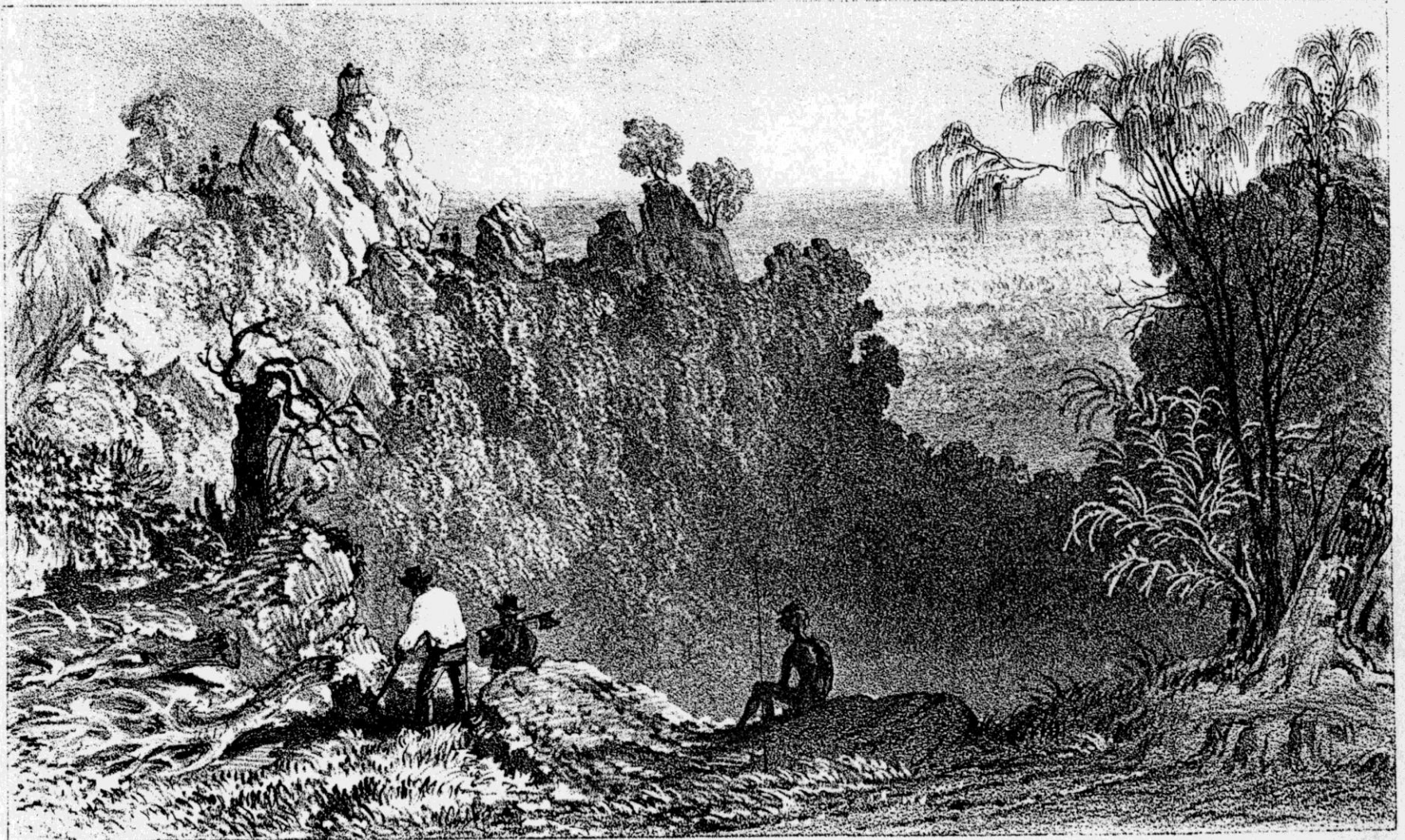


Eugène von Guérard Mt Elephant 1857



Mt Napier as seen by Mitchell in 1836

Pl. 46.



Major T. L. Mitchell del. A. Ficken lith.

CRATER OF MURROA OR MT NAPIER.

Day & Haghe Lith^{rs} to the Queen.

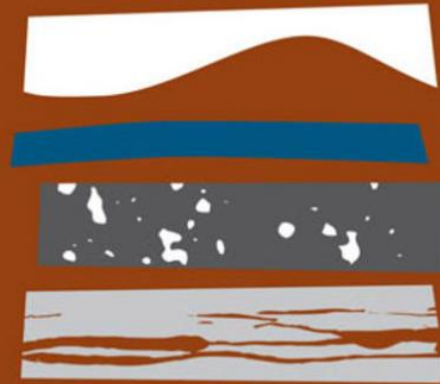
Gnotuk maar (von Guerard 1857)





Eugène von Guérard *Lake Bullen Merri* 1858

These cultural features, supported by a detailed geological and geomorphological story, have helped make the area an ideal candidate for nomination as a Geopark.



KANAWINKA
GLOBAL GEOPARK



KANAWINKA GLOBAL GEOPARK

**The Geology that forms the landscape, culture and communities of
Western Victoria and South Eastern South Australia**

AUSTRALIAN GEOPARK NETWORK



IN SUMMARY

The important aspects of Geoparks are the links between the geology and the people, their stories, culture and history that build into a sustainable source of geotourism, bring jobs to rural and indigenous people and in turn help protect sites of importance and promote geoheritage complementing the work of the Local Government Bodies through partnering with all levels of government and other relevant authorities.



POSTER:

"Volcanic, Karst and other Geosites within the large Kanawinka Geopark of southeastern Australia: working with indigenous and other local inhabitants in managing Geoparks and Geosites

Some volcanic, karst and other Geosites in the Kanawinka Geopark.

International Significance

Lakes Gnotuk and Bullenmerri volcanic complex, Camperdown
Red Rocks volcanic complex, Altona
Skipton lava cave, Skipton, basalt guano type mineral locality (newberyite, hamayite)
Tower Hill nested maar, Kororoit
Picatinnie Ponds karst rising springs RAMSAR site, Port MacDonnell

National Significance

Glenelg River karst area, including vertebrate fossil cave localities, Nelson
Grange Burn and Muddy Creek, Lake Tertiary exposures, Hamilton
Lady Julia Perry Island, volcanic site, Port Fairy
Lake Kellambote maar, Terang
Lake Purrumbete quarry and maar, Werrite
Mount Eccles volcanic complex, and Tyrendarra basalt flow
Mount Napier volcanic complex - Byaduk Lava Caves, Wallacedale tumuli,
The Great Barrier, Harman Valley Flow Features, Byaduk
Mount Moorat volcanic site, Terang
Mount Harnden volcanic complex, Stonyford
Mount Elephant scoria cone, Derrimallum
Mount Leura volcanic complex, Camperdown
Tyrendarra lava flow including the Darlot Creek crossover, Tyrendarra
Wannon Falls vivianite occurrence, Hamilton.

Other sites - not classified

Business Magazine Boree karst caves
Petrified Forest, Portland (karst overlying volcanics)
Mount Kosciuszko complex and lava flows
Mount Shadwell Olivine Quarry, Mortlake
Hopkins Falls
Nigretta and Wannon Falls
Lake Corangamite
Dry Stone Walls - Mount Porndon, Mount Napier and other volcanoes
Lake Bosc
Lakes Couch
Capes Bridgewater, Nelson & Grant volcanic complexes

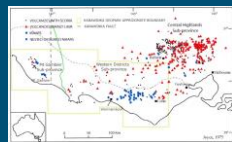
South Australian Geological Monuments

Crater Ashok Complex, Mount Gambier maar volcano
Blue Lake crater, Mount Gambier
Mount Schank volcanic complex
Karst Cenotes (sinkholes) - Little Blue Lake Sinkhole

Further reading: Kanawinka Geotrail map brochure

download from the Kanawinka website (PDF 5.7MB 2 Pages)
www.kanawinkageopark.org.au/wp-content/uploads/2012/05/KanawinkaMap1.pdf

Australia's first Geopark is on the broad Western Plains of Victoria and an adjacent part of Southeastern South Australia. Within the Kanawinka Geopark are many important Geosites including lava caves of international significance, open volcanic vents, major tumuli groups, and springs and waterfalls. Coastal features include limestone cliffs, calcareous dunes, basalt headlands and cliffs, drowned lava flows and a large offshore volcanic island.



Volcanic centres of Newer Volcanic Province showing abundance of maars south of the northern margin (dotted line) of the Ovens Basin. (Adapted from Joyce 1975 © Mac Web Service 2012)

The Geopark is part of a larger area known as the Newer Volcanic Province of Southeastern Australia, one of the best studied of the world's young basaltic monogenetic lava fields.



Mount Elephant scoria cone, from the northeast.



Ash deposits at Tower Hill maar, northwest of Warrnambool.



Stony rise lava flows from Mount Porndon at the Lake Corangamite shoreline.

Volcanic landforms include numerous scoria cones, and some 40 maar craters with ash deposits, and extensive lava shields have been built up by Strombolian/Hawaiian eruptions, with fluid lava flows travelling for tens of kilometres down river valleys.

Volcanic, Karst and other Geosites within the large Kanawinka Geopark of southeastern Australia: working with indigenous and other local inhabitants in managing Geoparks and Geosites.

Bernard JOYCE 1 Ian LEWIS 2
1 School of Earth Sciences, University of Melbourne, Melbourne, Victoria, Australia.
Email: bji@unimelb.edu.au
2 Director, Kanawinka Geopark, PO Box 1724, Mount Gambier, South Australia, Australia.
Email: ian.lewis@sa.gov.au

Colloquium MINAH, 11-13/09/2013, Clermont-Ferrand, FRANCE

Volcanic research, local history study, and working with local inhabitants on heritage interpretation is the key to developing a greater public awareness of the Kanawinka Geopark.

www.kanawinkageopark.org.au

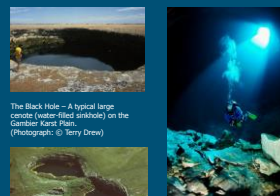


The volcanic plain drops 100m along the Kanawinka Fault onto a wide karst plain to the west. Several volcanoes have emerged through the limestone at Mounts Gambier, Schank and Burr, forming a direct geo-link between the volcanic and karst landscapes of the geopark.



Mount Gambier volcano and Blue Lake crater - lava, scoria and ash over white limestone. The Blue Lake at Mount Gambier is the best example of groundwater flooding the crater after eruption. (Photograph: © Limestone Coast Tourism 2000)

Recent research suggests that deep volcanic gases migrating upwards through the limestone acidified the groundwater at certain times in the past, generating in particular the large clear fresh-water-filled sinkholes (cenotes).



The Black Hole - A typical large cenote (freshwater sinkhole) on the Gambier Karst Plain. (Photograph: © Terry Drew)

Kilar's Sinkhole - Cave diver in crystal-clear fresh water 40 metres below large cenote entrance. (Photograph: © Gary Barclay 2011)

The Sisters Sinkholes - A rare double-cenote in the Tertiary limestone of the Gambier Karst Plain. (Photograph: © Ian D. Lewis)

The Kanawinka Fault also initiated the formation of the World Heritage Fossil Caves at Naracoorte on the geopark boundary.

Since the area was recognised as a Geopark in June 2008, new material has been produced by local government bodies for Kanawinka and also made available through the Kanawinka website for use by Geotourists and Geotourism operators.

References

- Grimes, Ken G. 1994. 'The South-East Karst Province of South Australia'. *Environmental Geology*, 23, pp. 134-148.
- Joyce, Bernard. 2004. 'The young volcanic regions of southeastern Australia: early studies, physical volcanology and eruption risk'. *Proceedings of the Royal Society of Victoria*, 116 (1), pp. 1-13.
- Joyce, Bernard. 2005. 'How can eruption risk be assessed in young monogenetic areal basalt fields? An example from southeastern Australia'. *Special issue on volcanic geomorphology*, *Zeitschrift für Geomorphologie* 59, Suppl. 56, 149, pp. 195-207.
- Joyce, Bernie. 2009. *Geomorphology and Volcanism*, Chapter 13 in Section IV - Examples of geomorphology management, in *Raymond E. Carrara P. Regina-Bosny G. (2009) (eds) Geomorphology*, Wiley, Dr. Friedrich Pfeil, München, pp.185-198.
- Joyce, Bernie. 2010. 'Jokone Tourism in the New Kanawinka Global Geopark of Victoria and SE South Australia', Chapter 20 in *Patricia Erfurt-Cooper and Malcolm Cooper (eds), Volcano and Geothermal Tourism, Sustainable Geo-Resources for Leisure and Recreation*, Earthscan, London, UK, pp. 202-211.
- Lewis, Ian D. 2006. 'Origin and genesis of the major caves at Naracoorte, South Australia'. *Helvetic*, 39 (1), pp. 62-65.
- Webb John A., Grimes Ken G. and Lewis Ian D. 2010. 'Jokoneogenic origin of cenotes near Mt Gambier, southeastern Australia'. *Geomorphology*, 119, pp. 23-35.



Reconstruction of stone houses in Budj Bim National Heritage Landscape, Tyrendarra, National Heritage listed in July 2004. Winda-Mara Aboriginal Corporation manages the Indigenous Heritage values of the landscape in Tyrendarra. (Photograph: © Robert Blackden - Geology Share Council)

The indigenous heritage of the Geopark includes a complex aquaculture of Aboriginal fish and eel traps, and the remains of stone houses in the stony rise flow landscapes of Budj Bim (Mount Eccles volcano).



Dry stone wall with Mount Napier scoria cone, from the east. (Photograph: © Mac Web Service 2012)

Post-contact settlement is evident in historic "bluestone" (basalt) houses and farm buildings, bridges, churches, and the many striking stone walls.



Penhurst Volcanoes Discovery Centre in historic "bluestone" former Offices of Share of Mount Rosier (1864). (Photograph: © Mac Web Service 2012)

Within the Geopark a Volcanoes Discovery Centre has been established at Penhurst, new reserves have been developed at Mount Elephant and Mount Rouse volcanoes, and improvements to interpretation made at other sites.