

Tide gauges that withstand stormy seas and Antarctic ice

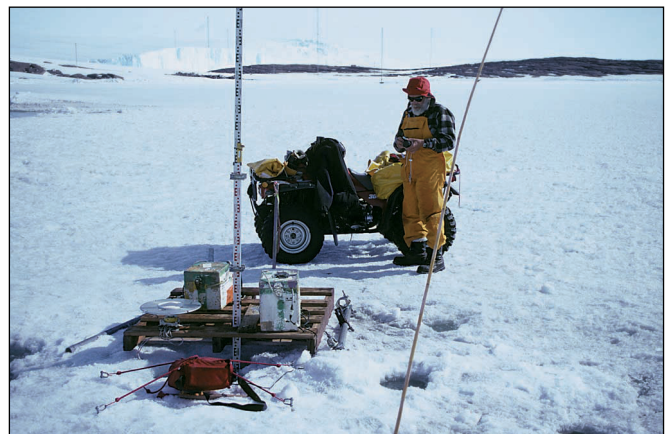
WE MEASURE TIDES FOR MANY DIFFERENT RESEARCH and operational purposes. Such measurements have a practical value in determining sea level for mapping elevations and ocean depths, tidal predictions for shipping, and in the calibration of satellite altimeters.

Tide measurements also have a research value. Sea level data helps us understand long-term climate change as well as continental readjustment, heat transfer across the continental shelf, and other oceanographic phenomena including observation of the recently-observed Southern Ocean oscillation.

The Antarctic region had no effective tide-measuring network until recently. The Australasian Antarctic Expedition installed tide gauges at Cape Denison and Macquarie Island in 1912. Several gauges have operated in the region since then, but only for short periods.

Antarctic and subantarctic coasts are difficult places for measuring tides. Rough seas and floating Antarctic ice regularly destroy both sea-bottom and shore structures. In 1991 the Australian Antarctic Division, with support from other national research and administrative bodies, made a concerted effort to obtain long-term tide data by installing gauges in Antarctica and the Southern Ocean.

At Macquarie Island, access to the sea was gained via an inclined bore hole, with the gauge and electronics in a sealed fibre glass dome at the top of the hole. In Antarctica, 600-kg concrete moorings containing gauges in areas relatively free of icebergs have operated for eight years at Mawson and Davis and at Casey for five. A new shore gauge at Mawson will use an inclined borehole to



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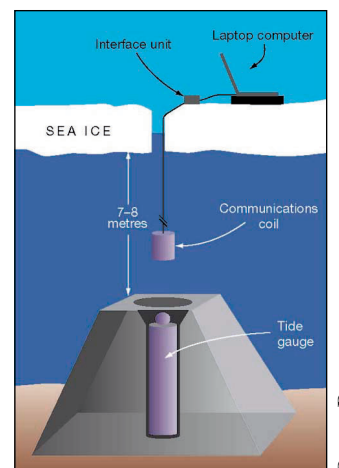
Equipment used to download and calibrate the gauge, and to establish the height difference between the tide gauge benchmark and the AUSLIG GPS base station (Mawson, December 1997).

the sea, heated to stop the water from freezing.

The tidal data will need to be gathered for another decade or more before any long term sea level trends can be detected.

Henk Brolsma, Mapping Officer, AAD

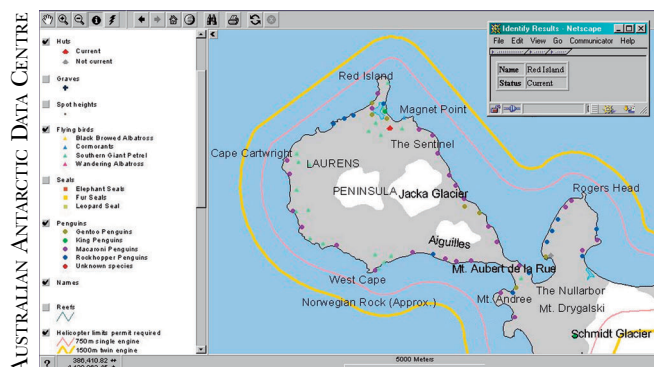
ANARE bottom-mounted tide gauge installation



PETER BOYER

A moveable feast: explore the AAD's interactive maps

MAPS ARE NOT WHAT THEY USED TO BE. WITH WEB technology users can now create their own maps interactively. The Australian Antarctic Data Centre is serving interactive maps of Australian Antarctic stations and nearby areas as well as Heard Island and Macquarie Island. There are also maps of the whole of Antarctica, respectively showing territorial claims and presenting the spatial coverage of remotely sensed data held by the AAD,



including aerial photography and satellite images.

Using just a Web browser, anyone can pan across an area and zoom in or out to view features of interest at the desired scale. Feature attributes, such as coordinates, the name of a feature, the height of a contour or the date of an aerial photograph can also be queried. Such customised maps can then be printed from the user's computer.

A series of interactive maps was developed in support of environmental management of the abandoned Wilkes station. Photographs of many map features may be viewed using a hotlink tool – simply click on the feature and the associated image will be displayed. The Atlas Cove interactive map displays survey data from the 2000–01 season and includes photographs taken at the site of the old station.

Try it! The Data Centre's interactive maps can be accessed from: <http://www-aadc.aad.gov.au/mapping/>.

David Smith, Australian Antarctic Data Centre, AAD



Antarctic visions: making the most of digital imaging

ANTARCTICA REMAINS VERY ISOLATED, ACCESSIBLE ONLY TO RELATIVELY few people. But from the earliest years of its exploration the images brought back from this remarkable place have captured the imagination of people who can never hope to go there. In Captain Cook's time the media were watercolour and rough pencil and ink drawings. Photography opened up new possibilities exploited with consummate skill by the pioneers of classic Antarctic photography, the Australian Frank Hurley and Englishman Hebert Ponting.

Since the birth of ANARE in the 1940s expeditioners and professional photographers have produced some unforgettable images of man and nature in this ice-world. In the process, they have captured moments in time of great value to science. Pictures of subantarctic glaciers from the 1950s are showing scientists the extent of glacial retreat (an important climate change indicator); early images of bird colonies reveal fluctuations over time in species numbers (an indicator of ecological changes).

The technology of the World Wide Web takes Antarctic photography to the world. The classic panoramas seen here were created using a combination of conventional photography and digital image technology. The original images for the 360° panoramas were taken in portrait (vertical) mode using a 35mm film camera on a special-purpose tripod head. The 18 images for each panorama were then scanned into a computer at high-resolution and 'stitched' together in a special software program before being re-touched digitally to eliminate seams and other irregularities. They may also be viewed as 'QuickTime-VR' images – 'virtual reality' pictures, often a full 360° as these are – which can be explored by panning around and zooming into the scene. Such images have wider application in training, security, pre-visit orientation and other needs. A series of QuickTime-VR images of natural and station views in Antarctica can be seen at the AAD website at <<http://www.aad.gov.au/explore/default.asp>>. A historical panorama of Australia's Atlas Cove station on Heard Island is currently being prepared.

The AAD holds a huge archive of Antarctic pictures dating back to the time of Hurley and Ponting. A total of 350,000 still images – colour and black-and-white, glass plates, prints, slides,

negatives, and digital images – cover subjects as varied as micro-organisms to people, ice crystals to aerial and satellite images. In addition, the Multimedia Library holds high-quality videotape records of historical and current movie film, fully shotlisted and recorded on database, amounting in film terms to around 500,000 feet. The collection has been showcased at Australia's Parliament House in Canberra for the past seven years, to audiences of over 100,000 people each year.

Digital cameras, now permanently available at each station and aboard ships, make it possible to send Antarctic images to Australia and other parts of the world almost instantaneously. Such photography has wide application in every aspect of human activity. As a research and publicity tool the digital camera is unsurpassed. X-rays and other medical digital images can be flashed to Australia to enable a diagnosis to be back at the station within an hour. Families can exchange photographs of their respective lives across great distances.

The AAD has taken a leading role in converting traditional images to digital media for these and many other purposes. The conversion has enabled a much higher degree of security for original images because of reduced handling, as well as provision of 'loss-less' duplicates. Its database of historical and current digital images and film footage has been greatly enhanced by former ANARE expeditioners, including the first AAD director, Dr Phillip Law, who have freely given their knowledge and expertise to identify images.

The AAD Multimedia Unit has added value to its image library by creating posters for science conferences – a valuable publishing medium for scientists – and for other professional and promotional purposes. Many of the scientific posters won plaudits and awards at international meetings for their authors and designers.

Peter Boyer, Information Services Manager, AAD

Panorama, top: The emperor penguin colony at Auster Rookery, taken in early November 1999. The images that make up this panorama were shot with a 28 mm lens. Below: Casey station taken from Reeves Hill in late January 2001. This pan was shot with a very wide angle lens (17 mm) to enable the foreground and sun to be included.

