

Australian Astronomy

ASA Factsheet No. 5

The Millennium

In this information sheet we will consider a topic that was subject to increasing public debate as the year 2000 approached - where you should have been to see that first ray of sunlight beginning the year. And we will discuss the history of our calendar to clarify why 2000 is not really the start of the new millennium anyway.

Where was the first sunlight of 2000 be seen? The answer is not straightforward. For example, if you do not mind the cold and travel to Antarctica you will find that in December and January it has 24-hours of daylight with no sunrise or sunset. Does that count?

Discounting that travel option, let us first consider the question for those of us on the Australian mainland. For most of the year Mt Warning near Byron Bay receives each day's first glimpse of the Sun. In December, however, things are different. At that time of the year the line of dawn (a moving line joining places where sunrise occurs at the same time) is almost parallel to the NSW coastline and so hits all along the coast between Byron Bay and Cape Howe almost at the same time. Cape Howe, near Mallacoota, and right on the NSW/Victorian border will see the sunlight marginally earlier than other places as it juts out slightly from the coast. Some representative times of sunrise are listed below:

Sunrise on the mainland	
Mt Warning	5.47 am
Newcastle	5.47 am
Sydney	5.47 am
Penrith	5.49 am
Wollongong	5.47 am
Narooma	5.45 am
Eden	5.43 am
Cape Howe	5.42 am

As the line of dawn curves as it goes further south, the east coast of Tasmania receives sunlight earlier than anywhere on the mainland. Sunrise at Cape Pillar near Port Arthur will be at 5.31 am at ground level and at 5.28 am on Chasm Lookout above. Many people are expected to watch from the wind-swept top of Mt Wellington in Hobart as that receives sunlight only a few seconds later.

By going a little further afield, but staying within Australian territory we could receive sunlight even earlier. Sunrise on Lord Howe Island will be at 5.22 am, on Norfolk Island at 4.52 am and on the scientific outpost of Macquarie Island at 3.49 am Eastern Australian summer time. These times are summarised below:

First sunrise in Tasmania and in Australian territories	
Chasm Lookout	5.28 am
Mt Wellington	5.28 am
Lord Howe Island	5.22

	am
Norfolk Island	4.52 am
Macquarie Island	3.49 am

Where on the globe is the first populated place to see the first sunrise? The best candidate seems to be the eastern tip of Pitt Island, one of the Chatham Islands, about 850 km east of New Zealand. They will see the Sun rise there at 5.49 am local summer time or 3.04 am Eastern Australian summer time. Kiribati has put in a claim for Caroline Island where the Sun will rise 21 minutes earlier. However, as that is an almost inaccessible group of tiny islets, the claim is generally ignored. The list below includes some other places where sunrise occurs earlier than in Australia:

First sunrise before Australia		
Place	local time	Eastern Australian summer time
Pitt Island, Chatham Islands (NZ)	5.49 am	3.04 am
Wellington, NZ	5.51 am	3.51 am
Nuku'alofa, Tonga	6.02 am	4.02 am
Suva, Fiji	6.33 am	4.33 am

Why does the new millennium begin in 2001?

The 20th century ended on 31 December 2000 and the new millennium began on 1 January 2001. Though these dates seem contrary to common sense there are sound historical reasons for them. The tale of why we have these dates involves two interesting characters: a six century monk named Dionysius Exiguus or Dennis the Little and the eighth century English historian the Venerable Bede.

It is a fair bet that Dennis the Little was short in stature though of course his fellow monks may have had an Australian-style of larrikin humour and he was in fact tall. We may never know. It was he who decided to switch chronologies from that prevailing at his time to one beginning with the birth of Jesus. Although he seems to have made an error of four years in determining that date, this is not too bad an accuracy considering he was writing over 500 years after the event. That is, however, another story.

The main problem with Dennis' chronology is that he started with year one and not year zero. That may seem like a careless error to make, one that we would not make today. For example, no one today would celebrate a baby's first birthday until he or she had completed 12 months of life. We cannot fully blame Dennis, however, as the concept of zero was not yet known in his lifetime. That concept seems to have been invented by Indian mathematicians around the end of the eighth century or at the beginning of the next. By the time it reached the West it was far too late to influence Dennis or even the Venerable Bede who is the real culprit, albeit unintentionally, in this story.

Until the Venerable Bede came along the chronology could have been fixed retrospectively by inserting the missing zero year. Bede, who acquired the honorific "Venerable" only after his death, was born in 672 or 673 near Durham in England. At his monastery of Jarrow he was a prolific writer on a wide range of religious matters. His best known work is the "Ecclesiastical History of the English People". Even today historians rely on that work for much of the early history of Britain.

It was Bede who in his writings popularised the still little-known chronology due to Dionysius Exiguus. More importantly, he extended the chronology backwards, again without the zero.

Thus the year 1 AD was preceded by the year 1 BC. This extension entrenched the timescale and made any retroactive repair impossible. So we have to accept that the first century began with year one and ended with year 100, the second century began with year 101 and ended with year 200. Continuing this scheme we inevitably find that the twentieth century began with year 1901 and ended with the year 2000. The twenty-first century began with the year 2001 and will end with the year 2100.

A cricketing analogy may be helpful for those who are still unconvinced that the millennium started on 1 January 2001. Cricketers avoid a "duck" and start on their century by scoring run one. We applaud them for scoring a century only after they have completed their 100th run. Spectators loudly celebrating after run 99 would not be popular with their fellows! Further, cricketers are said to begin their second century after they have completed run 101 and not before. The situation with years and centuries is the same. Yet there were plenty of *premature celebrators* at the end of the 99th year of the twentieth century!

This information sheet is an extract from an article on the millennium written by Dr Nick Lomb that appears in the Dec/Jan '99-00 issue of SKY & SPACE Magazine, available at all good newsagencies and by subscription - call (02) 9369 3344.

Further information is also available from the United States Naval Observatory at http://aa.usno.navy.mil/AA/faq/docs/first_sunrise.html.

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