Australian Aboriginal Astronomy in the International Year of Astronomy 2009

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Summary

Each of the 400 different Aboriginal cultures in Australia has a distinct mythology, and its own ceremonies and art forms, some of which have a strong astronomical component. Sadly, the Australian media tend to focus on negative aspects of contemporary Aboriginal culture, and very few non-Aboriginal people in the wider Australian community are aware of the intellectual depth of traditional Aboriginal cultures. The International Year of Astronomy 2009 seemed an excellent opportunity to tell the wider public about Aboriginal astronomy, so that they might understand something of the depth and complexity of traditional Aboriginal cultures. This article describes some of the challenges and successes of this programme, and the impact that this work has had on Australian perceptions of Aboriginal culture, helping to build a bridge across the cultures. It also describes the achievement of an unexpected and unplanned goal: the inclusion of Aboriginal astronomy opened up astronomy to a section of the population who had never before intentionally attended a talk on science.

Introduction

Each of the 400 different indigenous cultures in Australia has a distinct mythology, and its own ceremonies and art forms, some of which have a strong astronomical component. Many share common traditions such as the Emu in the Sky constellation of dark clouds, and various common stories about the Sun, Moon, Orion and the Pleiades. Several use the rising and setting of particular stars to indicate the time to move to a new campsite, with food sources appropriate to that season. At least two independent accounts suggest that traditional indigenous people associated eclipses with a conjunction of the Sun and Moon. For example, the explanation from North-West Arnhem Land of a lunar eclipse as a conjunction of the Sun-woman and Moon- man, when the Sun and Moon are on opposite sides of the sky, is evidence of a great intellectual leap by some Indigenous thinker in the distant past. Yolngu stories explaining how the Moon causes the

Figure 1. One of the paintings from the Ilgarijiri *(which means "things belonging to the sky" in the Wajarri Yamatji language) art exhibition. This painting is entitled Seven Sisters and is reproduced here by courtesy of the artist, Christine Collard. Photo: Curtin University.*

tides can be compared with Galileo's denials that the Moon had anything to do with it! One stone circle appears to indicate the position of the setting Sun on the horizon at the solstices and equinox, and there are suggestions of several other sites with an astronomical connection. Short reviews of this subject can be found in Norris & Hamacher (2009) and Norris & Norris (2009).

Since the British occupation of Australia over 200 years ago, Aboriginal Australians have been treated badly by the European majority. While all sections of responsible society are now trying to repair the damage, there remains an element of latent prejudice against Aboriginal Australians. This continues to be fuelled by negative stereotypes in the media, typically featuring allegations of child abuse or substance abuse in dysfunctional and marginalised Aboriginal communities. Rarely appearing in the media are the well-functioning communities in which charismatic elders of great integrity strive to achieve a balance of traditional values with health and education. These elders are also a fount of knowledge on Aboriginal cultures, including astronomy, and so an outreach programme on Aboriginal astronomy could also raise awareness in the wider public that not all Aboriginal communities conform to the negative stereotype.

The International year of Astronomy 2009 seemed an excellent opportunity to tell the story of Aboriginal astronomy to a wider public. In late 2008, Steven Tingay and Ray Norris established the IYA2009 Working Group on Australian Indigenous Astronomy (WGAIA) with two main goals:

- to raise the profile of Australian Aboriginal astronomy, thereby contributing to greater cross-cultural understanding;
- to use Aboriginal astronomy as a means of bringing astronomy to young people.

The WGAIA served primarily as a forum in which its members could interact and coordinate their individual activities.

The planned outreach programme

As well as coordinating individual activities, the WGAIA planned a number of activities as follows.

1. Public talks

The WGAIA planned a series of public talks on Aboriginal astronomy, to raise the awareness of this little-recognised aspect of Aboriginal culture. An estimated 60 public talks on Aboriginal astronomy were given, initiated through a wide range of channels.

2. Introductory book on Aboriginal astronomy

A small book (*Emu Dreaming*; Norris & Norris, 2009) was published privately and has been very well received. It quickly sold its initial print run of 1000, and is now in its second printing.

3. Virtual art gallery

There was an initial plan to build an art gallery on the web containing Aboriginal art with astronomical themes, with appropriate permissions. This idea, initiated by Steven Tingay, developed into a more substantive art exhibition (*Ilgarijiri* — things belonging to the sky), using art works (one of which is shown in Figure 1) with an astronomical theme produced by the artists of Yamaji Art cooperative in Geraldton, Western Australia, whose artists are drawn from the region in which the Australian SKA Pathfinder (ASKAP) telescope and the Murchison Widefield Array will be built. The first stage in this project was a visit to the Murchison Radio-astronomy Observatory by the artists and scientists from the International Centre for Radio Astronomy Research (ICRAR). During the visit the group discussed the country and the astronomy developments, as well as indigenous and non-indigenous stories of the sky, under the clear and dark skies of the mid-west of Western Australia. As a result of this interaction, the artists produced well over 100 original pieces of art. These pieces were exhibited in Geraldton and it was the largest event ever held at the Geraldton Regional Art Gallery. The exhibition was subsequently shown in Perth at Curtin University of Technology and

in Canberra, at the Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS). Finally, the exhibition travelled to Cape Town in South Africa and was shown at an international conference, Communicating Astronomy with the Public 2010. The art was included in a virtual gallery[1] and a project blog was kept online[2] and will be updated beyond 2009.

4. Conference

It seemed appropriate to mark IYA2009 by holding the first-ever symposium on Aboriginal astronomy, to which all those engaged in this field would be invited. The conference (see Figure 2) was kindly hosted by AIATSIS, in conjunction with the *Ilgarijiri* exhibition. It was very successful, with a range of talks and presentations ranging from mainstream academic studies to presentations built around music and dance. A symposium proceedings is currently in preparation.

The significance of this conference should not be underestimated. While many writers have made valuable contributions over the years to our knowledge of Aboriginal astronomy, their work has largely gone unnoticed, or been dismissed as a fringe activity, by the professional research community. This is now changing, and a small number of systematic research studies in Aboriginal astronomy are now under way. This symposium was hosted by Australia's leading body in Aboriginal studies, and was attended by several well-respected archaeologists and anthropologists. The symposium seems to have marked a transition, as Aboriginal astronomy grows from a fringe science to become a legitimate academic field of research.

Figure 2. Participants at the Symposium on Indigenous Astronomy held at the Australian Institute for Aboriginal and Torres Strait Islander Studies on the 27 November 2009, in conjunction with the launch of the art exhibition, Ilgarijiri *— things belonging to the sky. Some of the exhibition paintings can be seen behind the participants. Credit: Australian Institute for Aboriginal and Torres Strait Islander Studies.*

The unplanned outreach programme

As well as the planned activities, a number of other activities occurred either serendipitously or as a result of the increased awareness engendered by the planned activities. They are unplanned in the sense that WGAIA didn't foresee them, although each was of course meticulously planned by those involved in its production.

1. Radio and TV

A number of events were covered by the media (print, radio, and TV), and this increased exposure led to even greater media coverage. The highlight was the ABC-TV Message Stick documentary on Aboriginal astronomy, entitled *Before Galileo*, produced and directed by Grant Saunders of the ABC. This widely acclaimed programme was first aired on prime-time television, and subsequently repeated several times, as well as being highlighted on the ABC website. It features interviews with several members of WGAIA, including captivating contributions by senior Wardaman elder Bill Yidumduma Harney.

2. Print media and the web

In addition to articles specifically about Aboriginal astronomy, images from Aboriginal astronomy are widespread on the web and in print media. *The Emu in the Sky* image by Barnaby Norris, shown in Figure 3, was distributed by the Department of Education to every school in Australia, and, together with other Aboriginal astronomy images, now seems to pop up in the most unlikely places, and has been used as an illustration in a number of text books in several languages.

To celebrate the IYA2009, the ABC established an activity (Big Aussie Star Hunt) to get kids looking at the sky from their backyards. Included in the Big Aussie Star Hunt website is an Aboriginal astronomy theme, which has received excellent feedback on the ABC website.

3. The First Astronomers *show*

After the producer of the Darwin Festival, Jo Duffy, attended a talk by Ray Norris on Aboriginal astronomy, she invited creative producer Bec Allen and director Alex Galeazzi to team up with Ray Norris and Bill Yidumduma Harney (Figure 4) to produce an outdoor

Figure 3. The Emu in the Sky *by Barnaby Norris. Composed of dark clouds of dust in the Milky Way, the Emu rises above an Aboriginal rock engraving in Ku-ring-gai Chase National Park, Sydney, Australia. She stands upright above her engraving only at the time each year when the emus lay their eggs — an important food for the Ku-ring-gai Aboriginal people. Quite unlike European constellations, which are traced out by stars, the Emu is traced by the mysterious dark spaces between the stars. See her head and beak at the top right, her long neck stretching down to her body in the centre, and her legs trailing to the lower left. This powerful image in the sky is suggested by Hugh Cairns to be reflected in the ancient Aboriginal engraving in the rock below. Photo: Barnaby Norris.*

theatre show about Aboriginal astronomy. In this show, Bill and Ray compare their two worlds, of astrophysics and traditional belief. They discuss how the black hole at the centre of our Galaxy shares similarities to the Wardaman hole in the sky to which spirits fly, and combine ancient dreaming stories with real science, including the Sun as a star, dark clouds as the birthplaces of young stars, light-travel time and black holes. The show received excellent reviews after playing to audiences of 500–600 in the Darwin and Adelaide festivals, and is expected to appear in other Australian cities in 2010.

Outcomes

There has been no attempt to measure impact in a formal sense, although anecdotal evidence implies an impact far greater than initially expected by the WGAIA. In particular, the following outcomes have been noted.

1. An increased level of awareness of Aboriginal astronomy, and Aboriginal culture, amongst the public as a whole

Although this was the primary planned outcome, the degree of impact has been much higher than expected. In particular, informal feedback suggests that while most Australians are aware of some aspects of Aboriginal culture such as painting, music and dance, many were previously unaware of the intellectual component, such as the discovery of the causes of eclipses and tides.

A further side effect has been to dispel the widespread myth that Aboriginal people cannot count beyond four or five. This was taught in Australian schools until very recently, despite sound anthropological evidence of complex number systems that was well-established nearly a century ago.

2. Aboriginal astronomy as a way of teaching science

To understand Aboriginal astronomy requires some understanding of modern astronomy. For example, a western student cannot appreciate the significance of an eclipse without understanding the causes of eclipses. And Aboriginal number systems cannot be understood without understanding how our own number system works, which is perhaps why some arts-trained anthropologists failed to recognise the Aboriginal number systems in the first place! Teaching science by way of a traditional indigenous knowledge system seems an effective way of bringing scientific understanding, particularly to those who are unreceptive to conventional science teaching methods.

Perhaps even more fundamental is the demonstration of a scientific approach. Often, science is portrayed as a stand-alone subject, at a distance from cultural concerns. The Aboriginal astronomy outreach programme shows how astronomy is intimately linked to life and culture, how our different cultures lead us to interpret the world in different ways, and yet we are all under the same sky, trying to make sense of it, whatever our culture. It also shows that hard science can say something useful and relevant about a delicate cultural issue.

3. Science by stealth

An unexpected and unplanned outcome, which has been dubbed "science by stealth" by Helen Sim, is that the Aboriginal astronomy activities attract sections of the arts community who have never knowingly attended a talk on science, and seem to be surprised that science can actually be entertaining. By showing how science is linked to culture in traditional Aboriginal societies, we can also see how science is linked closely to our own culture. Some of the reviews that have appeared in the arts media are particularly gratifying, suggesting that combining

science with culture may be an effective way of bridging the "two cultures".

4. Validating Aboriginal cultures

Another unexpected result has been the warm reception by young Aboriginal children, who are surprised to find white Australians valuing and celebrating traditional Aboriginal knowledge. While the value of traditional knowledge has always been obvious to older members of their community, young people do not often see this value reflected in the European-dominated media.

Conclusion

IYA2009 has been a wonderful — and exhausting — year. It was obvious at the start of IYA2009 that we should use it to raise awareness of Aboriginal astronomy, and yet few of us understood what a pivotal year this would be for Aboriginal astronomy, a year in which the subject was transformed from a fringe science to a mainstream research topic. And few of us understood that the subject would catch the public imagination, resulting not only in greater awareness of Aboriginal astronomy, but also a greater awareness of how science is inextricably linked to culture.

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Notes

[1] http://astronomy.curtin.edu.au/ilgarijiri

[2] http://ilgarijiri.wordpress.com

Biography

Ray Norris is an astrophysicist with CSIRO Astronomy & Space Science, whose day-job is researching the origin and cosmic evolution of galaxies. A side interest for the last few years has been the study of the astronomy of Aboriginal Australians, as a result of which he is now an Adjunct Professor in the Department of Indigenous Studies at Macquarie University, where he heads the Aboriginal Astronomy Research Group and enjoys working with several indigenous groups, particularly the Yolngu communities of eastern Arnhem Land.

Figure 4. Bill Harney and Ray Norris in the First Astronomers *show in Darwin. Credit: Bec Allen and the Darwin Festival.*