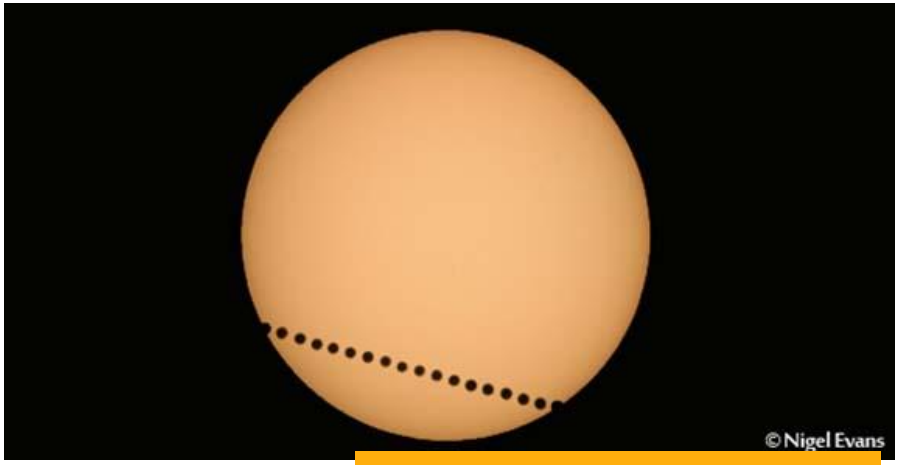

TRANSIT OF VENUS
AUSTRALIA 2012

What is a Transit?

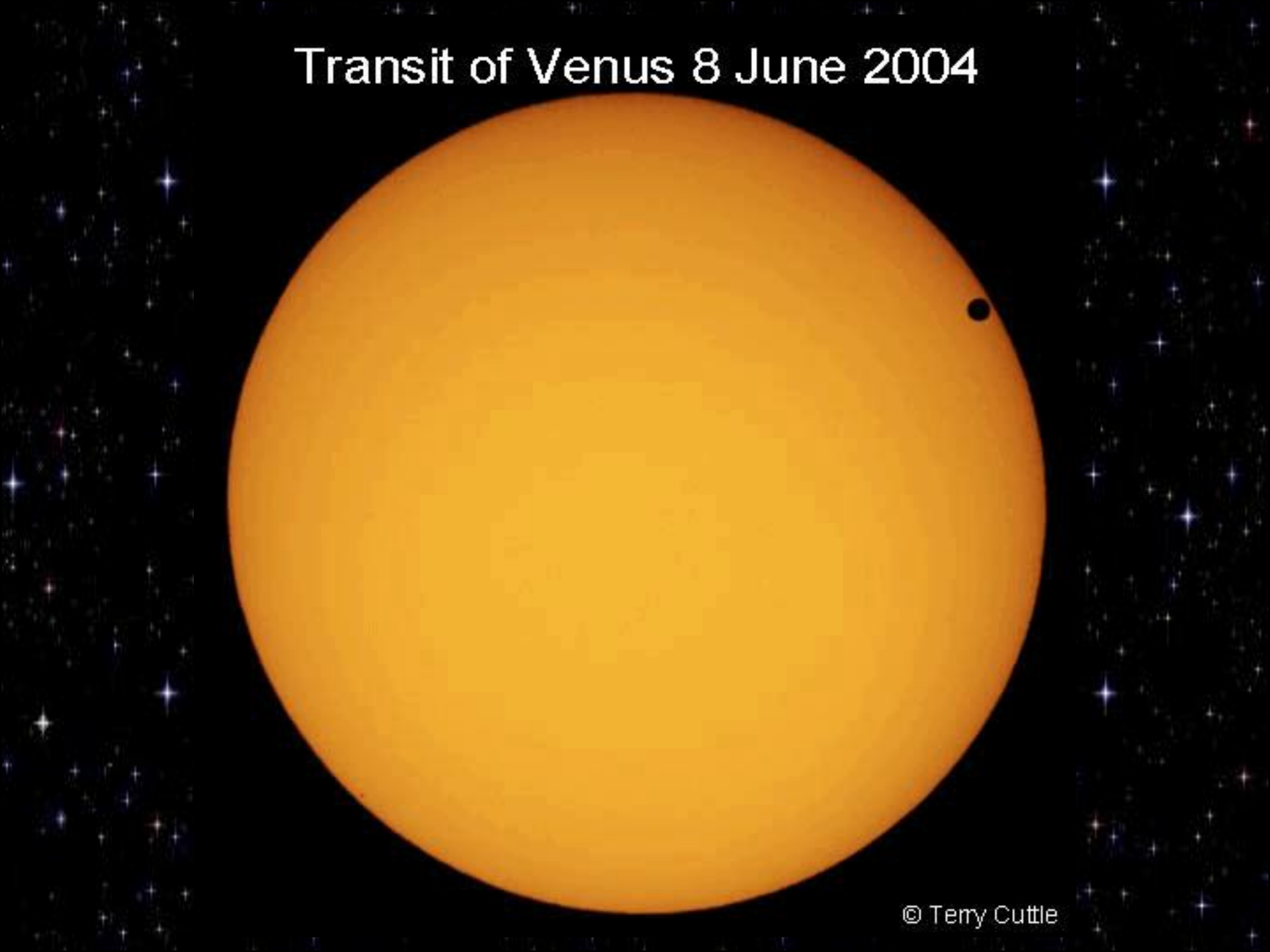
- A transit is when a planet passes directly between the Earth and the Sun
- The solar eclipse is when the Moon passes between Earth and Sun and partially to totally blocks out Sun
- Venus and Mercury are the only planets between Earth and the Sun so the only ones that can Transit

Solar Eclipse



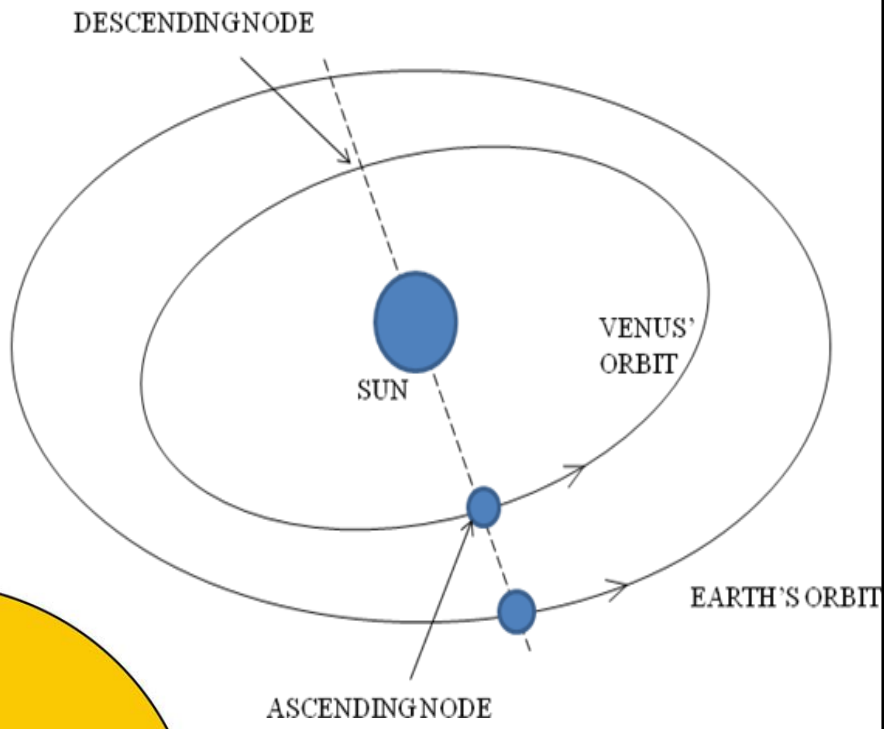
2004 Transit of Venus

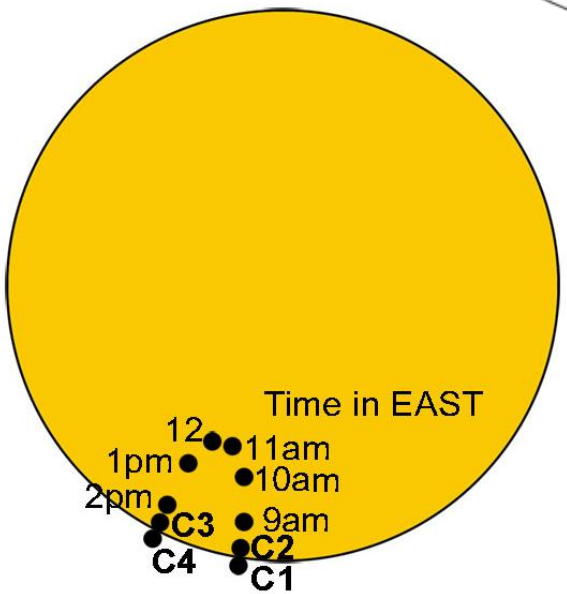
Transit of Venus 8 June 2004



What is the Transit of Venus?

- Venus passes directly between Earth and the Sun during its orbit
- Appears as a black disc, or silhouette moving across the Sun
- Takes around 6 hours
- Path of an upside down "U" because the Sun appears to rotate across sky





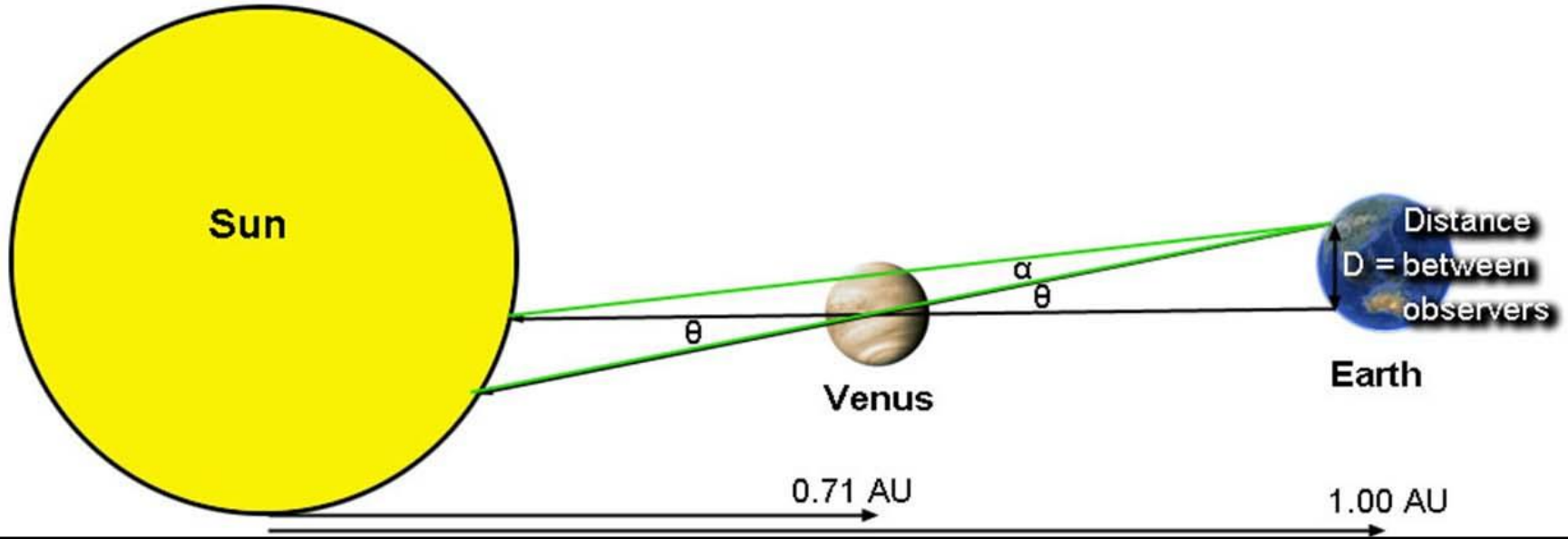
Transit of Venus 6 June 2012

History of Transits

- Come in pairs separated by over a century
- Earliest recorded in 1639
- 1769 Transit observed by Lieutenant James Cook
  - Sent by Britain to Tahiti
  - Took measurements using traditional Surveying, Mapping & Astronomical principles
  - After the Transit he explored & mapped south-east Australia
- 1761 and 1769 observations calculated the size of the Solar System applying Kepler's 3rd law of planetary motion

Computational analysis

- Spherical Trigonometry used to plot & map the Universe
- Astronomical Unit (AU) is used to measure the distance from Earth to the Sun
- Calculated by measuring how long it takes Venus to transit across the Sun
  - Two different locations
  - Measure distance between locations ie Latitude & longitude
  - Time the contacts 1 & 3

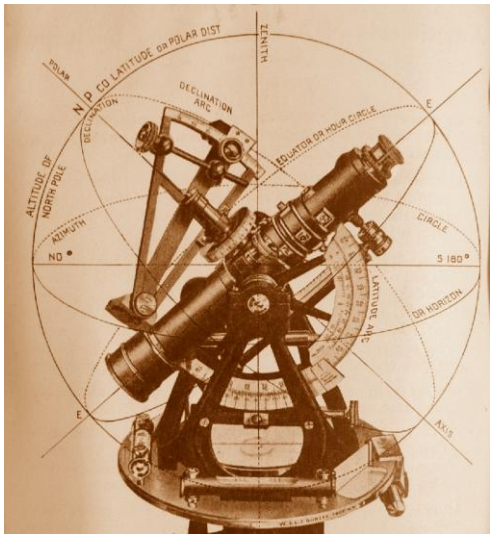


Observing the Transit - THEN

- Historical observations required Surveying and Astronomy skills
- Surveyors used stars to help identify positions on the earth
- Surveying skills were needed to make maps for navigation and exploration
- Most explorers were also Surveyors:
  - Captain James Cook
  - Matthew Flinders
  - Will (from Burke & Wills)

What is Surveying?

- Surveying is the measurement & mapping of the environment
- Use specialised tools and equipment
- Principles of
  - Maths
  - Geography
  - IT
  - Science

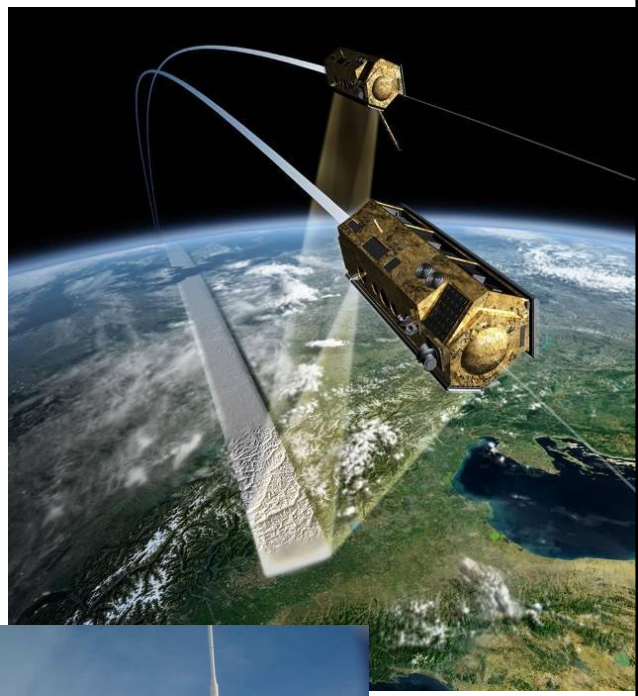


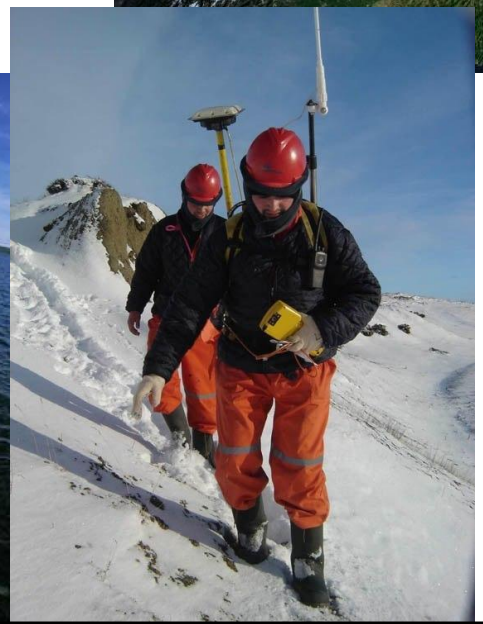
A life without limits

SURVEYING

Observing the Transit - NOW

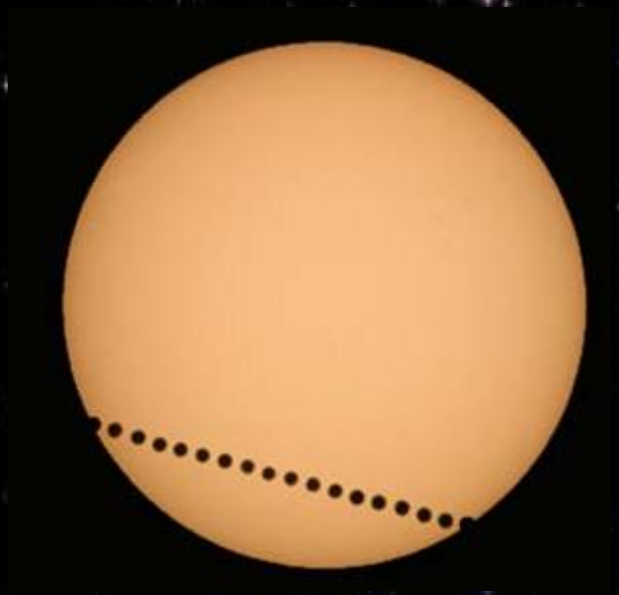
- Modern technology now uses Global Positioning Systems (GPS), satellite remote sensing and other space-based measuring techniques.
  - Still based on early Surveying, Astronomy and Mathematics principles to fix positions and take measurements.
  - Tools are faster, more economical and provide more precise results.
  - Specialist field called Spatial Science





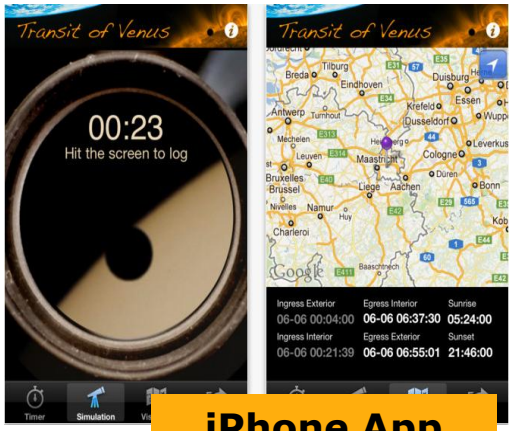
You will experience a rare Astronomical event

- Last transit was in **2004**
- Next Transit will happen in **2117**
- **6 June 2012 –** *the last in your lifetime*



Observing the Transit – 2012

- Never look directly at the Sun – serious damage can occur
- Safe viewing
  - SolarScope
  - Webcast
  - iPhone App
- Using the SolarScope
  - Simple but sophisticated tool
  - Look inside the SolarScope
  - View a large size projection
  - Take time measurements



iPhone App

SolarScope


SolarScope for
safe viewing

Acknowledgements

- Donated on behalf of Surveying and Spatial Science Industry, and Astronomical Association of Queensland
- Student education
  - about the Transit of Venus
  - how Surveying was integral to early Astronomy
  - consider career opportunities
- More information
  - Transit of Venus: www.transitofvenus.com.au
  - Surveying: www.alifewithoutlimits.com.au
  - Spatial Science: www.destinationspatial.com.au

Sources:

- Surveyors & Astronomy & Future (Peter Swan, Bob Ross, Connie Beadell, Graham Tweedie 2012)
- National Aeronautics and Space Administration (NASA)
- Bill Kitson (ABC Radio interview Adelaide Mar 2012)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