

# ISWI National Reports – Asia Region

Australia (Richard Marshall)

China (Bingxian Luo)

India (Nandita Srivastava)

Indonesia (RM behalf Dhani Herdiwijaya)

Korea (Kyung-Suk Cho)

Kazakhstan (Olga Kryakunova)

Nepal (Narayan P. Chapagain)



The Bureau  
of Meteorology

# ISWI Space Weather Report Australia

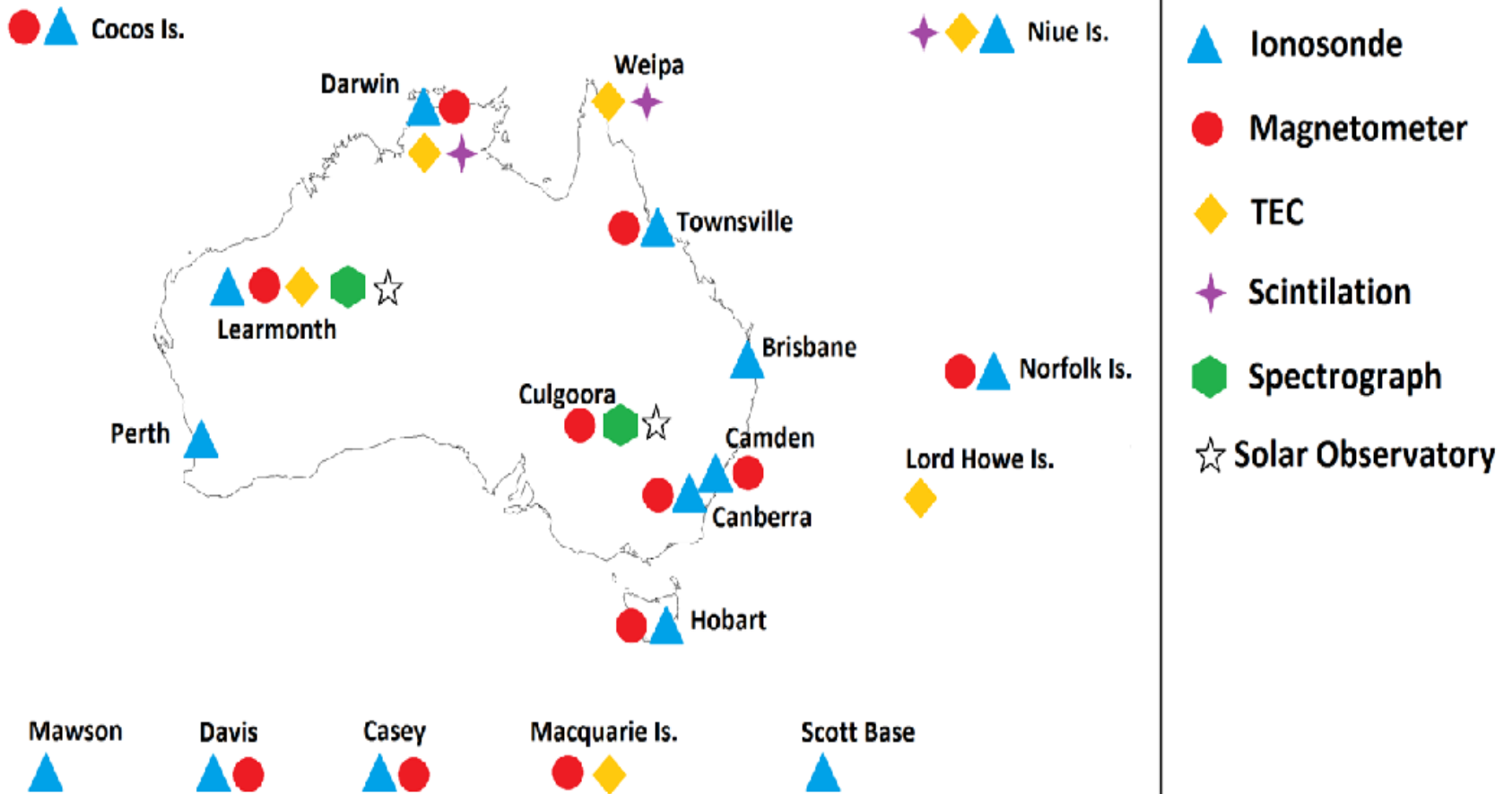
Richard Marshall<sup>1</sup>, David Pontin<sup>2</sup>, Hannah Schunker<sup>2</sup>, and Iver Cairns<sup>3</sup>

<sup>1</sup>Australian Bureau of Meteorology

<sup>2</sup>University of Newcastle

<sup>3</sup>University of Sydney

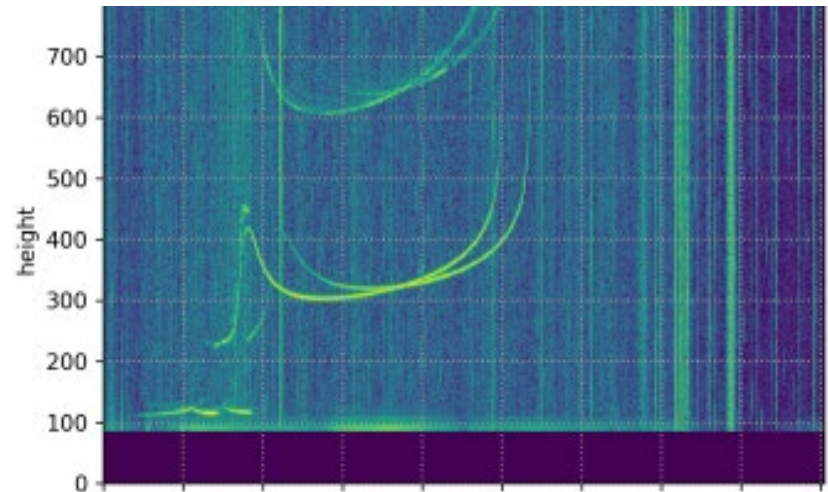
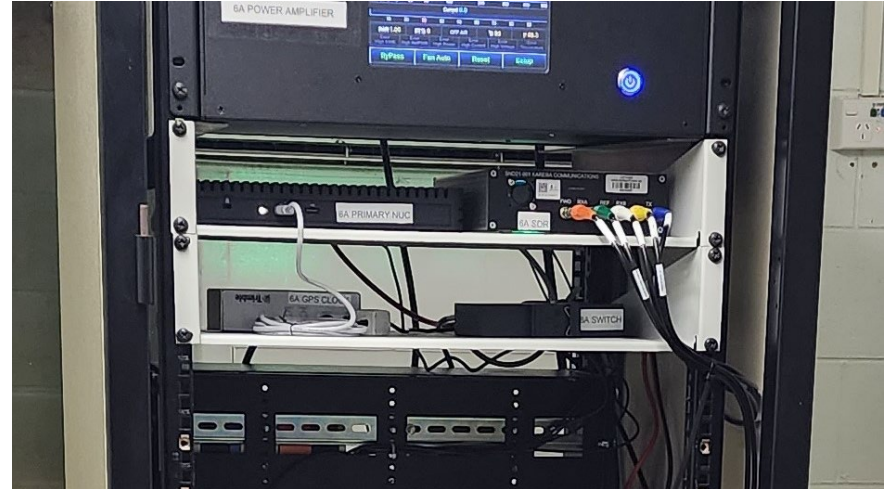
# Bureau's Space Weather Services and Network



# Ionosonde Upgrades

## IPS6A Instrument

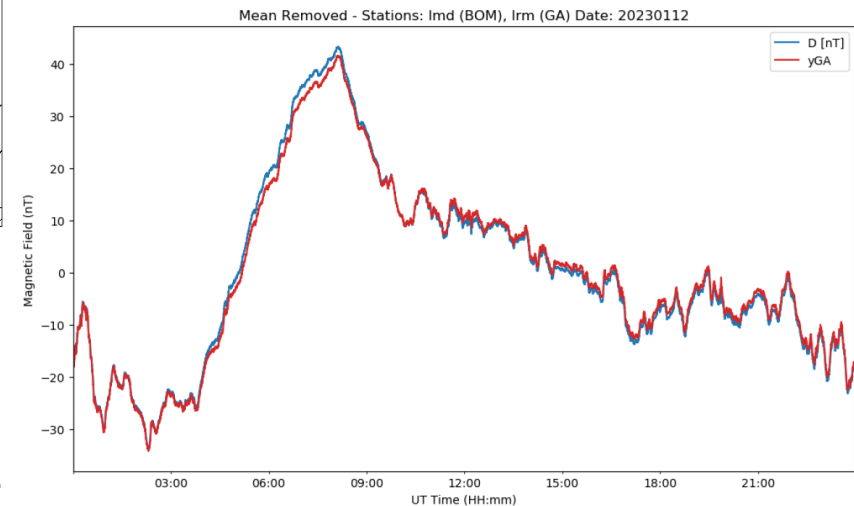
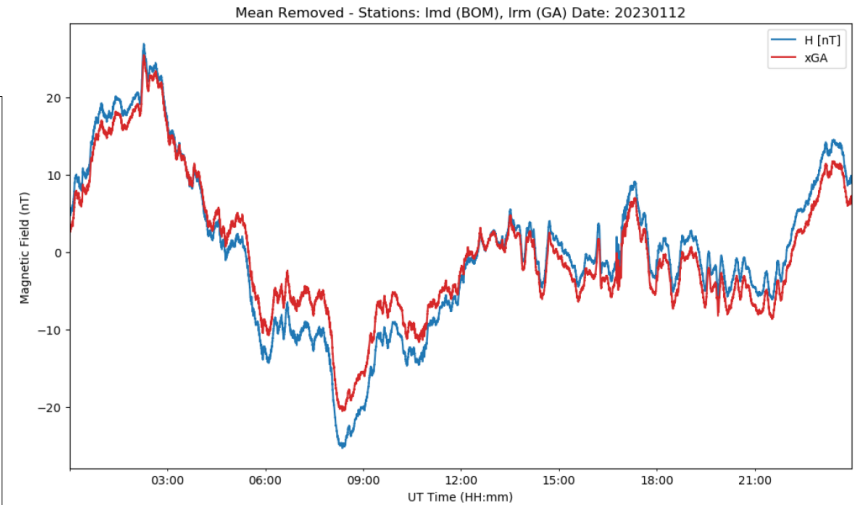
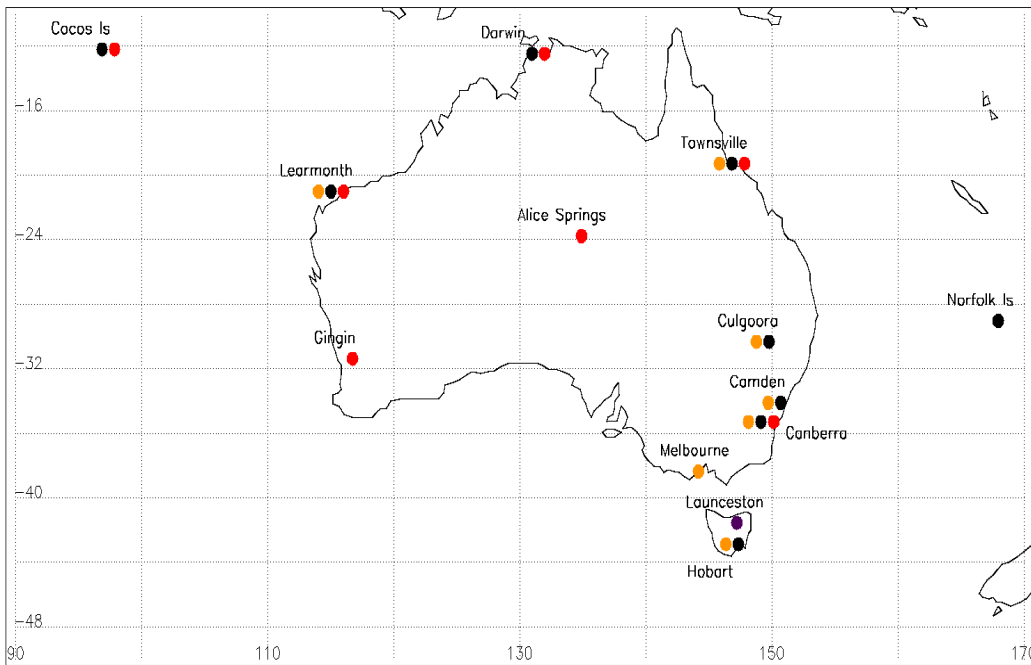
- The IPS6A is based on COTS hardware from multiple sources, and software developed by BoM and external companies.
- The frequency range of the instrument spans from 1.0MHz to 22.0MHz.
- Typical sweep is spaced logarithmically across the frequency span (vertical range of 70km to 750km).
- The Series 6A ionosonde uses chirp modulation and can achieve sensitivity almost 6dB better than the Series 5D / 5F instruments.
- The transmitter output power is approximately 1kW PEP
- The receiver is two channels (O and X mode), with the detector matched to the transmit pulse.
- The Series 6A control computer is Linux based.



# MDAS/MAGDAS Installations at Bureau Sites

(MDAS regression tests)

(MAGDAS denoted by orange circles)



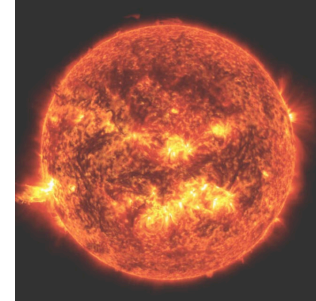
# Heliophysics Research @ University of Newcastle



## **Solar Physics:**

Prof David Pontin; Dr Hannah Schunker (ARC Future Fellow)

- Plus three postdocs, four PhD students
- Solar interior, corona, magnetic activity, solar wind...  
Current projects (~\$1.5M Research Council funding):
  - ARC DP: Understanding the Sources of the Slow Solar Wind
  - ARC DP: Ensemble Modelling of Space Weather Drivers
  - ARC FT: Closing the Solar Cycle



## **Magnetosphere and Ionosphere Physics:**

Prof Colin Waters, Em. Prof Fred Menk, Em. Prof Brian Fraser

- Magnetoseismology; EMIC and radiation belt energization; AMPERE (with Johns Hopkins University Applied Physics Lab), travelling Ionospheric disturbances; geomagnetic induced currents (with BoM); GNSS applications to space weather; computer simulations of magnetosphere plasma waves

# ARC Training Centre for CubeSats, Uncrewed Aerial Vehicles, and their Applications (CUAVA)



	<b>ARC funding</b>	<b>\$4.6 million over 2017-2022</b>
	<b>Partner &amp; RAAP funding</b>	<b>Over \$1 million over 2017-2024</b>

	<b>HQ</b>	<b>USYD</b>
	<b>Director</b>	<b>Prof Iver Cairns</b>



## Aims and Goals

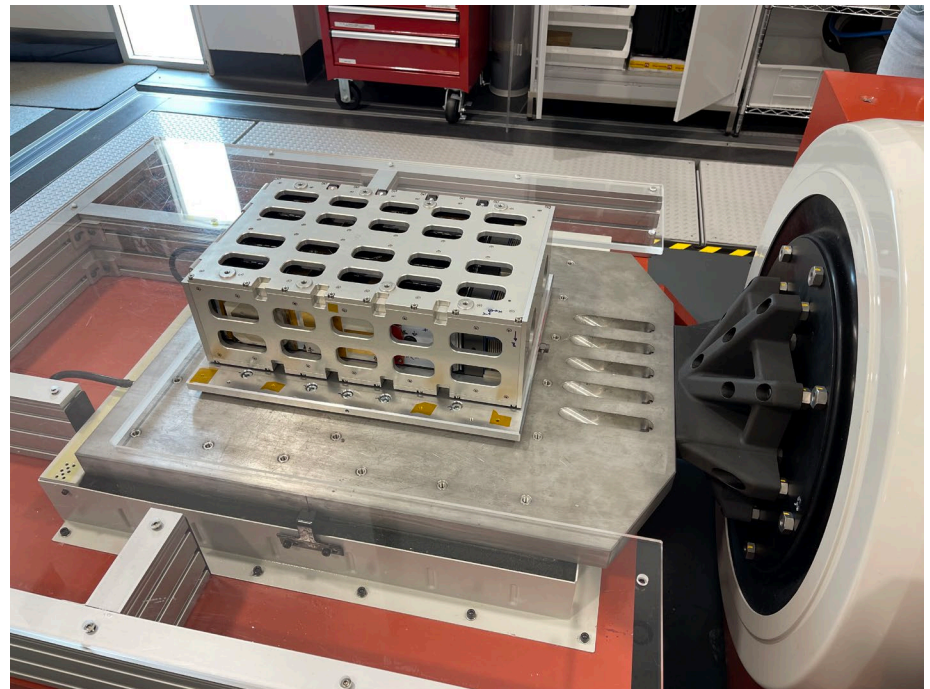
- CUAVA works to develop a world-class Australian space industry in CubeSats, UAVs, and their services & products.
- We bring together academic, government & industry partners.
- We aim to
  1. Train the next generation of workers in sustainable space and UAV industries,
  2. Greatly change the capabilities of CubeSats, UAVs, and their instruments and technologies,
  3. Progress our R&D to create major commercial value with widespread applications across Earth observations, GPS, satellite communications and space weather.



## Results Thus Far

- 12 PhD, 6 Masters, and 3 Honours students graduated or enrolled. 6 postdocs & over 30 undergraduates trained.
- 1 3U CubeSat launched in 2021 and 2 6U CubeSats built and integrated for 2024 launch.
- Extra funding from Investment NSW, SmartSat CRC, Defence Innovation Hub, & NSW Space Research Network.
- Multiple UAV and aircraft missions with partners.
- Instruments & technologies developed:
  - hyperspectral imagers OpenHSI, HSI, & RedEye-1 (IR),
  - GNSS receivers and reflectometers (Harry),
  - EDDI and SPaDeS electron density & debris detectors,
  - CROSS star tracker,
  - ElectroPermanent Magnetotorquer (EPM) & Data-Over-Power Network





Left: CUAVA's Waratah Seed-1 CubeSat (in its protective stand) at USydney prior to vibration tests at NSTF / AITC.  
Right: Waratah Seed-1 at NSTF / AITC on the shake table.





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**Thank you**



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