Arcturus, Queensland: An Introduction

Tehani J Kuske

Acknowledgements

Australian Government

Geoscience Australia

- Andrew Feitz
- Henry Berko
- Steve Zegelin
- Zoe Loh
- David Etheridge

We are voluntary contributors to OzFlux/TERN

Arcturus: Semi-arid cropping and grazing

Arcturus, Central Queensland, Australia

■ *GHG atmospheric monitoring station*

Purpose

Baseline greenhouse gas monitoring station established July 2010

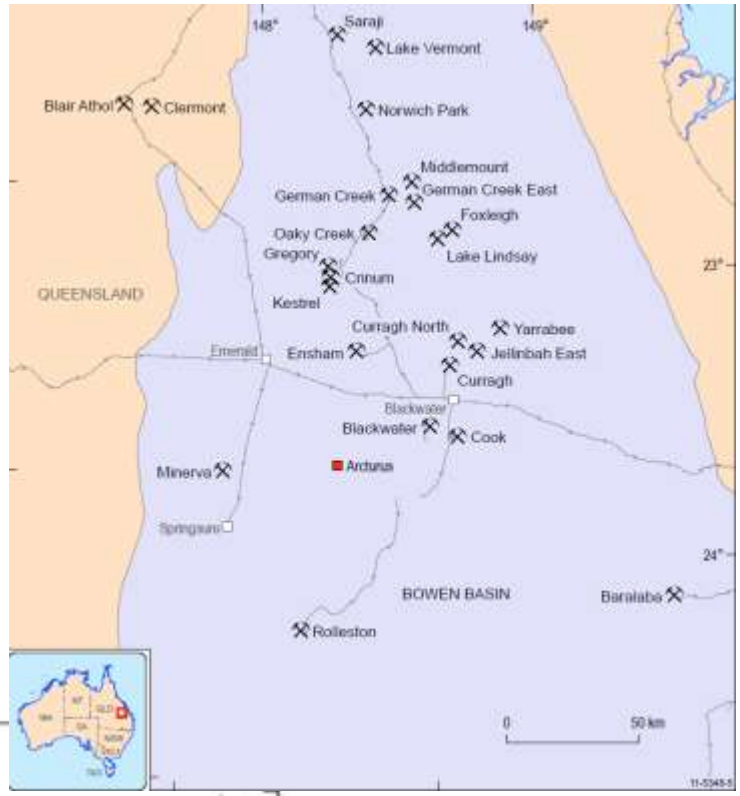
(EC established April-June 2011)

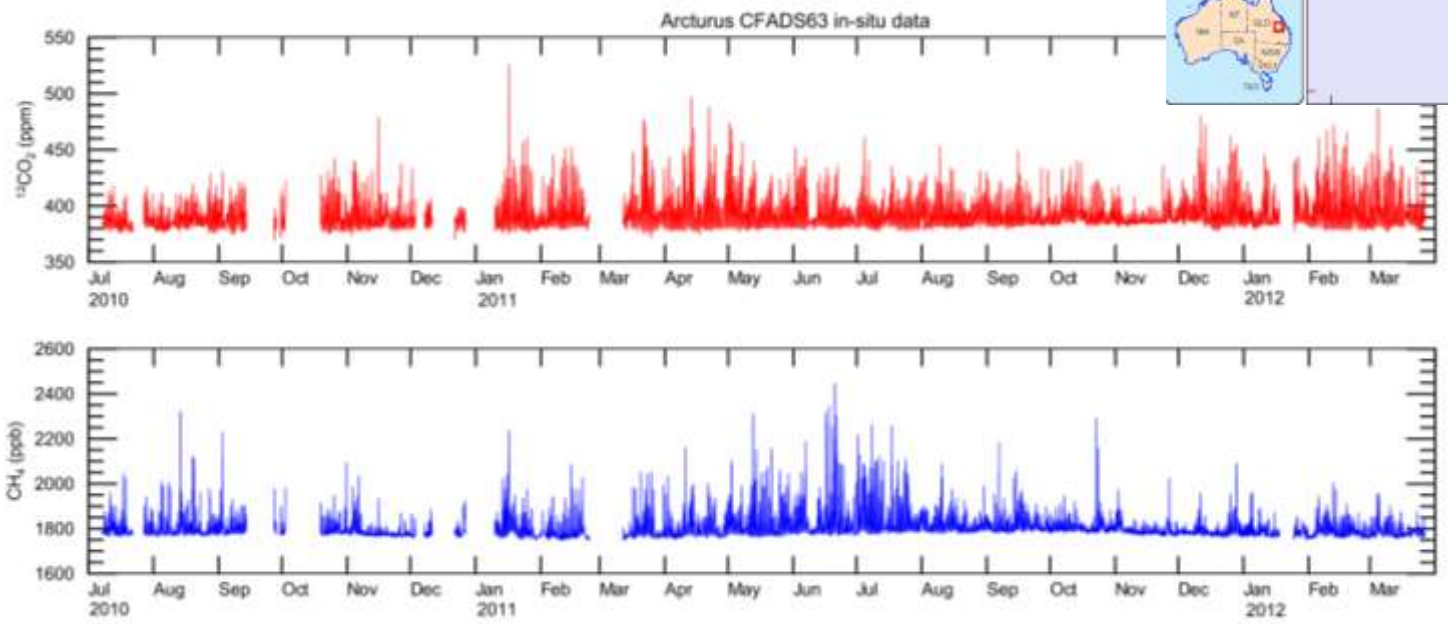
Collaborative project between Geoscience Australia and CSIRO Marine and Atmospheric Research (CMAR)

- Site established in a high priority geological storage CO_2 region
- Field test newly developed GHG monitoring technology
- Demonstrate best practice for regional baseline atmospheric monitoring for geological CO_2 storage
- Container: gas analysers continuously monitor GHGs and CO_2 isotopes (CH_4, H_2O, CO_2, ^{12}C and ^{13}C)
- EC to compliment these measurements

Purpose

- Focus moving to coal mine emission quantification



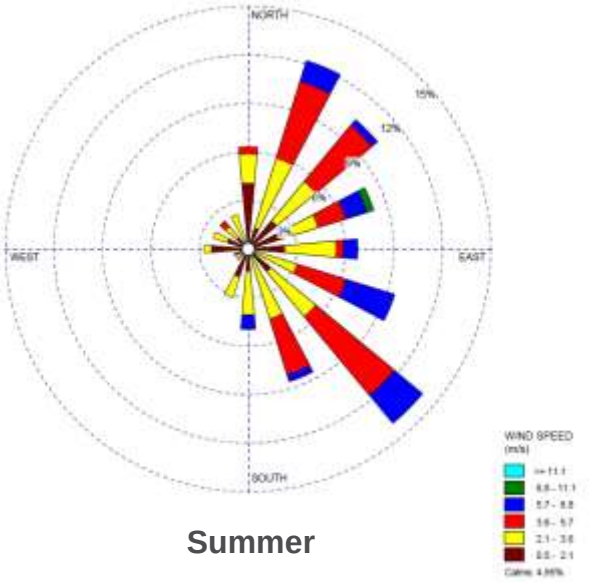


Site Characteristics

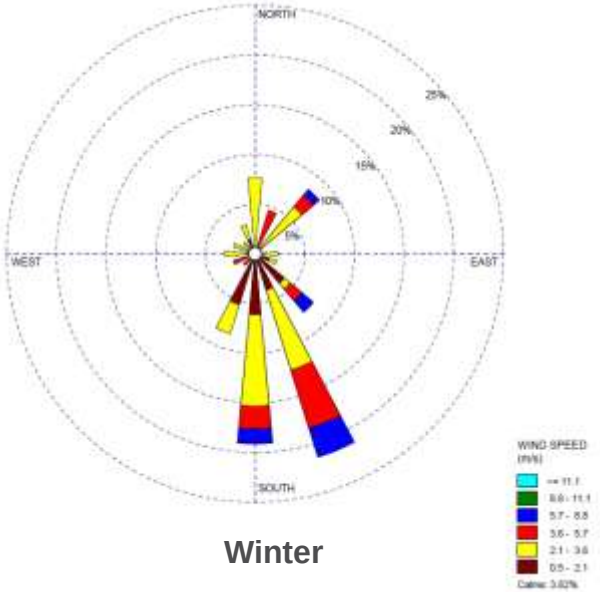
- 48 km southeast of Emerald, QLD
- EC site 250 m south of GHG container
- Cropping to the east (chickpeas)
- Pasture to the west (cattle)
- Summer wet, winter dry season
- 170 m above sea level
- Mean annual precipitation 572 mm
- Soil parameters still to come

Site Characteristics

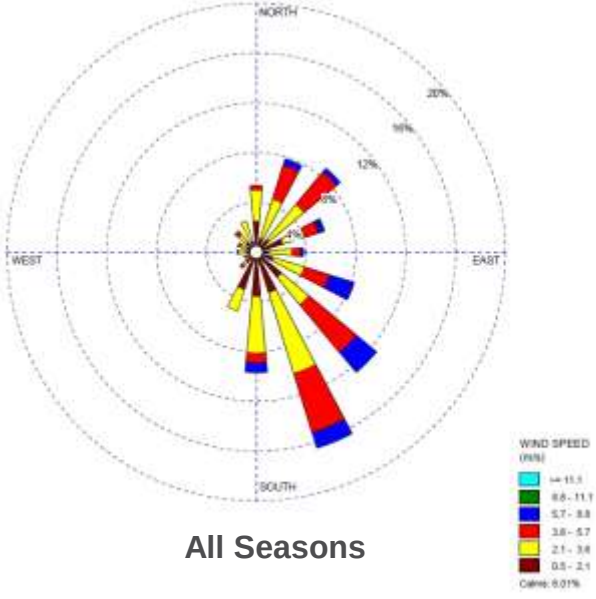
- **Predominant wind directions:**
  - South-south East, South East
- **Nearest BOM stations:**
  - Arcturus Downs 20km South
  - Wyntoon 17km West



Summer



Winter



All Seasons

Construction (April – June 2011)

- **Tower:**
  - Height 5.6 m
  - Steel construction with winch system
- **Sensor direction:**
  - South-south East (predominant annual wind direction)
- **Measurement height:**
  - EC: 6.7 m
  - Radiation: 6.7 m
  - 2D wind speed/direction: 6.9 m
  - Temperature/RH: 6.4 m
  - Ground heat flux: 5 and 10 cm
  - Soil temp: 2.5, 5 and 15 cm
  - Soil moisture: 5, 15, 22 and 30 cm

Construction (April – June 2011)

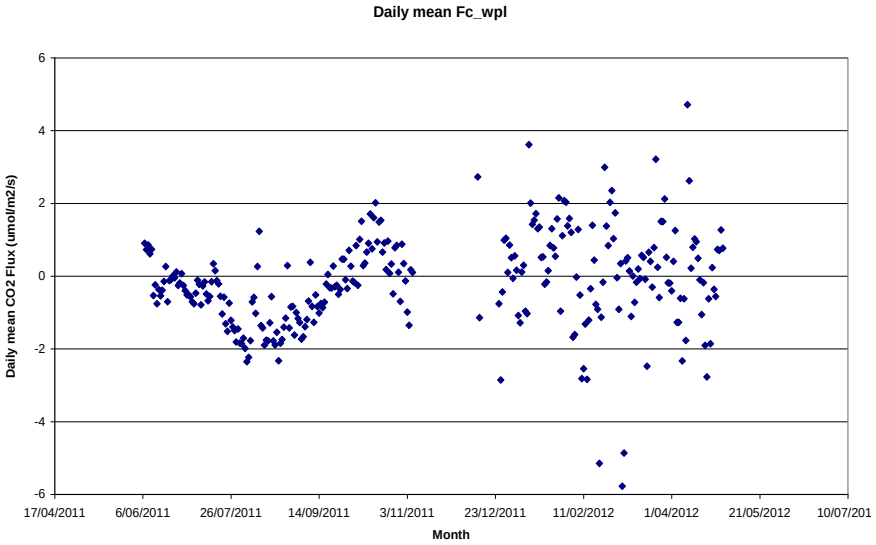
- **LI-7700 CH_4 sensor installed but still not recording!**
- **Telecommunications:**
  - Direct Wifi connection to container site for storage of 10Hz and 30 min data
  - Data automatically downloaded to CSIRO server daily
- **Power:**
  - 240 W Solar panel with 2 batteries

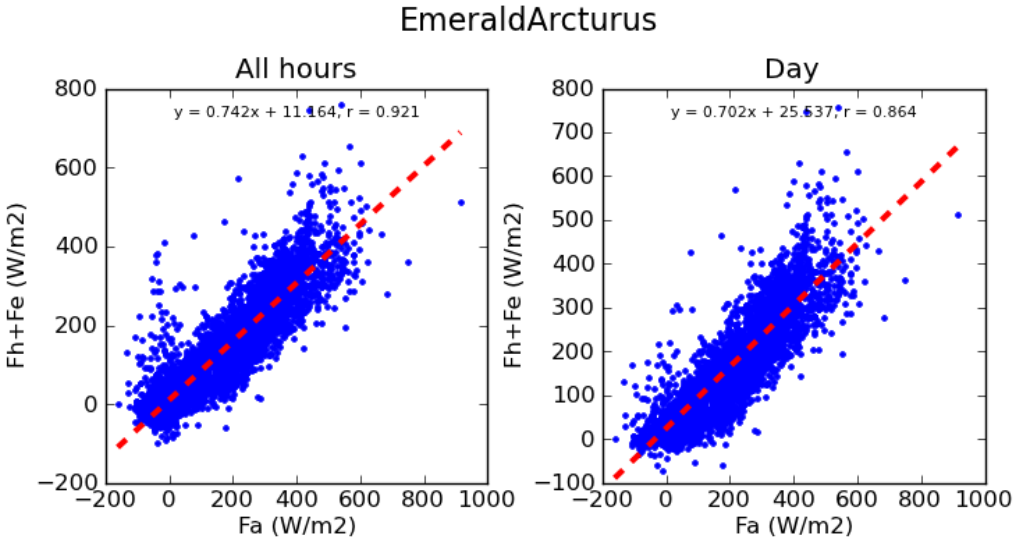
Data Processing

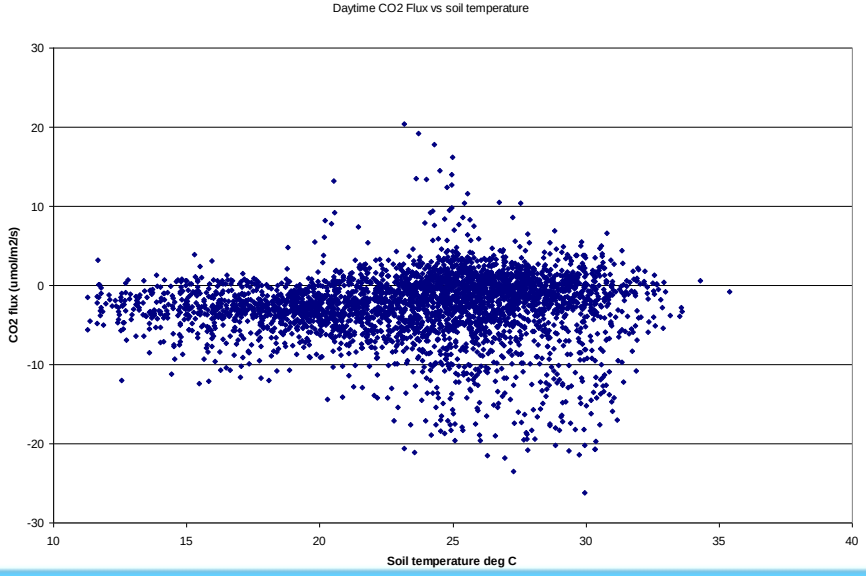
- **Currently have ~1 year of EC data**
- **Processing method used:**
  - Python GUI (by Peter Isaac and James Cleverly)
  - Processed to Level 3
  - No gap-filling applied yet
- **Loaded to the OzFlux/TERN website every 3-4 months**

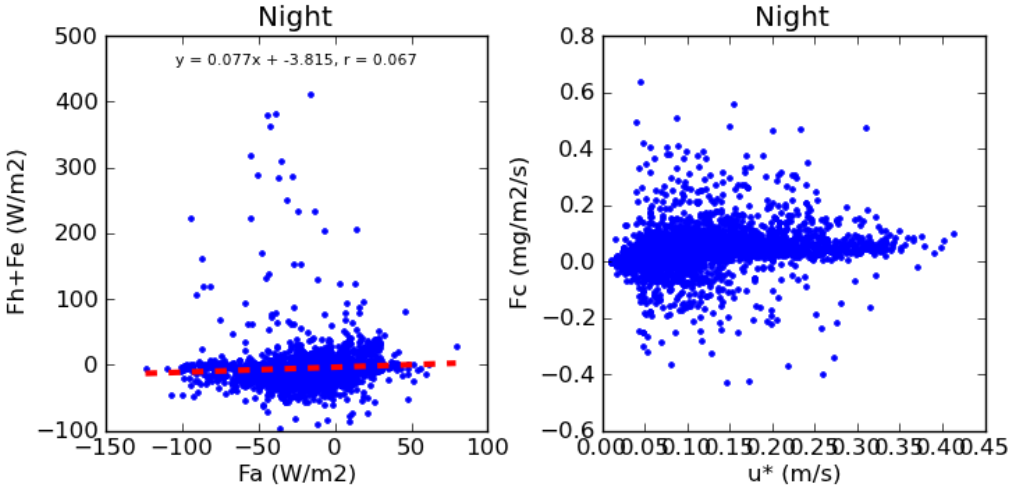
- **Suggestions and advice welcome for gap-filling and data analysis methods**

Preliminary Results









Where to next?

- Get LI-7700 working (July 2012 field trip planned)
- Assess which gap-filling method to apply
- Process 10Hz data using EddyPro
- Update data-processing scripts from the Python GUI
- Have graduate processing and analysing energy and water balance results
- Analyse CO_2 flux data
- Analyse data to contribute to concentration measurements at the baseline station and the atmospheric modelling results (TAPM) i.e. contribute ecological baseline?
- **Any suggestions from OzFlux members would be very much appreciated!**

Australian Government
Geoscience Australia

Discussion and suggestions

Tehani Kuske

Phone: +61 2 6249 9182

Web: www.ga.gov.au

Email: tehani.kuske@ga.gov.au

Address: Cnr Jerrabomberra Avenue and Hindmarsh Drive, Symonston ACT 2609

Postal Address: GPO Box 378, Canberra ACT 2601