Australian Government
Department of Agriculture, Fisheries and Forestry
ABARES

Agricultural monitoring in Australia using satellite data: status and developments

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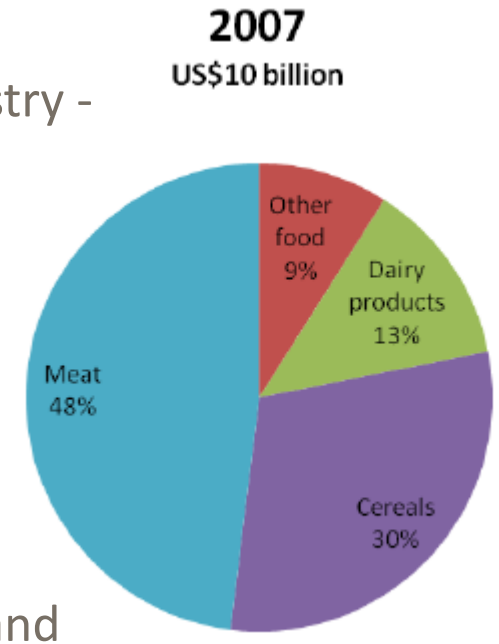
21 November 2013

Australian agriculture: snapshot

- 59% land area and 52% national water use (2009–10)
- 2% GDP (2011-12) – A$48 billion
- Export around 75% (2011-12)
  - crops & livestock = A$36 billion
- 2.1% global exports (agriculture, fisheries & forestry - 2012)
- 10% of global wheat exports (2005-2010)
- Challenges:
  - Land degradation
  - Variable climates (and climate change)
  - Increasing productivity to meet global food demand



Source: ABARES 2012

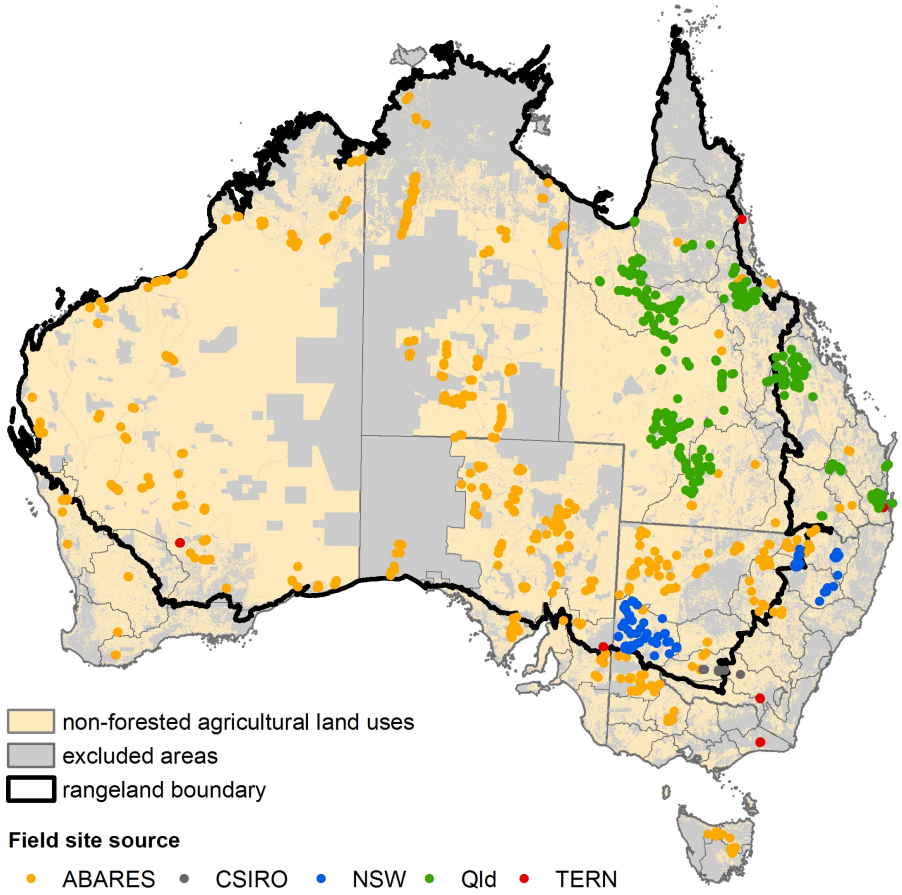
Satellite data for agricultural monitoring: key uses

- Monitoring land condition
- Within season forecasting
- Extreme events early warning and damage assessment
- Validation and calibration efforts
- State and Federal governments, industry, research agencies e.g. ABARES, CSIRO, Geoscience Australia, Terrestrial Ecosystem Resource Network (TERN), GEOGLAM

Monitoring land condition

National Ground Cover Monitoring project

- Nationally validated remotely sensed fractional cover - MODIS (non-woody and litter near soil surface)



Monitoring land condition

National Ground Cover Monitoring project

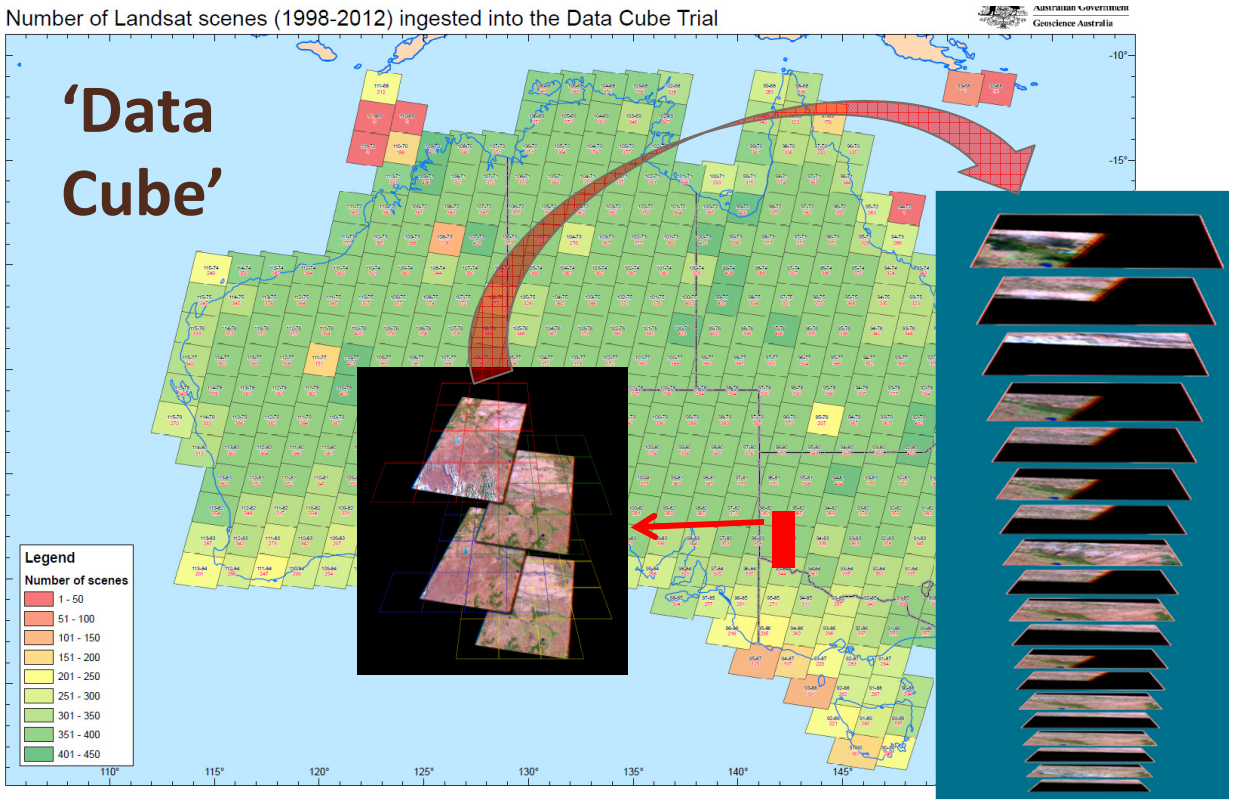
- Nationally validated remotely sensed fractional cover (non-woody and litter near soil surface)
- Ground cover monitoring over large spatial extents at multiple scales through time
- Assessment of environmental targets related to soil erosion and land management
- Using satellite data to track:
  - change in ground cover compared to previous years – influence of management practices
  - where cover persistently low – potential for improvement?
  - wind erosion risk (threshold 50% bare soil)
  - water erosion risk (threshold of 70% bare soil)

Photo: John Leys, NSW OEH

Monitoring land condition

Landsat time series

- Archive of calibrated time series of images (1998 to 2012) – Geoscience Australia
- Data set - land cover change, water inundation etc.
- Available on National Computing Infrastructure, CRC for Spatial Information, TERN
- Developing web portal for access and research

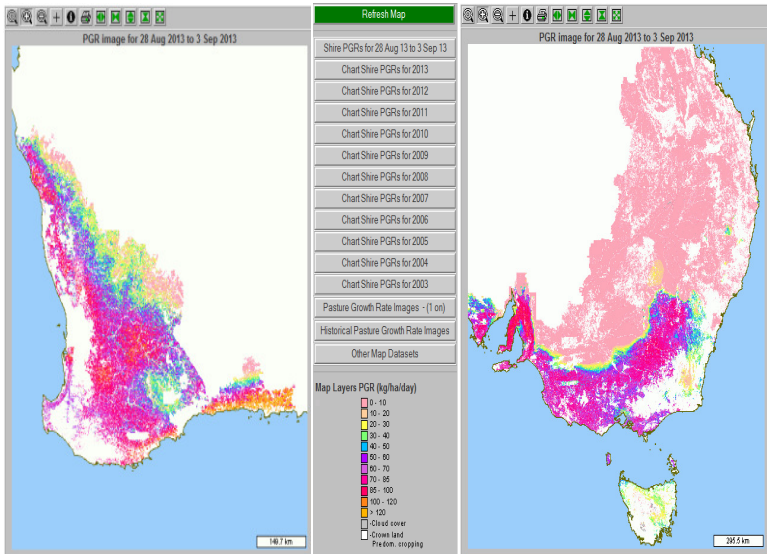


Monitoring land condition

Products for farmers

Web decision making tools using satellite data

- e.g. Pastures from Space®
  - Whole-farm & within-paddock - tactical & strategic decision support
  - Pasture growth rate (kg/ha/day)
  - Pasture biomass (kg/ha) – calibrated at intensive sites
  - Spatial and historical regional comparisons
  - Pasture growth model uses Modis NDVI + radiation, climate & soils data



Within season forecasting

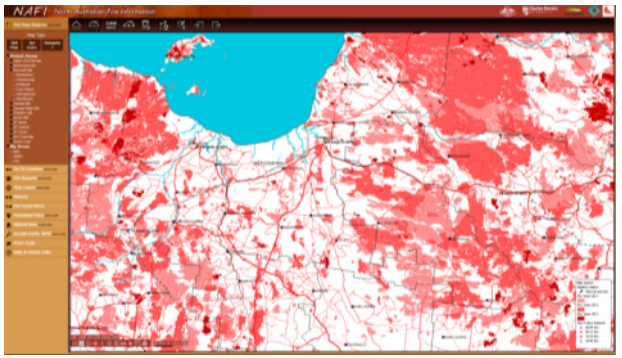
- Focus on crop forecasting (wheat and sorghum)
- Satellite data used to improve crop models
  - Green up (satellite data)
  - Other data used – climate and soil moisture
- Satellite data used to monitor crop condition through season
  - NDVI anomalies
    - Bureau of Meteorology
    - GEOGLAM
  - GEOGLAM – Rangelands initiative – NDVI, fractional cover, models
- Integrated crop forecasting (experimental) – complement crop forecasting using survey based techniques

GEOGLAM Rangelands

- Monitor global lands integral to producing animal protein - 'free-range', open-field basis.
- Global &regional population information - beef cattle, goats, sheep, camels, pork, dairy cattle, buffalo &deer.
- Excludes fisheries, intensive livestock - cattle yards, piggeries, poultry
- NDVI, fractional cover and models
- Activities
  - International workshop Sydney October 2013
  - Implementation plan finalised Jan 2014
  - France - 2nd meeting April 2014
  - Kenya – 2nd half 2014 – International Livestock Research Institute

Early warning and damage assessment

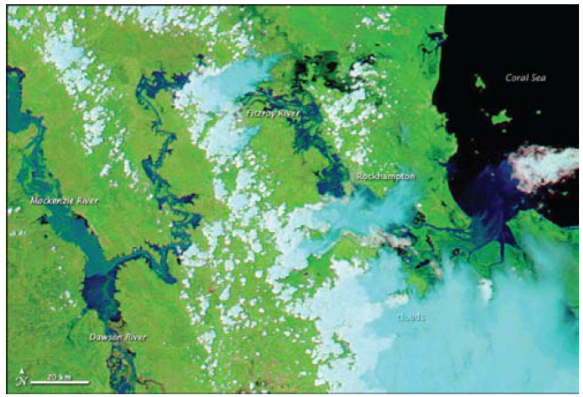
- Fire – Sentinel, Landgate Firewatch, Northern Australia Fire Information
- Drought
- Flood
- Plague locusts



Landgate Firewatch

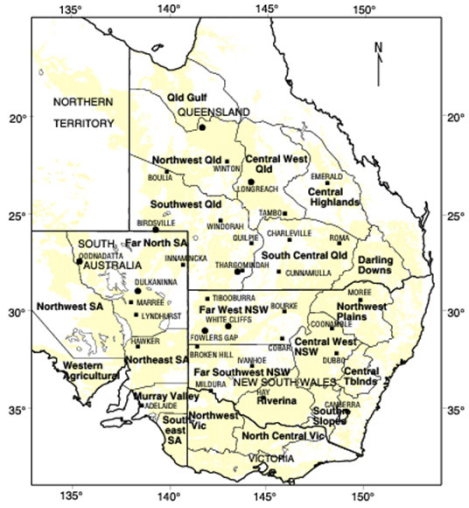
Sentinel – fire hot spots

Flooding central QLD Jan 2011



Note: Dark blue areas indicate water. Light blue and white are clouds.

Plague locusts



Future development – Australian context

- Integrated Crop Forecasting
  - Developing fully functional system
  - Incorporating longer term climate forecasts
- Improve identification of crop area
  - crop identification
  - improve determination of green up
- Coping with cloudy data – coastal & monsoonal areas
- Better coordination and access to existing & new data
  - New satellites
  - Soil moisture
  - Climate data (historical and seasonal forecast)
- GEOGLAM rangelands

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Thank you

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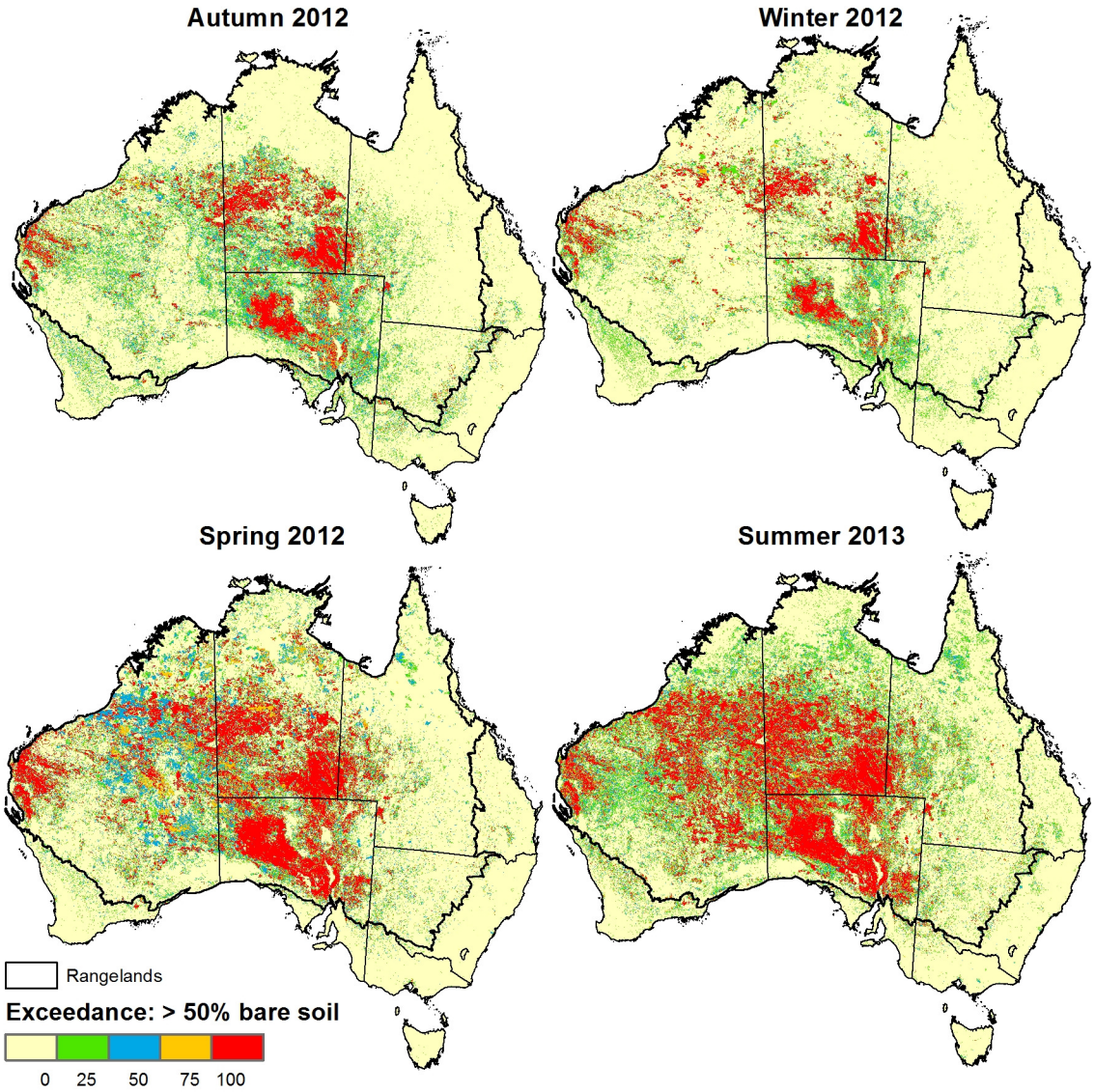
Assessment of wind erosion risk

Counts the number of time periods in a season that bare soil:

- Exceeds 50% (wind erosion)



Monitoring land condition

Products for farmers

Web decision making tools using satellite data

- e.g. VegMachine
  - Regional monitoring and data
  - Resource condition, carrying capacity, grazing impact
  - Spatial and historical regional comparisons within local area
  - Landsat cover index trends, climate & soils data

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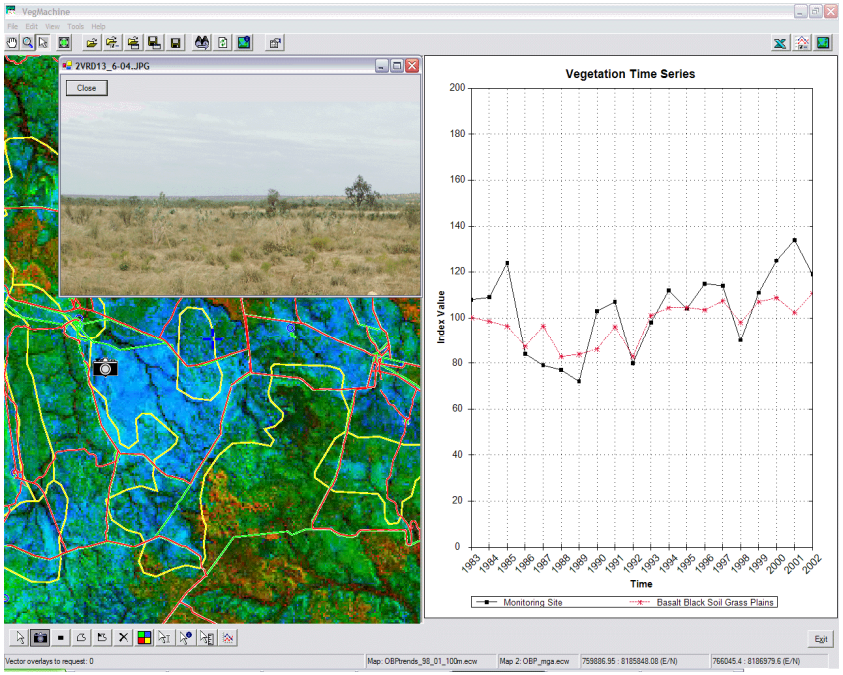

Wallace et al 1994, 1998, 2006
LCCA – operational scale ***Karfs et al* 2000**, 2002…

'VegMachine' – 2004

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Katherine Harle, 11/15/2013