



Australian Government

Department of the Environment and Energy

EO in the national carbon accounting system

Shanti Reddy, NISIR Branch, ICCEID, DoEE



Key Points

- Must be driven by clear purpose and use
- Collaboration and institutional arrangements are essential
- The framework and the system design must be open to latest science and data
- Time series consistency is a fundamental principle (recalculations / revisions / reanalysis)
- Accounts are subject to external scrutiny
- EO data are essential (at least in Aus) but not enough – need to combine multiple sources of data
- Examples of what we mean by accounts ready data



Australia's National Greenhouse Accounts

➤ Clear policy purpose

- Comply with international treaty obligations
- Report progress against international commitments; e.g. 2020 and 2030 targets (Paris Agreement)
- Support domestic climate change policies – eg. CFI / ERF (~\$1b), NGERs, 2017 Review, etc.

➤ Accounting frameworks

- UNFCCC and Kyoto Protocol accounting rules
- IPCC guidelines for estimating/reporting emissions



UNFCCC	Kyoto Protocol
Forest remaining forest	Forest management
Land converted to forest	Afforestation / Reforestation
Forest converted to other land uses	Deforestation

Compliance with the framework and accounting rules is assessed annually – 11 + 4 reviews so far plus 2 ANAO audits (2010 and 2017)

Land Use Conversion

Consistent representation of lands

- IPCC guidance requires consistent representation of lands and estimation of land use conversion.

FF = Forest Land Remaining Forest Land

GG = Grassland Remaining Grassland

CC = Cropland Remaining Cropland

WW = Wetlands Remaining Wetlands

SS = Settlements Remaining Settlements

OO = Other Land Remaining Other Land

LF = Land Converted to Forest Land

LG = Land Converted to Grassland

LC = Land Converted to Cropland

LW = Land Converted to Wetlands

LS = Land Converted to Settlements

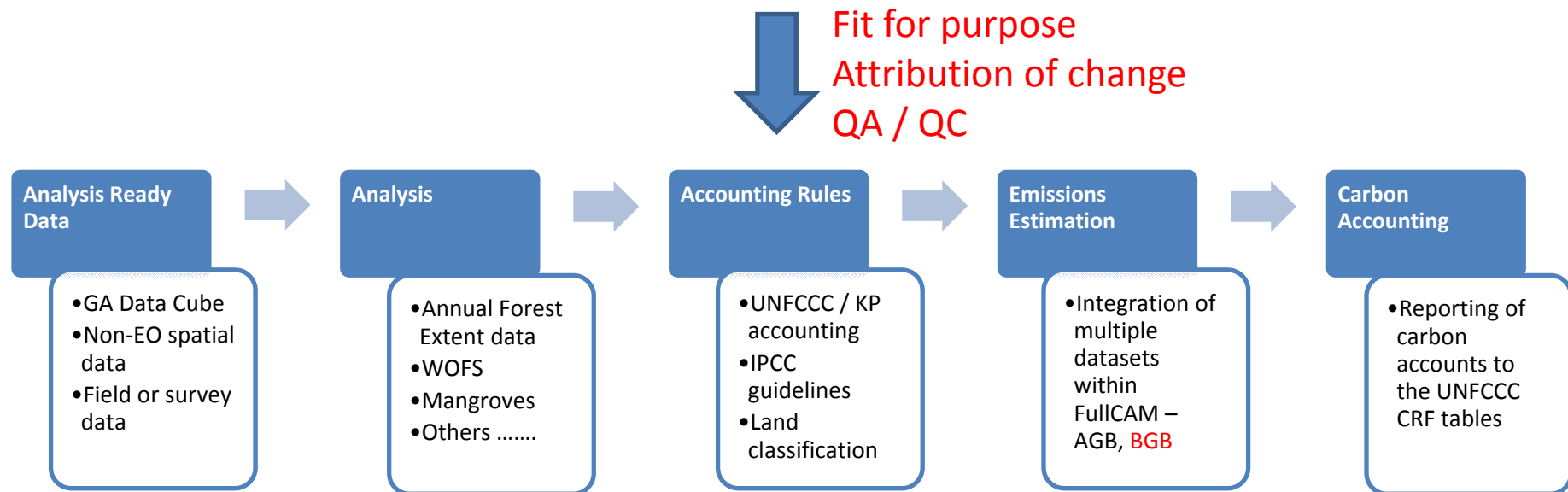
LO = Land Converted to Other Land

Paris Agreement
Key categories for
Australia under KP

Lands converted to another use and lands in the remaining category needs to be reported separately until end of transition period (50 years in case of Australia)

Production of NGA

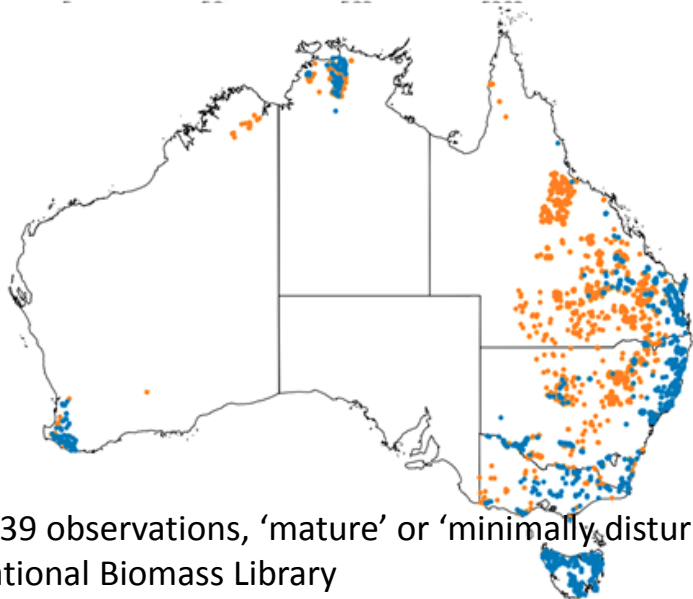
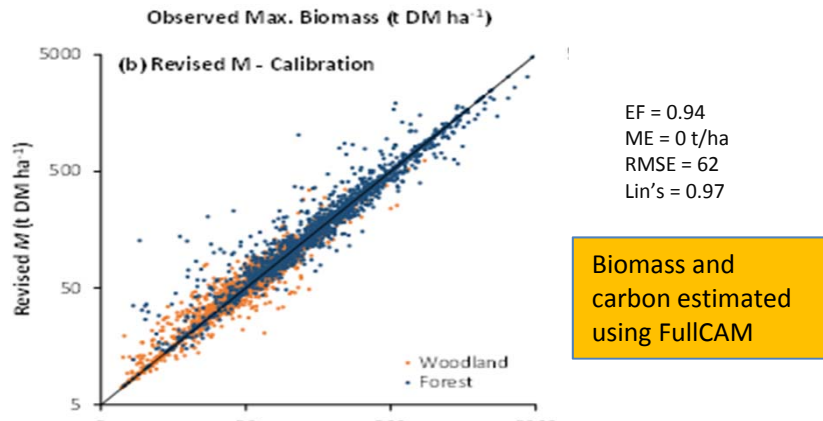
Analysis Ready Data to Accounts Ready Data



- Time series consistency is a fundamental principle
 - Improvements and advances must be applied to the entire time series through recalculations / revisions
-

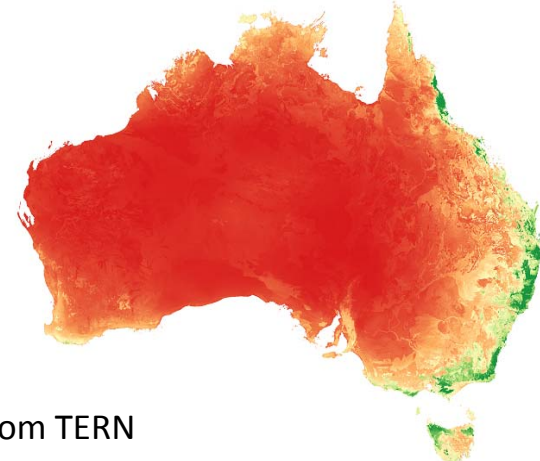
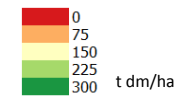
National Inventory uses latest data and science for carbon accounting

FullCAM Max Above Ground Biomass layer



FullCAM upgrade: New biomass and ecosystem dynamics research by CSIRO's Steve Roxburgh and Keryn Paul implemented 2017

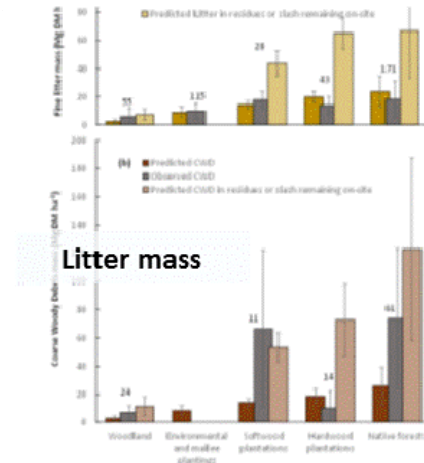
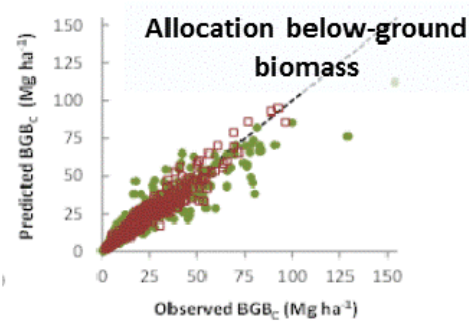
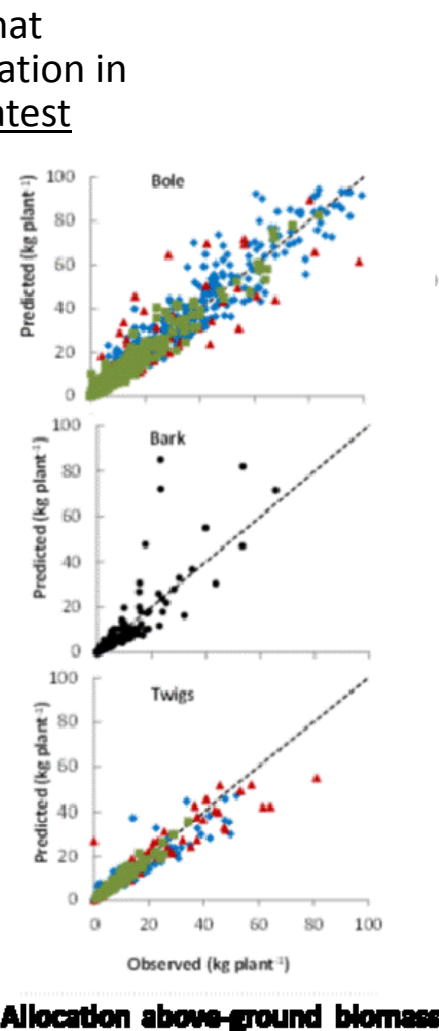
New ABG



Old ABG

National Inventory uses latest data and science for carbon accounting

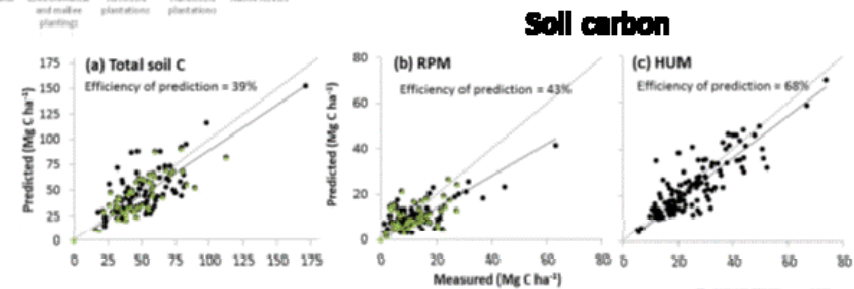
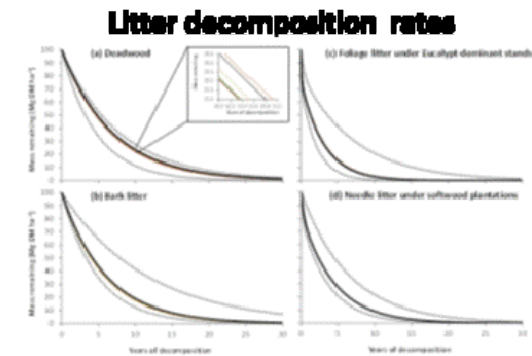
Update parameterisation of FullCAM to ensure that modelled C sequestration in forests reflects the latest data



Litter fall rates

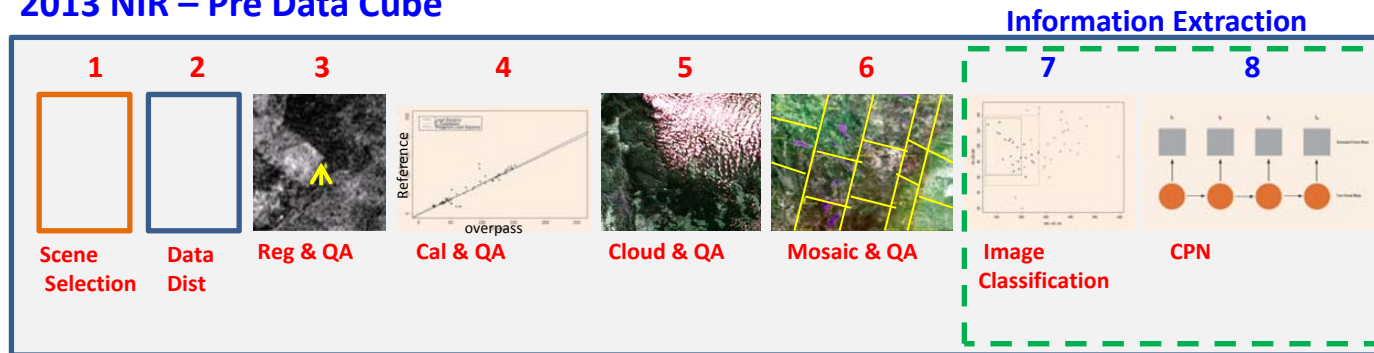
Forest type	Annual litterfall (Mg DM ha ⁻¹ yr ⁻¹)	Mean	SD	Min	Max	N
Total		1.26	0.87	0.40	3.05	8
Env. plantings						
Softwood	40	14	17	55	NA	NA
Native	NA	NA	NA	NA	NA	NA
Native forests						
Total	5.11	2.08	0.33	1.04	8.0	8
Softwood	18	17	28	80	108	NA
Native	38	10	7	46	100	NA
Woodland						
Total	1.92	0.97	0.72	1.14	2.4	24
Softwood	48	16	23	33	8	8
Native	28	8	20	30	6	6
Native	6	2	20	30	5	5
Hardwood plantations						
Total	5.58	2.54	0.72	4.60	14	14
Softwood	78	20	51	90	0	0
Native	5	4	0	5	2	2
Native	4	2	1	5	2	2
Softwood plantations						
Total	2.83	1.05	0.50	4.00	19	19
Softwood	48	15	51	90	8	8
Native	14	7	0	21	7	7
Native	8	4	1	13	7	7

*Total litterfall was attributable to pine forests.

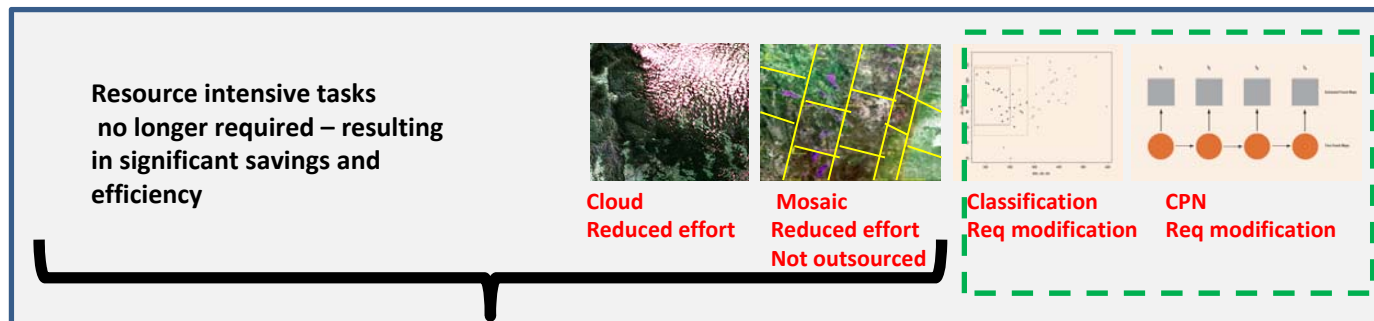


National Inventory - Satellite Data Processing

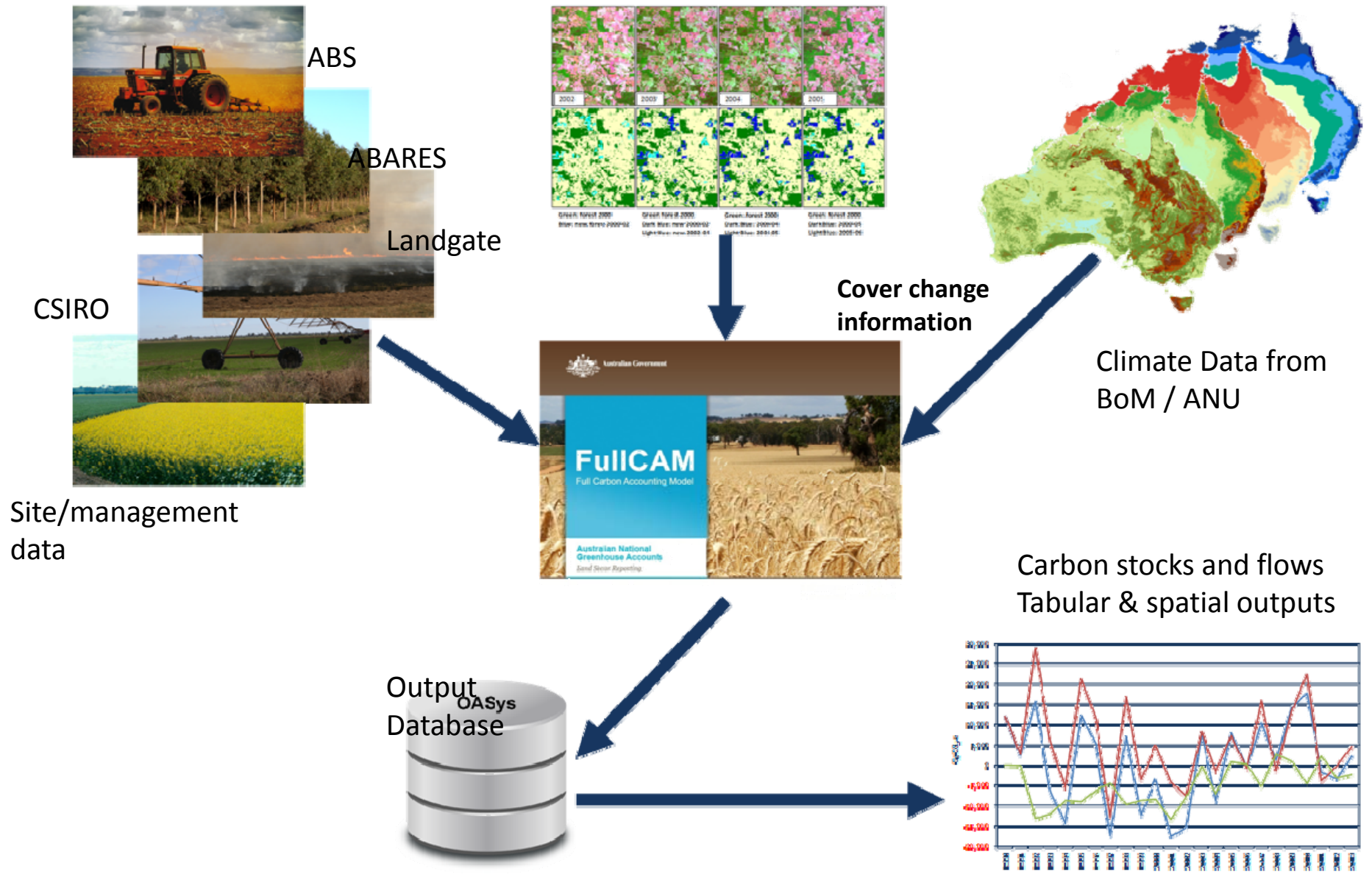
2013 NIR – Pre Data Cube



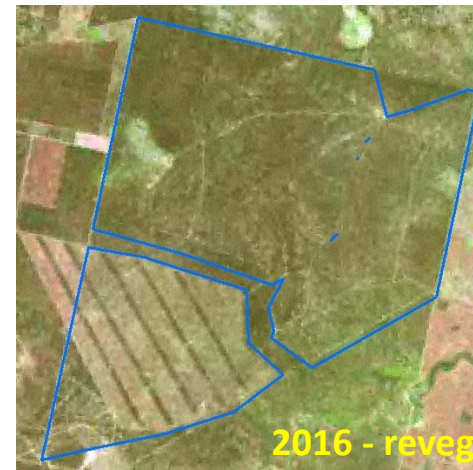
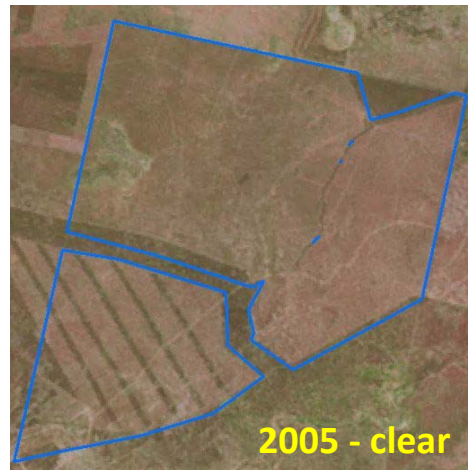
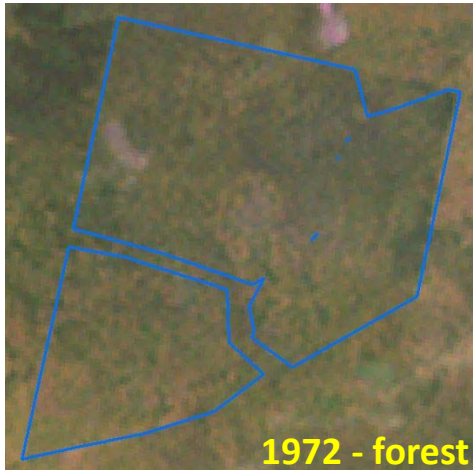
From 2014 NIR – Uses Geoscience Data Cube



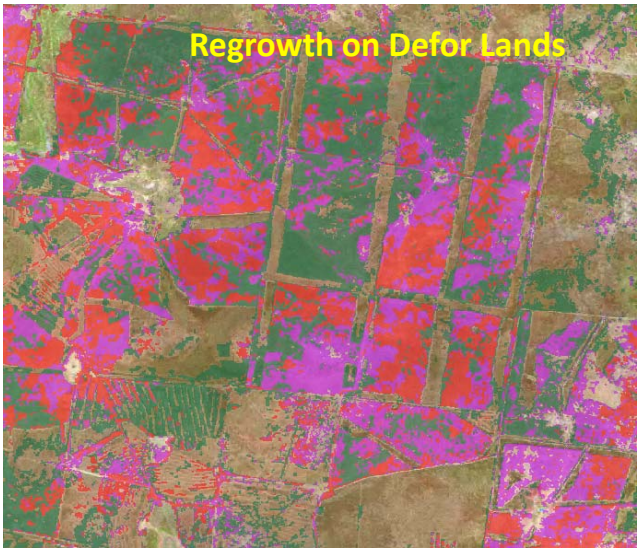
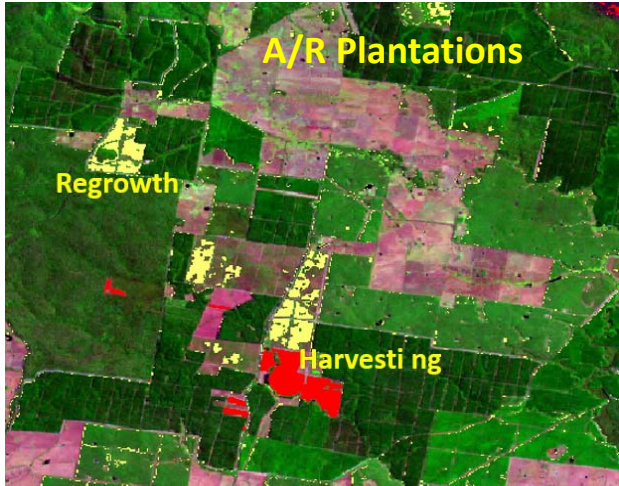
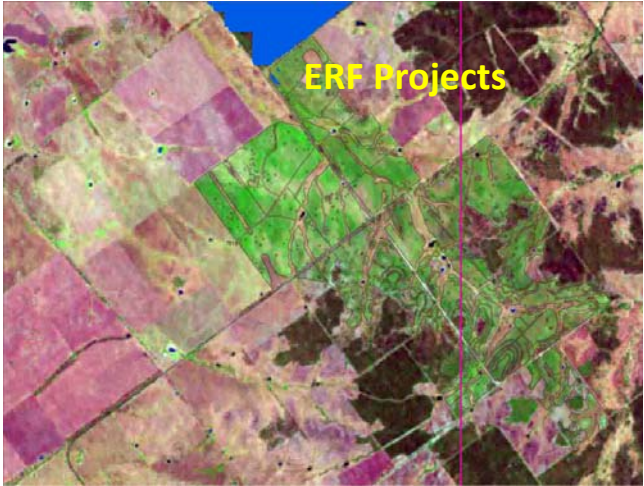
Integration of multiple datasets within FullCAM



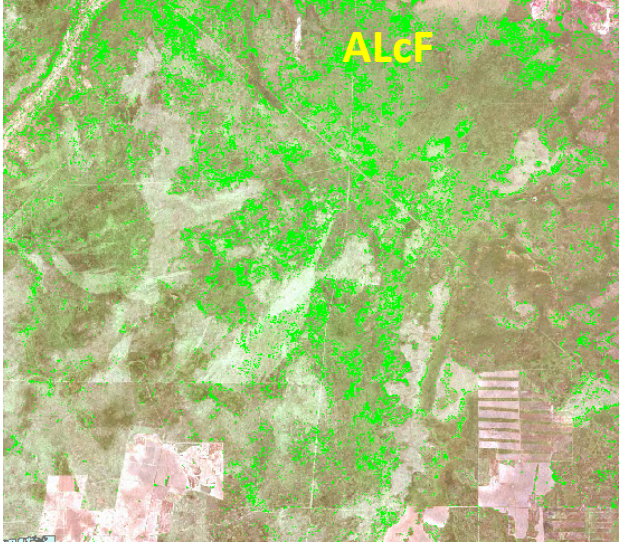
Accounts Ready Data – Attribution of Change – Forest Clearing and regrowth



Accounts Ready Data – Attribution of Change – Forest Regrowth

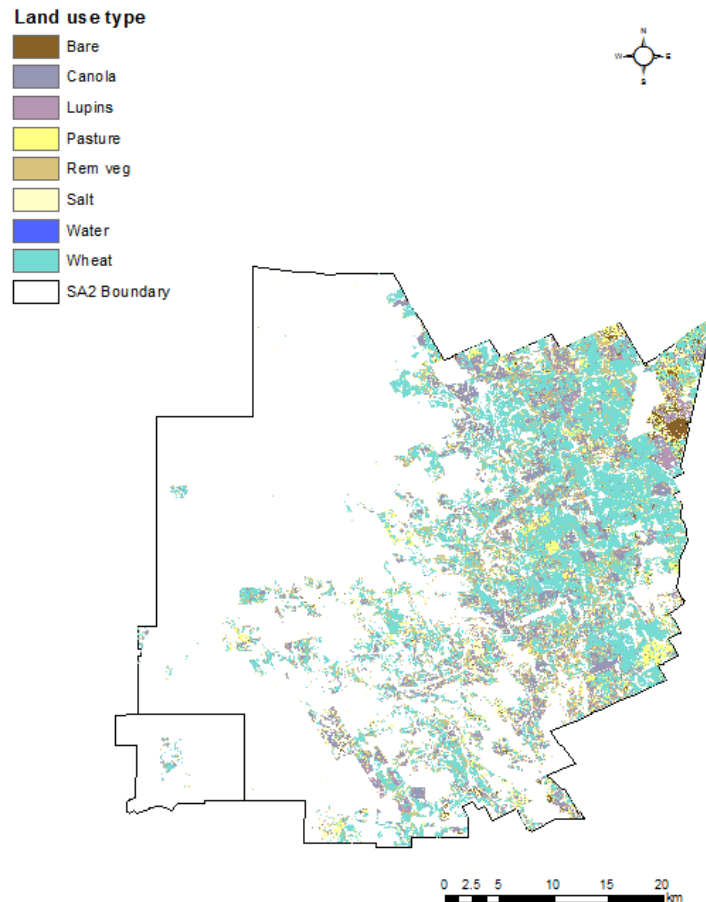


Green: Regrowth
Purple: Reclear
Red: First clear



Green: additional
lands converted to
forests

What additional info can EO data contribute?



SA2_51244	
CSIRO	
Crop	Fraction
Wheat	0.506
Salt	0.035
Pasture	0.067
Rem veg	0.164
Bare	0.018
Canola	0.139
Lupins	0.07
Water	0

ABS/FullCAM database	
Crop	Fraction
Annual grass	0.023
Annual legume	0.09
Barley	0.138
Blue lupin	
Canola	0.149
Fallow	0
Field pea	0.001
Narrow-leaf lupin	0.039
Oat	0.039
Weeds annual	0.113
Wheat	0.391

Crop type mapping using Sentinel-1 and Landsat data (P Caccetta)

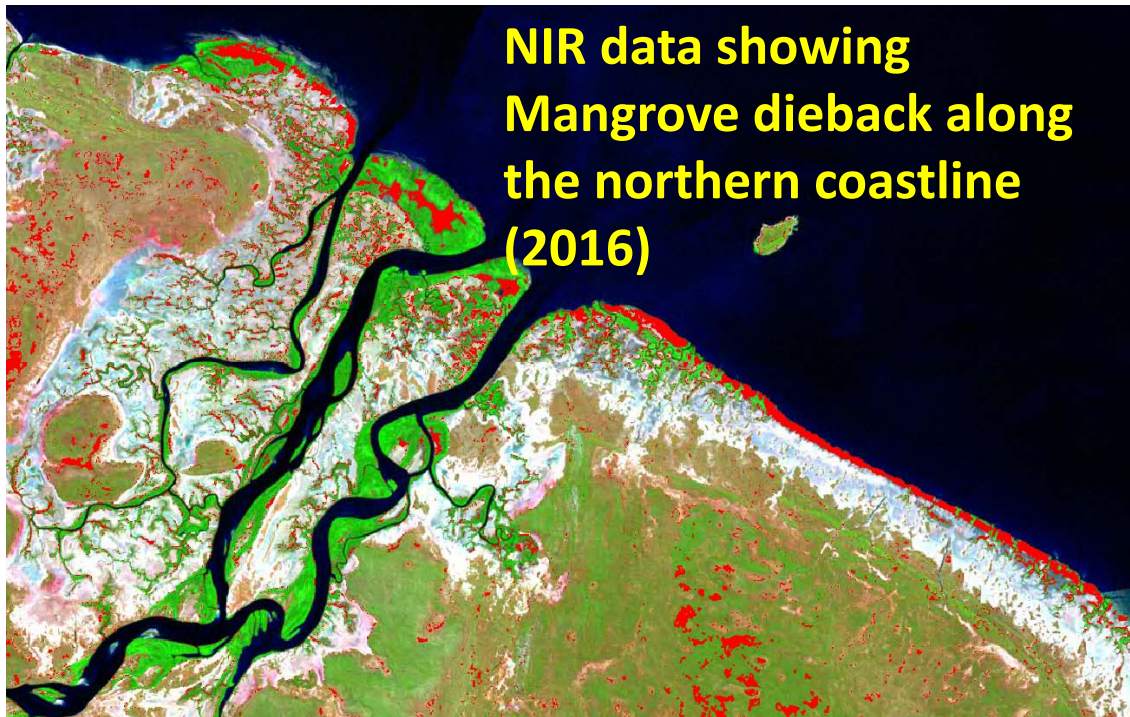
Wetlands - mangroves



NIR Data 1972



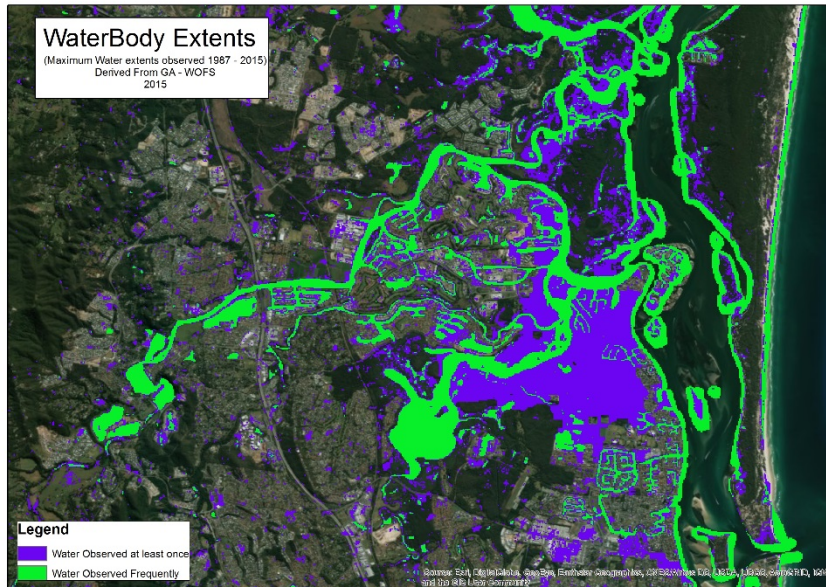
NIR Data 2016



Use best available data

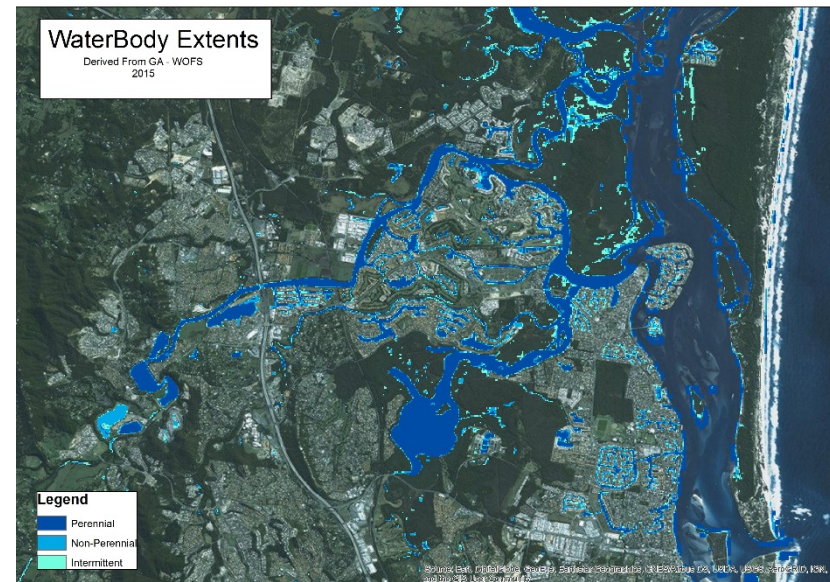
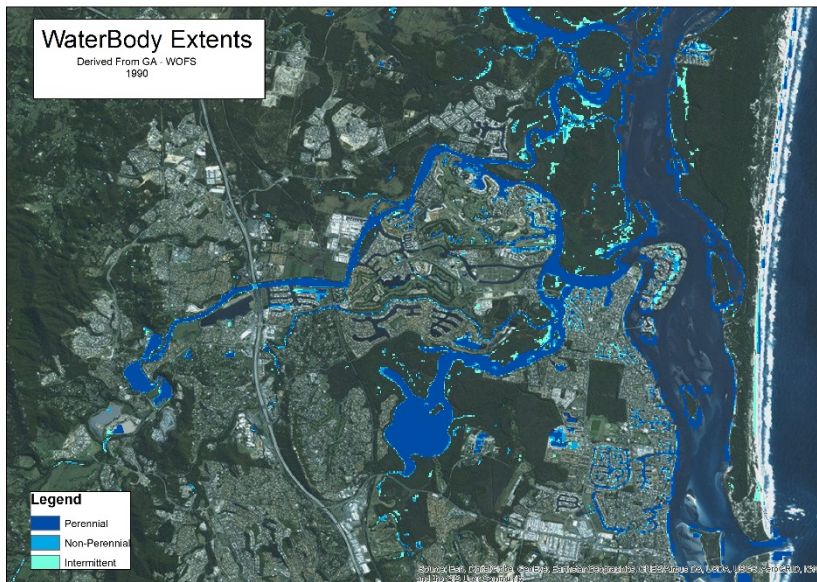
Improve over time

Wetlands – coastal canals

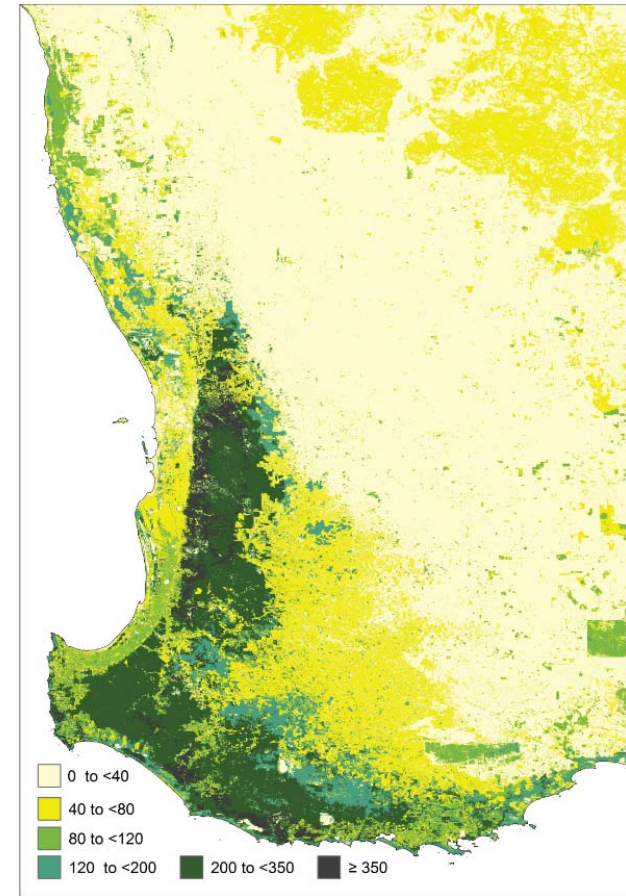
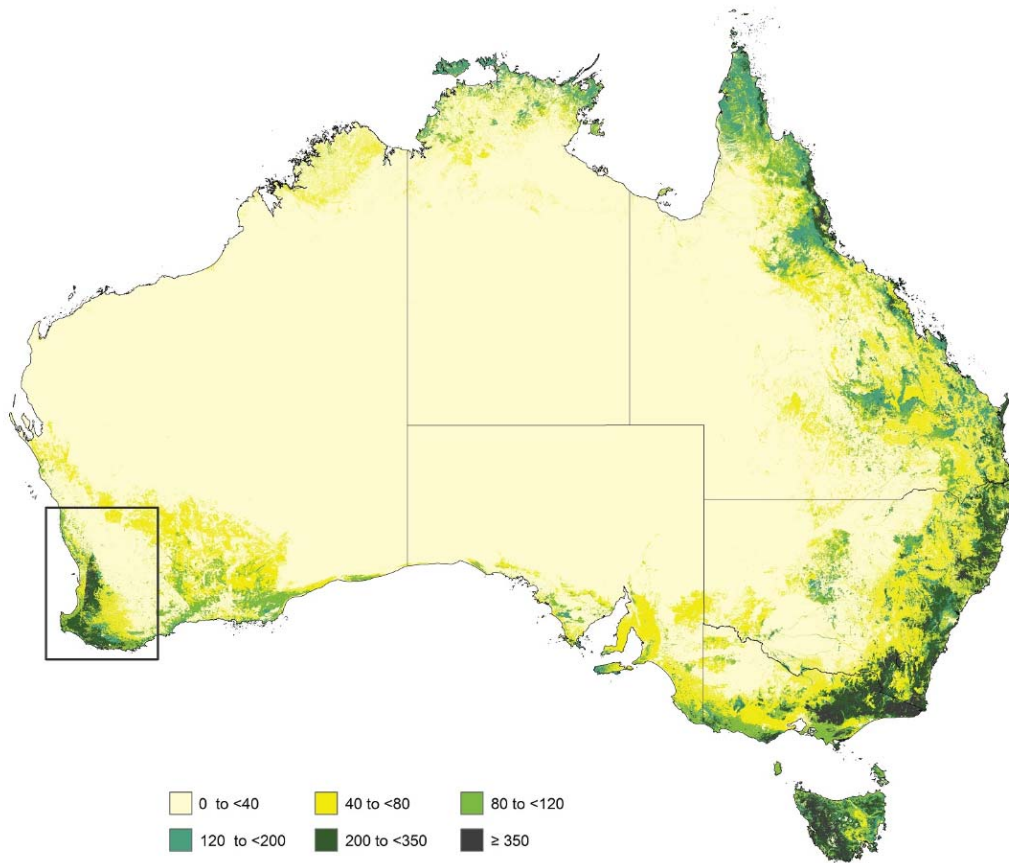


Attribution of large volume of WoFS data to derive IPCC compliant land use conversion data

Another example of Accounts Ready Data



- Stakeholder-driven innovation in
- National Greenhouse Accounts outputs



Land Sector Greenhouse Accounts

