

www.csiro.au

Carbon Farming – opportunities and challenges

Elizabeth Schmidt

National Research FLAGSHIPS
Cooperative Agriculture CSIRO

What do you need for a functioning carbon market?

- Property rights – who owns the carbon?
- Transfer rights – the right to sell the carbon.
- Reliable, repeatable carbon measurement.
- Trading rules – e.g. liability, how long carbon is tied up for; what happens if it is released? What happens if you sell the land after selling the credits?
- Willing buyers and willing sellers.

National Research FLAGSHIPS
Cooperative Agriculture CSIRO

What do you need for a functioning carbon market?

- Agreed price – market signals.
- Registration of trades – National system?
- Enforceable trades.
- Future monitoring of carbon levels.
- Active market.

National Research FLAGSHIPS
Cooperative Agriculture CSIRO

What do you need for a functioning carbon market?

- Property rights – who owns the carbon?
- Transfer rights – the right to sell the carbon
- **Reliable, repeatable carbon measurement**
- Trading rules – e.g. liability, how long carbon is tied up for? What happens if it is released? What happens if you sell the land after selling the credits?
- Willing buyers and willing sellers

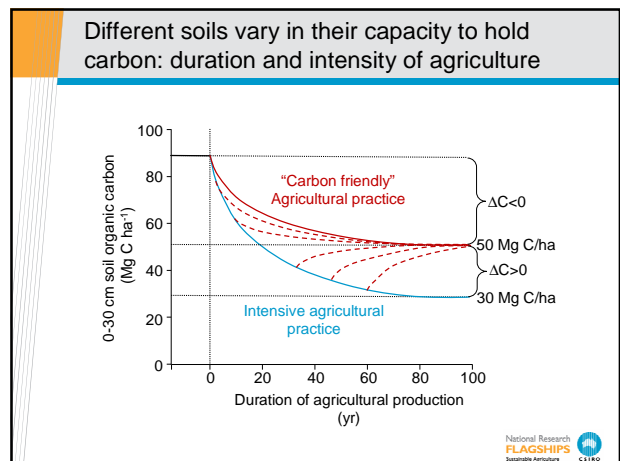
National Research FLAGSHIPS
Cooperative Agriculture CSIRO

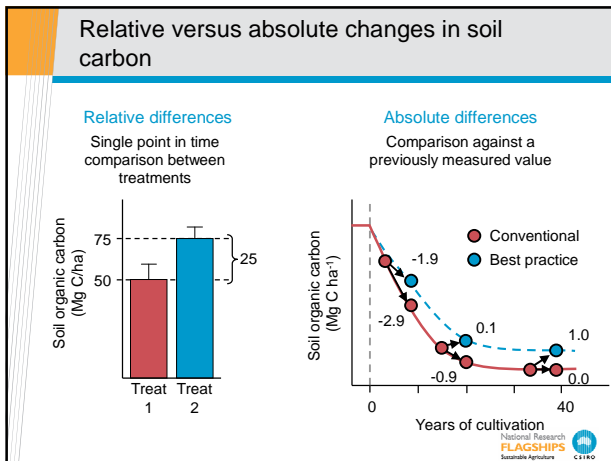
Soil carbon research program: SCaRP

Objectives

1. Define a **nationally consistent method** for quantifying soil carbon across Australia
2. Identify **land management strategies** with the potential to build soil carbon at regional levels
 - Not just total organic carbon but allocation to fractions as well
3. Develop **rapid and cost-effective methods** for quantifying soil carbon stocks:
 - a) MIR spectra to predict soil carbon
 - b) Test automated devices for measuring soil bulk density
4. Provide data for further development of the National Carbon Accounting System (NCAS)

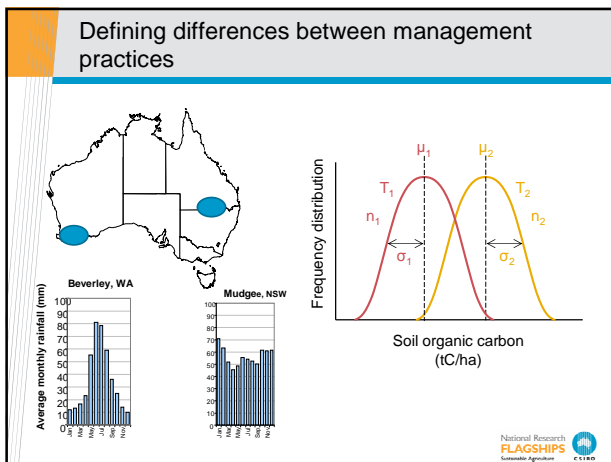
National Research FLAGSHIPS
Cooperative Agriculture CSIRO





Soil carbon research program (SCRIP) (DAFF & GRDC sponsored program)

- National program with federal and grower funding (DAFF and GRDC) with nodes across Australia (CSIRO, Universities and State agencies)
- Objectives
 - Identify region level agricultural management strategies with the potential to increase soil carbon
 - Provide data for further development of NCAS (National Carbon Accounting System)



- ### What do you need for a functioning carbon market?
- Property rights – who owns the carbon
 - Transfer rights – the right to sell the carbon
 - Reliable, repeatable carbon measurement
 - Trading rules – e.g. liability, how long carbon is tied up for; what happens if it is released?
 - Willing buyers and willing sellers

Soil Carbon: what are we measuring?

Soil C is made up from different components or fractions

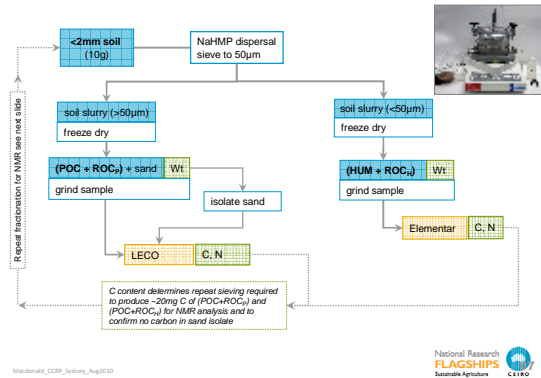
Soil organic carbon fractions:

- have different chemical composition
- turnover/decompose at different rates

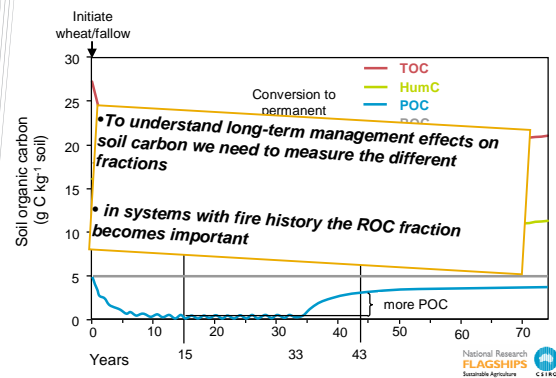
Soil Carbon: what are we measuring?

FRACTION / POOL		} Total soil organic carbon
	Surface Plant Residue: > 2 mm	
	Buried Plant Residue: < 2 mm	
	POC Particulate Organic Carbon: fragments > 50 μm – 2 mm, and sorbed molecules	
	HUM Humus: fragments < 50 μm, and sorbed molecules	
	ROC Resistant Organic Carbon: < 2 mm charcoal-like	

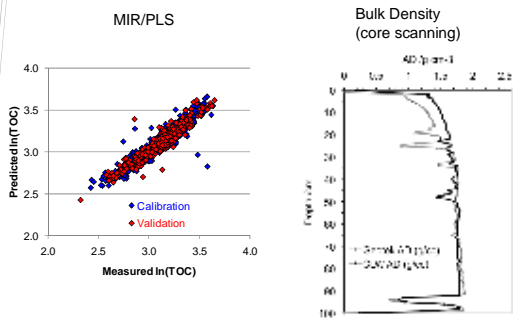
Soil Carbon: what are we measuring?



Why measure SOC fractions?



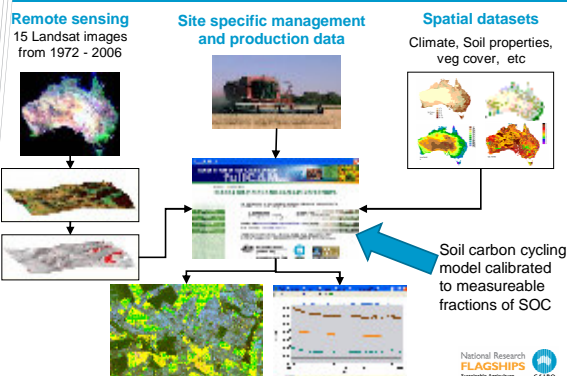
Development of rapid and cost-effective methods



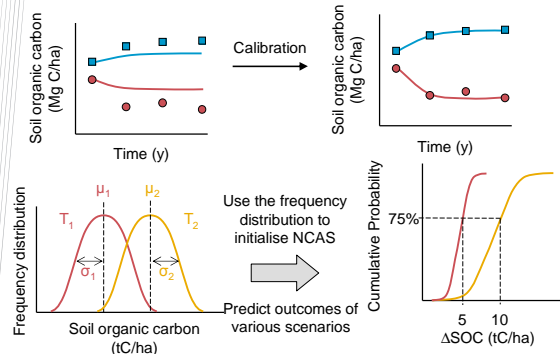
What do you need for a functioning carbon market?

- Agreed price – market signals
- Registration of trades – National system?
- Future monitoring of carbon levels
- Enforceable trades
- Active market

National Carbon Accounting System: an overview



Linking the SCRIP to NCAS: initialisation of regionally based scenario modelling



What do you need for a functioning carbon market?

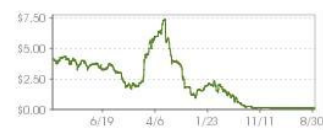
- Agreed price – market signals
- Registration of trades – National system?
- Future monitoring of carbon levels
- **Enforceable trades**
- **Active market**

Chicago Climate Exchange

- Established in 2003
- North America's only voluntary, legally binding greenhouse gas (GHG) reduction and trading system for emission sources and offset projects in North America and Brazil.
- Trades in emissions of six gases: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, per fluorocarbons and hydro fluorocarbons.
- Price of shares reached \$7 in 2008
- In July 2010 was taken over by IntercontinentalExchange
- Half of the company's Chicago-based workforce laid off due to inactivity in the U.S. carbon markets

Chicago Climate Exchange

CCX CFI	CLOSE	CHANGE
CFI 2003	\$0.10	\$0.00
CFI 2008	\$0.05	\$0.00
CFI 2010	\$0.10	\$0.00



Chicago Climate Exchange

- Why the collapse?
- Politics – no commitment at a national level and failed climate change talks in Copenhagen
- Voluntary, but legally binding system
- Monitoring – very little/no on-ground measurements
- Accountability/enforcement – costs too high
- Few willing buyers
- Inactive market

Opportunities for Viticulture

- Planting pastures between rows. However, if these are grazed methane production is likely to negate carbon captured
- Planting windbreaks around vines
- Timing application of nitrogen
- Mulching between rows
- Little opportunity to increase root growth unless top growth also increased
- If possible, reduce fuel use – tractor passes, distance to processor

Conclusions: Capturing carbon in Australian Soils

- Australian soils do have a place in emission mitigation, but are unlikely to provide the long term solution
- Opportunities for additional carbon capture in soils need to be adapted to specific soil and climate conditions
- Constraints
 - Farmers are paid to remove carbon in products
 - Measurement – spatial variability and degree of confidence
 - Future liabilities and implications on land values
 - Uncertainty in value of carbon and agricultural products
- Enhancing SOC has benefits beyond the context of C accounting