

Carbon Cycle



**GLOBAL CLIMATE
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Why observe C cycle?

- To see how well/badly we are doing: diagnostic
 - Large gaps in ocean observations
- To understand/predict how it will change : prognostic
 - Spatial and temporal resolution of stocks and fluxes
 - need other parameters to drive models such as surface properties – a good transport model to link fluxes and stocks
 - Regional understanding

Do the ECV yield sufficient constraints on C cycles?

- Poor info on stocks:
 - almost none on soil C, how well do we understand how this will change? Changes are estimated but difficult to validate. Reliance on models.
- How do you validate a flux?
 - Summation of instantaneous fluxes should equal stock changes
- Disparities on scale – point measurements v satellites.
 - Oceans – pCO₂ at surface – difficult to relate
 - Oceans estimate changes on stock rather than stocks themselves: Too few measurements
 - Riverine flux of C into ocean large and uncertain
- We do not understand dynamics of carbon cycle so need more than fluxes into the atmosphere to improve projections

- Need addition ECV (next slide)
- Measurements need to be more accurate, higher resolution to monitor changes
- In future isotopes of C will be important – still a research activity rather than operational observation
- Need to recommend/promote novel techniques to cover gaps “emerging ECV” e.g.
 - Aircraft/ocean measurements of CO₂ and CH₄
 - Cover gaps in satellite observations
 - particulate C and fluxes in the Oceans
 - On land and in the oceans the biospheric fluxes need to be better understood
- Consider UV radiation – CH₄ sink mechanism

- Missing: Need River discharge of carbon– how this changes with climate change
- Atmospheric CO₂ composition requirements need to be revised in line with their use
- Terrestrial CO₂ Flux measurements (e.g. FLUXNET) should become an ECV in the future
- Ocean DOC can now be measured

Thank you



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WMO



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