



The Defense Coastal/Estuarine Research Program - An Integrated Approach to Quantifying Carbon Cycling Throughout the Coastal Landscape at Marine Corps Base Camp Lejeune

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Background

The Defense Coastal/Estuarine Research Program (DCERP2), a multi-investigator project at Marine Corps Base Camp Lejeune (MCBCL), NC, focuses on carbon (C) cycling throughout the coastal landscape that includes the estuary, marshes, barrier island, and watershed.

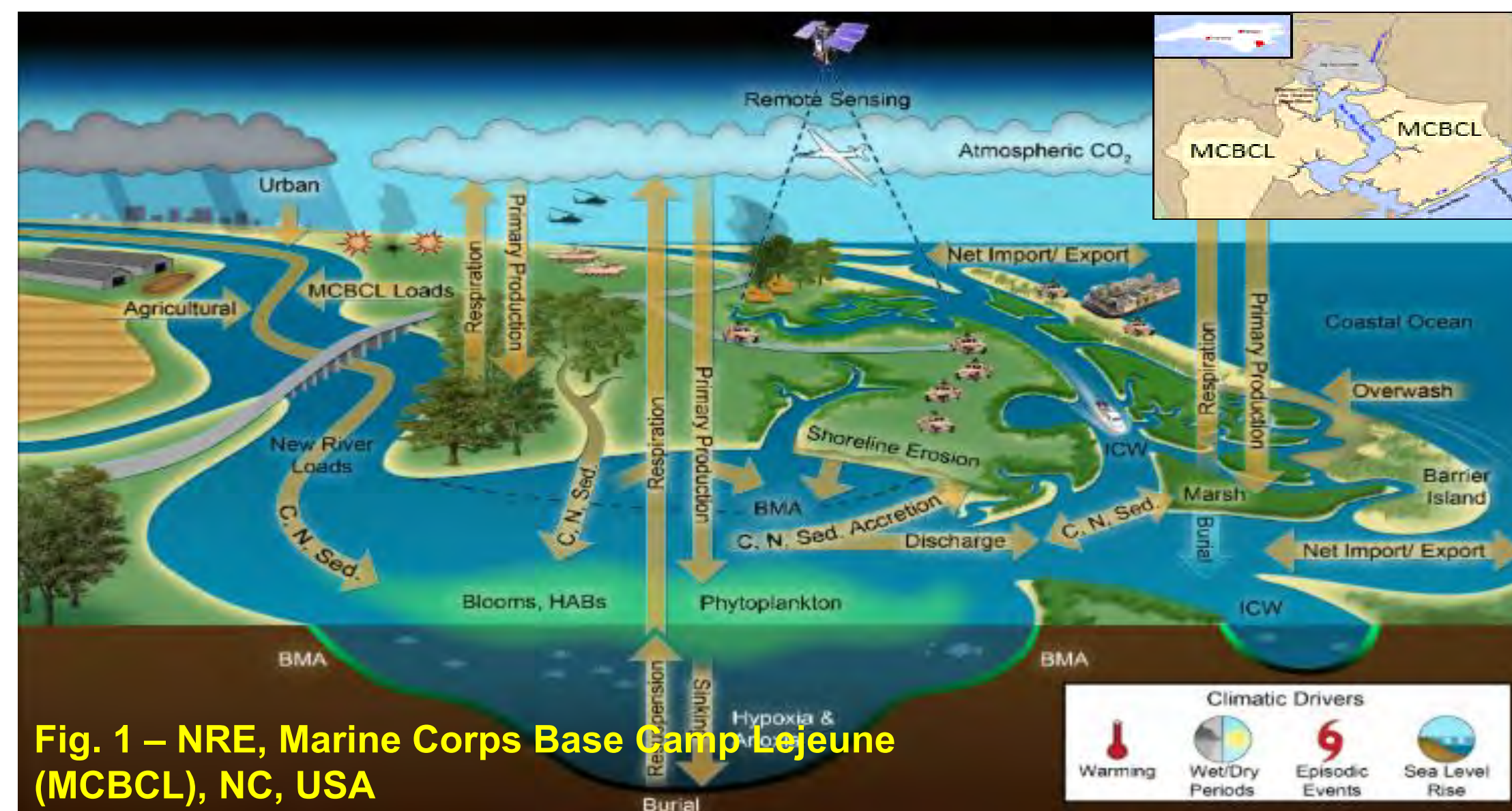
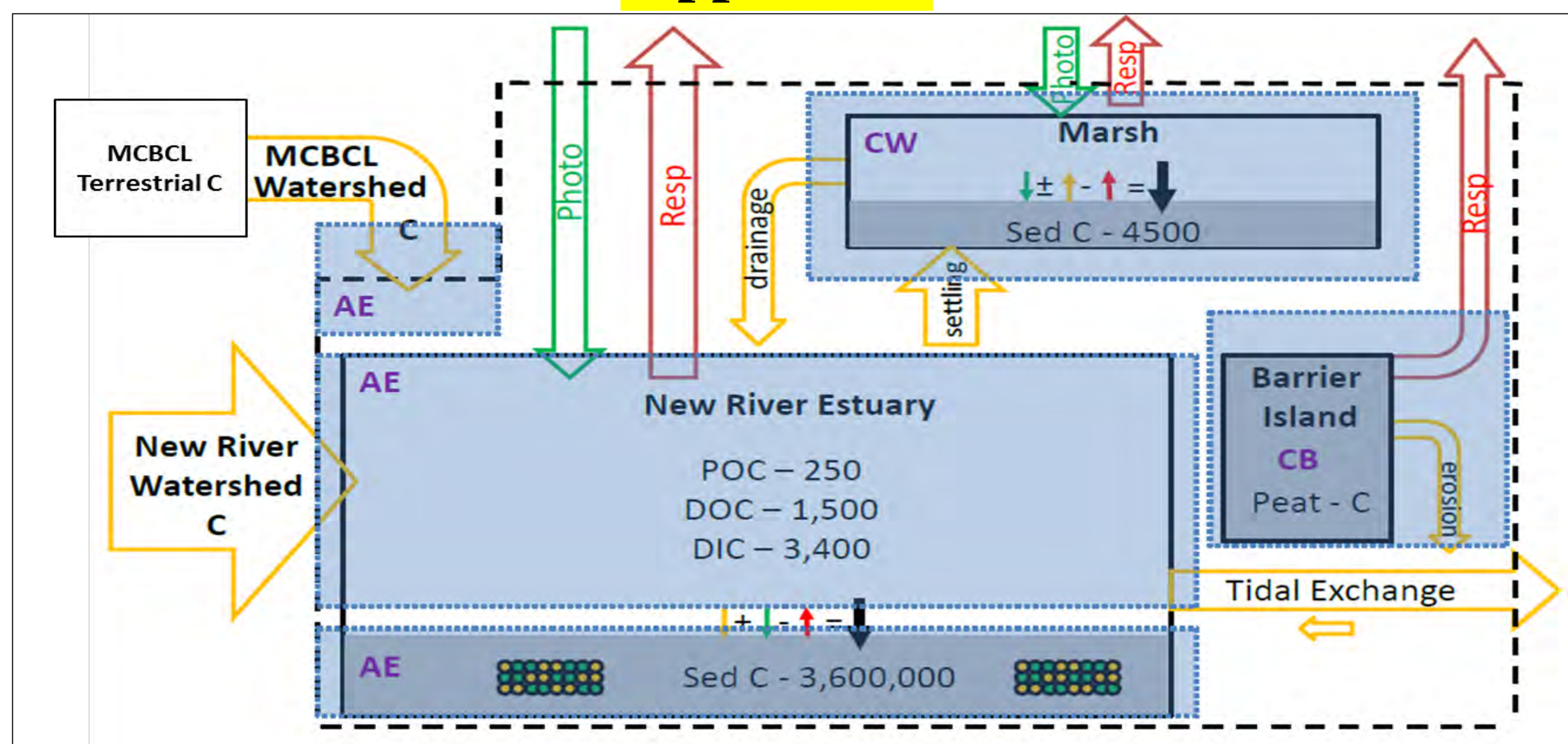


Fig. 1 – NRE, Marine Corps Base Camp Lejeune (MCBCL), NC, USA

Integrative Themes for DCERP2

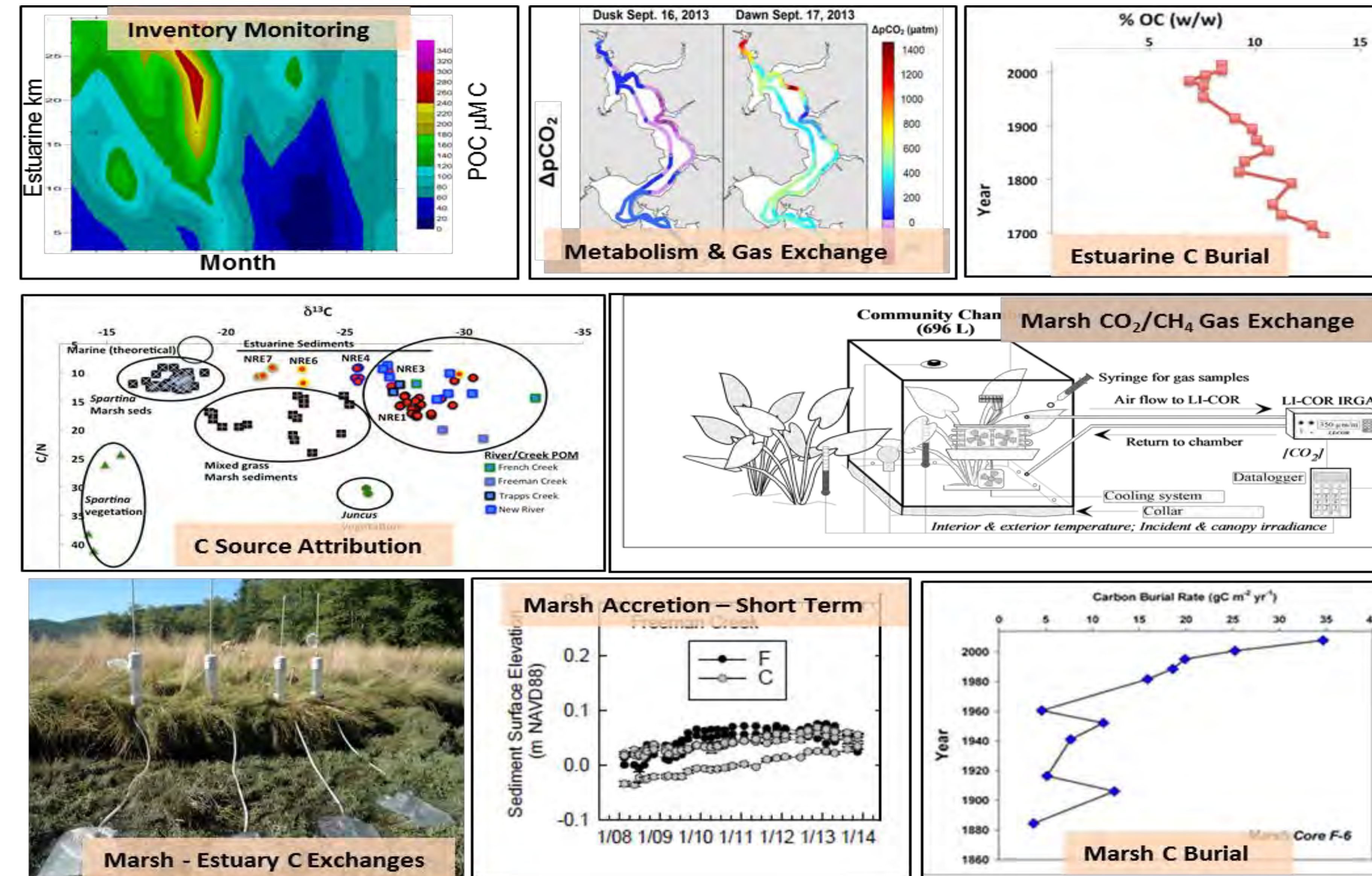
1. Climate Change – improved understanding of how coastal C cycling may respond to changing climate: resilience to local stressors and opportunities for managed adaptation.
2. Carbon Cycle – improved understanding of the carbon cycle and management implications for estuarine/coastal and terrestrial systems.
3. Translate Scientific Information into Practice – accessibility of DCERP decision support tools and models to DoD and other users.

Approach



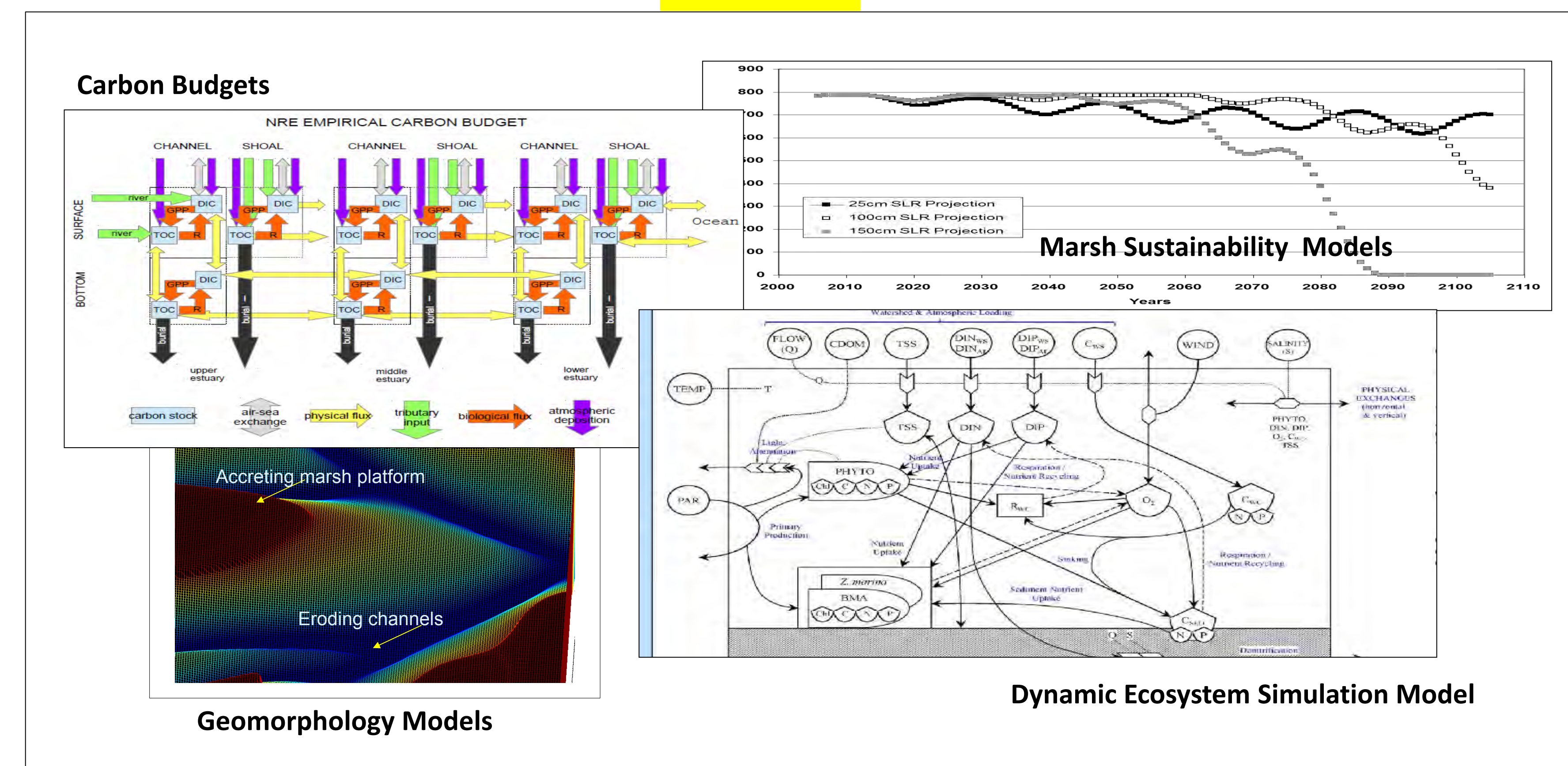
- Ecosystem modules
 - AE = aquatic/estuarine
 - CB = coastal barrier
 - CW = coastal wetlands
- Mechanistic Experimentation
- Boundary Fluxes and Cycling
- Integrative Monitoring
- Nested Mass Balances

Measurements

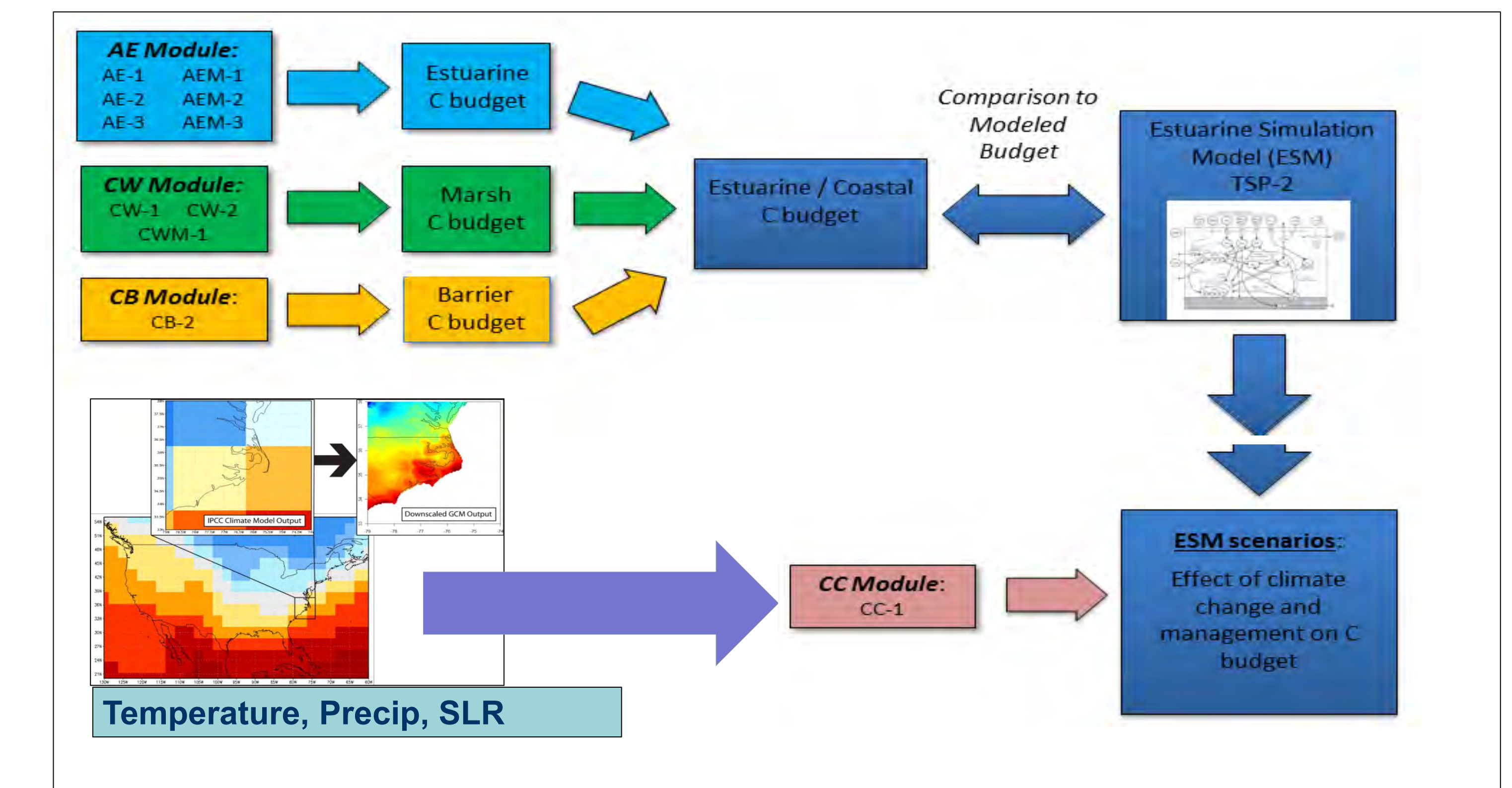


- Measurements serve models by characterizing: inventories, transport, reactivity, proxies, and by relating climate drivers to fluxes.

Models



Linking Coastal Carbon Dynamics to Climate Change



- Ecosystem-specific mass balances are integrated in the Estuarine Simulation Model (ESM)
- Downscaled regional climate drivers, developed by the climate change module (CC) are used to run scenarios in the ESM

Research Project	Measurement	Model	Daily	Weekly	Monthly	Annual	Decadal	Centennial	Millennial
Estuary	Loading from tributary creeks to NRE (AE-5)	✓							
	Flux and burial in benthic estuary (AE-6)	✓							
	Flux in pelagic estuary (AE-4)	✓							
Marsh	Estuarine flux and burial via Estuarine Simulation Model (TSP-2)	✓							
	Burial in salt marsh (CW-4)	✓							
Barrier	Flux among marsh, sea water, and air (CW-5)	✓							
	Transformation from burial in marshes to release in the shoreface (CB-5)	✓							
Terrestrial	Flux in forests under different climate, fire, and management scenarios (T-3)	✓							
	Terrestrial vegetation carbon volume (TSP-1)	✓							

- Collectively, measurements and models span temporal scales from hours to millennia, yielding current status and projections for future change.



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