全球变化背景下陆地生态系统变化的社会经济影响

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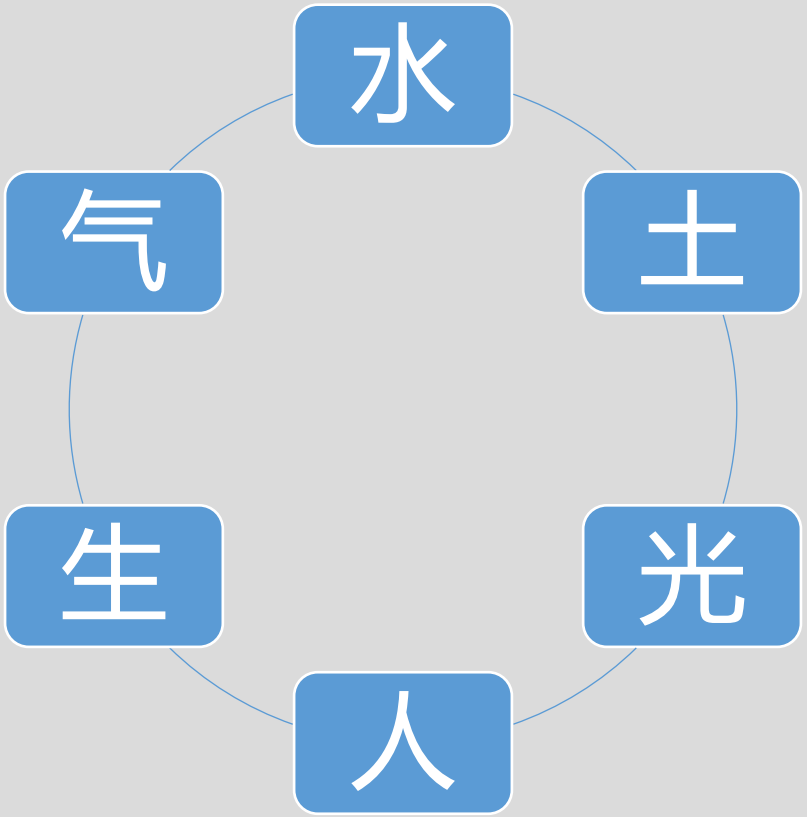
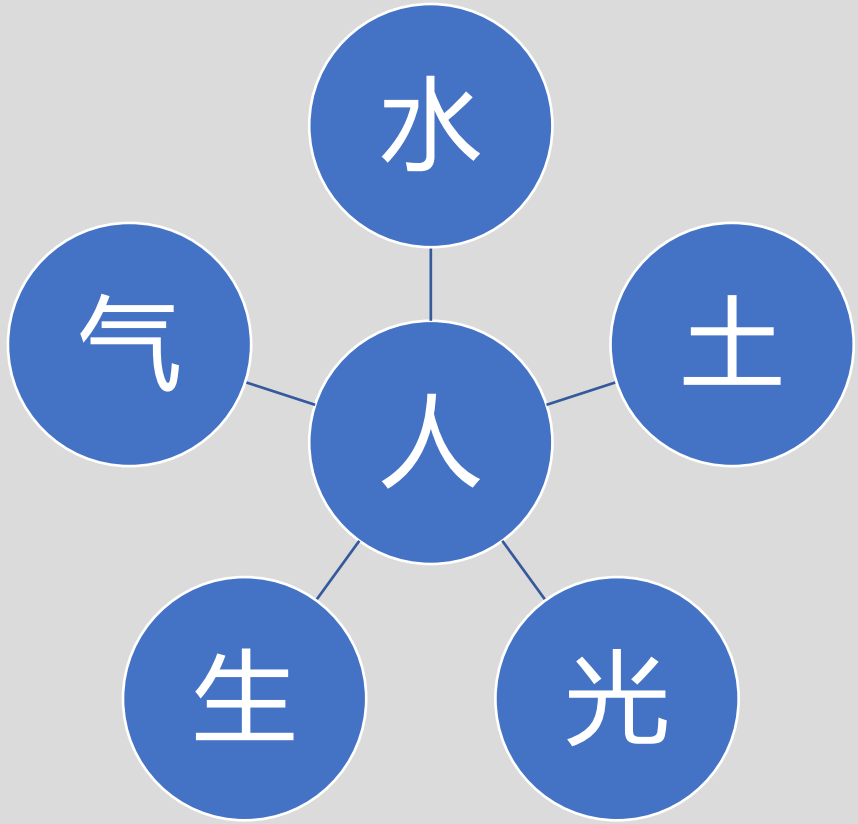
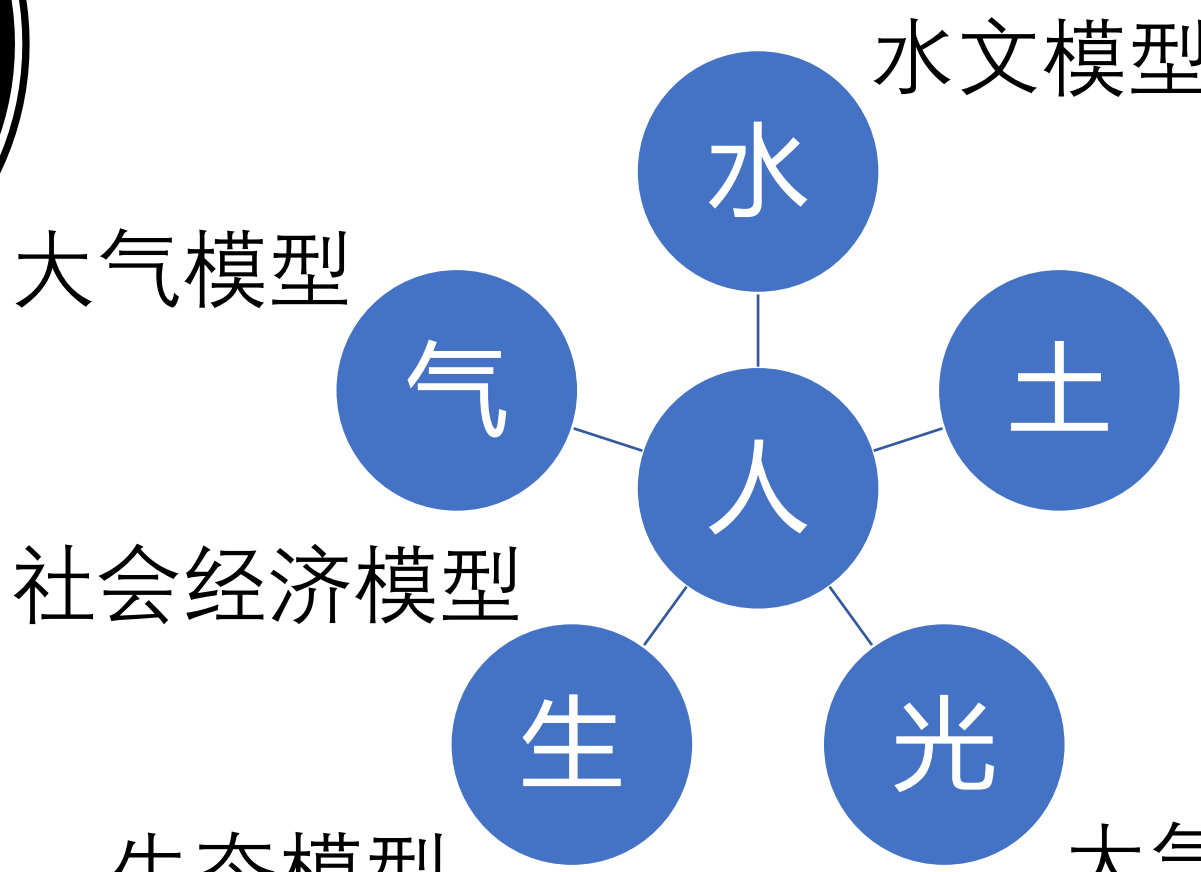
地球系统构成





Integrated human-Earth system modeling



水文模型

大气模型

陆面模型

社会经济模型

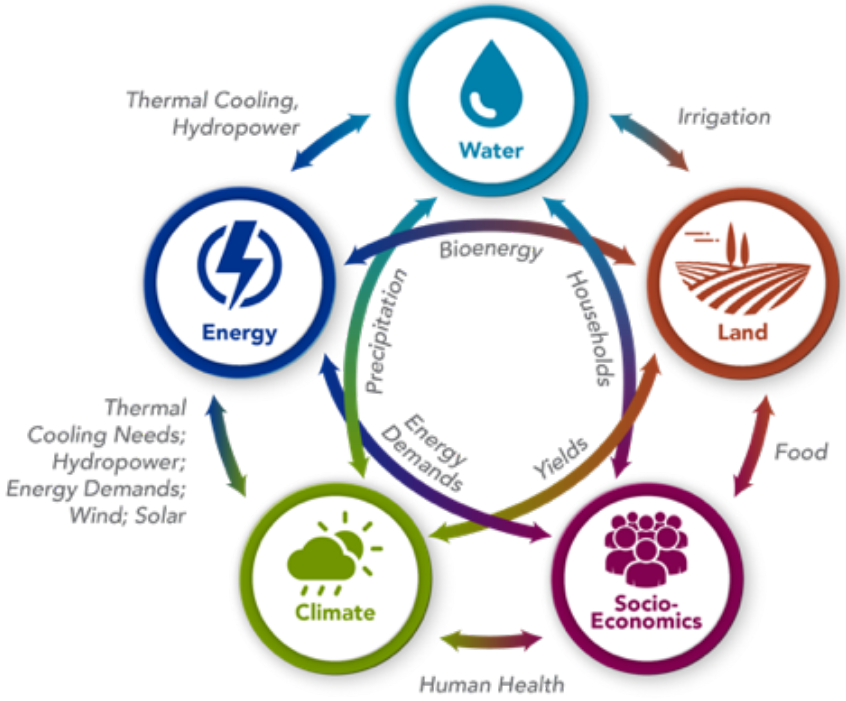
生态模型

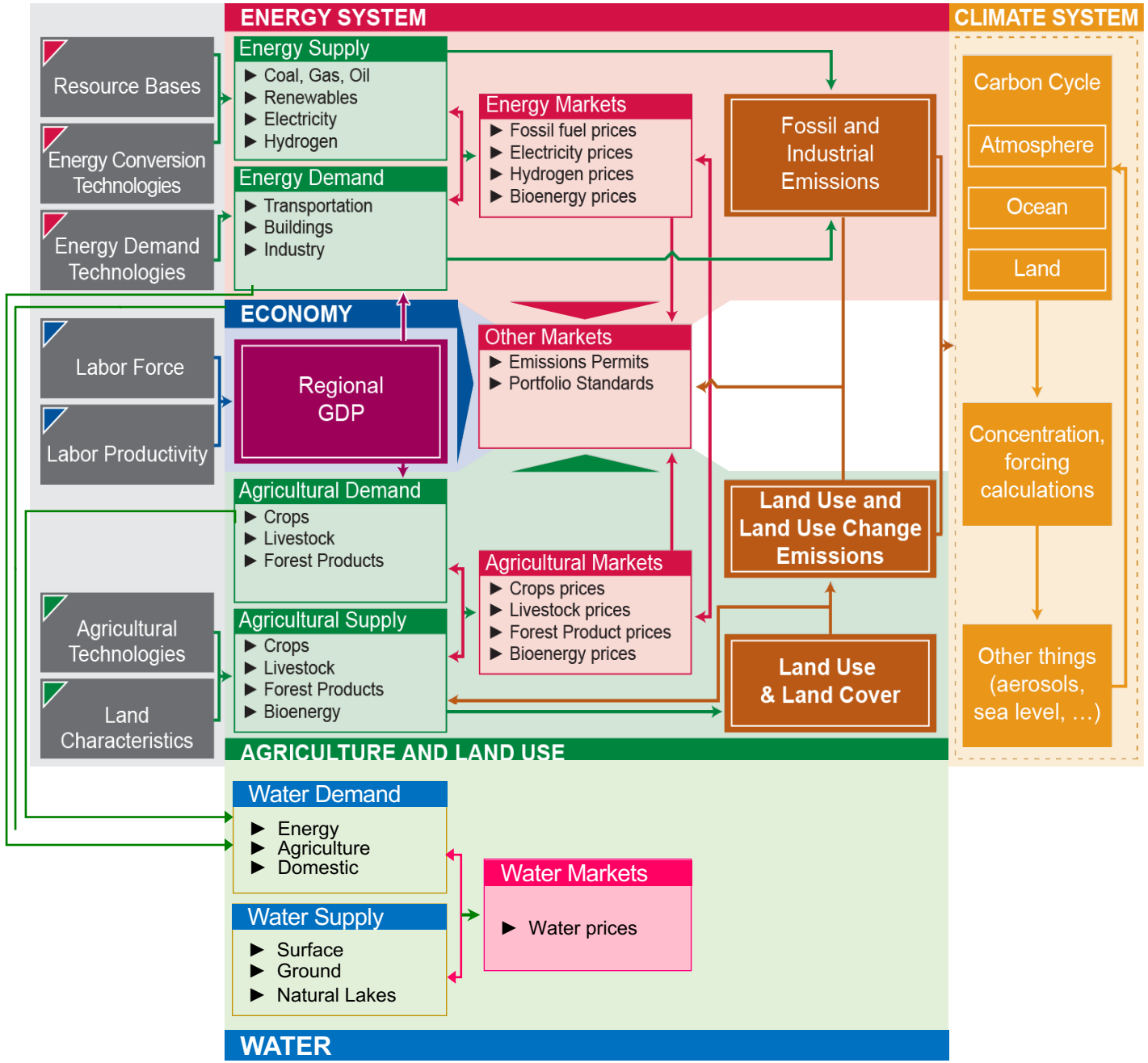
大气模型，辐射传输

Integrated human-Earth system modeling

Global Change Assessment Model

气候变化评估模式





Quantifying socio-economic impacts of changing Arctic ecosystems using ABoVE datasets in an integrated Human-Earth system modeling and data assimilation framework

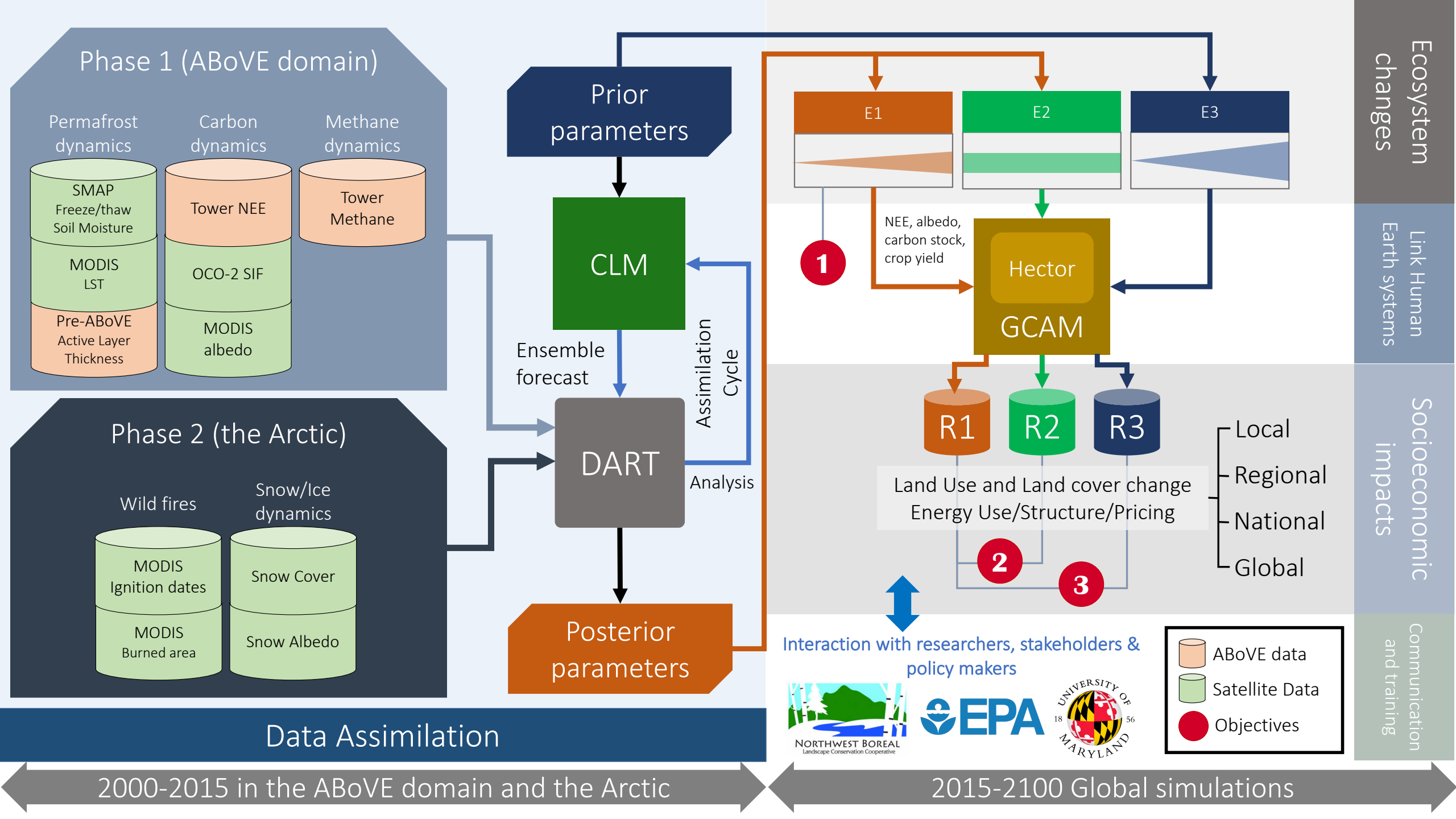
An exploration study on linking knowledge learned from geospatial data (e.g., Remote sensing) and terrestrial ecology to Human system

Scientific questions

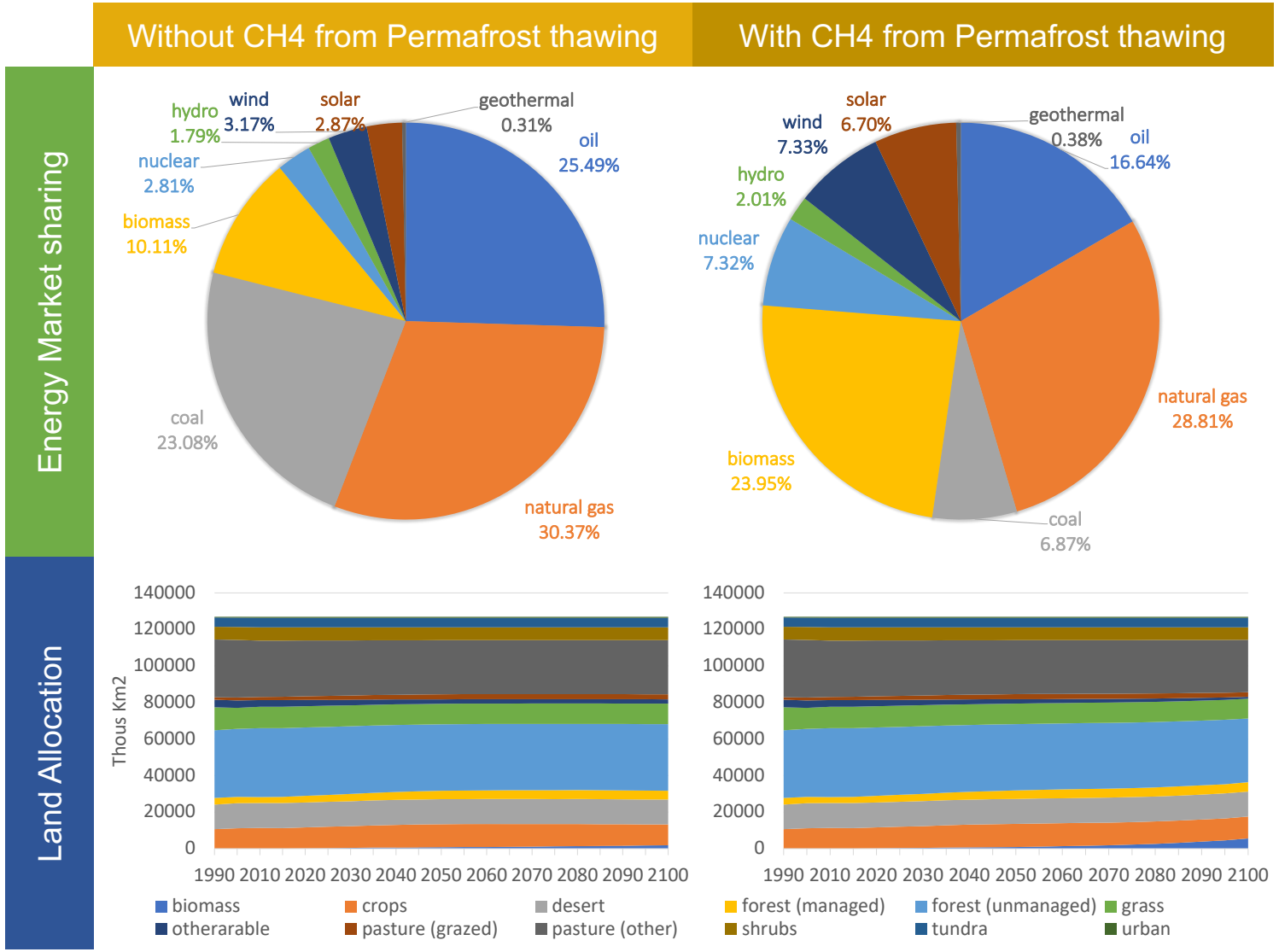
How will the key ecosystem services in the Arctic respond to the climate change in the past decade and in the future?

How big are the socioeconomic impacts of these changes in the 21st century?

How valuable are current observed ecological datasets, in terms of reducing the uncertainties of the estimated responses and changes?


Phase 1 (ABoVE domain)
Permafrost dynamics
Carbon dynamics
Methane dynamics
SMAP Freeze/thaw Soil Moisture
MODIS LST
Pre-ABoVE Active Layer Thickness
Tower NEE
OCO-2 SIF
MODIS albedo
Tower Methane
Phase 2 (the Arctic)
Wild fires
Snow/Ice dynamics
MODIS Ignition dates
MODIS Burned area
Snow Cover
Snow Albedo
Prior parameters
CLM
Ensemble forecast
DART
Assimilation Cycle
Analysis
Posterior parameters
Data Assimilation
E1
E2
E3
NEE, albedo, carbon stock, crop yield
1
Hector
GCAM
R1
R2
R3
Land Use and Land cover change
Energy Use/Structure/Pricing
2
3
Local
Regional
National
Global
Interaction with researchers, stakeholders & policy makers
NORTHWEST BOREAL Landscape Conservation Cooperative
EPA
UNIVERSITY OF MARYLAND
ABoVE data
Satellite Data
Objectives
Ecosystem changes
Link Human Earth systems
Socioeconomic impacts
Communication and training
2000-2015 in the ABoVE domain and the Arctic
2015-2100 Global simulations

一个简单例子



changes of GCAM projected energy market share and land allocations under RCP 6.0 by with and without considering methane emissions due to permafrost thawing.

谢谢

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Take home messages

- We have collected a huge amount of geospatial data for natural ecosystems
- It is time to link the knowledge learned from these data to human-Earth system models, and tell the stakeholders what does it mean in human life.