

Future Research at the Toolik Field Station

Perspectives from Breck Bowden

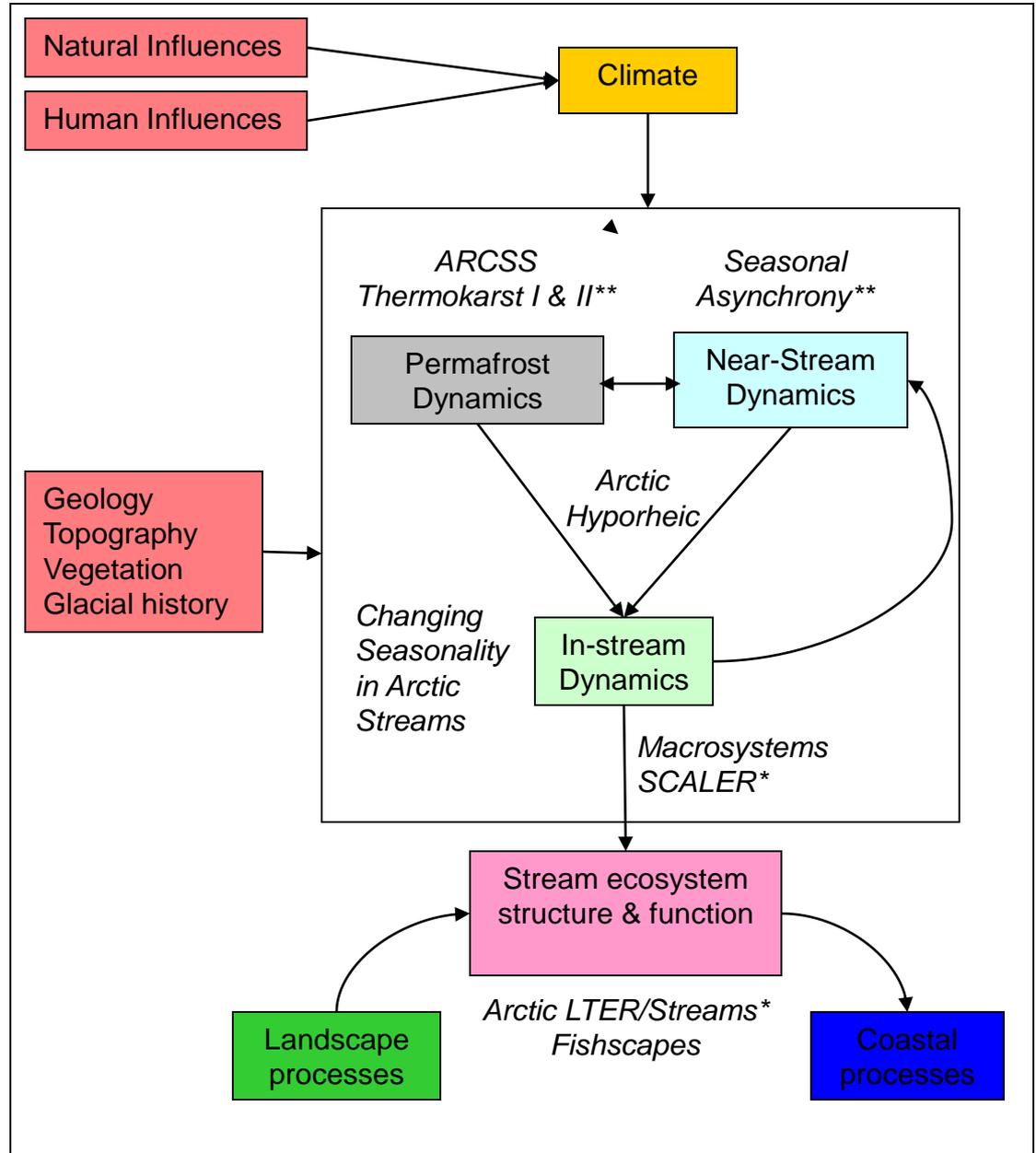
Science Support Visioning Workshop

Portland, Oregon

2-4 August 2012

How will change in the arctic system affect integrated land-water dynamics?

A streams perspective



Intellectual Rationale

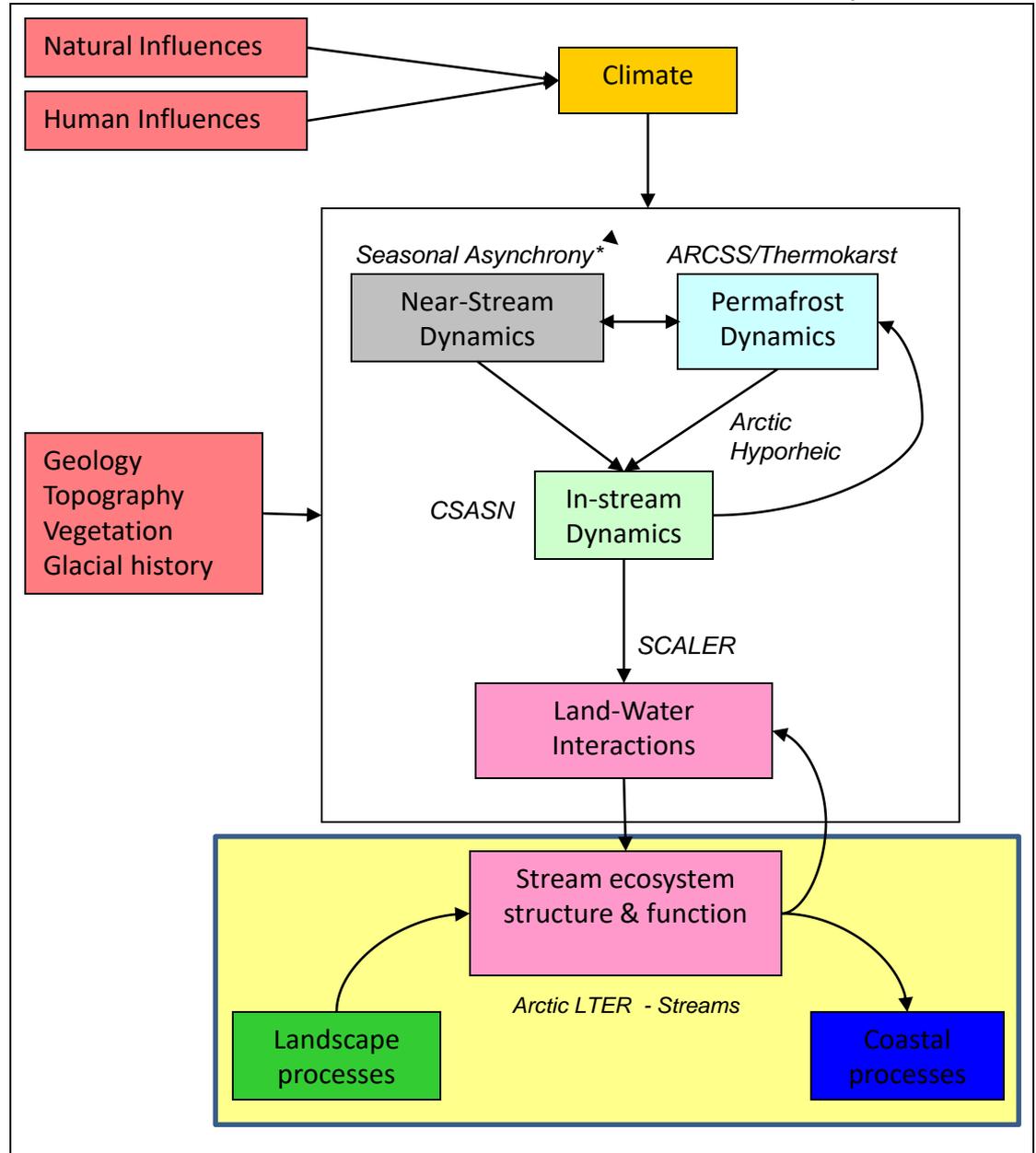
- Arctic streams and rivers are unique ecosystems with species that are important for biodiversity, recreation, and subsistence.
- Arctic streams and rivers are sensitive indicators of change in the arctic environment.
- Arctic streams and rivers are *the critical transformer* that connects terrestrial to coastal and marine ecosystems

Strategic Rationale

- **DOE/NGEE:** Develop a process-rich ecosystem model, extending from bedrock to the top of the vegetative canopy, in which the evolution of Arctic ecosystems in a changing climate can be modeled at the scale of a high resolution Earth System Model (ESM) grid cell
- **NASA/ABOVE:** Focus on key process associated with the land surface, and on key interfaces between the land and the coastal ocean and atmospheric boundary layer as they interact with climate-mediated terrestrial processes
- **NEON/STREON:** Enable understanding and forecasting of the impacts of climate change, land-use change and invasive species on continental-scale ecology -- by providing infrastructure and consistent methodologies to support research and education in these areas.
- **NSF/CZO:** Address pressing interdisciplinary scientific questions concerning geological, physical, chemical, and biological processes and their couplings that govern critical zone system dynamics. Integrate new understanding of coupled hydrological, geochemical, geomorphological, sedimentological and biological processes; and develop, couple and validate system-level models.

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Required Science Support

- Logistics and residential support are covered well
- Resources for larger meetings and classes (outreach and broader impacts) are adequate but could grow
- Extended environmental monitoring
- Technical instrument and sensor support
- “Last mile” internet connectivity
- Space to stage complex field installations
- Space to process large numbers of samples
- TFS as a field research operations hub
- Strong partnership between TFS scientists, staff, and management to develop TFS science resources with NSF