

What are the most important (and likely) impacts on ecosystem state & functioning over the next 50-100 years?

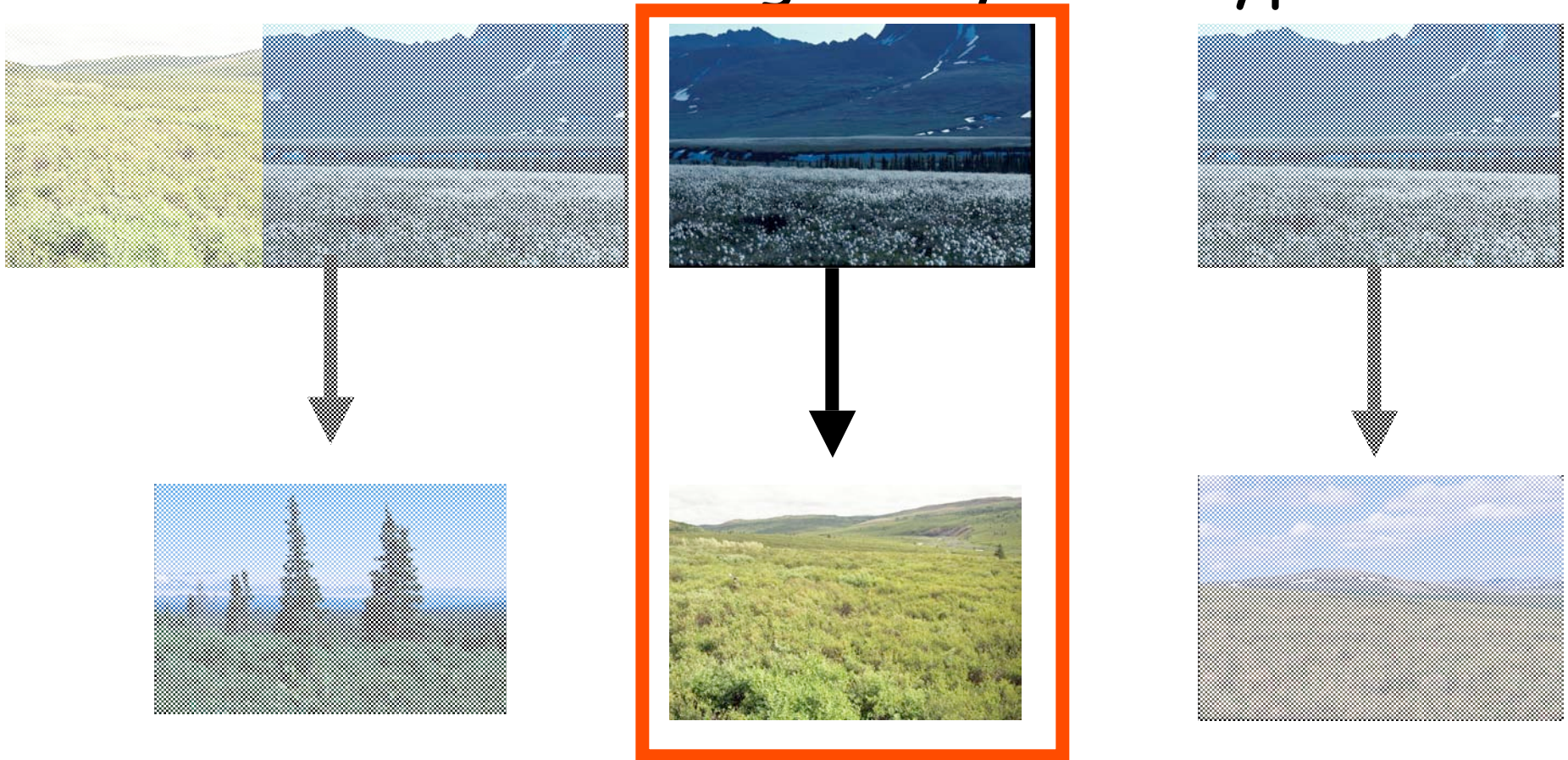
Hinzman et al., *In press*. Evidence and implications of recent climate change in Northern Alaska and other Arctic Regions. Climatic Change.

Epstein et al. *In press*. Nature of spatial transitions in the Arctic. Journal of Biogeography.

Chapin et al. *In prep*. Amplification of arctic summer warming by land-surface changes.

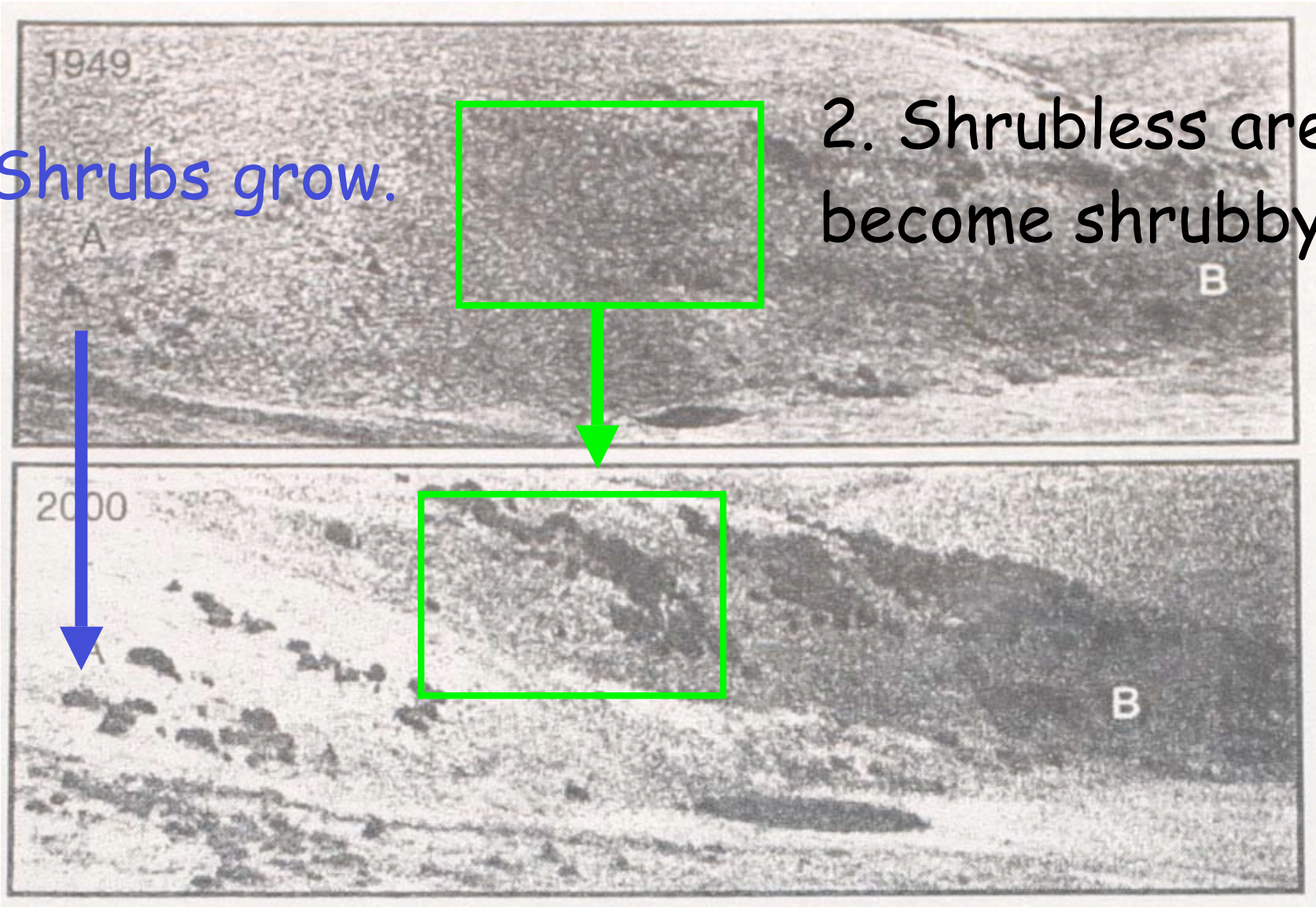
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- transitions among ecosystem types

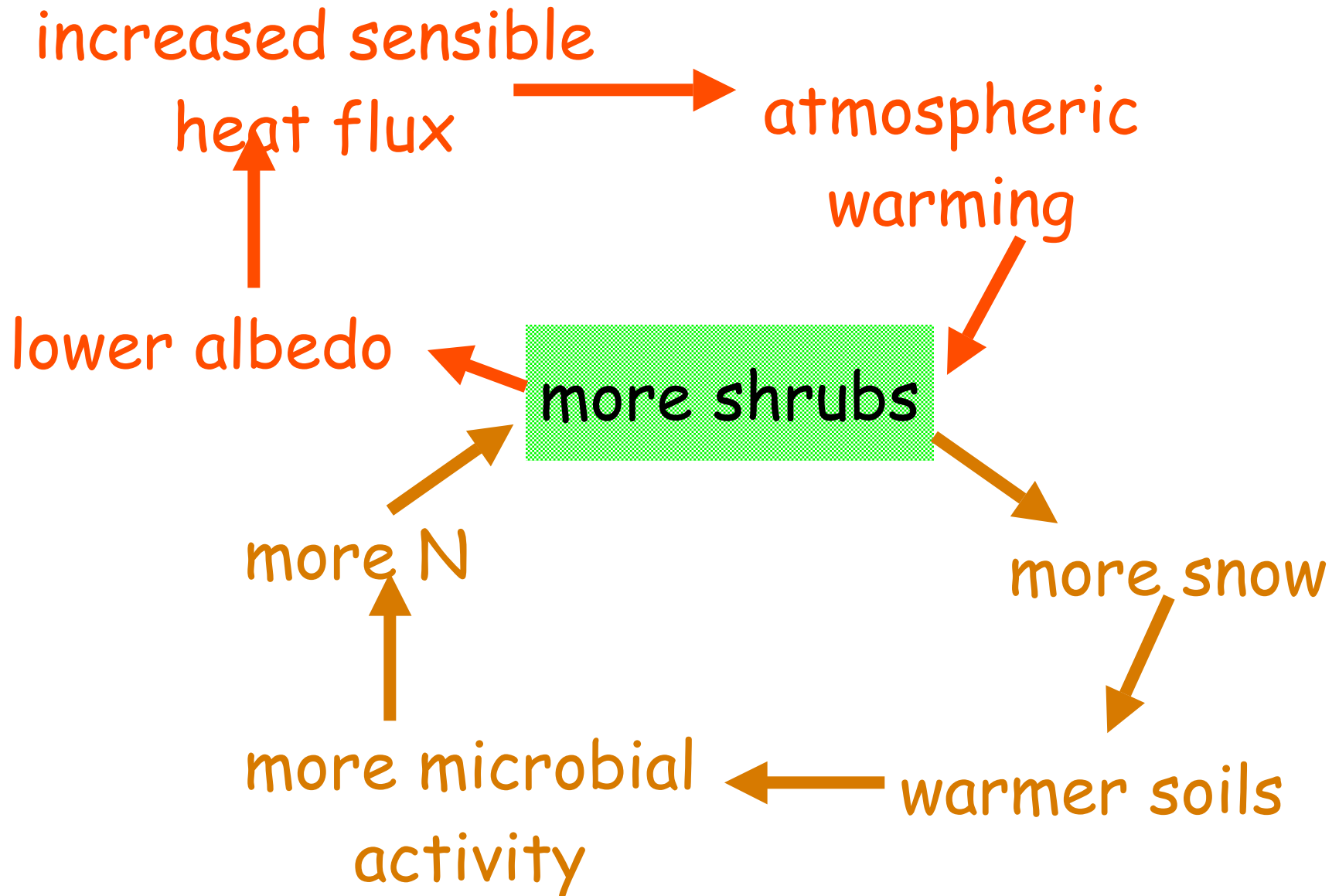


1. Shrubs grow.

2. Shrubless areas become shrubby.



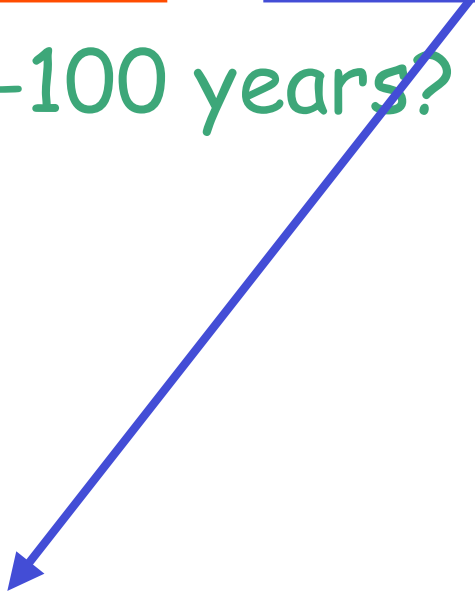
Sturm et al. 2001



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more shrubs



feedbacks on energy exchange
feedbacks on snow
feedbacks on soil processes

What key processes must be understood in order to predict timing/magnitude of impact?

I. Processes intrinsic to the system

- Plant migration rates
- Sources of lagged responses (e.g., interactions with permafrost processes)
- Changes to disturbance regimes
- Interactions with animal populations (esp. herbivores)
- Potential for novel biomes to arise (e.g., deciduous boreal forest)

What key processes must be understood in order to predict timing/magnitude of impact?

II. Processes extrinsic to the system

- changes in human use
- moisture!!!!!!!

What processes are most critical for this synthesis exercise?

