

Cornell University

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# **Multi-model intercomparisons as a tool to build confidence in SRM projections across fields**

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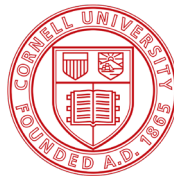
**Department of Earth and Atmospheric Sciences, Cornell University**

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Climate Intervention in an Earth Systems Science Framework: A Workshop  
20 June 2023



# Many coordinated experiments through GeoMIP

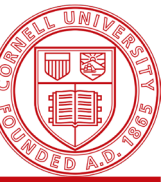


## Tier 1 GeoMIP experiments

	Solar Dimming	Sulfate	Surface Albedo	Cloud brightening	
Constant Forcing	G1	G4	G1 ocean-albedo	G4cndc G4sea-salt	<ul style="list-style-type: none"> <li>-Models' response to a step function input</li> <li>-Easier to set up and define across models</li> </ul>
Time-varying Forcing	G2 G3S G6solar	G3 G6sulfur		G3-SSCE	<ul style="list-style-type: none"> <li>-Varying level of intervention allows for exploration of emerging signal</li> <li>-Better-defined temporal baseline against which to compare</li> <li>-More "realistic" deployment scenario</li> <li>-May depend on models' sensitivity</li> </ul>
	<ul style="list-style-type: none"> <li>-Easy to replicate across models' complexities and models' versions</li> <li>-Comparison with more complex global methods</li> </ul>	<ul style="list-style-type: none"> <li>-Models' spread in latitudinal distribution of aerosols</li> <li>-Contribution of aerosol perturbation to surface climate and stratosphere</li> </ul>	<ul style="list-style-type: none"> <li>-Idealized representation of spatially heterogeneous methods</li> <li>-Comparison with more complex regional methods</li> </ul>	<ul style="list-style-type: none"> <li>-Good first step in simulating other, more regional, methods</li> <li>-Models used might not be simulating all relevant processes happening at a lower spatial scale</li> <li>-Unrealistic assumptions over size of aerosols injected</li> </ul>	



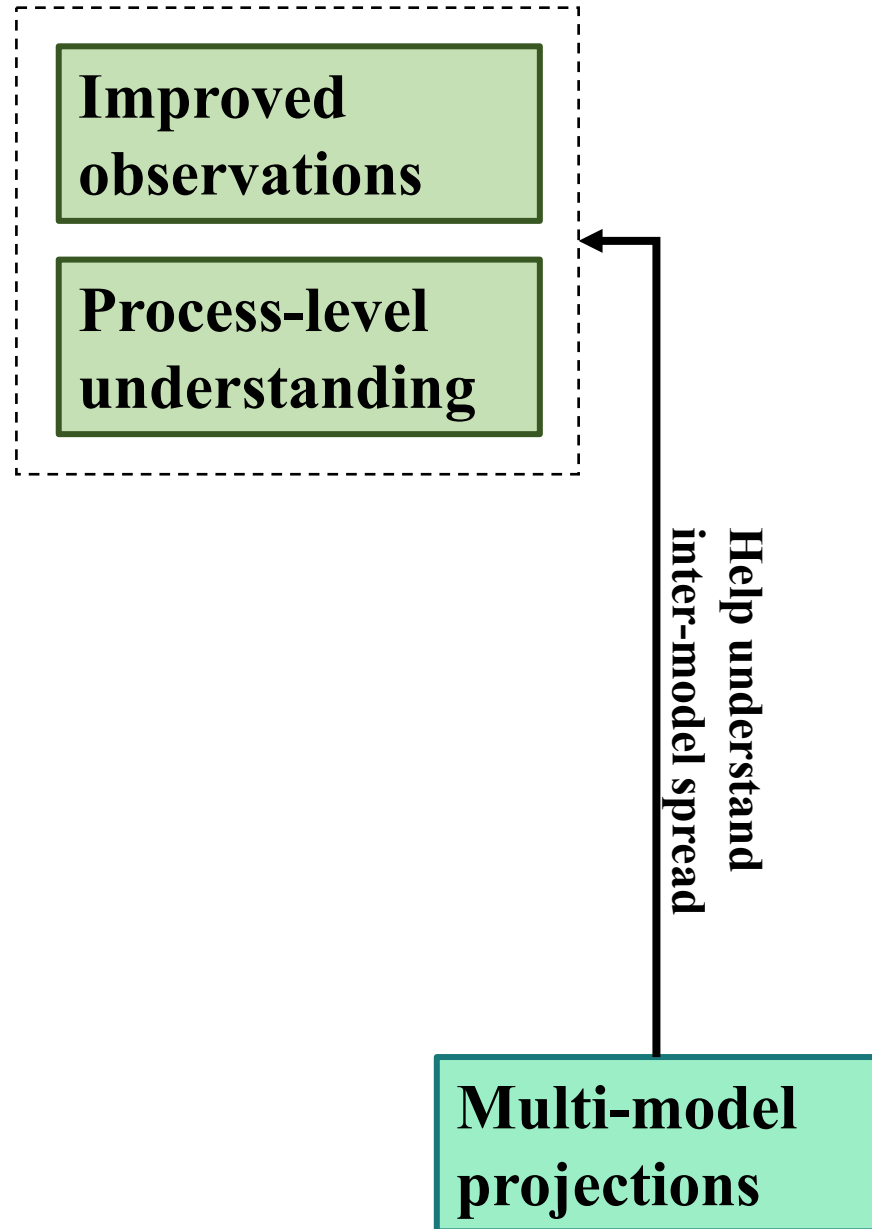
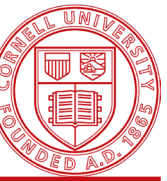
# Role of multi-model comparisons: climate science



**Multi-model  
projections**

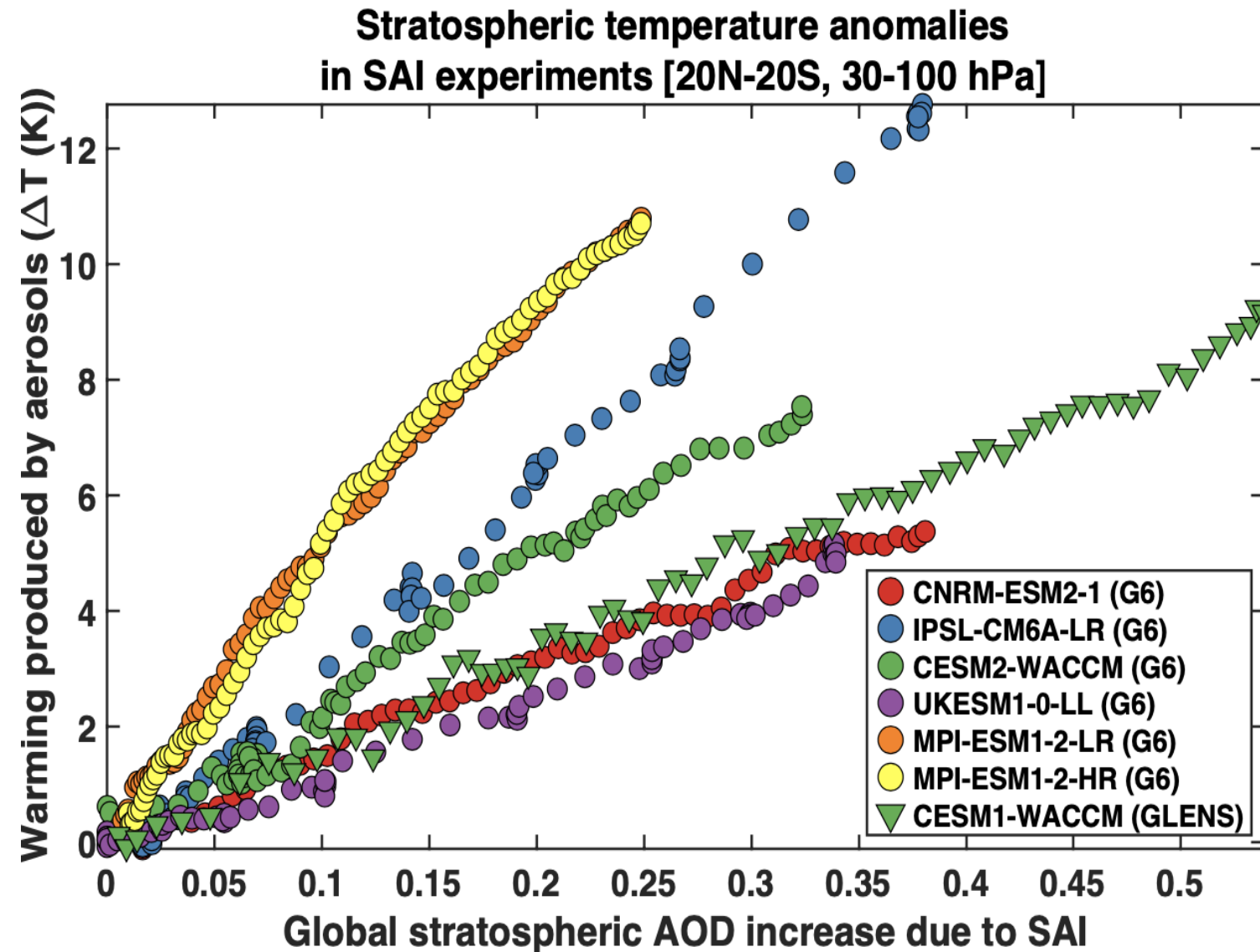
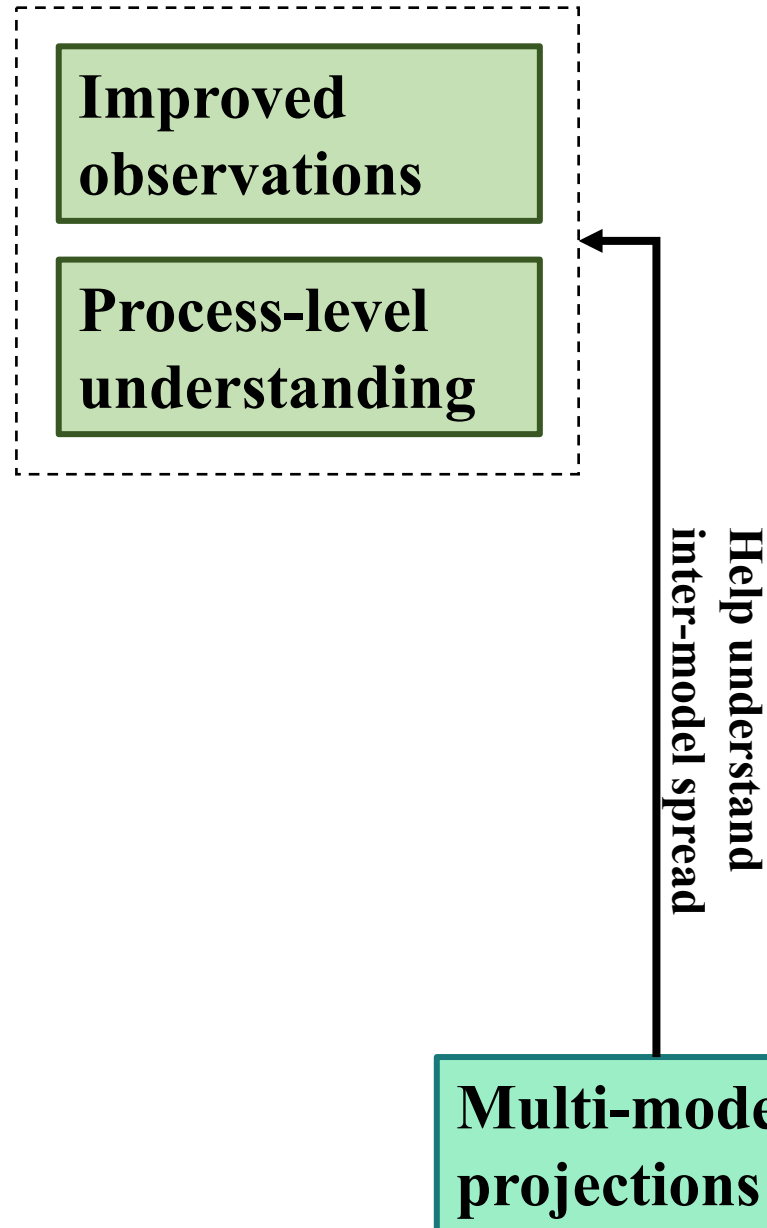
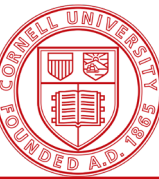


# Role of multi-model comparisons: climate science





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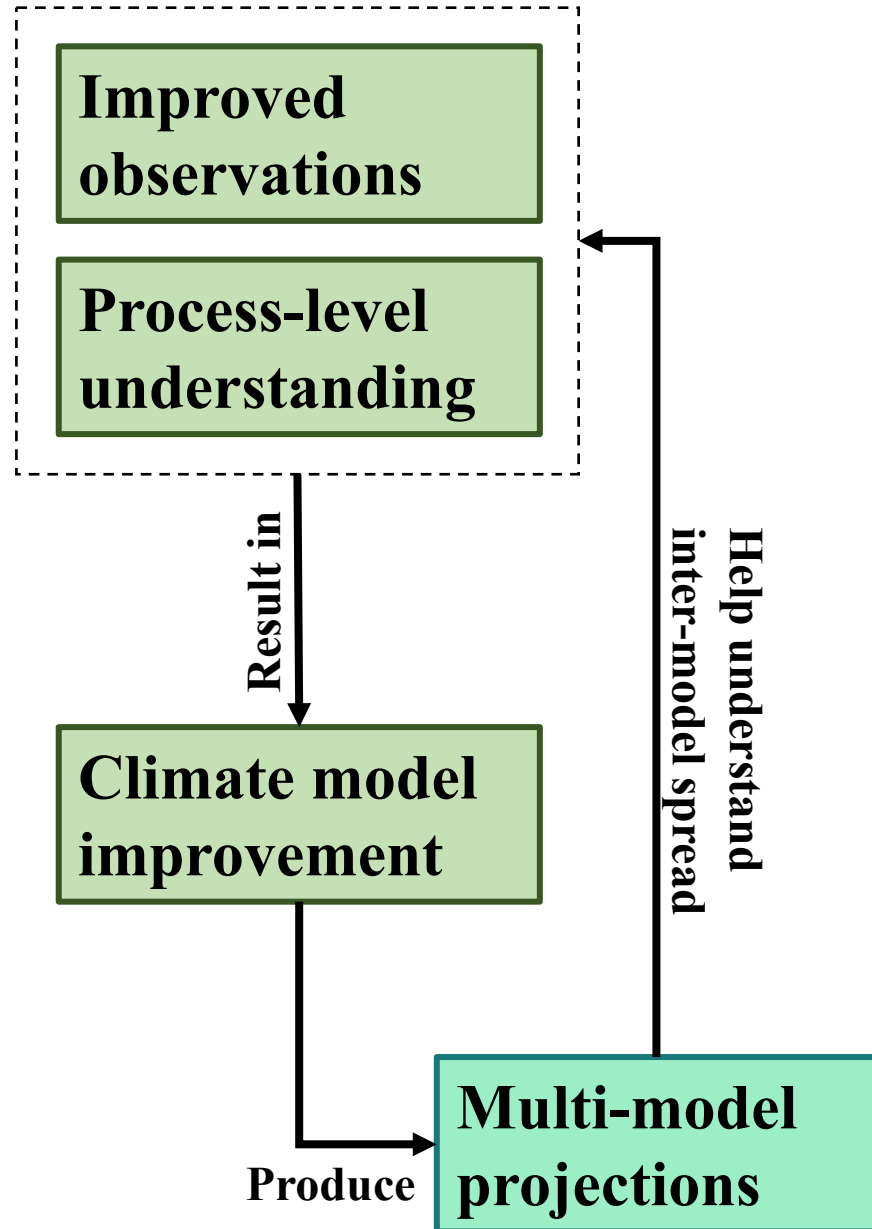
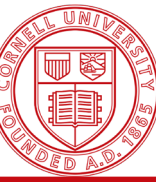


[Tilmes, Vioni et al., 2021 ACP](#)

and WMO Assessment, 2022

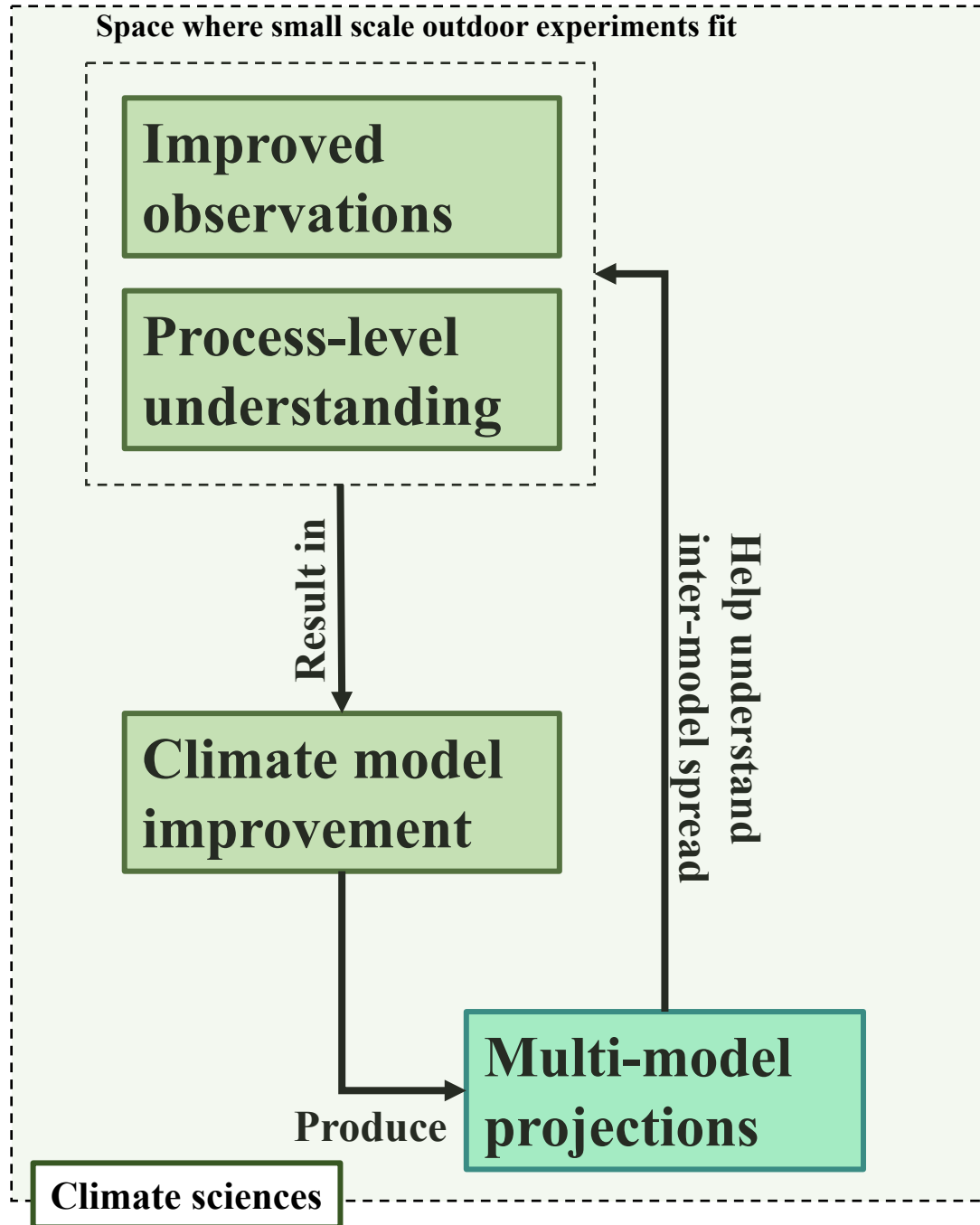
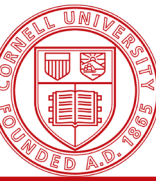


# Role of multi-model comparisons: climate science



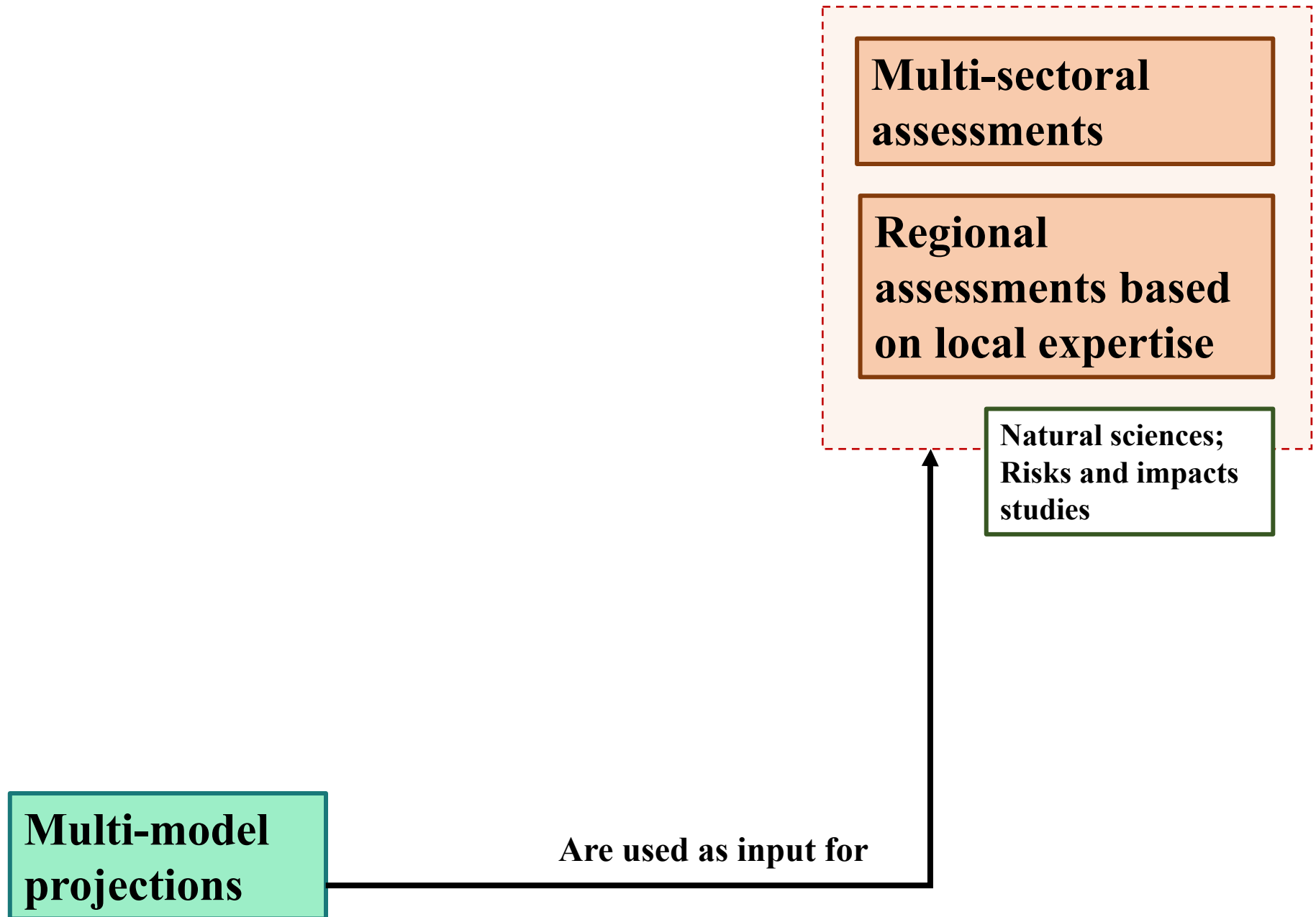
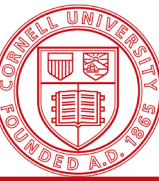


# Role of multi-model comparisons: climate science



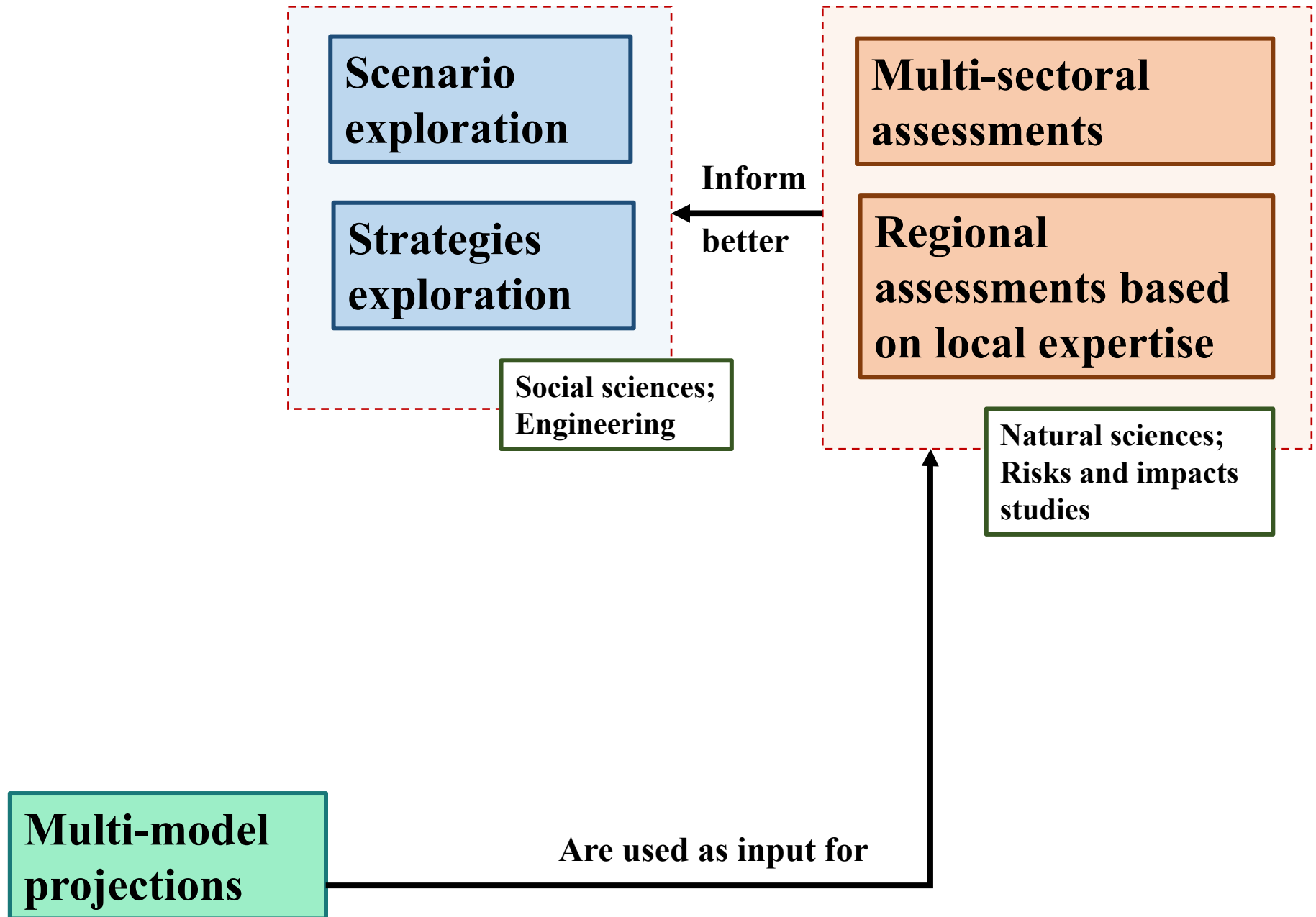
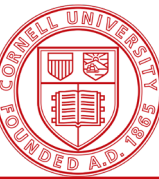


# Role of multi-model comparisons: impacts



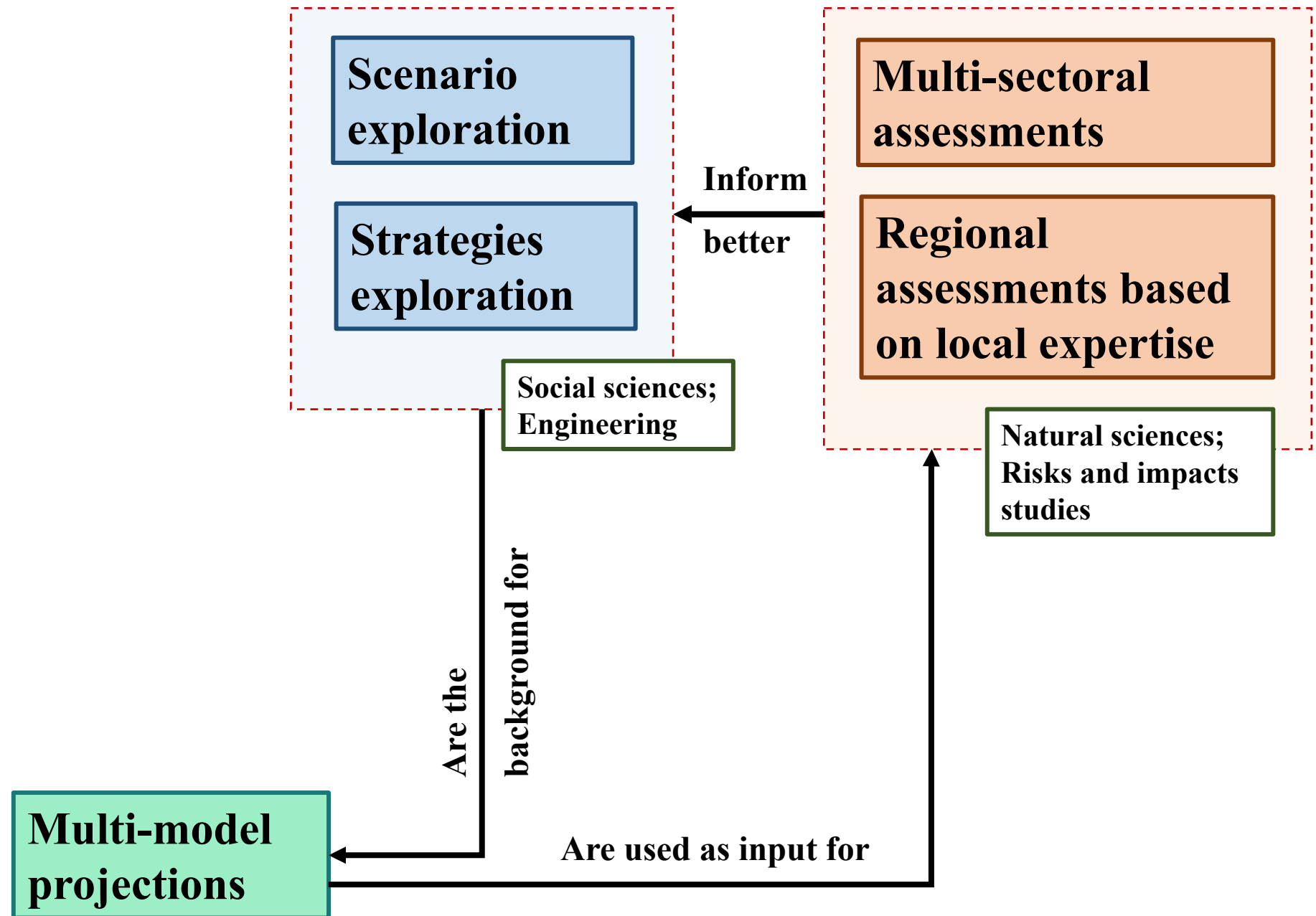
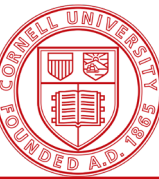


# Role of multi-model comparisons: strategies



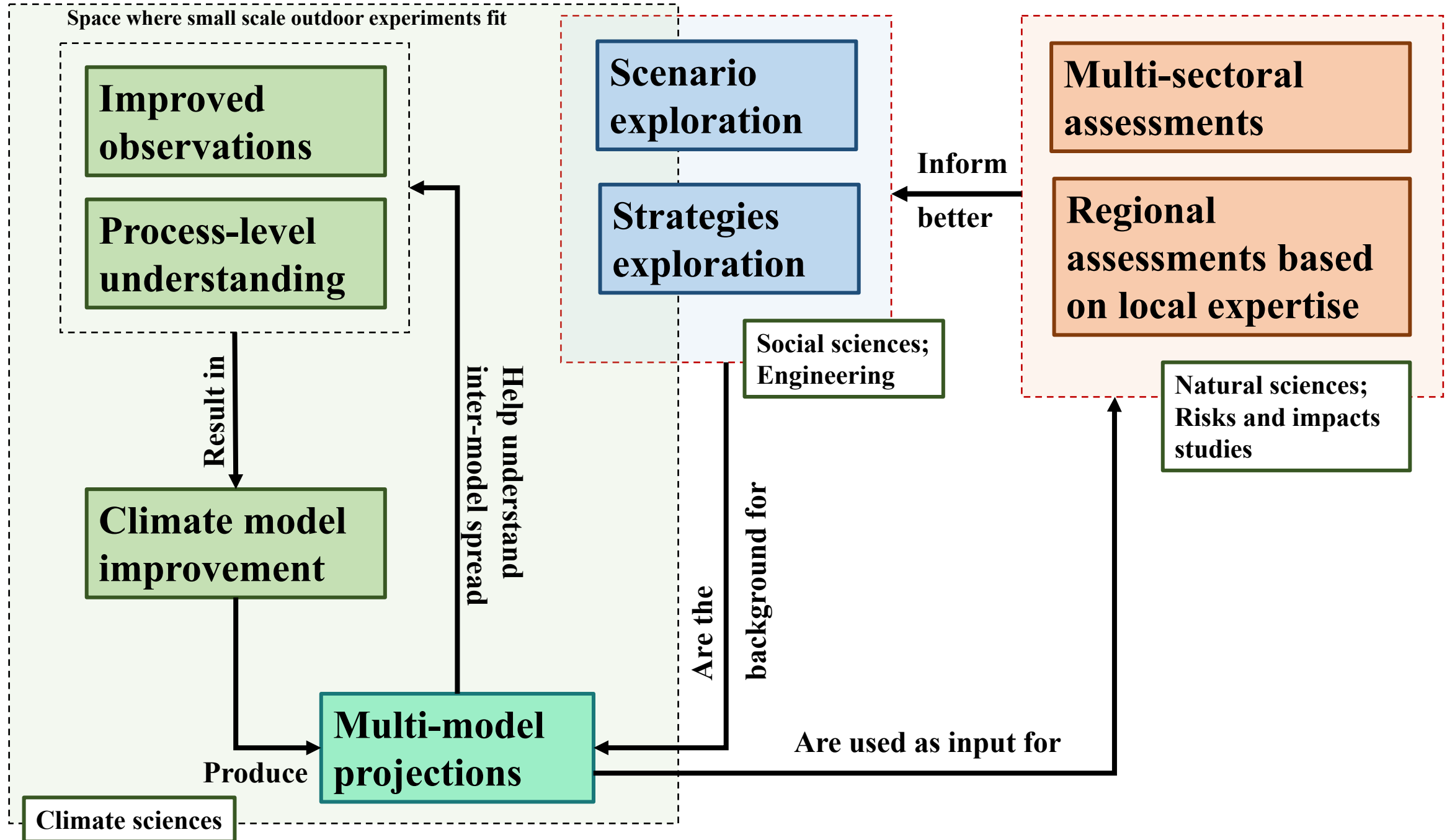


# Role of multi-model comparisons: strategies



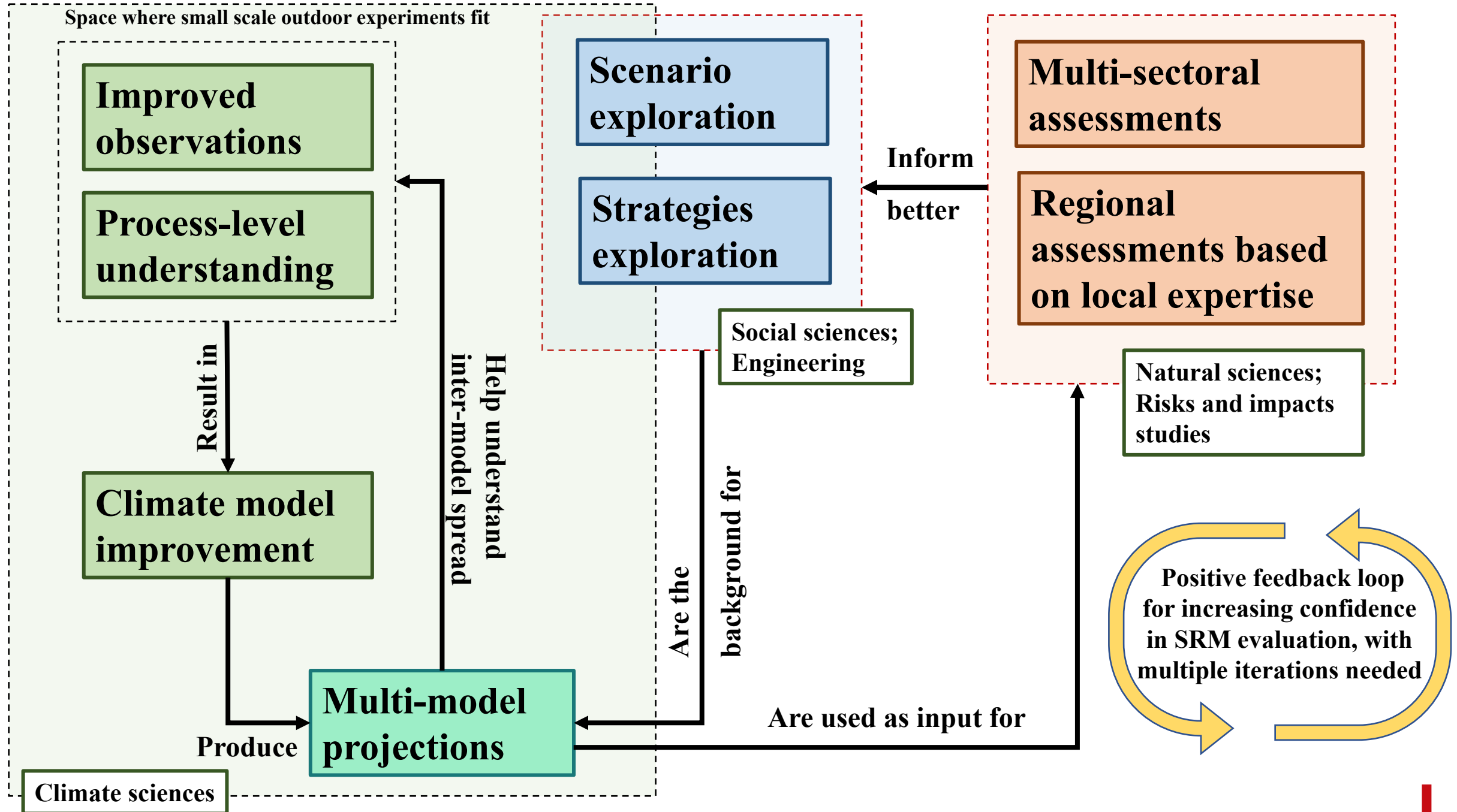


# A holistic view to increase confidence through legitimacy



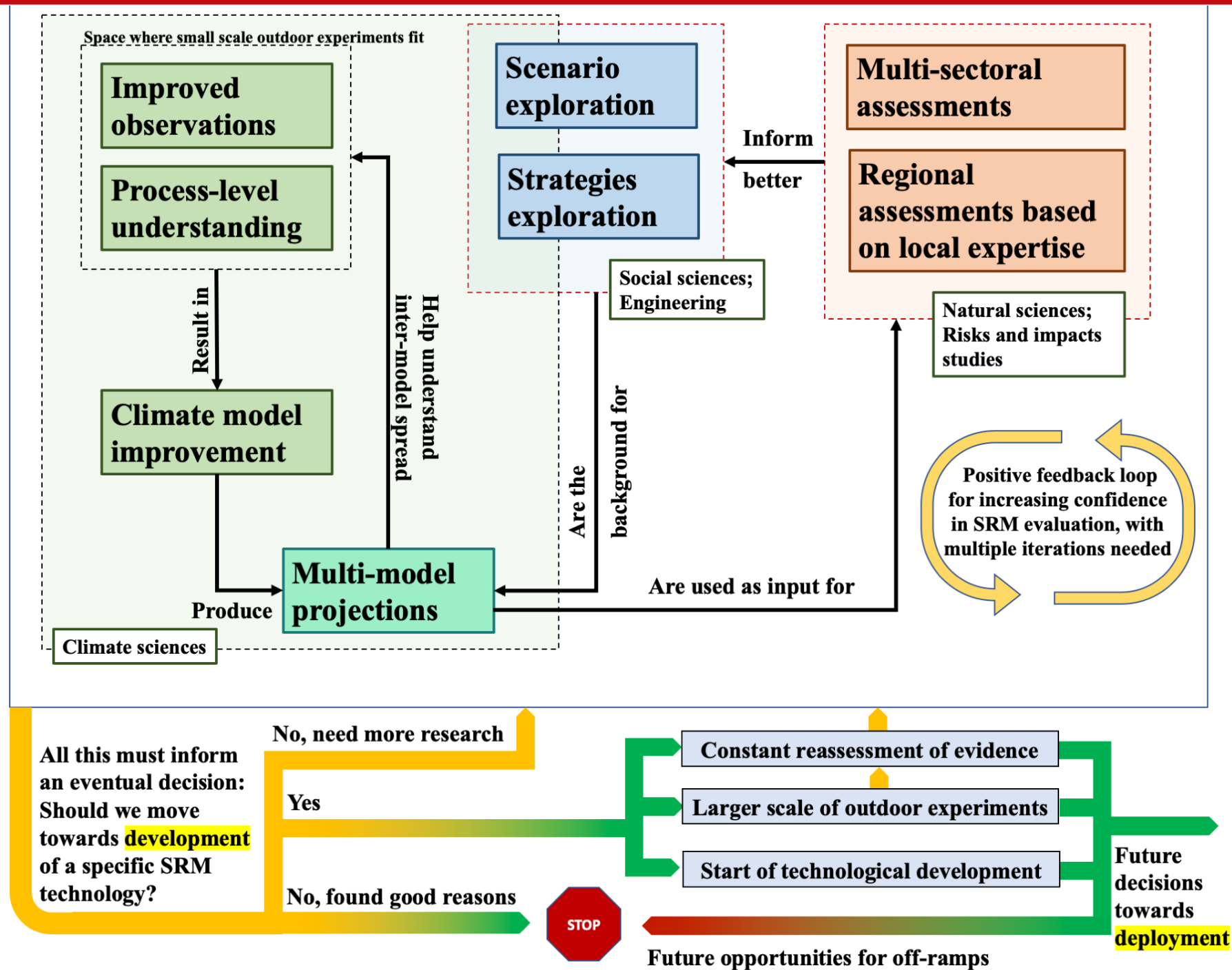


# A holistic view to increase confidence





# What's all this for?





# Conclusions

- Very good reasons to study SRM: can it reduce climate change risks? We should really try to find out.
- Research should touch every discipline and be highly collaborative. What are we missing?
- Research should be aimed towards assessing its risks **and** potentials: endgame should be informing a decision towards deployment, or not. It won't be up to the researchers!
- Climate models fit for the purpose will be useful for decision, **AND** for detection & attribution in case of a deployment.