

Digital Earth WCRP Lighthouse Activity - An Update

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Digital Earth LHA Goal

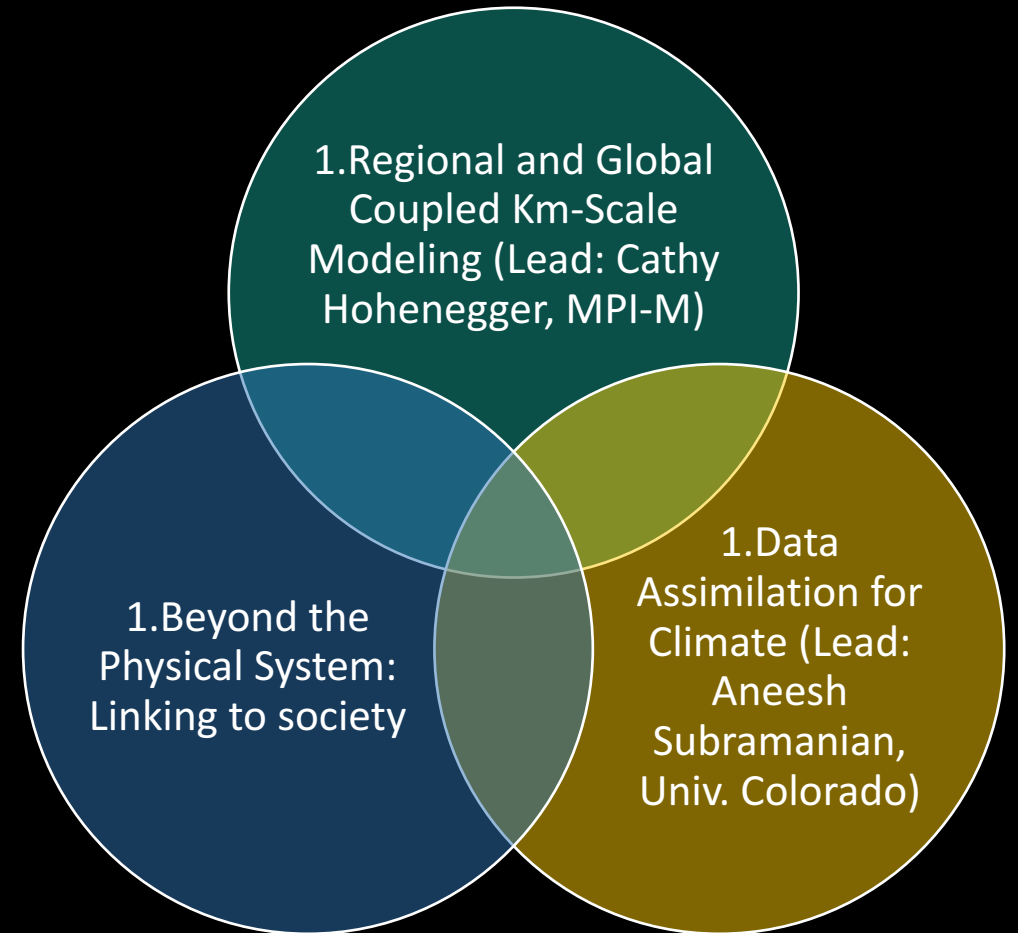
*Support and coordinate the research underpinning the establishment of **integrated interactive digital information systems** that provide global and regional information on the past, present, and future of our planet and our human systems*

4km MPAS-A
Falco Judt, NCAR

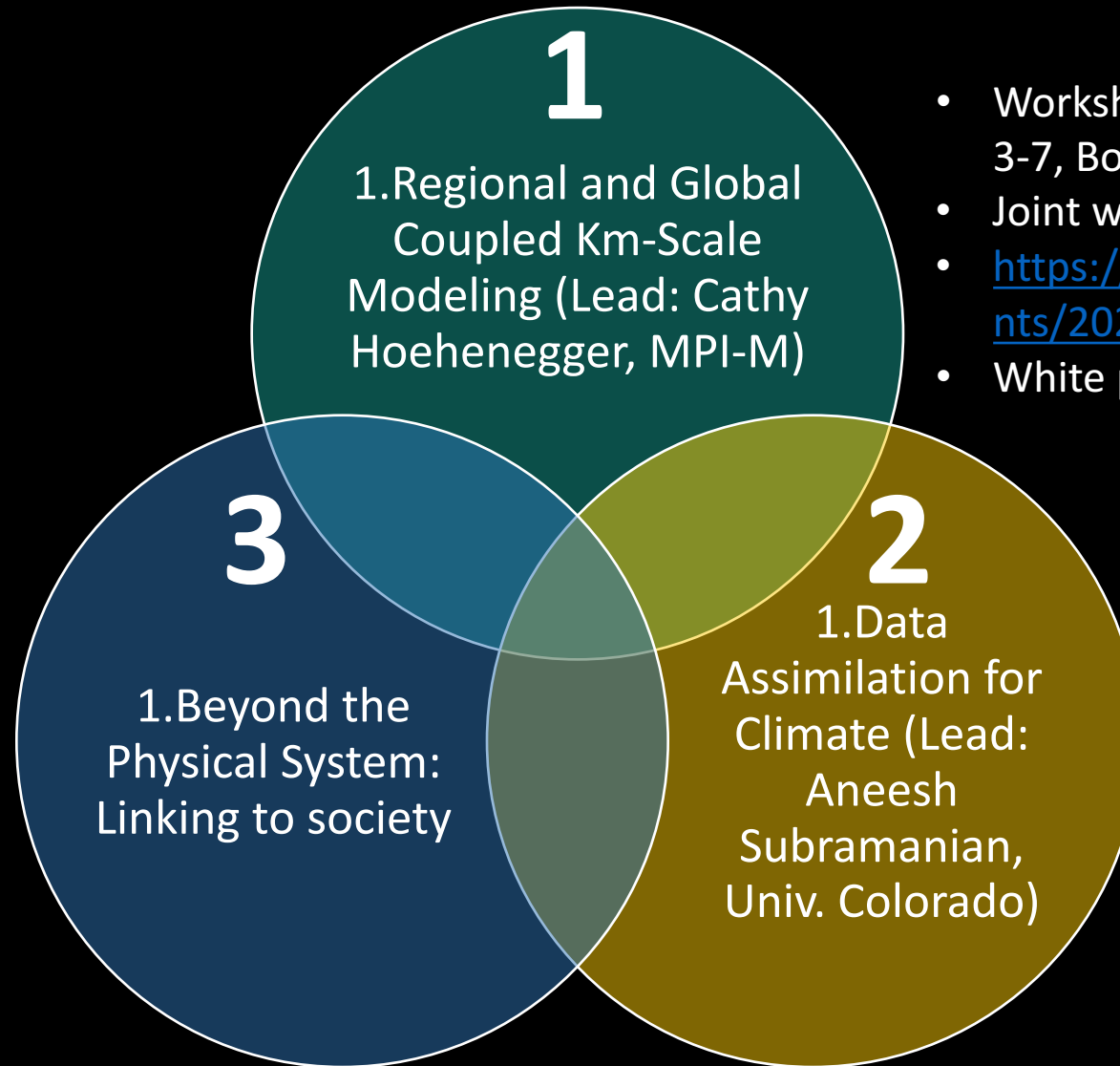


What is most needed to pull this off?

1. **Fully coupled km-scale regional and global models:** Need a global research network with expertise in km-scale modeling of the Earth system and its individual components
2. **Data assimilation for climate:** Establish an active research community in data assimilation for climate that builds on the existing numerical weather prediction and re-analysis efforts and significantly expands them
3. **Beyond the Physical Earth System:** Incorporate human interactions on and impacts to human systems in the information system workflow



Activities



- Workshop planned for October 3-7, Boulder, CO
- Joint with ESMO
- <https://www.mmm.ucar.edu/events/2022/wcrp>
- White paper planned

- Started discussions with GEWEX, US-RHP proposal and ISIMIP
- Aiming to establish one or more demonstration project(s)

- Workshop held in May
- Joint with Explaining and Predicting Earth System Change LHA
- White paper under construction

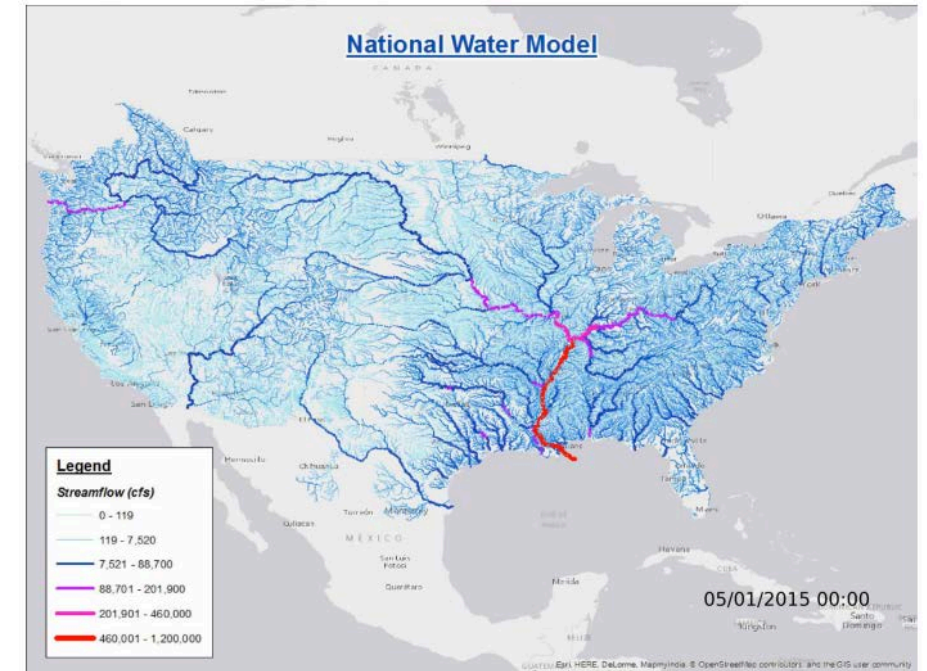
A global-regional modeling alliance

Goals

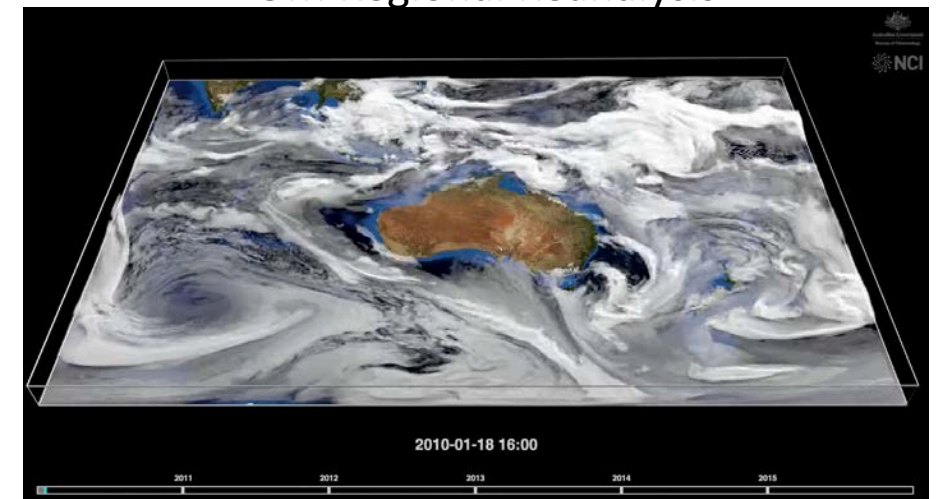
- Define several demonstration projects converging diversity of regional foci, and regional-global dependencies
- Build scalable modeling and workflows that can facilitate transition from regional to global modeling and vice versa

First steps

- Launch some common projects – for example pick some regions and periods and analyze global and regional simulations together.
- Organize a workshop dedicated to the development of regional Digital Earths systems?
- Create WCRP-wide Task Force that identifies opportunities for the application of Digital Earths outputs and propose demonstration projects for their potential utility?



BOM Regional Reanalysis



Data assimilation for climate workshop

- May 19-20 workshop, Boulder, CO (after US CLIVAR Meeting)
- **Covered 5 topics:**
 - Initialization and calibration for prediction
 - Reconciling climatology of observation constrained reanalysis and free running models
 - Uncertainty in the mean state and the climate trend in reanalysis products
 - Closing budgets and representing climate trends in reanalysis
 - Reducing model error (in both climate projection and reanalysis modes) by confronting models with observations using DA formalism



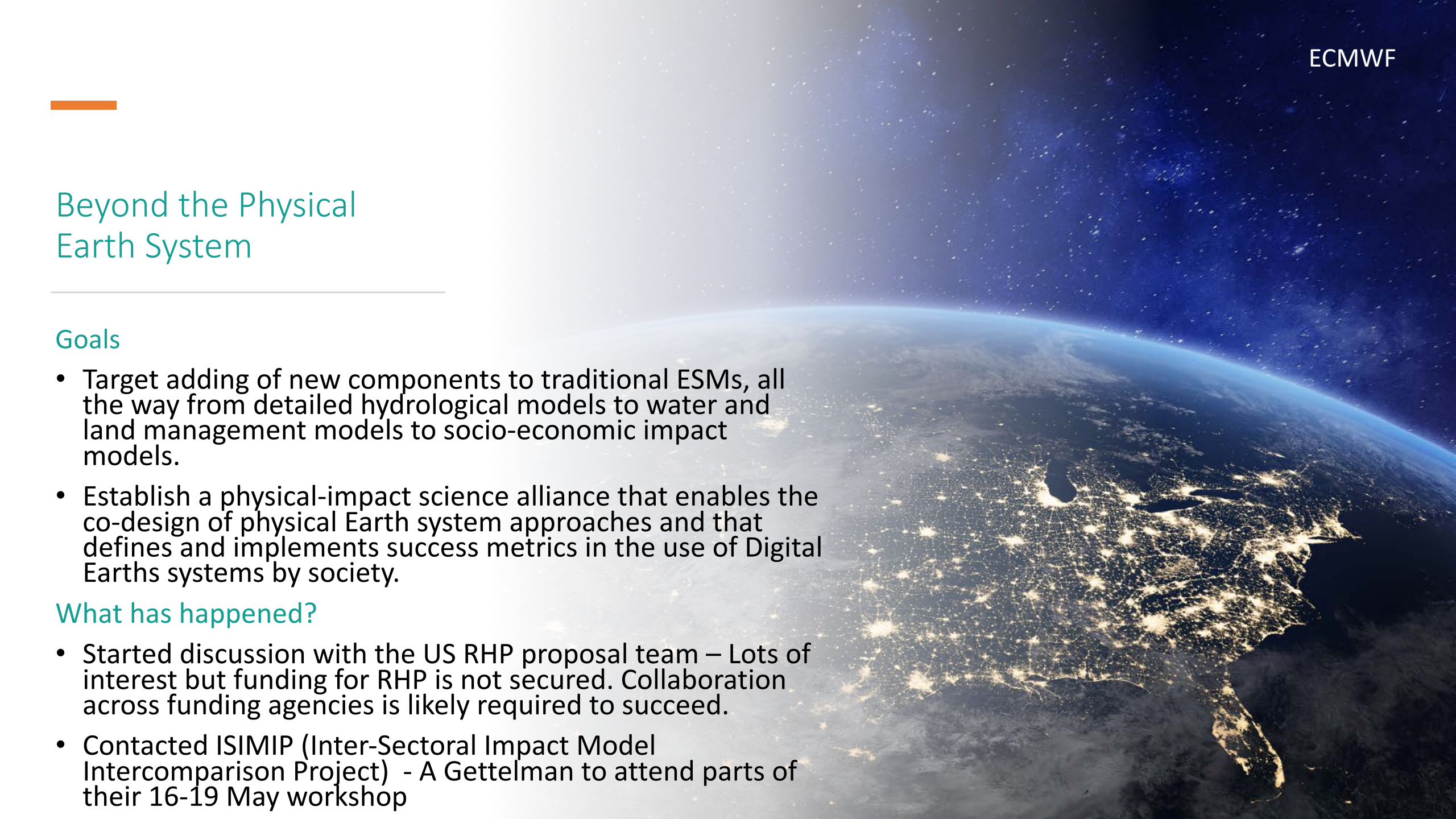
Beyond the Physical Earth System

Goals

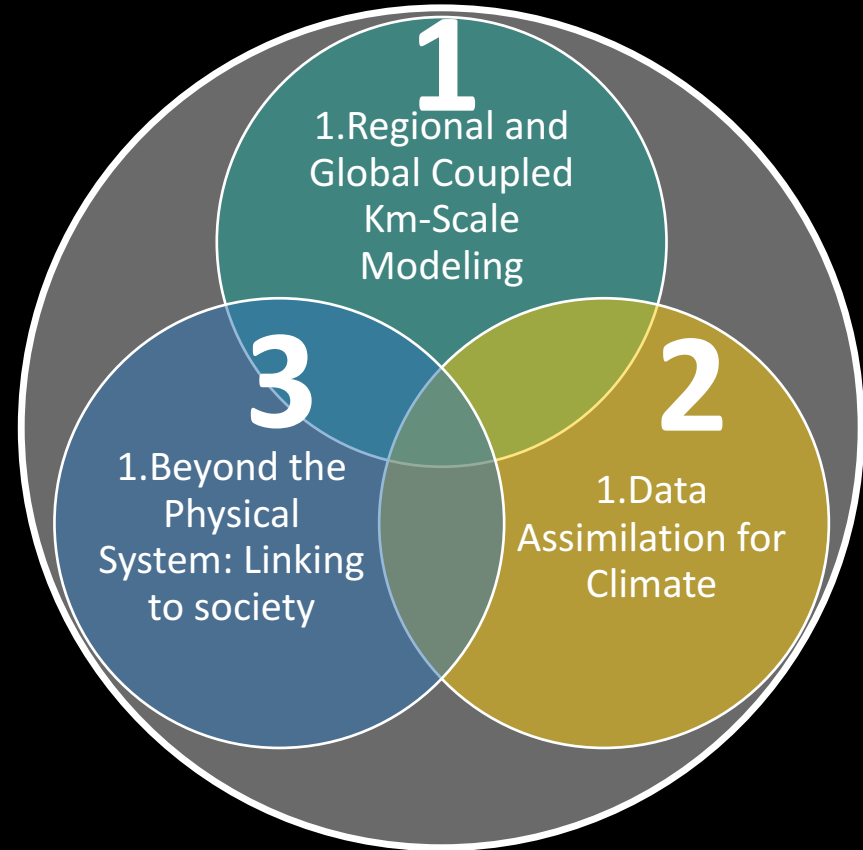
- Target adding of new components to traditional ESMs, all the way from detailed hydrological models to water and land management models to socio-economic impact models.
- Establish a physical-impact science alliance that enables the co-design of physical Earth system approaches and that defines and implements success metrics in the use of Digital Earths systems by society.

What has happened?

- Started discussion with the US RHP proposal team – Lots of interest but funding for RHP is not secured. Collaboration across funding agencies is likely required to succeed.
- Contacted ISIMIP (Inter-Sectoral Impact Model Intercomparison Project) - A Gettelman to attend parts of their 16-19 May workshop

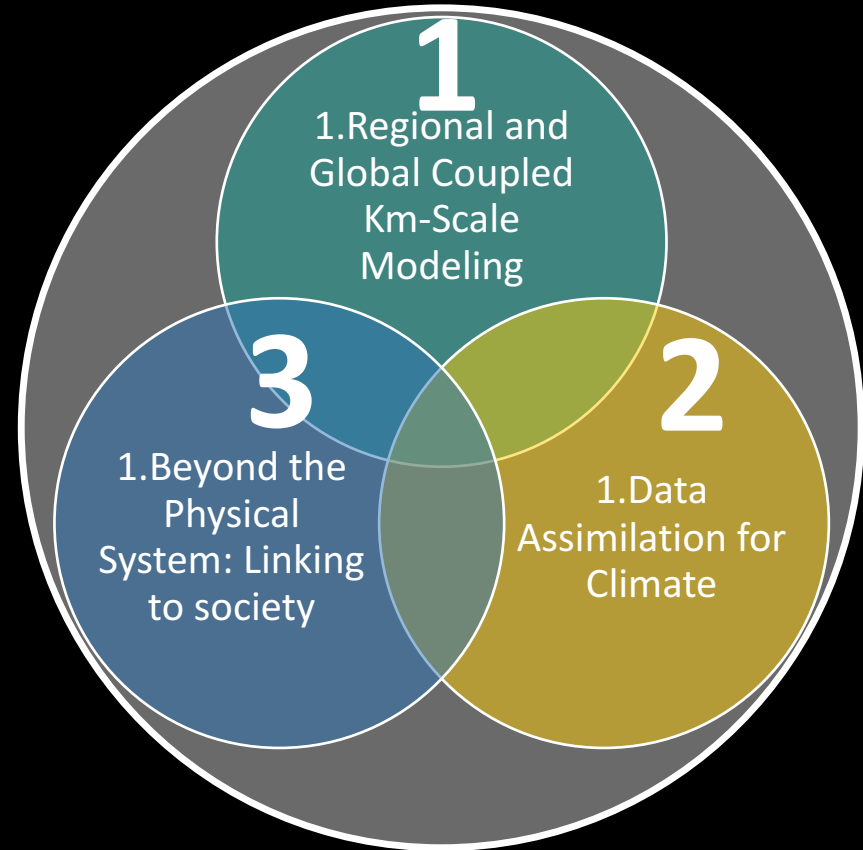


Challenges



- Our biggest challenge is to engage the community:
 - Modelling community is divided in its view on the value of ultra-hi-res modelling. Those in favour forge ahead without us. Those opposed are not keen on engaging.
 - DA for climate community is only emerging and small.
 - Impacts community is not yet engaging with the DE vision
- Propose to restructure LHA leadership by inviting active Centres/Groups to nominate a representative (a la WGNE, WGCM)
 - This will ensure a strong connection to the leading efforts around the world.

How can the JSC help?



- Spread the word and be positive!
- Advertise our activities in your networks.
- Help us make connections.
- Identify opportunities for joint activities to reduce number of acronyms and workshops.
- Ideas, ideas, ideas ...