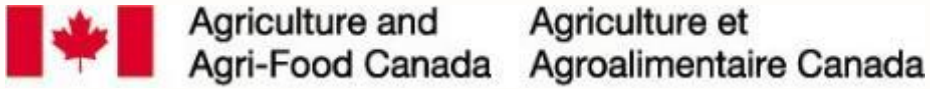
Network for Integrated Agricultural Resilience Research (NIARR)

Collaboration on the resilience of agricultural systems across North America



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NIARR: NSF-funded Research Coordination Network

What: NIARR is a collaborative network of networks

Networks:

- USDA Long-Term Agroecosystem Research (LTAR)
- Agriculture and Agri-Foods Canada's CALL-Net
- ResNet (NSERC Canada)
- Resilience Alliance (international)

Goal: Investigate resilience and vulnerability to regime shifts at multiple spatial and temporal scales in agricultural landscapes across North America.

Grant Duration: 3.5 years

People: ~ 110 scientists from across North America

Principle Investigators

Craig Allen
Director of the Center for Resilience in Agricultural Working Landscapes at UNL, Executive Board Resilience Alliance

Tala Awada
USDA-LTAR, UNL Associate Dean Agricultural Research

Elena Bennett
Director of ResNet, McGill Professor and Canada Research Chair, Executive Board Resilience Alliance

Anna Pacheco
Senior National Coordinator of Living Labs Division/CALL-Net

Shana Sundstrom
Resilience ecologist, Project Manager for NIARR

Steering Committee

Brandon Bestelmeyer—Research Head Jornada Experimental Range in New Mexico, Director of the Jornada LTAR site, co-PI of the Jornada Basin LTER program at New Mexico State University (NMSU)

Sheri Spiegal—Range Management Specialist Jornada Experimental Range, and Affiliated Faculty at NMSU

Jennifer Hodbod—Leeds Assistant Professor, Executive Board Resilience Alliance

Advisory Board

Edward Ayres—Lead Scientist for soil sensor data products and Megapit Soil Archive manager for the National Ecological Observatory Network

François Chrétien—Director, Living Labs Division/CALL-Net (Agriculture and Agri-Food Canada)

Marc Dahan—CEO Vivify, resilient and sustainable agricultural seed production

Deb Echo-Hawk—Keeper of the Seeds, Pawnee Seed Preservation Project

Ali Fares—Professor of Water Security, Prairie View A&M University

Evan Fraser—Professor and Director of the Arrell Food Institute at the University of Guelph, Canada Research Chair in Global Food Security

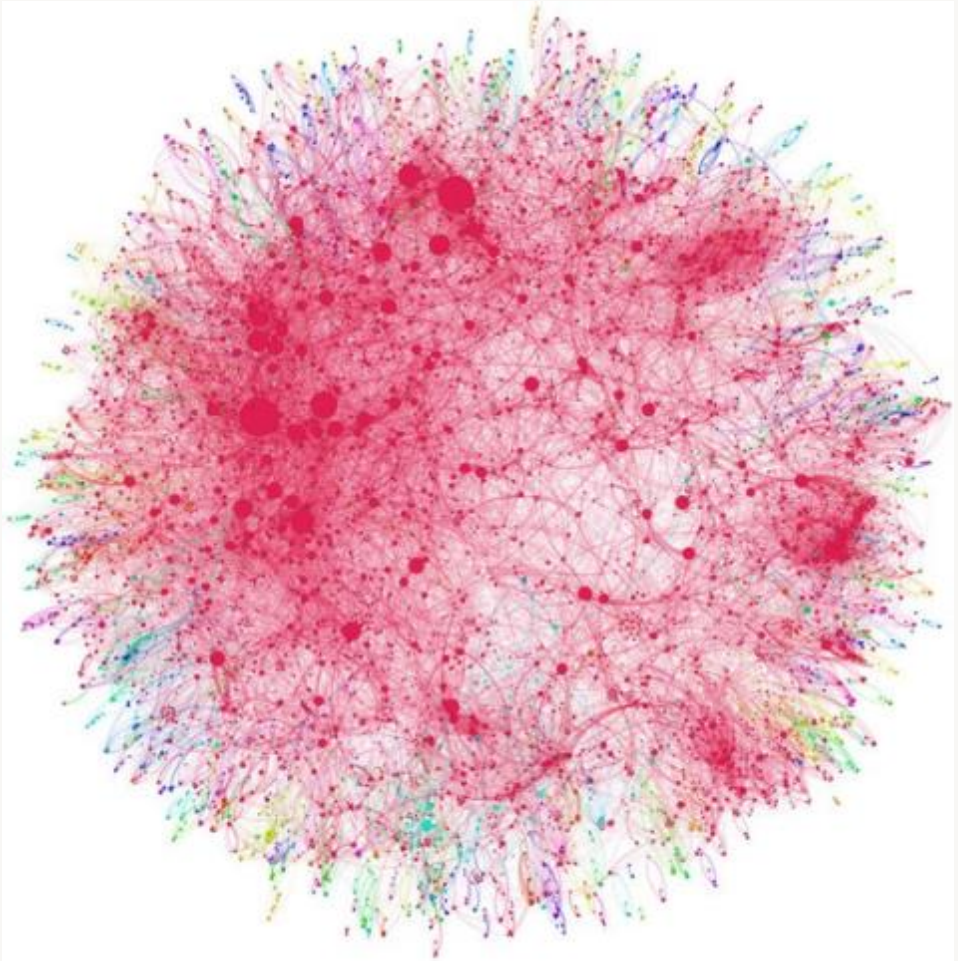
Teferi Tsegaye—National Program Leader, Long-term Agroecosystem Research (LTAR)

Methodology to create NIARR

- Buy-in from each organization/recognized need to address agricultural resilience at a North American scale
- Gave presentations to each network, inviting network scientists to attend monthly meeting
- Formal survey of participants
  - How do they define/understand resilience?
  - What resilience work have they participated in?
  - What do they want out of it?
  - Survey results used to shape early meetings
- Survey will be repeated at end of grant; will produce two manuscripts

Why is NIARR important?

- COVID-19 highlighted how connected our agri-food systems are
- Production systems don't stop at the borders; in North America, they are spatially connected
- Collaborating and learning from our neighbors means we are better together
- Each network has a unique focus and unique strengths



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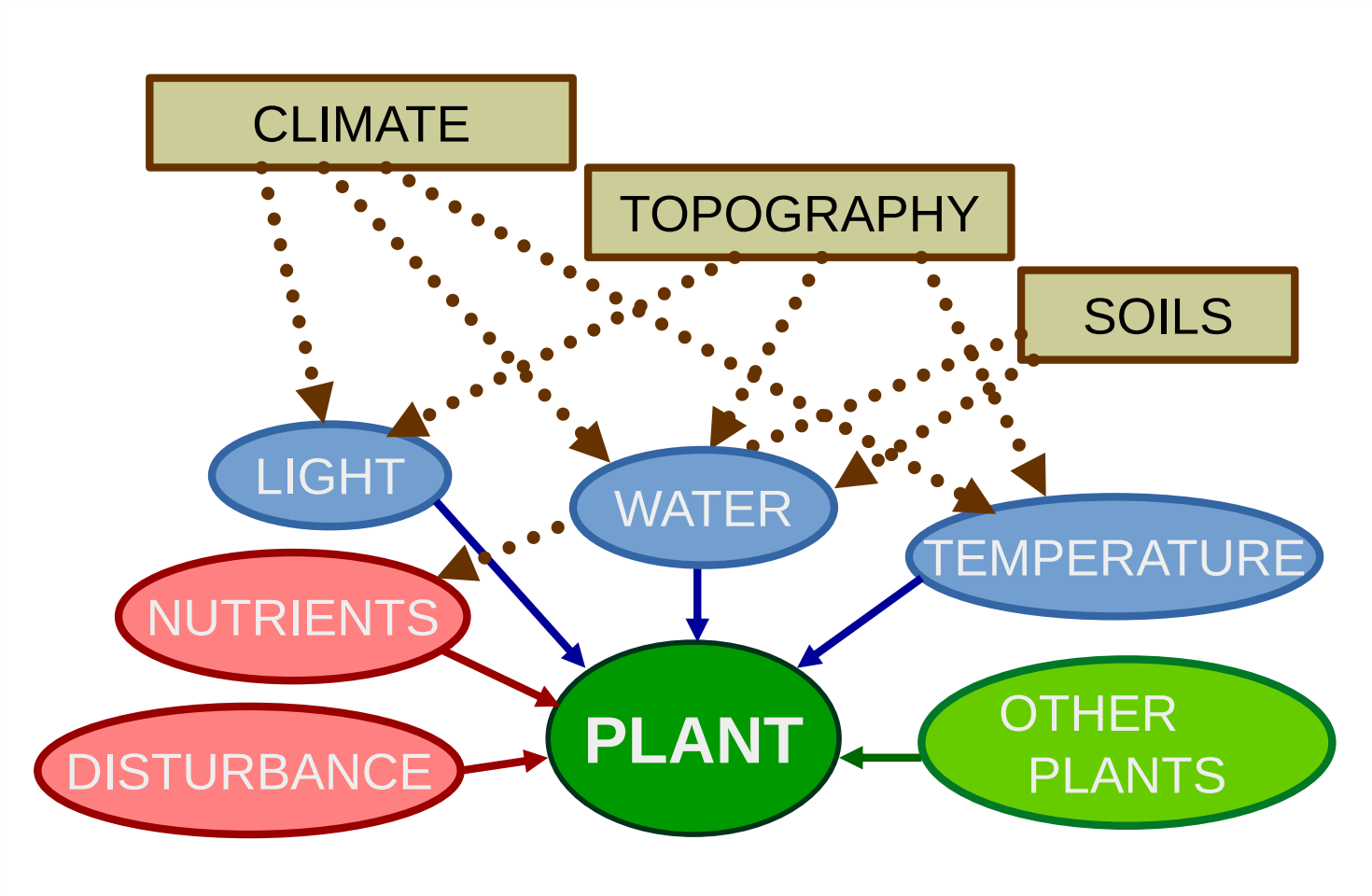
https://medium.com/@junp01/an-introduction-to-complexity-theory-3c20695725f8

Priority research project: Regionalization North America

Regionalization (LTAR Project 2018-ongoing)

- Goal was to identify regions (maps) that reflect agricultural variables, are statistically valid, and ecologically meaningful
- Three sets of regions: climatic, crop and livestock production, and human dimensions

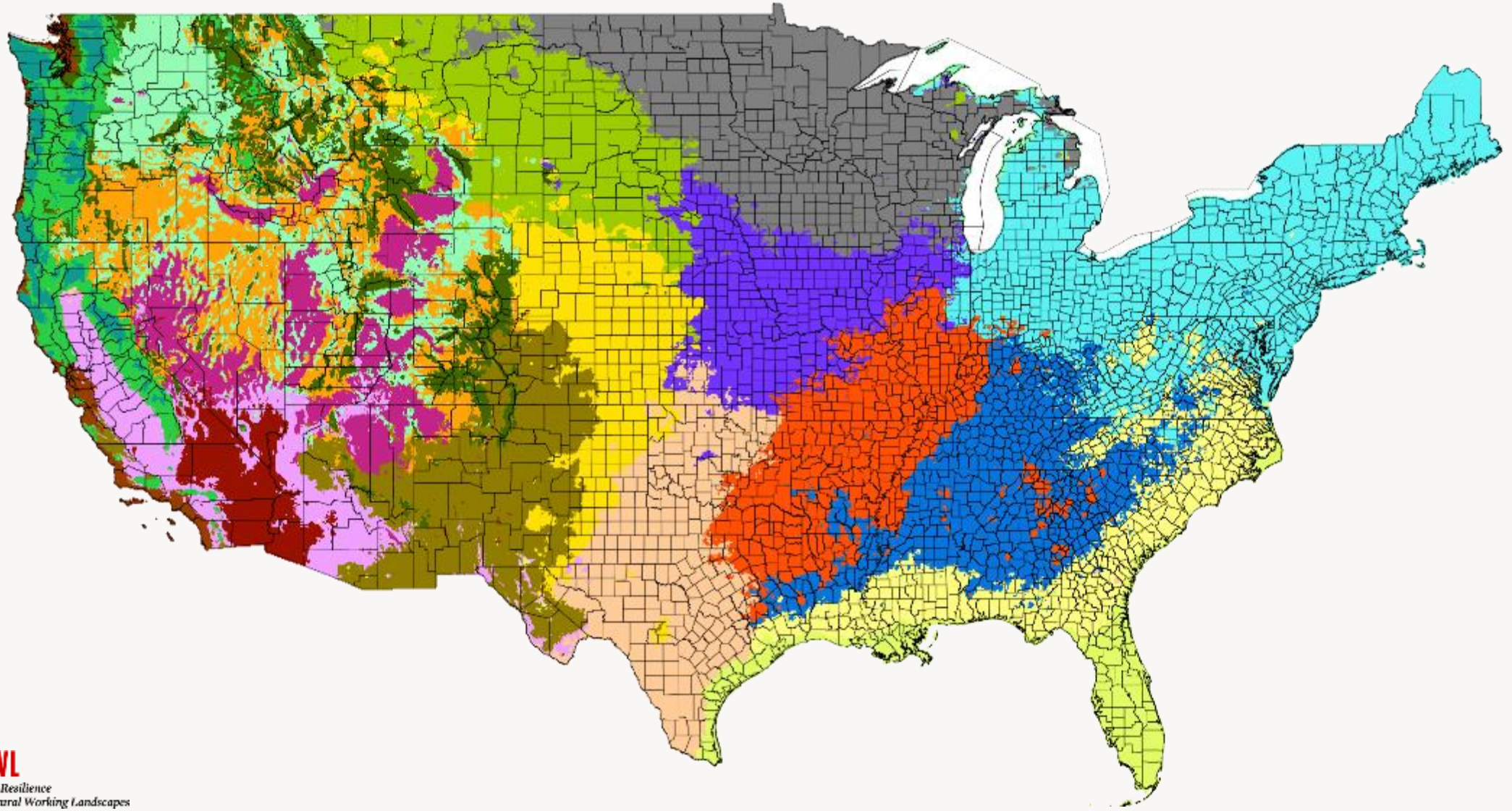
Climate conceptual model



Climate data

- 4km PRISM data
- 2006-2020
- 21 metrics related to temperature and water

Climate: 20 regions



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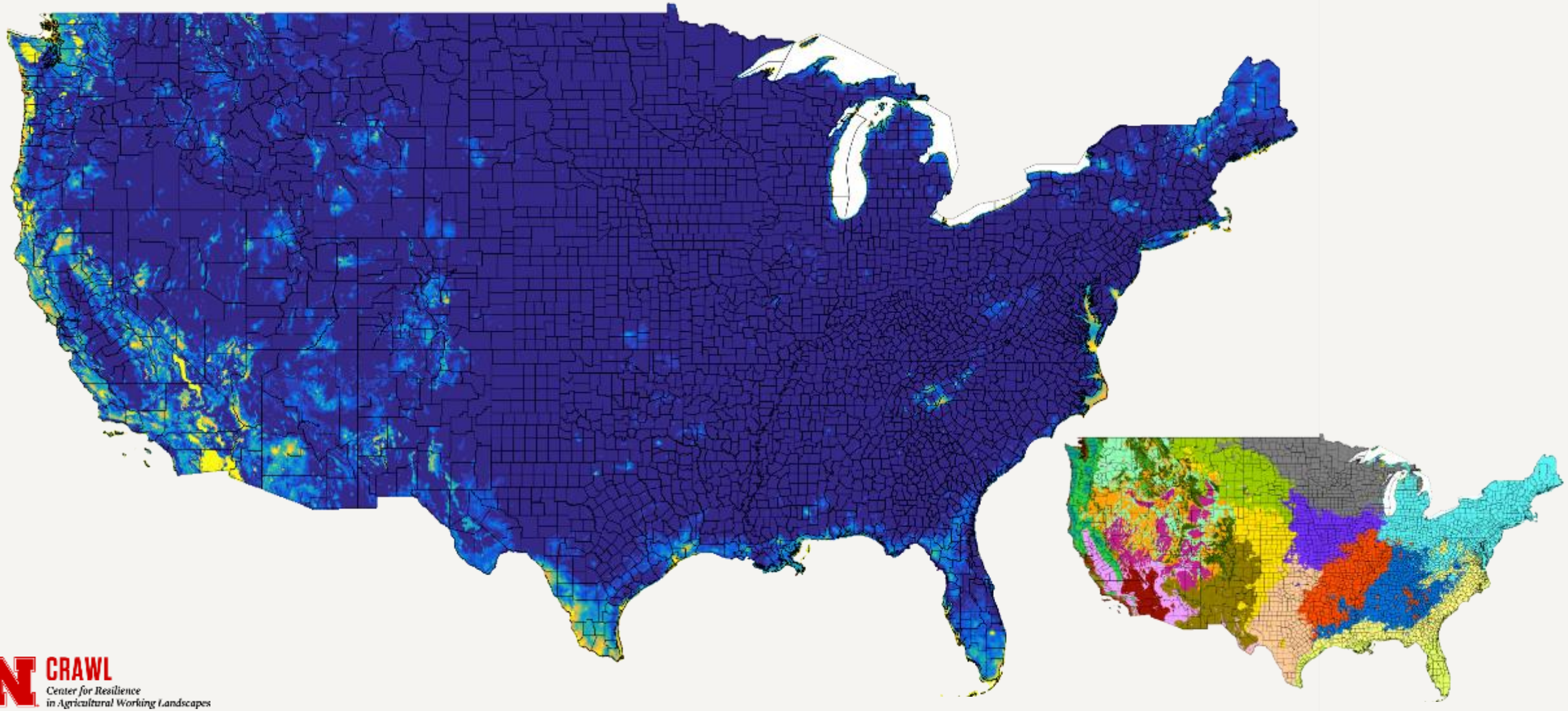
Climate overall representativeness



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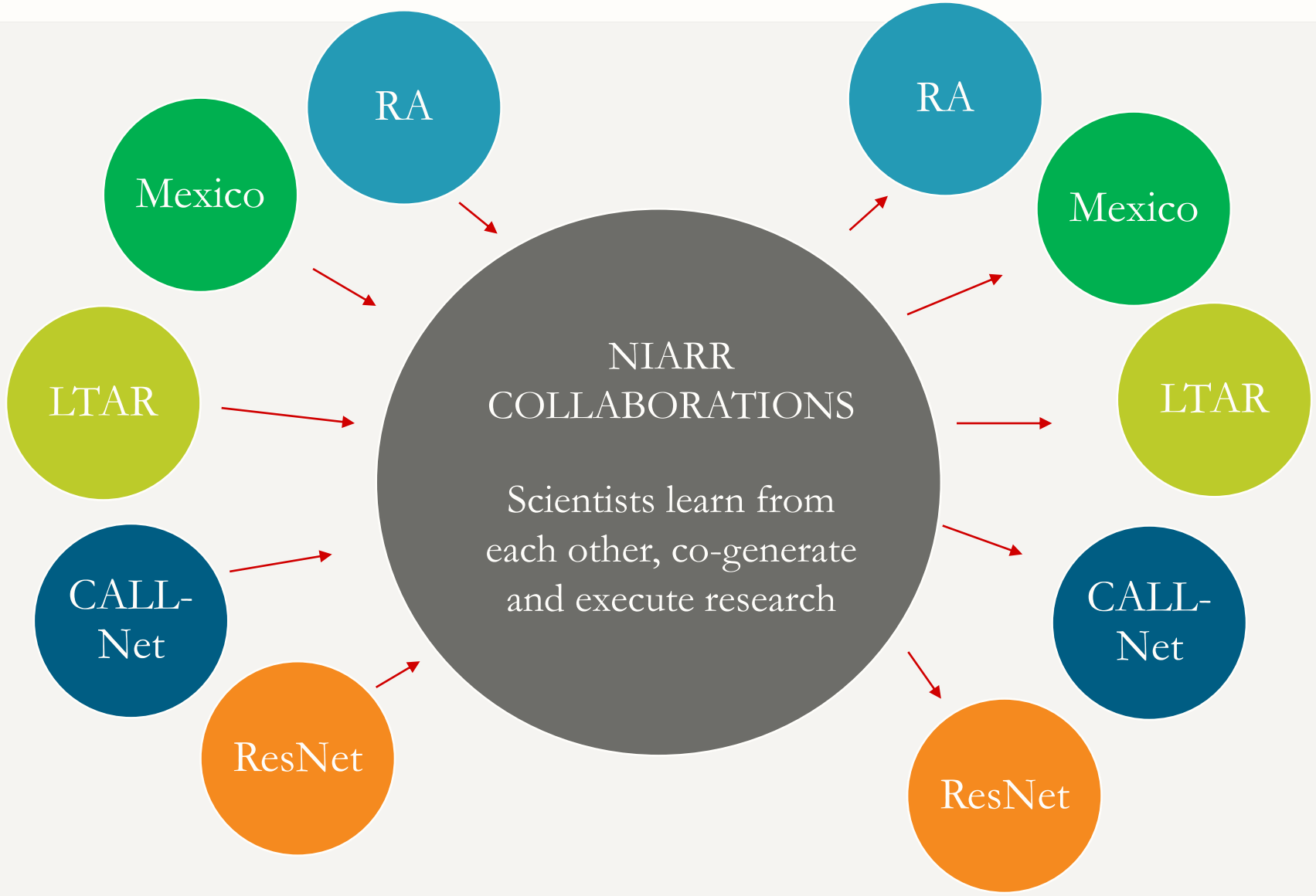
NIARR Project: Regionalization North America

Goal: Identify regionalizations at North American scales

Why do this?

- Identify regions that are not represented by our respective research sites
- Identify where experimental results may extrapolated to areas across North America with quantitatively similar environmental conditions
- Apply regionalization methods to climate backcasting in service of climate forecasting--how climate growing regions are likely to shift in the future?

Broader Impacts



Factors responsible for our success

- Clearly defined and shared scientific framework (resilience science)
- Ability to ask research questions at scales bigger plot/field/farm and longer than one or two growing seasons
- Leveraging the skills, expertise and knowledge base of each network to ask questions difficult to ask inside any single institution
- Positive and supportive environment—co-generation of knowledge

Questions?

Thank you so much!

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