Seamless Earth System Prediction / Representation of Scale Interactions

Breakout Group 1
How did we get here?

- Advances in our scientific understanding
- Improvements of modern computer architectures
- Increases in sophisticated observations
Scientific Understanding

- Improvements in the representation of unresolved processes.

Bauer et al. [2015]
Scientific Understanding

- Improvements in the representation of unresolved processes.

Bauer et al. [2015]
Scientific Understanding

- Also, the inclusion of additional Earth system components.

Growth of Climate Modeling

- Upper Atmosphere
- Atmospheric Chemistry
- Dust/Sea Spray/Carbon Aerosols
- Interactive Vegetation
- Biogeochemical Cycles
- Carbon Cycle
- Ice Sheet
- Marine Ecosystems

https://www2.ucar.edu/climate/faq
Computational Advancements

- Faster and faster computers.

https://en.wikipedia.org/wiki/TOP500
Computational Advancements

- Faster and faster computers – Allows for higher resolution
Computational Advancements

- More efficient scientific codes and software engineering.

Bauer et al. [2015]
Enhanced Observations

- More and improved observations
What does this mean?

- Improved scale interactions
What does this mean?

- Improved scale interactions
What does this mean?

- **Improved scale interactions:** [https://www.youtube.com/watch?v=cNyftYdjt-Q](https://www.youtube.com/watch?v=cNyftYdjt-Q)

*Wehner et al. [2014]*
The future?

What are the main steps towards seamless environmental predictions?

What are the main process to be tackled?

What are requirements of observational data?

How can developing countries contribute to seamless predictions?
Roadmap!

- Create roadmap towards seamless environmental predictions.
- Two future time steps:
  - 2020
  - 2030

High resolution modelling
observations
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Seamless environmental predictions