High Resolution and Scale-Aware Breakout

- Summarize presentations
- Highlight priorities
- Identify gaps
- Identify strategic potential advantages

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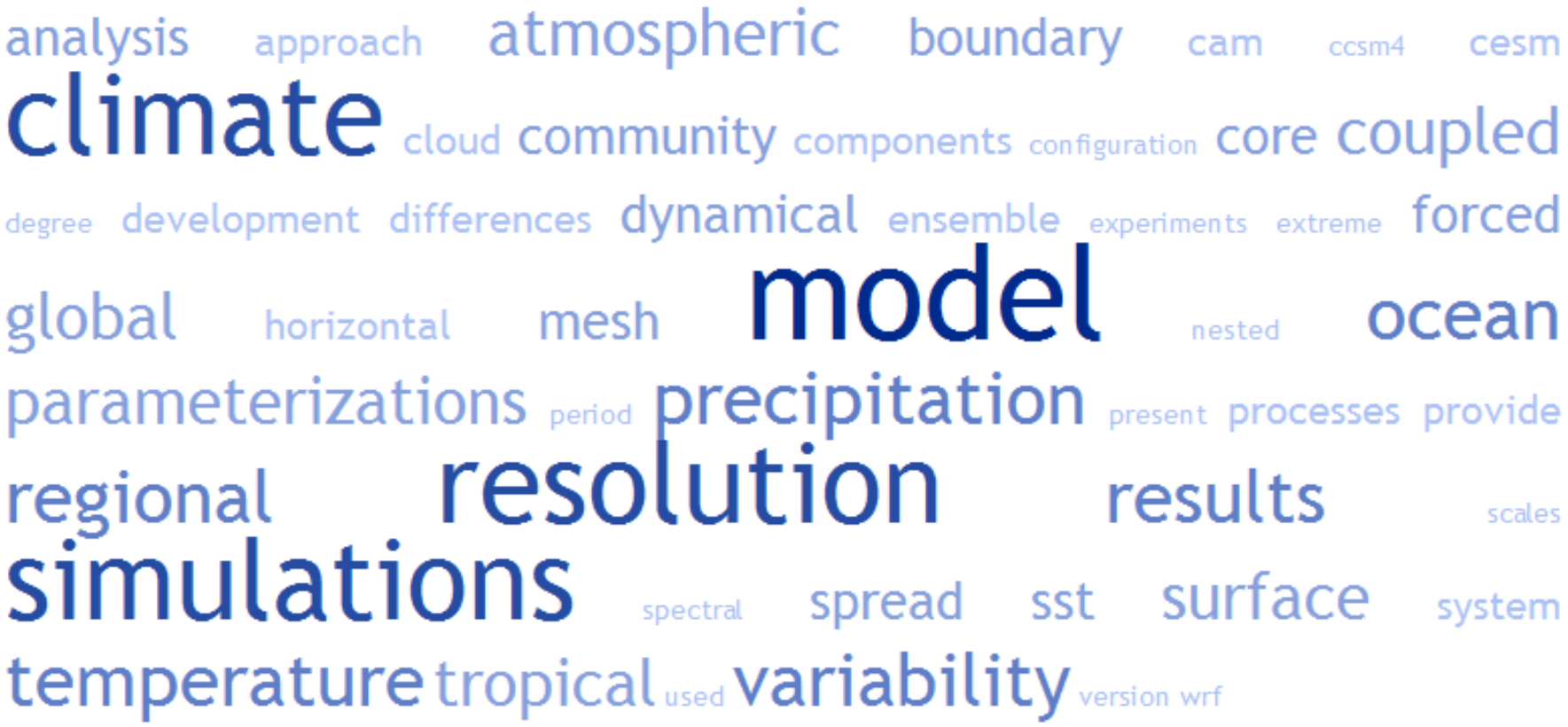
Summary

Abstracts Word Cloud



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Summary

- Atmosphere (high resolution = 0.25 deg ~25 km)
  - Tools
    - Models
      - CESM/CCSM (spectral eulerian, MPAS-FV, CAM-FV, spectral element)
      - WRF (nested within CESM)
      - RegCM, VIC
    - Frameworks
      - Climate (AMIP/Coupled/CMIP), Aqua-planet, Initialized (decadal predictability)
  - Strategies for regional resolution
    - Global domain
    - Nested (1-way/2-way)/downscaling
    - Tropical channels
    - Regional refinement within global domain runs (CAM-SE)
  - Phenomena
    - Climate means/variability
    - Tropical cyclones and tropical waves
    - Extreme events
    - Low-cloud regions
    - Aerosols (direct/semi-direct)
    - Great plains rainfall (cyclogenesis)
    - West African climate
  - Parameterizations (sensitivity to resolution)
    - Boundary layers
    - Quantifying behavior across scales
    - Sub-columns
    - Physics-dynamics coupling
    - Structural uncertainties
  - Techniques
    - Hydrostatic vs. non-hydrostatic
    - Extreme Value Theory (EVT)

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Summary

- Ocean (high resolution = 0.1 deg ~10 km)
  - Models
    - MPAS
  - Frameworks
    - Climate
    - Initialized (decadal prediction)
  - Phenomenon
    - ENSO
    - Equatorial mixed layer
    - Gulf stream, SST/Oceanic fronts
    - Ekman pumping

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Other work

- Value?
  - Need to see similar behavior across resolutions
  - Resolving high impact features
  - Atmos.
    - Useful resolutions
    - Clouds in non-terrain regions
    - Mesocale resolved at 12km (KE spectra)
    - Resolved vs. parameterized convection
    - Hurricane stats. Overestimated at 25km
    - Aerosol/chemical transport
  - Ocean
    - Useful resolutions (10km, resolving eddies)
- Vertical resolution?
- When do we know we have a good simulation?
  - It depends on what we are looking at
  - Distinguishing stochastic versus deterministic (need scale aware, no tunable parameters)
  - Split simulations; ensemble/large-scale climate evolution at lower resolution
- Parameterization
  - What are the problems with parameterizations?
- Phenomena
  - North American regional climate
  - Upstream tropical influences

High Resolution and Scale-Aware Breakout

- Highlight priorities
  - Coastal upwelling, boundary currents, coastal mountains, low-cloud
    - Demonstrate use of high-res meshes
  - Mid-west precip. events
- Parameterizations
  - Spatial and temporal incremental sensitivity
- Non-hydrostatic vs. hydrostatic (is it a priority)
  - If overhead small, move to it BUT
  - Need the appropriate physics
- Computational improvements
  - Scalability, solvers
- High resolution input datasets
- Entrain other groups (NWP, NOAA air quality group, oceanographers, land modelers, biogeo.)

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High Resolution and Scale-Aware Breakout

- Identify gaps
  - Focus/group experiments
  - Data processing/parallel SWIFT help
  - Parameterization/resolved decisions

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High Resolution and Scale-Aware Breakout

- Identify strategic potential advantages

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