



Application Research and Development Goals, Priorities, and Working Group Breakout Session

Group B

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UFS applications include the following (**BOLD** are subject of this exercise):

- **Medium-Range Weather (Weather) - Atmospheric behavior out to about two weeks**
- **Subseasonal-to-Seasonal (S2S) - Atmospheric and ocean behavior from about two weeks to about one year**
- Hurricane - Hurricane track, intensity, and related effects out to about one week
- **Short-Range Weather/Convection Allowing - Atmospheric behavior from less than an hour to several days**
- Space Weather - Upper atmosphere geophysical activity and solar behavior out to about one month
- Marine and Cryosphere - Ocean and ice behavior out to about ten days
- Coastal - Storm surge and other coastal phenomena out to about one week
- Air Quality - Aerosol and atmospheric composition out to several days

Breakout Objectives

- Identify top 5-10 high-level forecast or model improvement goals for three core UFS applications: Medium-Range Weather, Subseasonal-to-Seasonal (S2S), and Short-Range Weather/ Convection Allowing
- Propose recommended research and development solutions: Science priorities to address forecast goals
- Propose any changes that may be needed for Working Groups to best support these applications
- Remember that the forecast goals and the science priorities form the basis of activities described in the next SIP (2020-2022).

Groups should consider the [Science Priorities Worksheet](#) initiated by the UFS Steering Committee to develop science and prediction priorities of the UFS

Medium-Range Weather

- Reduce lower troposphere cold bias
- Reduce errors in 2m temperature & improve land model and DA
- Improve representation of boundary layer and low level inversions
- Better representation of tropical waves
- Connect microphysics and DA
- Representation of model uncertainty in DA, especially near land surface
- Optimize DA ensemble size and resolution
- Reduce stratospheric biases e.g. in temperature and circulation
- Improve parameterization of gravity wave breaking

Subseasonal-to-Seasonal (S2S)

- Better representation cloud-radiation interaction and convective organization for tropical variability
- Include TOA radiation budget in evaluation
- Better representation of stratosphere, e.g. SSW
- Sea ice model improvement
- Coupling of components as a science problem
- Optimize ensemble size and the frequency of initialization
- *and all medium range weather priorities*

Short-Range Weather/Convection Allowing

- Representation of PBL
- Collection of near-surface observations and DA - need multiple sites with comprehensive observations
- Prediction of convection initiation
- Prediction of storm environment
- Storm motion (tends to be too fast)
- Improve microphysics
- Satellite DA and channel selection due to lower model top
- Gravity waves in non-hydrostatic model

Medium-Range Weather

- 1) Improve connection between microphysics and DA
- 2) Improve use all-sky radiances in DA
- 3) Coordination of land and atm physics development
- 4) Run weather model to seasonal scales to identify biases
- 5) Better collaboration with data providers on observations for process-oriented diagnostics (e.g. surface heat flux)

Subseasonal-to-Seasonal (S2S)

- 1) Hierarchical testing of components
- 2) Continuous testing of the coupled system
- 3) Long simulation to identify biases and drift

Short-Range Weather/Convection Allowing

- 1) Hierarchical testing framework and process-oriented diagnostics
- 2) Take advantage of available observations

Medium-Range Weather
did not discuss this topic

Subseasonal-to-Seasonal (S2S)
did not discuss this topic

Short-Range Weather/Convection Allowing
did not discuss this topic