Expanding the NextGen Framework to Multilayer Computation

SESSION NUMBER

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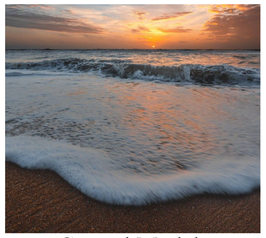
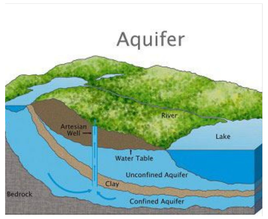
Uses for Multilayer Model Computation

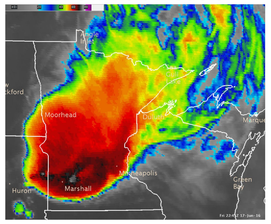


Coastal Models

Snowmelt models



Groundwater Models



High Resolution Overlays

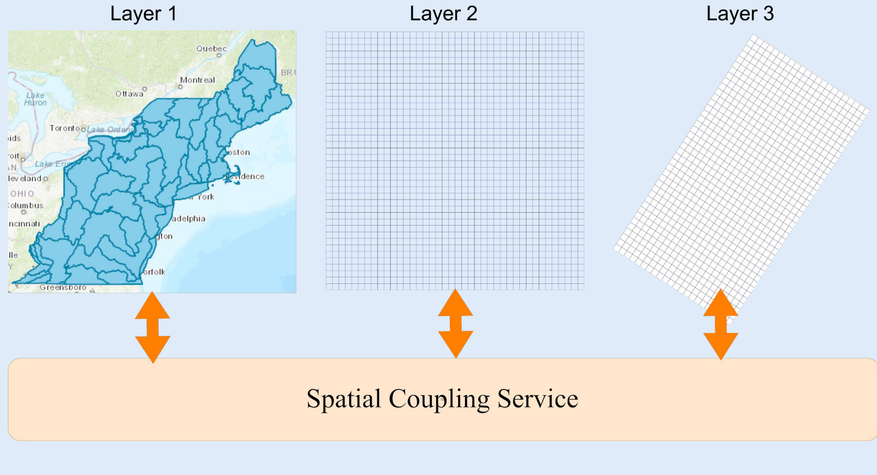
Reasons for Multilayer Modeling

One of the principles of the **NextGen Framework** is to use the models **that best performs in any given locations.** The use of multilayer computation allows this principle to more closely adhered too, by allowing **different discretizations of a domain to be used for the prediction of different output variables**. This means that models are not restricted to the discretization used to produce surface runoff and streamflow. This allows all models to be run using the domain and domain decomposition that is optimal for that model.

Multilayer Modeling Expands Modeling Possibilities by Allowing Exchange of Information Between Different Spatial and Temporal Discretizations

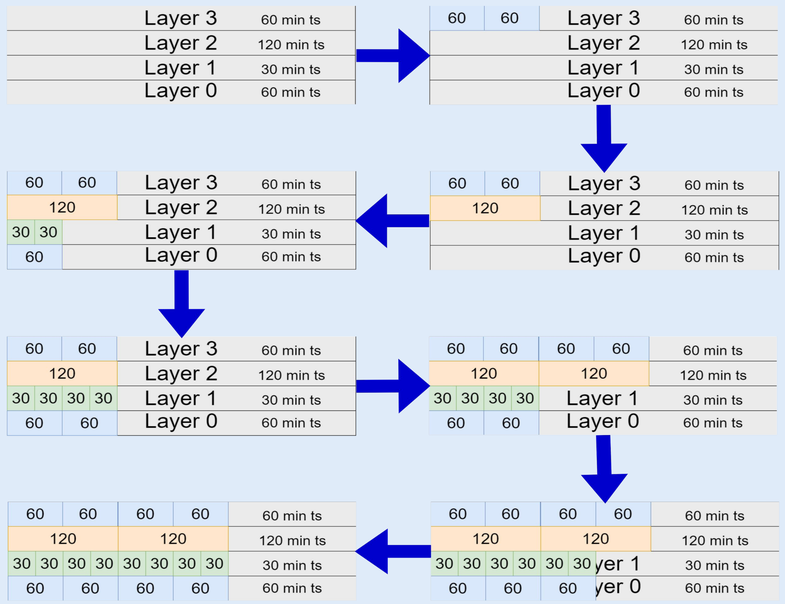
Exchanging Data Between Layers with Different Spatial Representations

Different models will have different discretization of a domain that work best. Multilayer computation allows each layer to use a different discretization



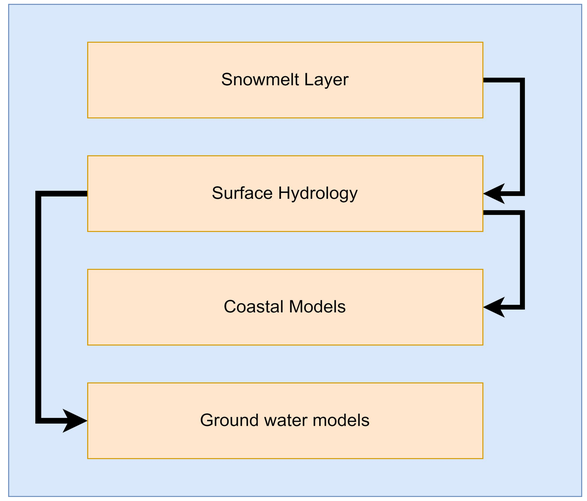
Exchanging Data Between Layers with Different Timesteps

For any layer time must be advanced sufficient for a time step from the next layer to be executed. This causes a pattern of model advancements that is unique to the timesteps of the layers being executed.



Time steps are split and combined as necessary to move data between layers with different timesteps

Spatial Coupling Service



- Allows exchange of data between different gridded and vector formats.
- Support disaggregiation of lumped average data from vector shapes to gridded data and aggregation of grided data into polygon averages.
- Powered by xESMF and ExactExtract.

Comparing Multilayer and Simple Model Execution

	Original NextGen	NextGen With Multilayer
Number of Spatial Descritizations	One	One per Layer up to 100 Layers
Number of Timestep durations	One	One per Layer up to 100 Layers
Spatial Transform and Resampling Support	No	Yes

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