Data Environment for Rapid Exploration and Characterization of Organized Systems (DERECHOS)

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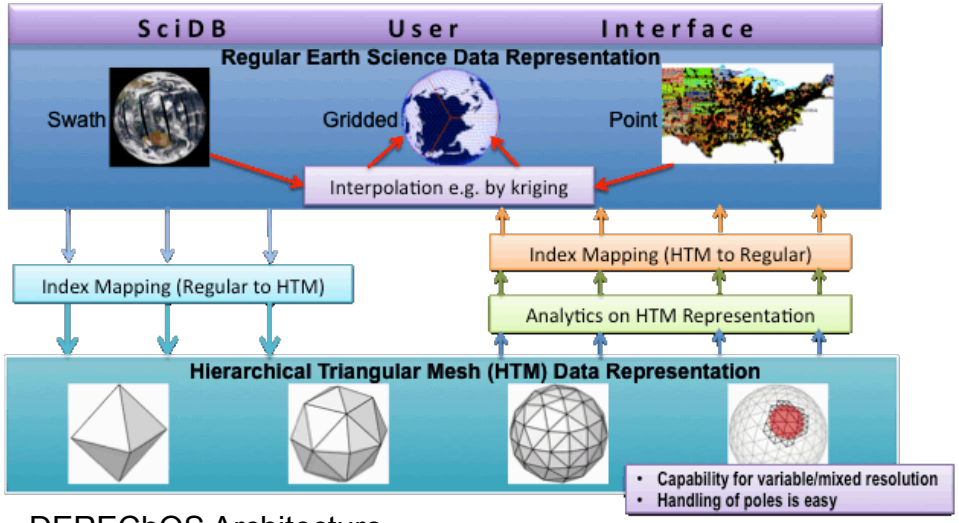
Objective

- Advance automated event detection with SciDB to:
  - Extend to all Hierarchical Data Format - Earth Observing System data models, i.e., grid, swath, and point data
  - Synthesize data from different sources onto a common array representation
  - Provide regridding to convert among data models with uncertainty estimate
  - Improve the interpretability of high-dimension data by applying nonlinear dimensionality reduction (NDR)
  - Track episodes of phenomena through geo-space and time as a continuous object-event
- Demonstrate DERECHOS with hydrometeorological and hydrological science data analysis



DERECHOS Architecture

Accomplishments

- Demonstrated DERECHOS to restructure datasets with different grid characteristics
  - Created intersection of TRMM (4km resolution) and National Mosaic and Multi-sensor Quantitative Precipitation Estimate (NMQ) (1km resolution) datasets
  - Winter blizzard events Dec. 2009 to Feb. 2010
- Re-implemented Moving Object Database with Spatiotemporal Adaptive-Resolution Encoding (STARE)
  - Enables event-based queries
  - Improves performance of analysis by allowing all data for same spatiotemporal subspace to reside on same node
  - Includes fully developed Hierarchical Triangular Mesh (HTM) for spatial indexing down to ~1m linear resolution
  - Developed hierarchical temporal indexing
- Implemented Event-based Virtual Collection (EVC) Portal
  - Interactive means to visualize and explore events with Google maps as backdrop
- Developed re-gridding infrastructure using flux conservative method enabling cross-dataset analysis

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$TRL_{in} = 3$ $TRL_{out} = 4$