

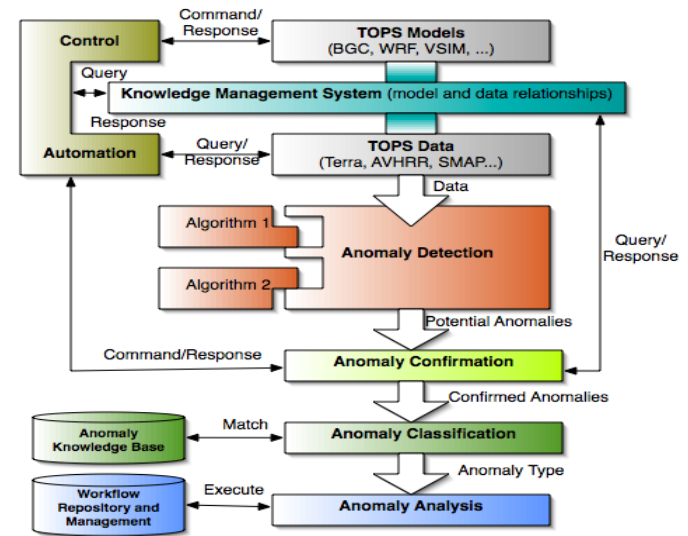
Anomaly Detection and Analysis Framework for Terrestrial Observation and Prediction System (TOPS)

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Objective

Enhance data processing capabilities in Earth sciences by providing a framework for automated anomaly detection, confirmation and on-demand data/model analysis in multivariate scientific observations

- Develop a catalog of model and data hierarchies and their relationships
- Enable multiple on-demand executions of TOPS models with similar datasets
- Develop a searchable catalog of known anomalies
- Provide automatic anomaly confirmation and anomaly-triggered workflow execution



Accomplishments

- Developed initial set of ontologies describing data and processes within the TOPS system
- Integrated several spatial and temporal anomaly detection algorithms into the framework
- Developed a provenance infrastructure supporting the tracking and automatic re-creation of datasets within the system
- Demonstrated the system by automatically re-creating the Amazon drought analysis performed by the NASA Ecocast team for publication in *Geophysical Research Letters (GRL)* in 2010, reducing the analysis time from two years to three weeks, and extended the analysis to other parts of the world
- Integrated the above analysis with workflow components (VisTrails) so that it can be automatically triggered when similar anomalies are observed
- Performed initial integration of the anomaly framework with the NASA Earth Exchange (NEX)

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TRL_{in} = 3 TRL_{out} = 6