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#### **Climate Model Diagnostic Analyzer Web Service System**

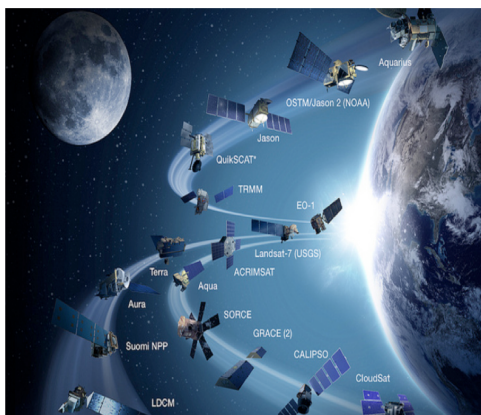
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**Seungwon Lee**, Jet Propulsion Laboratory, Pasadena, CA, United States

#### **Abstract Text:**

Both the National Research Council Decadal Survey and the latest Intergovernmental Panel on Climate Change Assessment Report stressed the need for the comprehensive and innovative evaluation of climate models with the synergistic use of global satellite observations in order to improve our weather and climate simulation and prediction capabilities. The abundance of satellite observations for fundamental climate parameters and the availability of coordinated model outputs from CMIP5 for the same parameters offer a great opportunity to understand and diagnose model biases in climate models. In addition, the Obs4MIPs efforts have created several key global observational datasets that are readily usable for model evaluations. However, a model diagnostic evaluation process requires physics-based multi-variable comparisons that typically involve large-volume and heterogeneous datasets, making them both computationally- and data-intensive.

In response, we have developed a novel methodology to diagnose model biases in contemporary climate models and implementing the methodology as a web-service based, cloud-enabled, provenance-supported climate-model evaluation system. The evaluation system is named Climate Model Diagnostic Analyzer (CMDA), which is the product of the research and technology development investments of several current and past NASA ROSES programs. The current technologies and infrastructure of CMDA are designed and selected to address several technical challenges that the Earth science modeling and model analysis community faces in evaluating and diagnosing climate models. In particular, we have three key technology components: (1) diagnostic analysis methodology; (2) web-service based, cloud-enabled technology; (3) provenance-supported technology. The diagnostic analysis methodology includes random forest feature importance ranking, conditional probability distribution function, conditional sampling, and time-lagged correlation map. We have implemented the new methodology as web services and incorporated the system into the Cloud. We have also developed a provenance management system for CMDA where CMDA service semantics modeling, service search and recommendation, and service execution history management are designed and implemented.



## Climate Model Analysis

JPL has provided a repository of web services for multi-aspect physics-based and phenomenon-oriented phenomenon-oriented climate model performance evaluation and diagnosis through the comprehensive and synergistic use of multiple observational data, reanalysis data, and model outputs.

[Getting Started »](#)

We will help you learn the available web services, how to use them, and help you to design your climate analytics workflows.

**Topic Selection:** Advanced Information Systems to Support Climate Projection Data Analysis

**Title:** Climate Model Diagnostic Analyzer Web Service System

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**Preferred Presentation Format:** Assigned by Program Committee (Oral or Poster)

First Presenting Author

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