

AI-READY DATA

Enabling Analytics and AI for Climate and Science Missions

When urgent, complex issues like climate change demand precise, decisive action, the data that powers artificial intelligence (AI) can help deliver multi-faceted solutions that are relevant to every sector of our society. Investments in the collection, curation, enrichment, and management of data are just as important to driving the advancement of AI with improvements to computational technology and machine learning (ML) algorithms.

Government and commercially developed geospatial data is a key source for many organizations. It offers critical insights needed on many fronts, from providing visual evidence of extreme weather to aiding in emergency preparedness and movement of critical assets. As the U.S. government seeks to become “AI-ready,” the ability to collect, process, and analyze geospatial data with advanced analytics will be a key component of the climate change agenda.

Booz Allen currently supports critical missions—including those targeting the climate crisis—by delivering analysis and AI-ready Earth observations and environmental data across the government. Examples of the types of AI-ready Earth observations data we help organizations create include:

Climate Preparedness & Resilience

Historic and real-time conditions of sea level and hydrology for engineering reports and for downstream analysis using data from the National Oceanic and Atmospheric Administration (NOAA) sensors.

Climate Intelligence

Climate projections of future sea-level rise and indicators for drought, flooding, heat, and wildfire, among others, using outputs from NOAA climate models.

Threat Warnings

Historic and real-time conditions of water quality and meteorology for monitoring the Chesapeake Bay watershed using data from NOAA reanalysis products.

GEOSPATIAL DATAOPS FOR ANALYSIS AND AI-READY DATA

Data scientists and data engineers spend a substantial amount of time refining data for integration into scientific models for enhancing climate and mission outcomes. This can result in niche data products that are optimized for a single capability, limiting reuse for future analytic efforts. To help organizations prepare and execute their AI-adoption plans, Booz Allen has

developed an open platform called aiSEMBLE™, which integrates best practices for AI design, development, and deployment.

As a critical component to the AI lifecycle, DataOps principles are incorporated and engineered within aiSEMBLE™ to improve the speed, repeatability, and quality of data products from data ingest to ML model development and all the way through deployment.

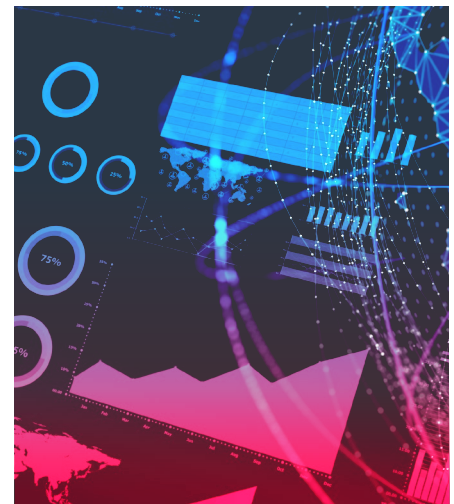


FIGURE 1:
aiSEMBLE™ Platform: Illustrative Reference Architecture for Operationalizing AI

Using this baseline, our Geospatial DataOps pipeline (Figure 2) incorporates key data management/governance practices and data pipeline design principles to create AI-ready datasets. The solution is entirely open-source and can be customized down to the source code level for testing, evaluation, and rapid operationalization of research advancements.



FIGURE 2: KEY FEATURES

- **Adaptable** to different geospatial data types, including tabular, vector, raster, and array-oriented (e.g., NetCDF)
- **Open-source** tools that incorporate state-of-the-art temporal/spatial processing techniques, thereby preventing vendor lock-in
- **Standards-based** throughout the pipeline in accordance with frameworks such as VAULTIS [Visible, Accessible, Understandable, Linked, Trusted, Interoperable, and Secure] in alignment with the Department of Defense Data Strategy
- **Extensible** beyond data preparation through a scalable, fully orchestrated, decision-centered solution that enables geospatial analytics and ML model development to drive insights

CASE STUDIES: DELIVERING AI-READY DATA TO SUPPORT CLIMATE AND SCIENCE MISSIONS

Earth Observation Agency

Booz Allen has revolutionized analytic tradecraft to provide enterprise-scale analytics, ML, and activity-based intelligence in the cloud. This is made possible by the deployment of an analytics platform, which allows analysts and data scientists to rapidly spin up analytic development environments with massive compute power. This platform leverages the latest advancements in open-source geospatial technology, coupled with Databricks to enable massive-scale data processing, to generate AI-based geospatial insights from over 60 Petabytes of data and achieve 5–25 times performance increase.

Space Agency: Prediction of Worldwide Energy Resources (POWER)

Booz Allen conducts data validation of the remote-synced POWER Data archive, by completing both time-series ensemble and site-specific analysis. Booz Allen develops and maintains a compilation of Application Programming Interfaces (APIs) serving over 100,000 unique users with over 50 million data requests in a year. In addition, Booz Allen manages a suite of geospatially enabled Analysis-Ready Data (ARD). All community-specific parameters and outputs are provided in formats, naming conventions, and units that are commonly employed in each user community.

Engineering Agency

To increase the value of light detection and ranging (LiDAR) data available to the Engineering Agency client, Booz Allen has developed software and data engineering capabilities that support data fusion and correlation for a wide range of mission sets. For the Cold Regions Research and Engineering Lab (CRREL), we developed the MODEM capability. At ingest, MODEM automates file type and area of interest detection, accelerating the processing and fusion of disparate data types and data elements. Downstream, fused LiDAR data can be used for object tracking, pattern of life analysis, change detection, and AI operationalization.

About Booz Allen

Booz Allen is the established leader in scientific-enabled missions for the federal government. Booz Allen serves as the prime mission systems implementor across multiple federal programs spearheading climate, health, and energy to solve our nation's most complex challenges.

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