AI-Based 3D Earth and Space Observing Digital Twin
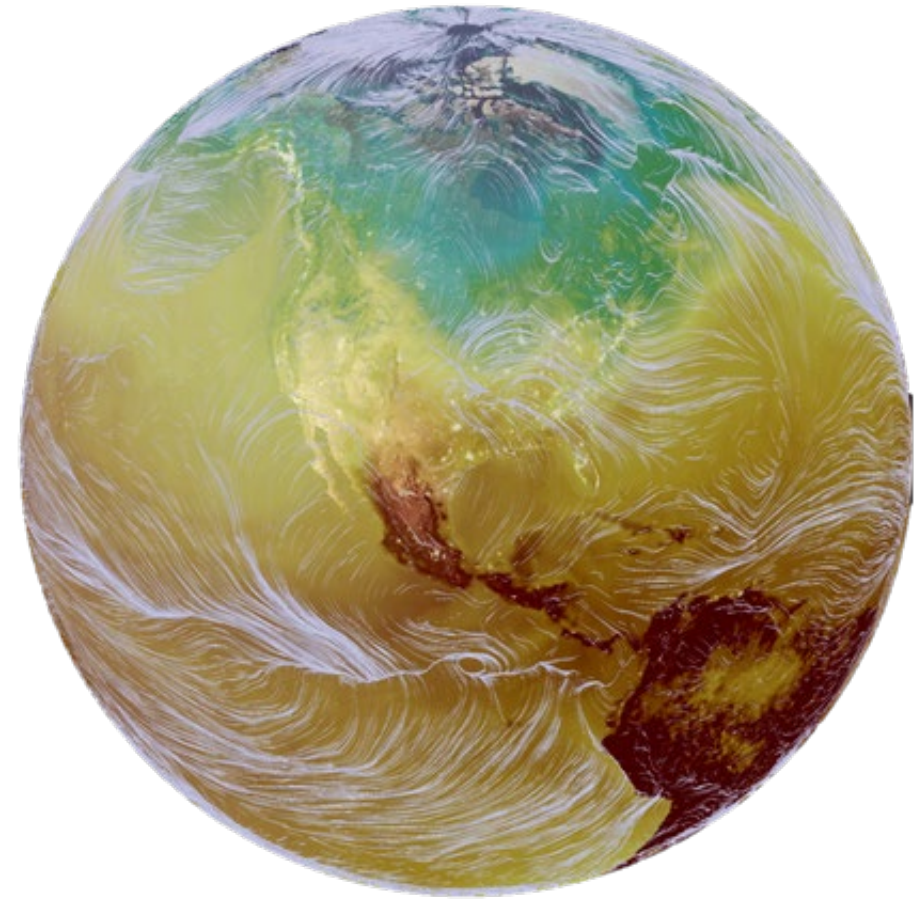
Presented By: Dr. Lynn Montgomery, AI Research Engineer Stf
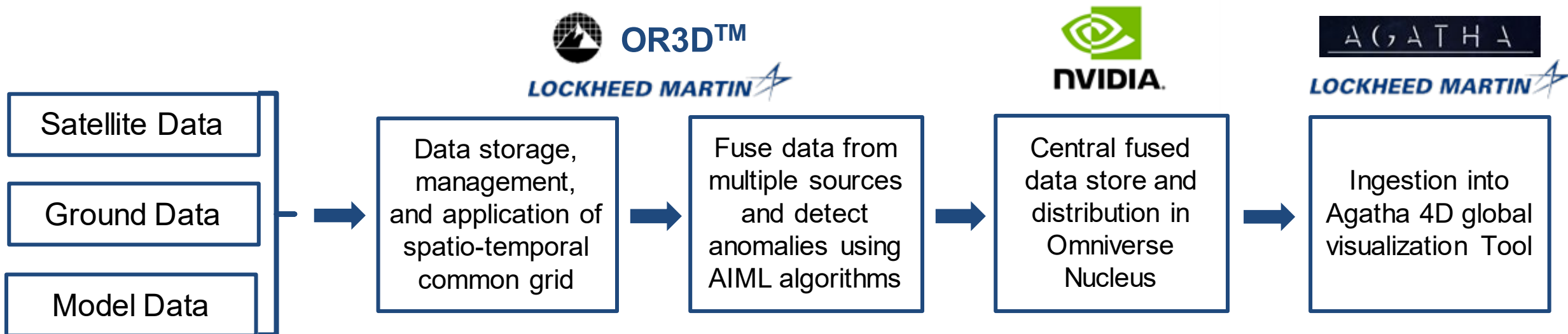
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Overview

- ***Ingest, analyze, and display*** data from 5 Earth system domains:
    - Atmosphere (Temperature and Moisture Profiles)
    - Ocean (Sea Surface Temperature)
    - Cryosphere (Sea Ice Concentration)
    - Land and Hydrology (Fire Products)
    - Space Weather (Solar Wind Bulk Plasma)
- Creating a one-stop-shop prototype for NOAA satellite and ground-based observations along with model output at ***different temporal and spatial resolutions***.
- Easily ***configurable to other geospatial data sources and algorithms***.
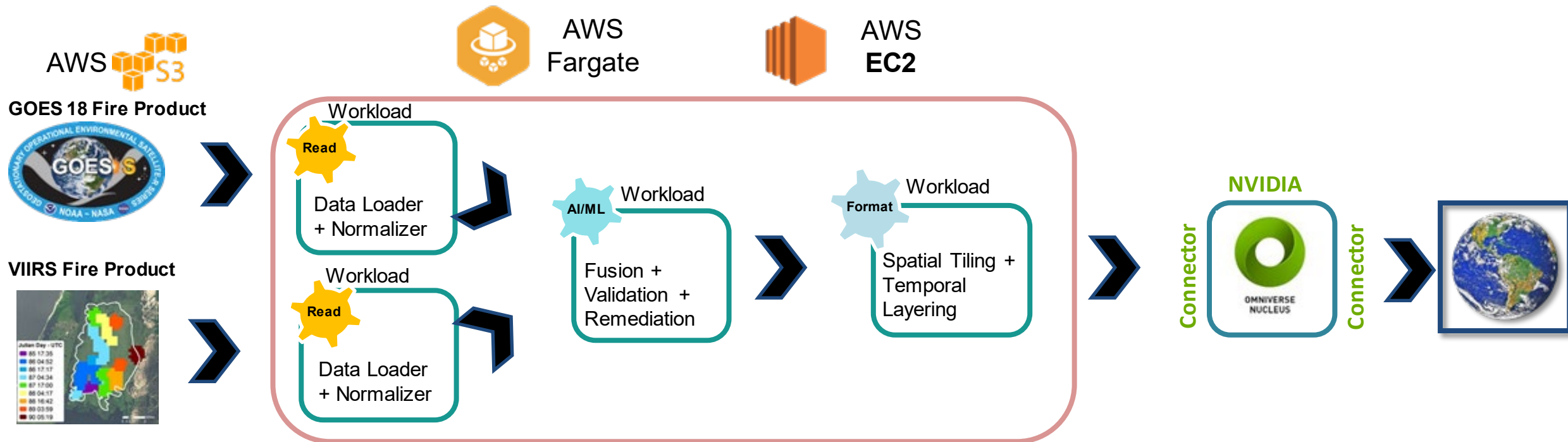
High Level Architecture

OR3D™
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| Satellite Data |
| Ground Data |
| Model Data |

→ Data storage, management, and application of spatio-temporal common grid

→ Fuse data from multiple sources and detect anomalies using AIML algorithms

→ Central fused data store and distribution in Omniverse Nucleus

→ Ingestion into Agatha 4D global visualization Tool

All SW is high TRL and in current use.

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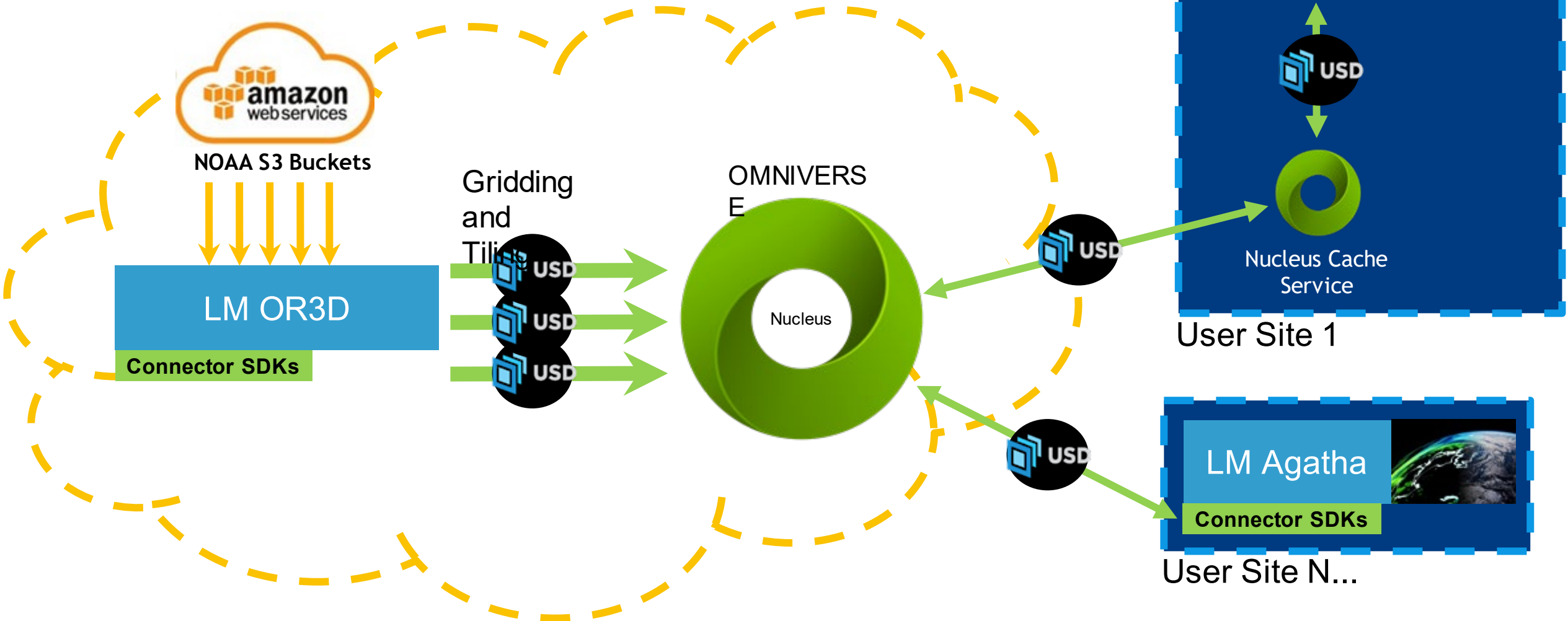# OR3D™ Example Workflow

Extremely configurable architecture allowing for plug-and-play algorithms.

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NVIDIA Omniverse Nucleus

- USD provides an open, efficient, and extensible data interchange format for digital twins
- Omniverse Nucleus provides a data storage and distribution center
- Multiple users can access data with Omniverse Nucleus
- Omniverse provides a Nucleus Cache Service to permit hierarchical scaling of access to large numbers of geographically distributed clients

NVIDIA Omniverse Nucleus

Video

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