The RECOVER Cloud-Based Data Server

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Talk Outline

The RECOVER Project
The RECOVER System
The RECOVER Server
Next Steps
Demo / Q&A

The RECOVER Project

- Goal is to build an automated decision support system for post-fire rehabilitation planning.
- Focus is on savanna ecosystems of the Western US.
- Funded by NASA's Applied Sciences Program.
- Outgrowth of NASA-sponsored research on post-fire assessment and monitoring and decision support application development.
- Interagency Collaboration:

-Idaho State University's GIS Training and Research Center (GIS TReC)

-NASA Goddard Space Flight Center (GSFC)

-DOI Bureau of Land Management (BLM)

-Idaho Department of Lands (IDL).

- Phase I - Feasibility Study.
- Phase II - Operational Deployment.

The RECOVER System

•RECOVER brings together in a single application the information necessary for BAER team post-fire rehabilitation decision-making and long-term ecosystem recovery monitoring.

•RECOVER is a multi-criteria decision aid that integrates information about fire severity and intensity with other types of data to help BAER teams plan reseeding strategies in the aftermath of savanna wildfires.

•Major system components:

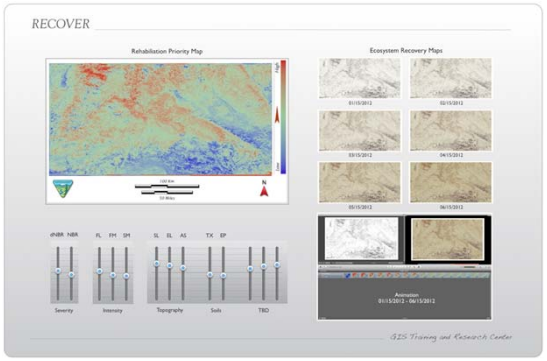
1.RECOVER Clients - Desktop and mobile interfaces that are able to connect to the RECOVER Server.

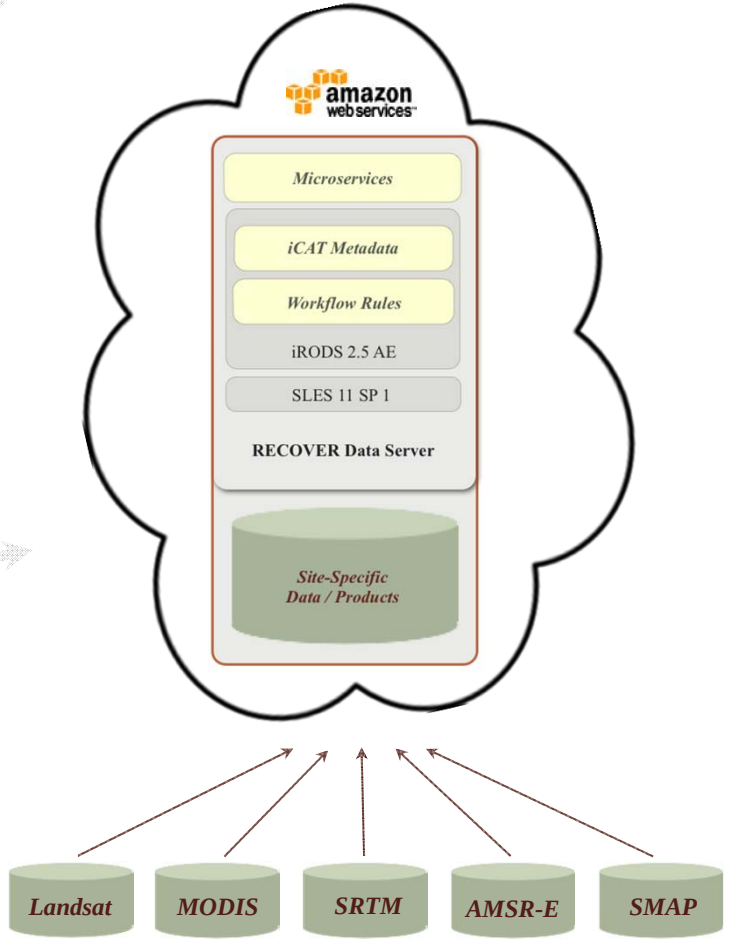
2.RECOVER Server - A cloud-based data management system that automatically aggregates site-specific data from a distributed collection of relevant web-accessible resources.

GIS TReC leading client-side development

GIS TReC, BLM, IDL, and NASA together are identifying important data sets, workflows, and decision products ...

NASA leading server-side development





The RECOVER System

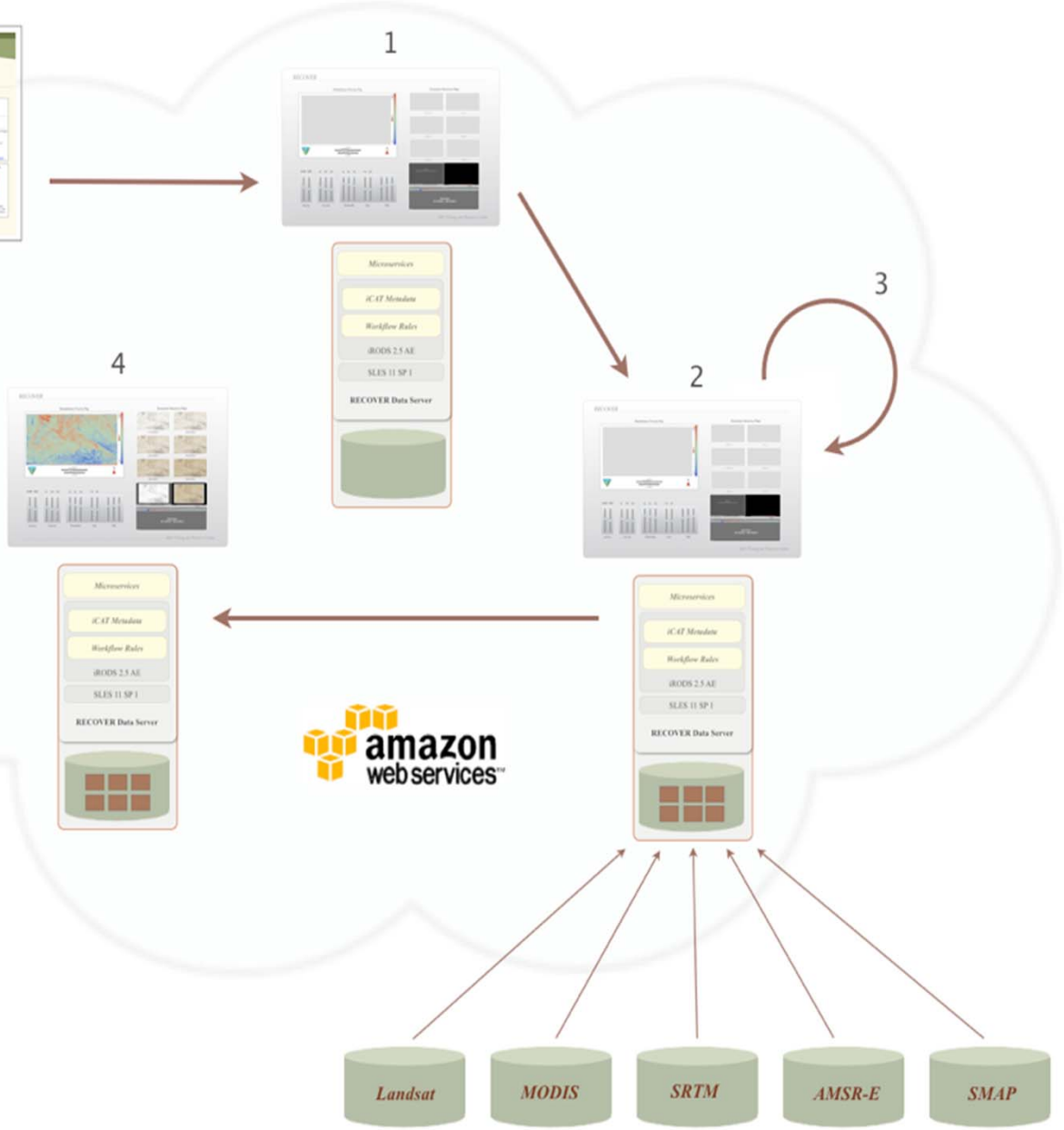
The typical RECOVER use scenario goes as follows:

1. A request containing the wildfire name and spatial extent is sent to the RECOVER Server.

2. The RECOVER server connects through web services to various data resources and automatically collects tailored, site-specific data and derived products.

3. These staged, mash-up products are refreshed as needed to maintain coverage and currency throughout the burn.

4. When the fire is contained, decision products and the RECOVER Clients are immediately ready for use by BAER Teams …



The RECOVER Server

•Uses iRODS data grid software to manage site-specific data and metadata.

iRODS = Integrate Rule-Oriented Data System

Background

- Open source data grid software system.
- Developed by the Data Intensive Cyber Environments (DICE) group, University of North Carolina.
- Historic roots in data grids, digital libraries, persistent archives, and real-time data systems R&D, and SRB.

Features

- Targets large repositories, large data objects, digital preservation, and integrated complex processing.
- Supports server-side workflows implemented by chaining execution rules together based on data policies.
- Enables scalability and extensibility.

Major Concepts

- Policies => iRODS rules.
- Mechanisms => iRODS microservices.

With iRODS metadata providing the information necessary to perform these mappings ....

www.irods.org

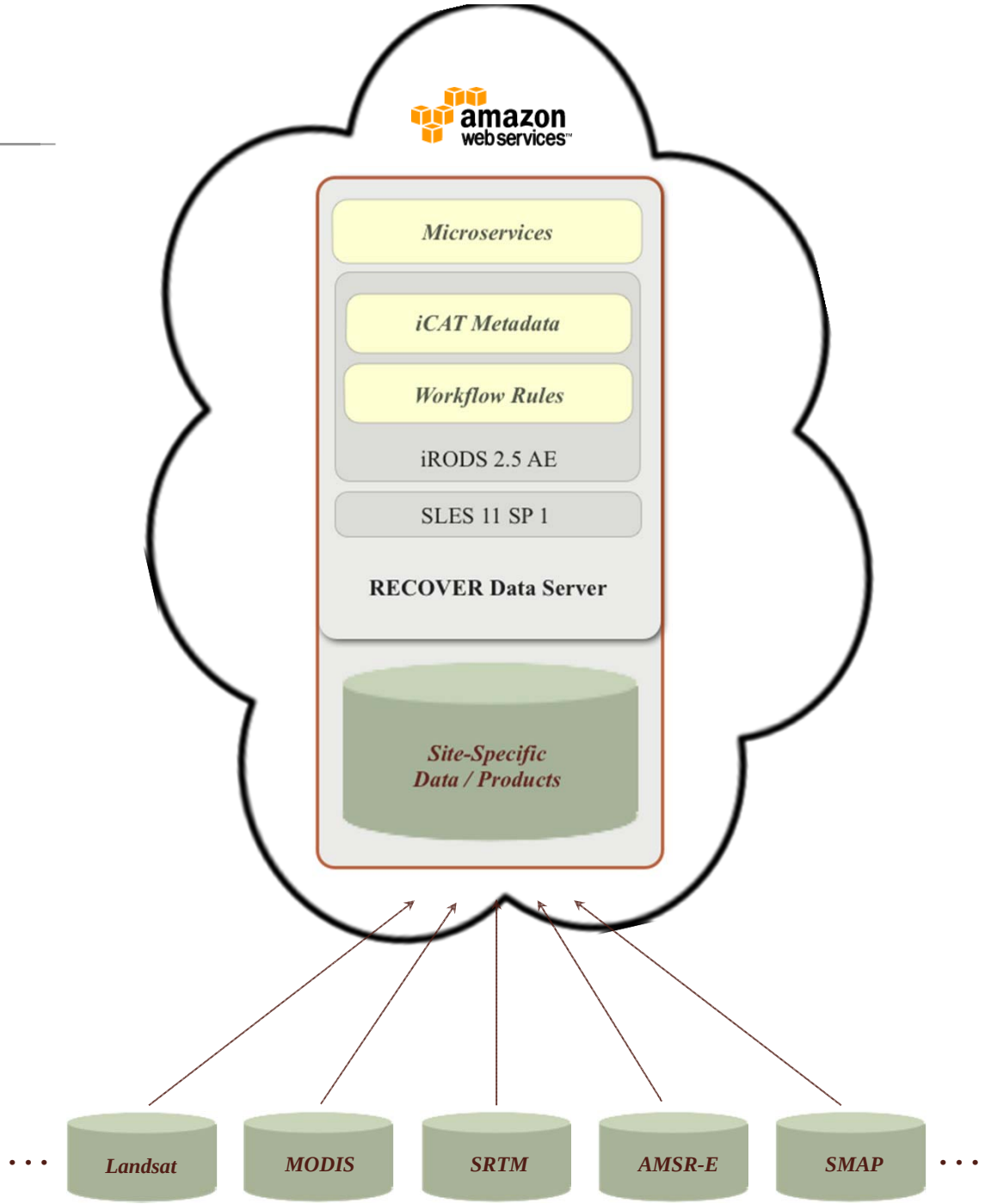
The RECOVER Server

•Is deployed in the Amazon Elastic Compute Cloud (EC2).

•Assembles and manages a variety of data:

Stage 1 Collection - Core
Normalized Burn Ratio (NBR)
Normalized Difference Vegitation Index (NDVI)
Fraction of Photosynthetically Active Radiation (fPAR)
Net Primary Production (NPP)
Topography Aspect (TA)
Topography Elevation (TE)
Topography Slope (TS)
Soil Texture (ST)
Soil K Factor (SKF)
Biophysical Setting (BPS)
Geology (GEO)
Existing Vegetation Cover (EVC)
Exiting Vegetation Type (EVT)
Environmental Type Potential (ETP)

Stage 2 Collection - Derived / Ancillary
Difference in Normalized Burn Ratio (dNBR)
Fire Severity (FS)
Fire Intensity (FI)
Fire Regime Condition Class (FRCC)
FRCC Percent Departure (dFRCC)
Historic Fires 1936-2012 (H0)
Historic Fires 2002-2012 (H1)



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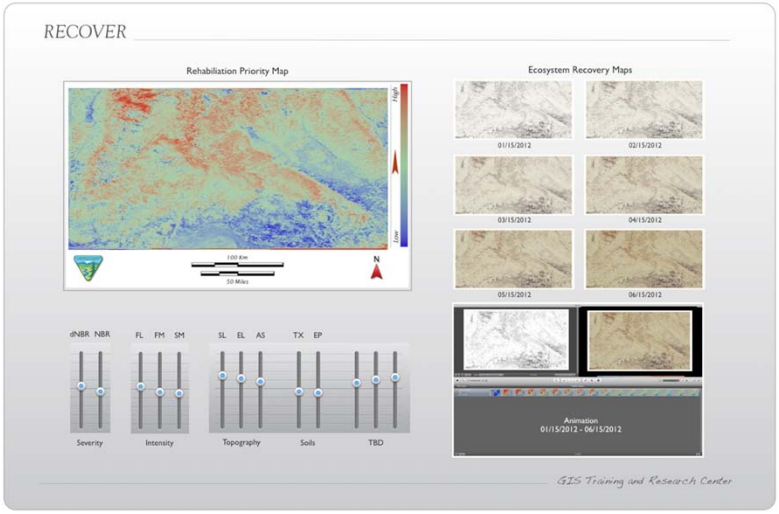
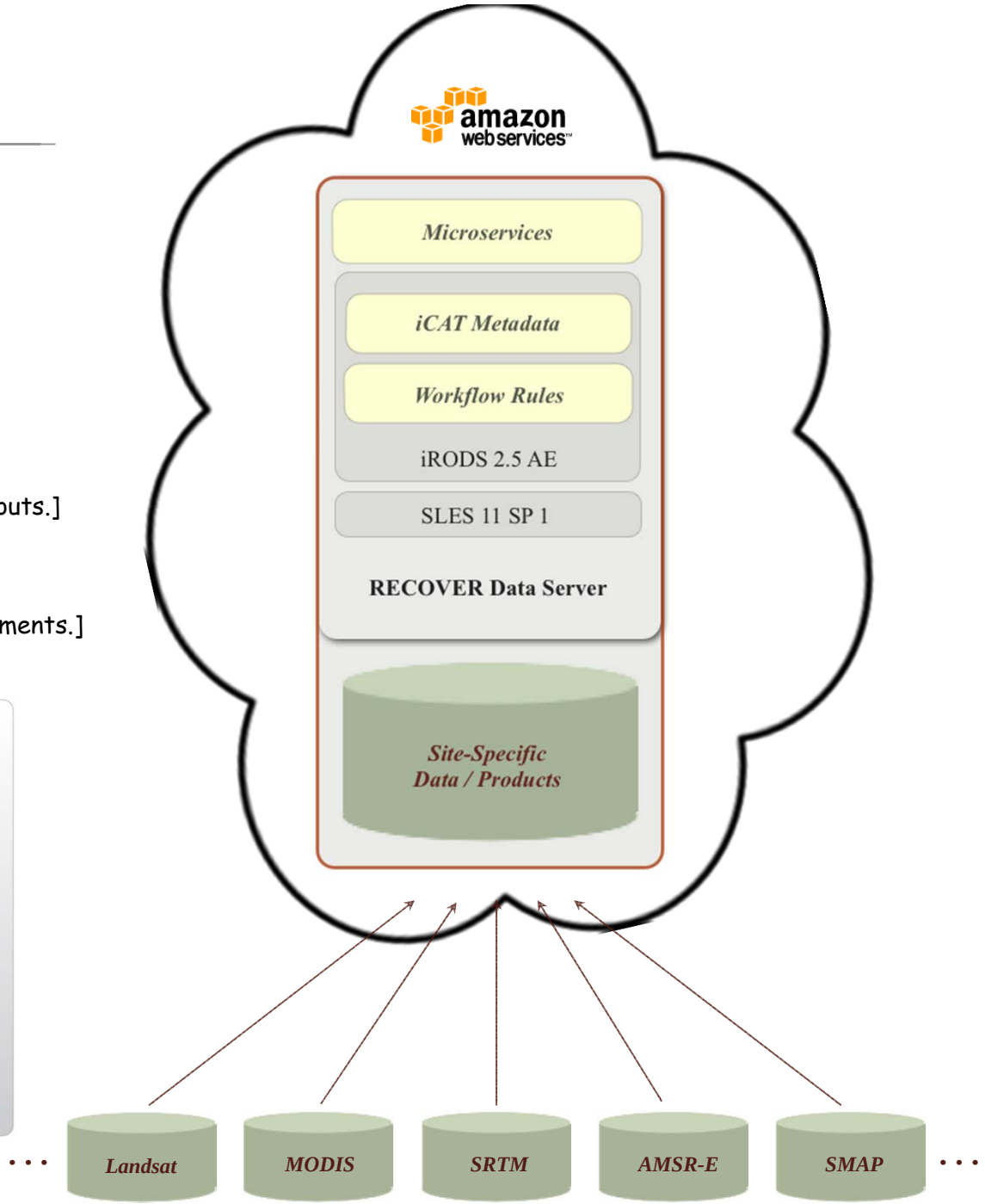
Stage 3 Collection - Short-Term DSS Products
Rehabilitation Priority Maps (RPMs)
[Derived product composed of Stage 1 and Stage 2 inputs.]

Stage 4 Collection - Long-Term DSS Products
Ecosystem Recovery Maps (ERMs)
[Derived product composed of periodic fPAR measurements.]





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Stage 1 Collection - Experimental
Evapotranspiration (modisET) **<= Placeholder for SMAP Data**
Soil Moisture (amsreSM)
Soil Moisture (smapSM)

Historic Temperature (merraHT) **<= Placeholder for MERRA Reanalysis Data**
Historic Precipitation (merraHP)
Historic Temperature (ecmwfHT)
Historic Precipitation (ecmwfHP)
Historic Temperature (ncepHT)
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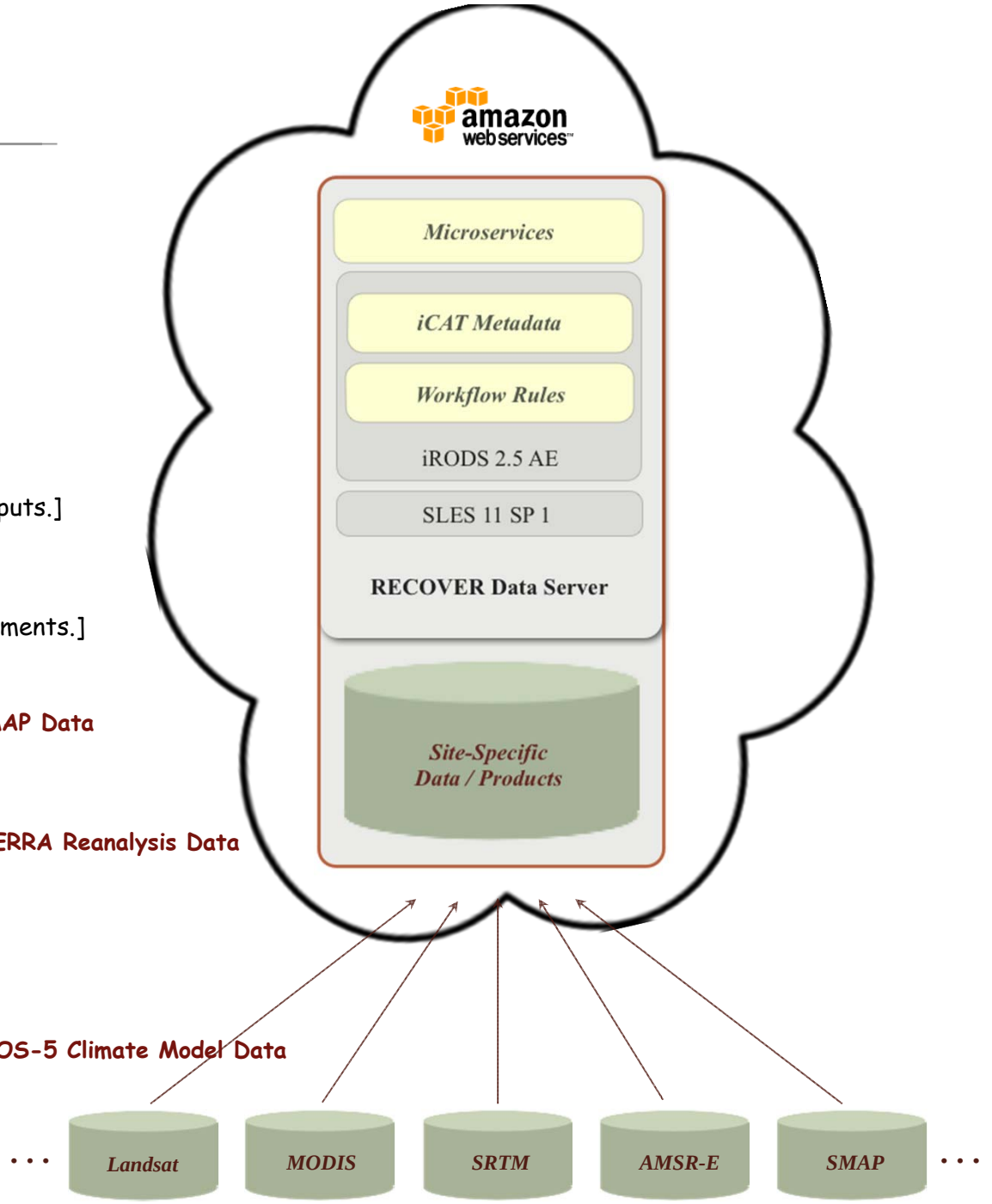
Future Temperature (goes5FT) **<= Placeholder for GEOS-5 Climate Model Data**
Future Precipitation (goes5FP)
Future Temperature (modeleFT)
Future Precipitation (modeleFP)



Next Steps ...

•Phase I - Feasibility Study

-1 Year (FY13) Prototype development and evaluation activity.

-Idaho / Crystal Fire are being used for prototype development.

-Want to "shadow" work on at least one fire this season to evaluate.

-Evaluate with partners and develop proposal / teaming arrangement to develop production system.

•Phase II - Operational Deployment

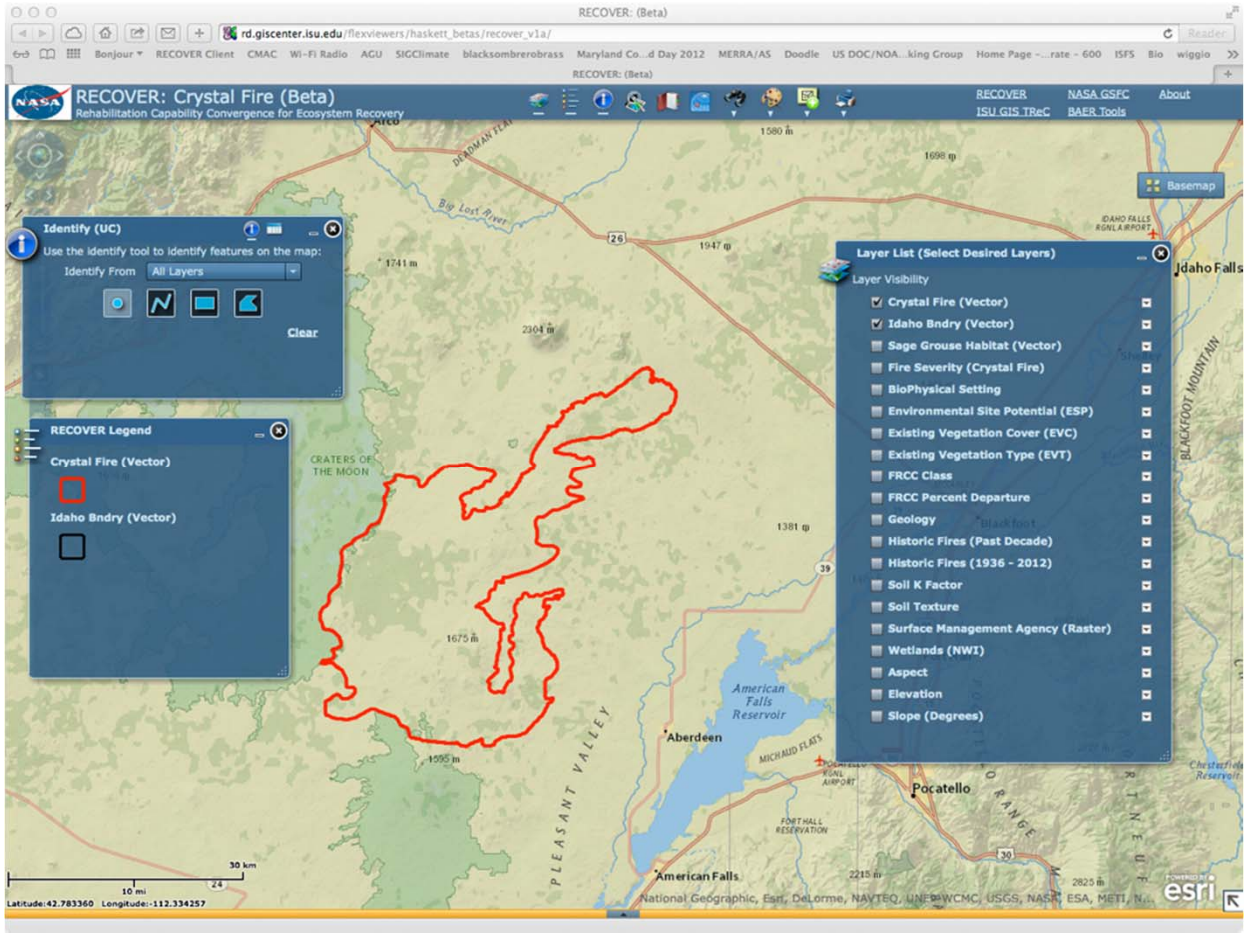
-2 Year (FY14-15) activity to develop full-scale system for Western US regions of interest.

-(NB: There's a Phase I down-select!)

-Develop mobile tablet/smartphone capabilities to complement desktop interfaces.

-Enable the RECOVER platform to consume SMAP, LDCM, Suomi NPP, Reanalysis, and Climate Model data.

- Create a modern wildfire DSS optimized to for the current suite of GIS technologies and Earth observing missions ...



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RECOVER iPad Prototype

App Definition Statement:

The RECOVER iPad Prototype application provides ecologists a tool to analyze burn site recovery imagery.

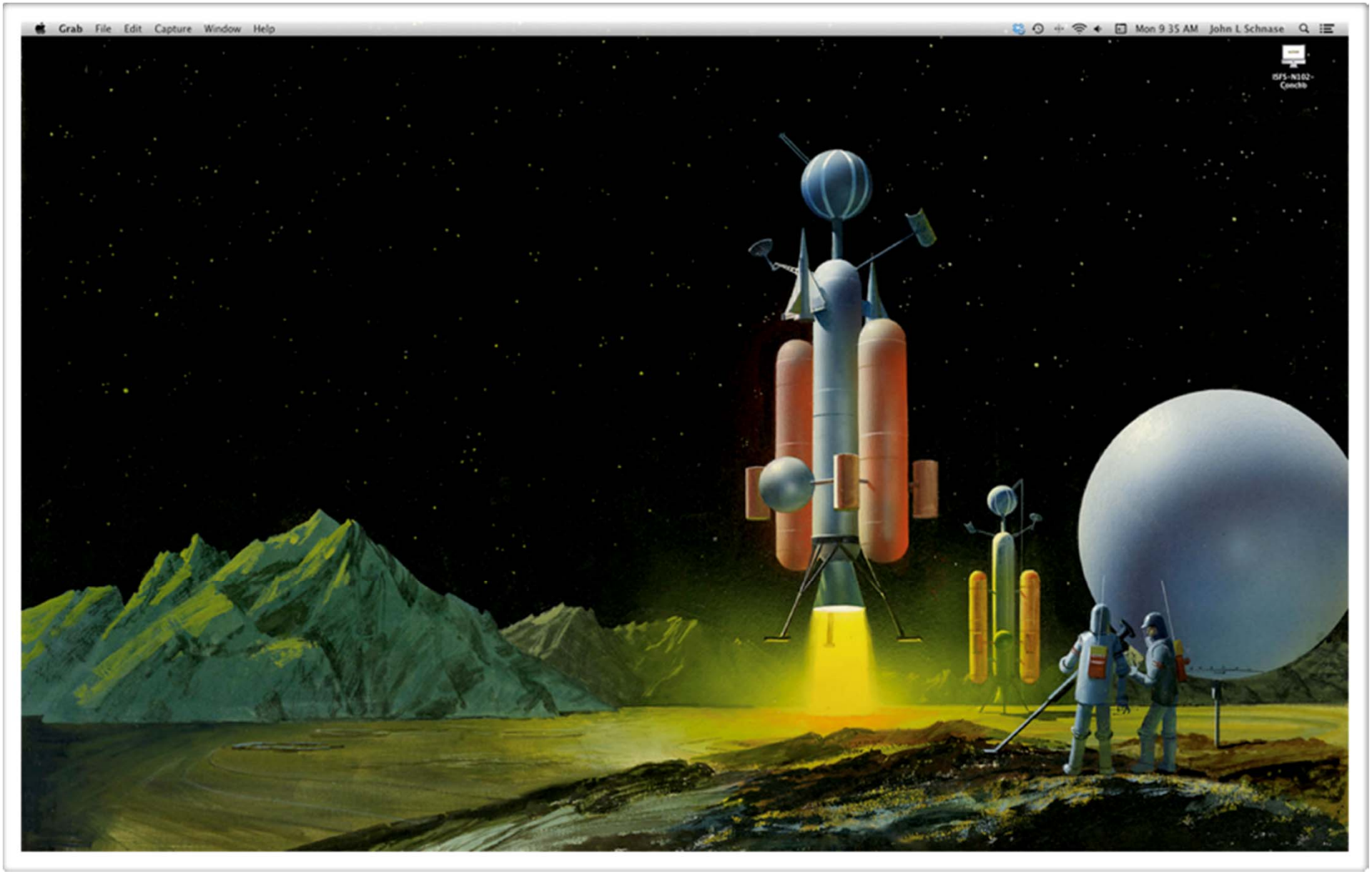
Initial State
Pins indicate fire sites, green pins indicate recent updates.

Click the information button, "i", to view the site.

Site View
The site view shows the fire boundary and a mosaic of all layers.

Layer Selection
Choose layers for the mosaic. For the prototype, all layers contribute equally. Slider bars will be added later.

The RECOVER Server - Demo



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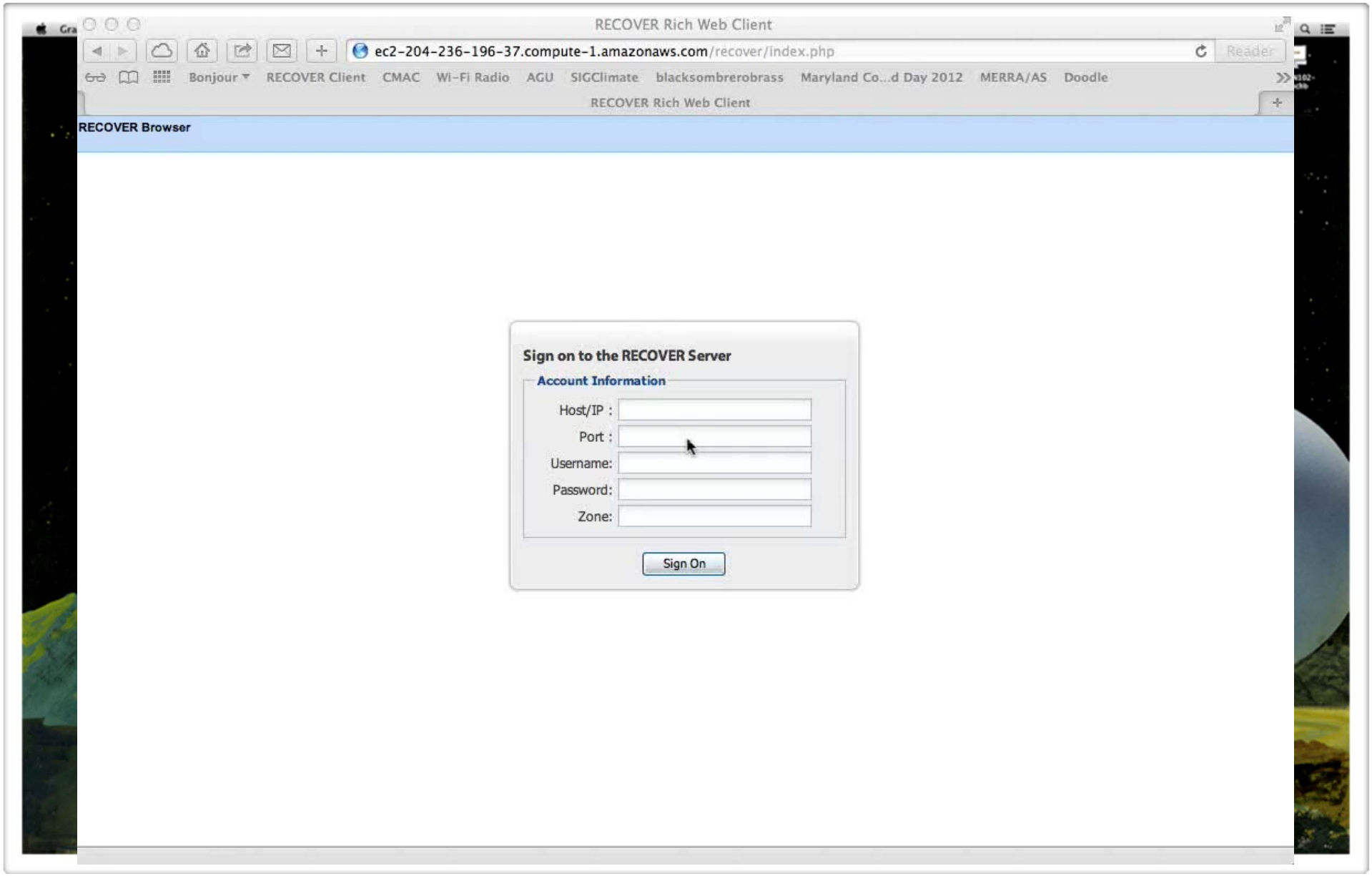

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