Use Case

To understand the environmental factors leading to the encroachment of desert flora into the Chihuahuan desert region, in particular the proliferation of Larrea Tridentata and Agave Lechugilla.

A line-based spread of desert flora in the Chihuahuan desert. Notice the desertification of the greenlands.

Lifemapper provides a set of web services that project potential future species distributions from specimen occurrences and environmental data. Larrea Tridentata is show above.

Approach: Multitier Ontology-Driven Service Orchestration

**ELSEWeb Generic Geospatial Data Ontology**

- Provides umbrella concepts from which specific data providers can specialize
- Describes Open Geospatial Consortium (OGC) services in terms of how they were published from NASA and PRISM sources

**EDAC Data Ontology**

1. Extend data/model ontologies for specific domains
2. Delegate data-to-model integrations to SADI
3. Instrument SADI infrastructure to capture PROV

**ELSEWeb Generic Modeling Ontology**

- Provides umbrella concepts from which specific model providers can specialize
- Describes experiment specifications, experiment results, and how the results were generated

**EDAC-to-Lifemapper Ontology**

- Serves as the bridge between the data provider (EDAC) and the model provider (Lifemapper) by describing the relationships between source data concepts and model concepts

**ELSAWeb Experiment GUI**

- Allows users to specify linked open data (LOD) scenario data, species occurrences, and model parameters

**Results: EDAC LOD Stats**

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>Term</th>
<th>Units</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF</td>
<td>low_point_temperature</td>
<td>degrees celsius</td>
<td>1532</td>
</tr>
<tr>
<td></td>
<td>precipitation_amount</td>
<td>Millimeters</td>
<td>1532</td>
</tr>
<tr>
<td></td>
<td>air_temperature</td>
<td>degrees celsius</td>
<td>8064</td>
</tr>
<tr>
<td>GCMD_Science</td>
<td>LAND_SURFACE_TEMPERATURE</td>
<td>bit field</td>
<td>424</td>
</tr>
<tr>
<td></td>
<td>VEGETATION_INDEX</td>
<td>unitless</td>
<td>804</td>
</tr>
</tbody>
</table>

The material is based upon work supported by the awards:

- NASA ACCESS-11-0018: Earth, Life, and Semantic Web
- HRD-0734825 (Cyber-ShARE)
- HRD-1242122 (Cyber-ShARE)