



# ELM SPRING HD: PROJECT BIBLE

Geospatial Intelligence & Ground-Truth Integration

[www.elmspringfarmco.com/research](http://www.elmspringfarmco.com/research)

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## 1. MISSION OBJECTIVE

To establish a high-fidelity "Digital Twin" of **Elm Spring Farm** (Hughesville, MO) by merging satellite-derived biomass data with high-definition topographic modeling. This system provides a 1:1 visual record of land health, seasonal transitions, and elevation-specific agricultural performance.

## 2. CORE GEOSPATIAL PARAMETERS

- **Primary Location:** Hughesville, MO
- **Coordinates:** 38.9814 {N}, 93.3000 {W}
- **Base Elevation: 264m AMSL**
- **Terrain Profile:** HD Topography Mesh (SRTM 1-Arc Second / COP-DEM-30).

## 3. THE ARCHITECTURE (THE HANDSHAKE)

The system operates on a hybrid-cloud model to bypass standard web limitations and deliver high-resolution textures:

- **The Backend (Oracle Cloud):** An **Oracle A1-ARM instance** serves as the processing hub. It handles the heavy lifting for the 3D terrain rendering and satellite data alignment.
- **The Secure Tunnel (ngrok):** A secure bridge connects the Oracle instance to the **Madewithclay.org** interface.
  - *Endpoint:* <https://darrell-pseudopolitic-subimbricately.ngrok-free.dev>
- **The Persistence Engine:** The data refresh is handled by a background Python script (.py) running 24/7 via nohup to ensure the feed never drops.

## 4. GROUND-TRUTH PROXY: GOODWATER CREEK (LTAR-CMRB)

Because we are in the pre-deployment phase for on-site hardware, we utilize the **Goodwater Creek Research Station** as our ecological mirror.

- **Purpose:** Validates the "Green Wave" (phenology) for **Zea mays (Corn)** and **Glycine max (Soybeans)**.

- **Data Feed:** 365-day historical midday archive (139,399+ images available).
- **Direct Link:** [USDA/NAU Goodwater Station Feed](#)

## 5. DATA SOURCES & APIs

- **Satellite Imagery:** Sentinel-2 L2A (Multispectral).
- **Topographic Mesh:** Copernicus 30m Global DEM.
- **Ground-Truth API:** PhenoCam Network API (University of Northern Arizona).



### NOTES FOR INTEGRATION

- **Browser Security:** The connection uses a custom ngrok-skip-browser-warning header to ensure a seamless user experience.
- **Dynamic Slider:** The bottom-half interface utilizes a chronological image slider to show real-time seasonal change, providing the "Ground-Truth" needed to verify the HD Topography renders above it.