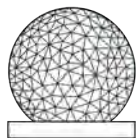# Future Plans for the Madrigal Database

Katherine Cariglia, University of Massachusetts Lowell

Mentored by Bill Rideout
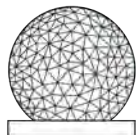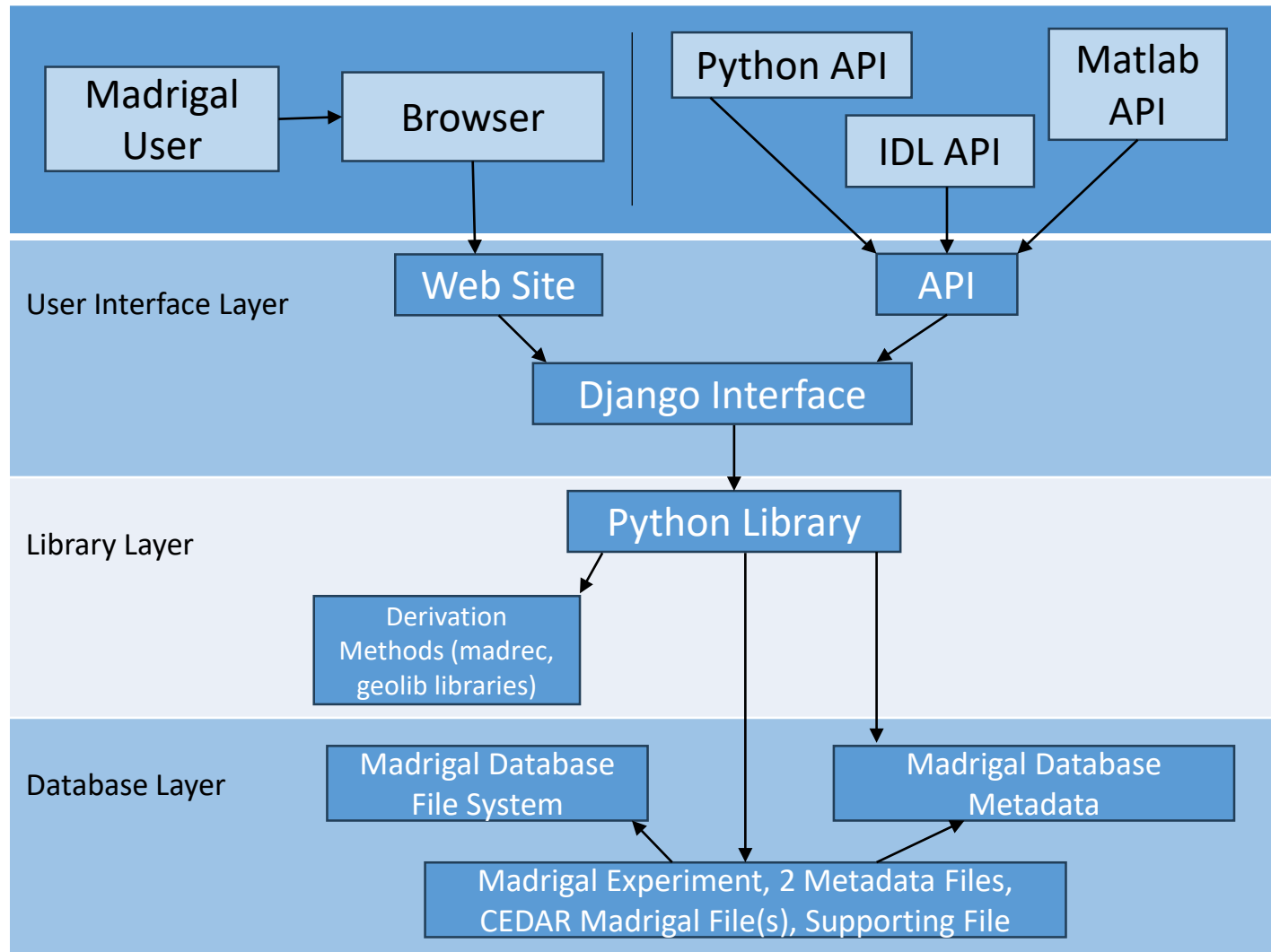
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Introduction: CEDAR Madrigal Database

- CEDAR (Coupling, Energetics, and Dynamics of Atmospheric Regions) is a research community investigating the near-Earth space environment

- CEDAR Madrigal database is a community resource for upper atmospheric science data from various ground and space-based instruments from around the world

- Madrigal is installed at various sites around the world and has a central archive at the CEDAR Madrigal database

- Data at each Madrigal site is controlled locally, but metadata is shared between all sites for easy data access

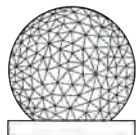- Haystack atmospheric sciences group maintains the CEDAR Madrigal database
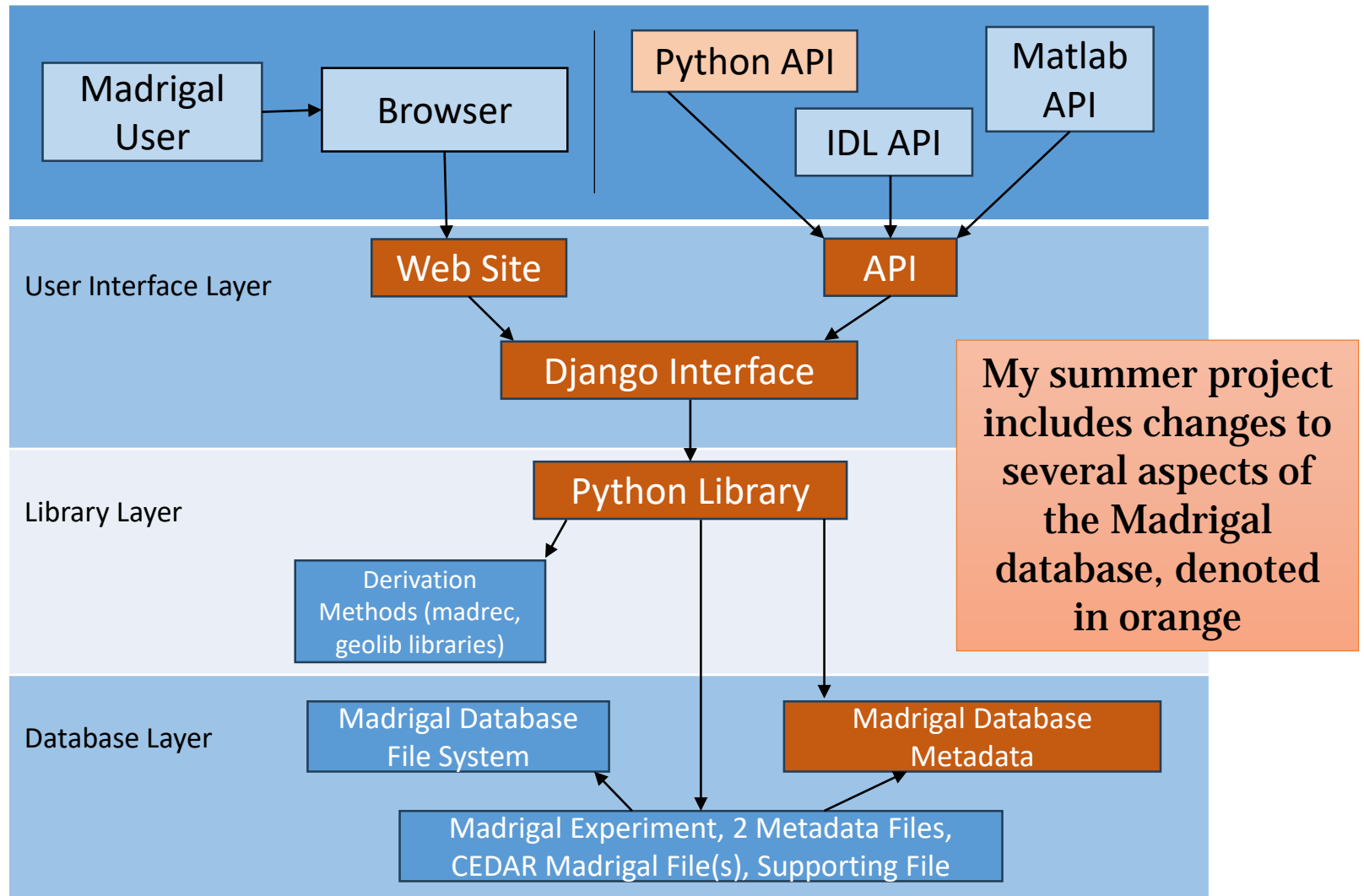
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Motivation and Project Goals:
Continued Improvement of the Madrigal Database

- Include geographical boundaries at the file and experiment level–implications for integration with Google Maps/Google Earth

- Track funding agency grant number at the experiment level

- Add new data
  - Data from South Pole and McMurdo stations
    - Magnetometer data
    - Riometer data
    - Photometer data
    - VLF data
  - Quality flags for DMSP SSIES-3 F16 satellite data

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Overview of Madrigal Architecture

User Interface Layer

Madrigal User → Browser

Python API, IDL API, Matlab API

Web Site

API

Django Interface

Library Layer

Python Library

Derivation Methods (madrec, geolib libraries)

Database Layer

Madrigal Database File System

Madrigal Database Metadata

Madrigal Experiment, 2 Metadata Files, CEDAR Madrigal File(s), Supporting File

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Overview of Madrigal Architecture

Filter Experiments by Geographical Boundaries

Corresponding Django form for this page populated by user input– communicates with Madrigal python API to filter experiments by geographical boundaries in the "show experiments" view

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Display Funding Agency and Grant Number

Funding agency and grant number available for each experiment for reference

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Example of Integration with Google Earth

Wedge Plot: Millstone Hill Radar Azimuth Scan
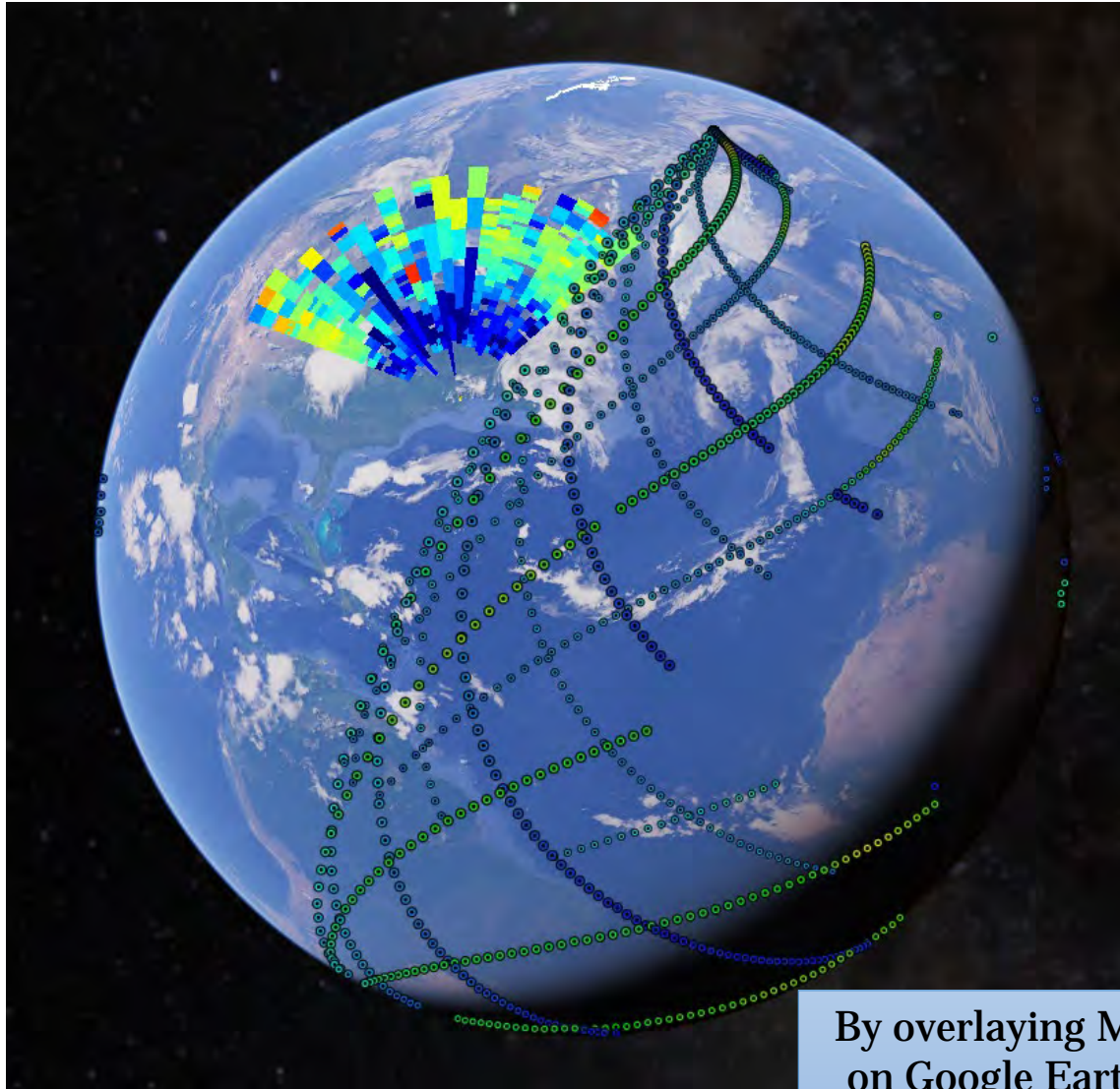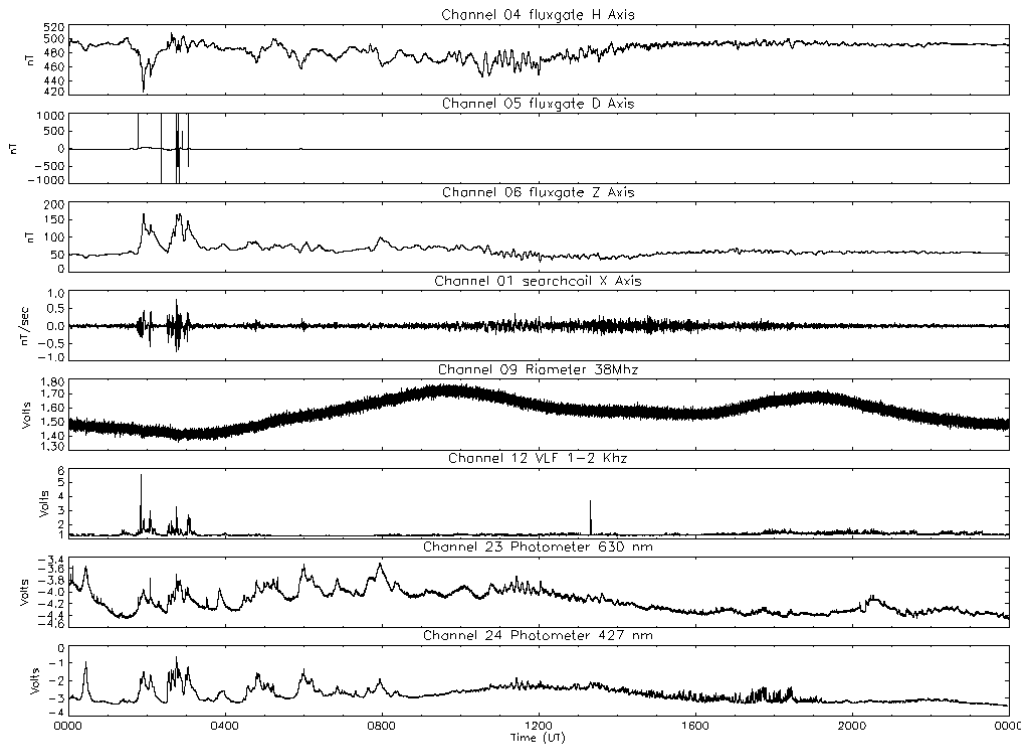
Colored Dots: Jason-2 and Jason-3 Satellite Data
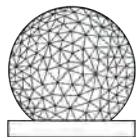
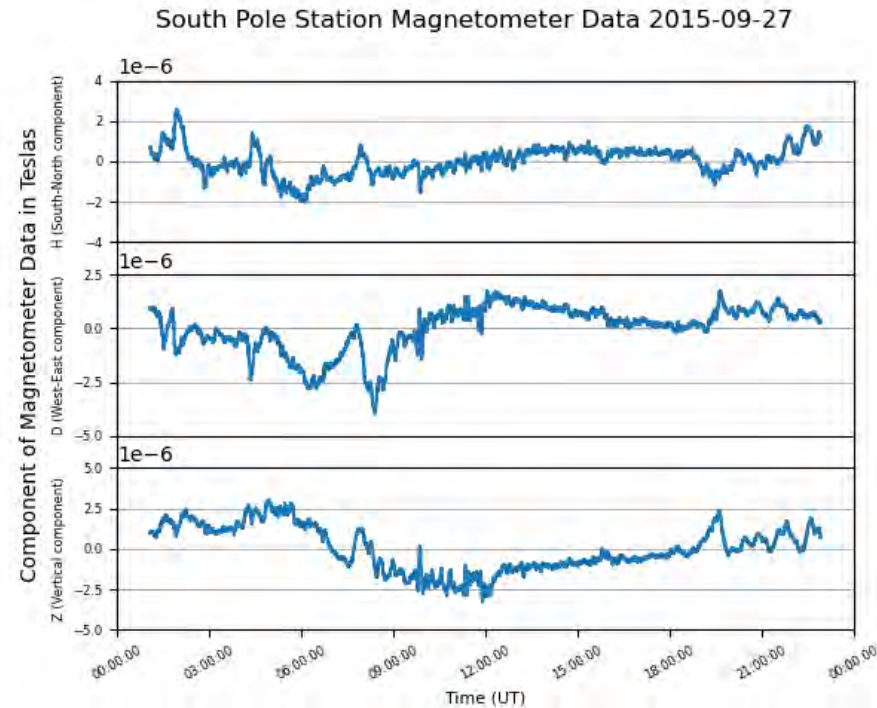By overlaying Madrigal data on Google Earth, users can visually find which datasets overlap in space and time

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New Data Types: South Pole

- Time series data from multiple ground-based instruments: magnetometer, riometer, photometer, and VLF

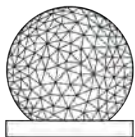South Pole DAS, 19 June 2006, day 170

Summary plots of available South Pole data

Example of new magnetometer data

Created loading script to download South Pole data and upload to Madrigal in HDF5 data format

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New Data Types: Quality Flags for DMSP SSIES-3 F16 Satellite Data
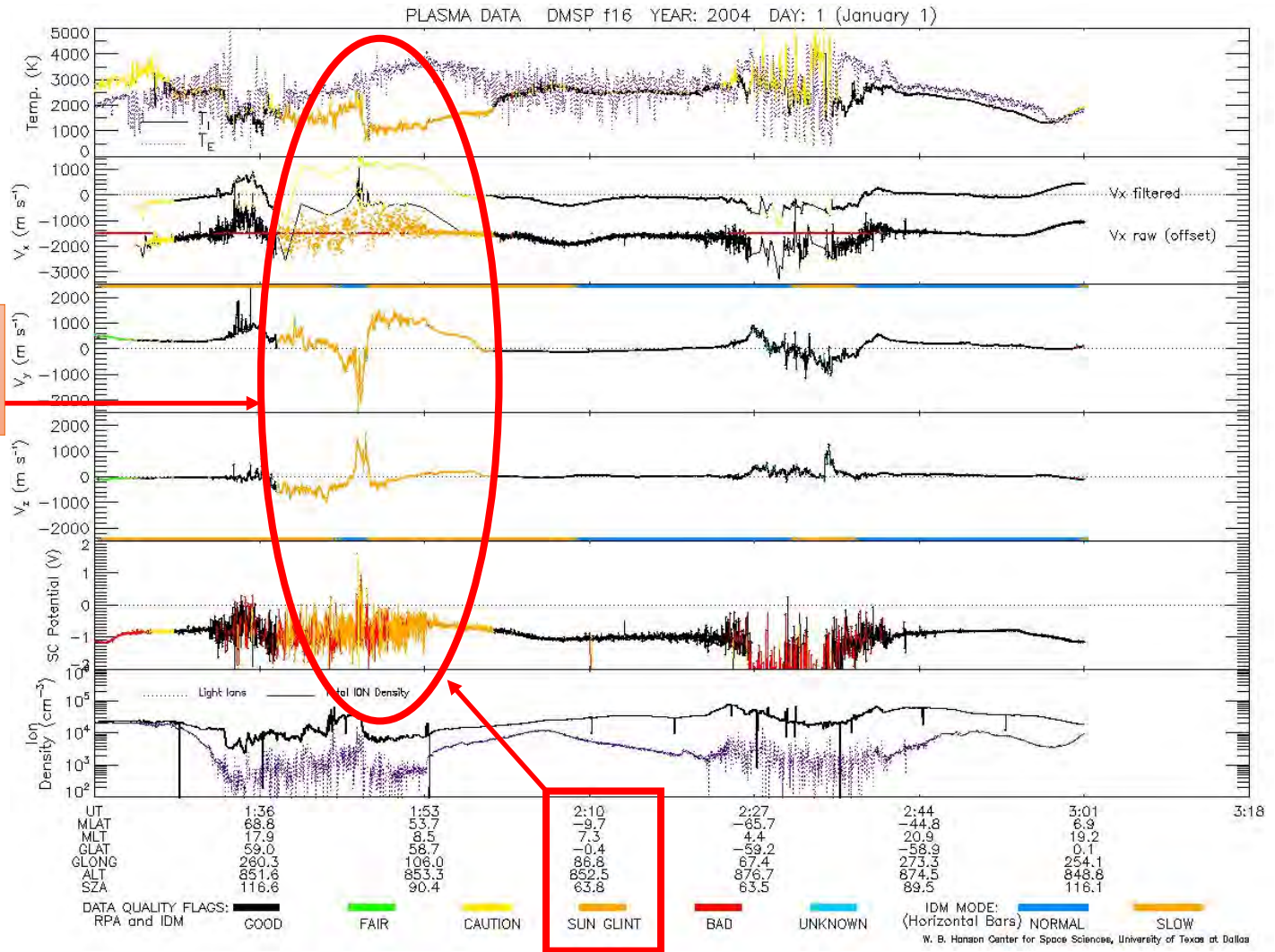
Contaminated data – not for scientific use
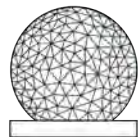
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- DMSP satellite observes in-situ plasma velocity and temperature at altitude of ~800 km
- New data quality flags denote sun glint signal contamination

Work Completed

- Updates to Madrigal metadata
  - Geographic boundaries at file and experiment level
  - Funding agency grant number
- New data types: loading script for magnetometer data

Work In Progress (~90% complete)

- New data types
  - Riometer, photometer, VLF
  - DMSP SSIES-3 F16 data quality flags

Future Work

- Google Earth/Google Maps integration with Madrigal data

All changes made will be included in the next release of Madrigal(v 3.3)

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Thank you to…

- Bill Rideout for being an outstanding mentor
- Allan Weatherwax for providing South Pole data
- Marc Hairston (UT Dallas) for providing DMSP data
- Haystack IT team for helping with various computer issues
- Violet Pfeiffer for introducing me to Nix OS
- All the wonderful folks at Haystack for a great summer experience!

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