

Subsurface Insights

Develop and provide cloud based platform (Predictive Assimilation Framework) for site monitoring

Data ingestion, management, custom hardware (since 2015), analysis, visualization, reporting,...

Funded through inhouse investments,
commercial projects and DOE SBIR

See PI meet poster and DOE website

The screenshot shows the DOE SBIR/STTR Phase III Success Stories webpage. The page is titled "Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR)" and features a navigation menu with options like "Programs", "Laboratories", "User Facilities", "Universities", "Funding Opportunities", "About", and "News". The main content area displays three success stories:

- Low-cost, polymer-based security tag technology uses crack patterns for unambiguous tampering evidence.** (Program(s): National Nuclear Security Administration (NNSA))
- An integrated cloud based cyberinfrastructure for sustainable and optimal use of subsurface resources.** (Program(s): Biological and Environmental Research (BER))
- Innovative functional sensors employ carbon nanotubes and polymer nanowires with a tunable surface chemistry to detect a variety of molecules.** (Program(s): Office of Fossil Energy (FE))

The page also includes a sidebar with "SBIR/STTR Home", "About", "Funding Opportunity Announcements (FOAs)", "Applicant Resources", "Award Resources", "Frequently Asked Questions", "Research Areas & Impact", "Awards", "Outreach & Events", "SBIR/STTR Phase II Success Stories", and "Reporting Fraud". There is also a "CONTACT INFORMATION" section for Small Business Innovation Research and Small Business Technology Transfer, and a "Join Mailing List" section.

Numerical modeling of different processes

Not fully linked to ingestion



HPC Resources

Hydrological, geochemical, geophysical, remote sensing ingestion, validation and storage
Application control and automation

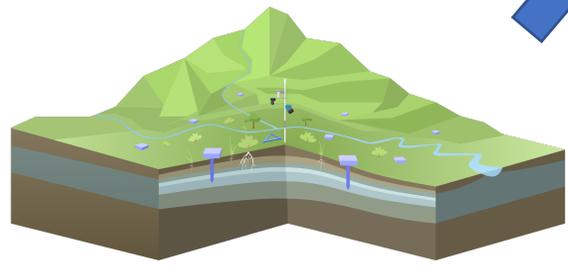


Web server

Irrigation control



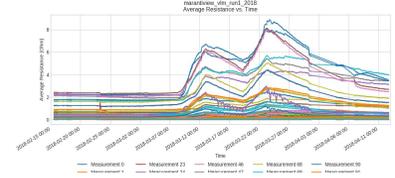
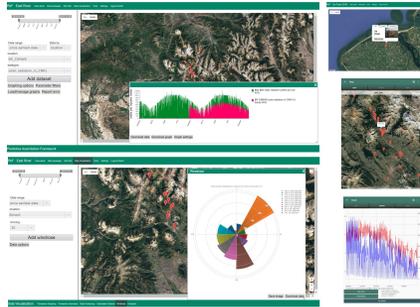
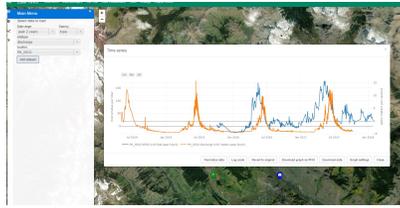
Remote sensing data



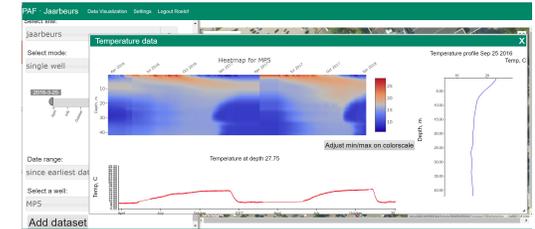
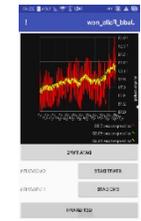
Field data

Data acquisition using other hardware (own sensors beta)

On demand and automated information



User

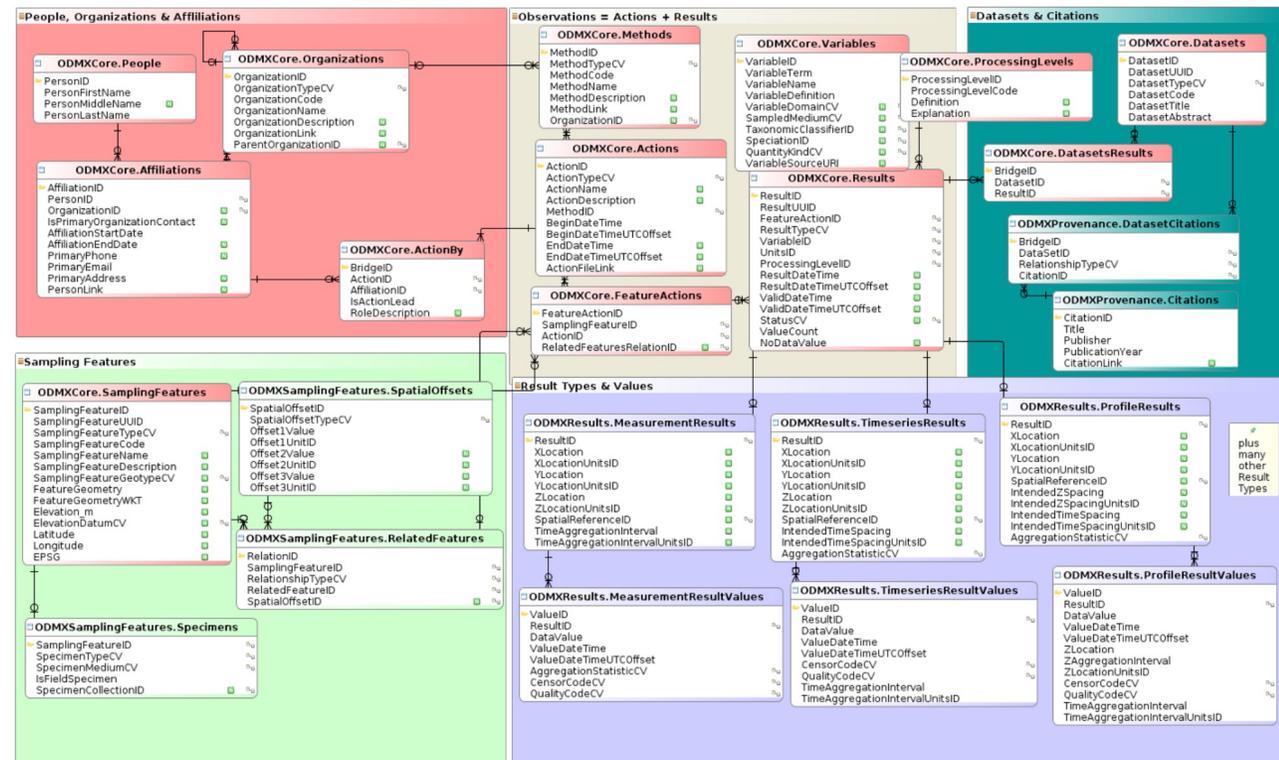


ODM2 → ODMX

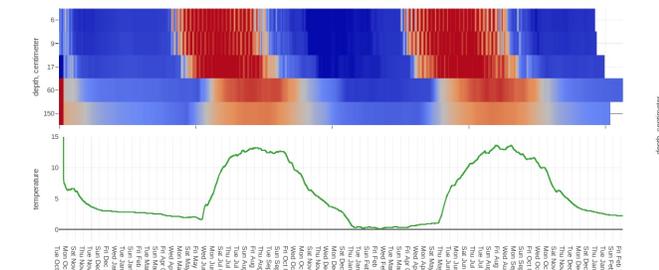
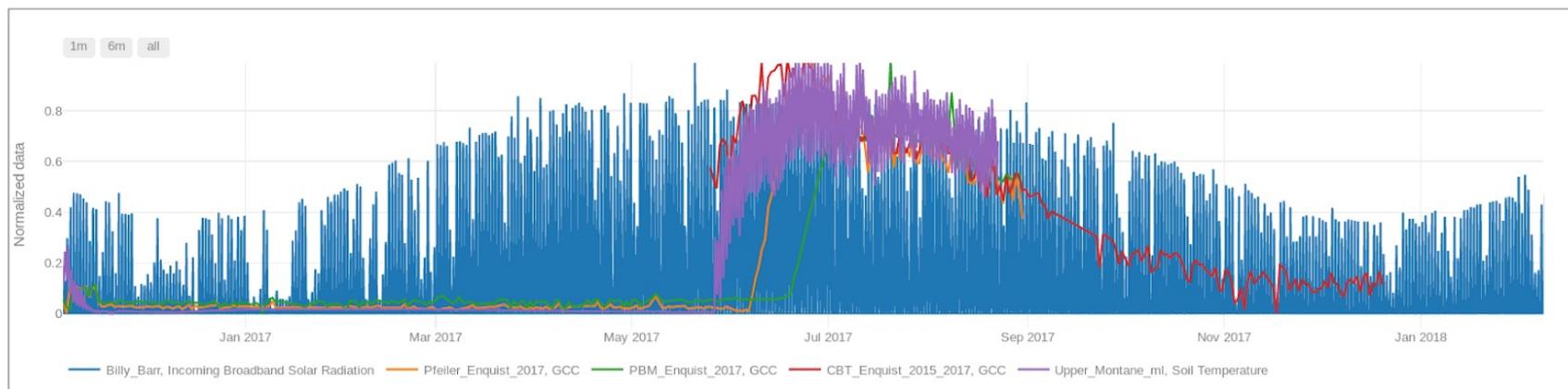
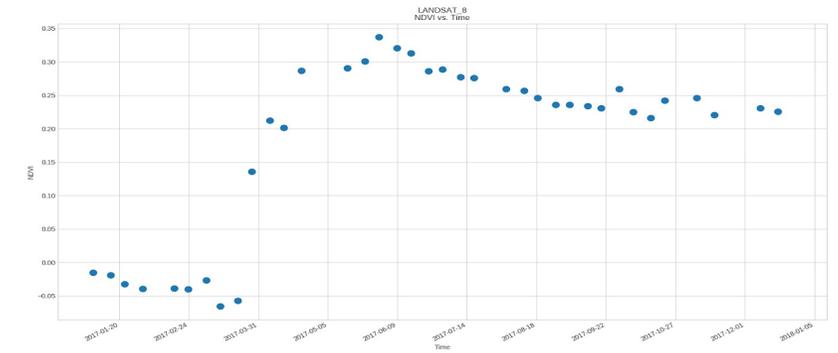
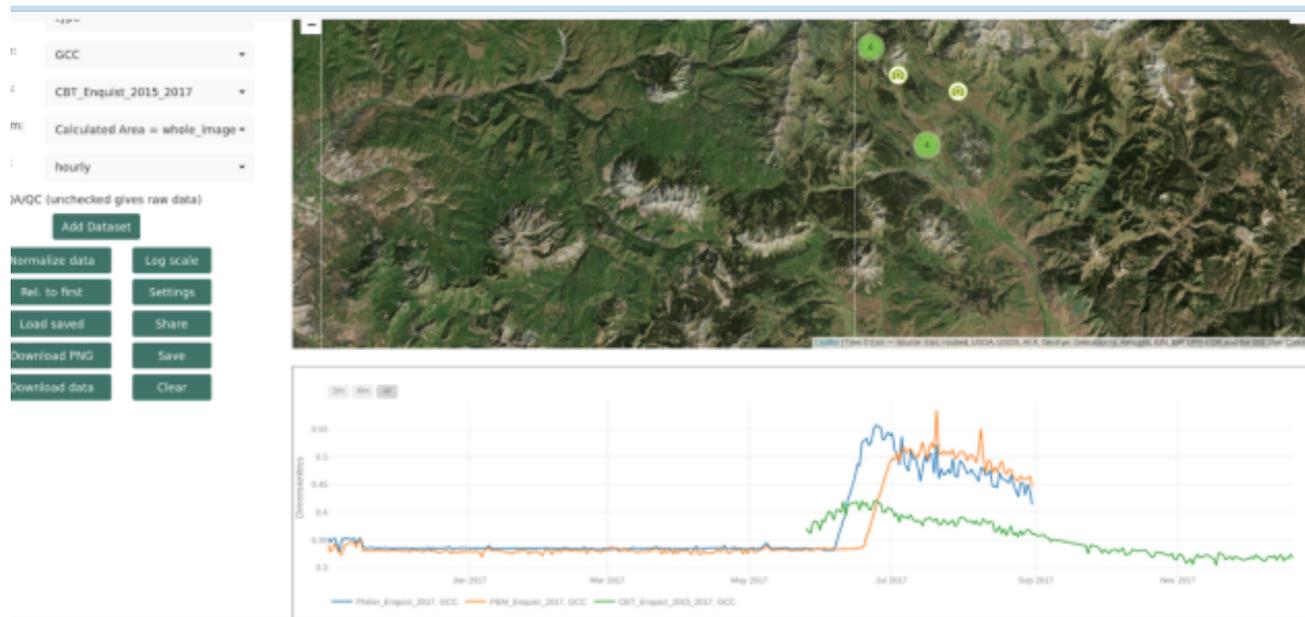
- [ODM2: https://github.com/ODM2/ODM2](https://github.com/ODM2/ODM2)
- Supposed to be merge of ODM1 (Hydrology data) and GeochemDB (sample data)
- Developed under NSF funding, used by CUAHSI
- Has many components
 - Datamodel
 - Python API (using SQL Alchemy)
 - Controlled vocabularies (<http://vocabulary.odm2.org/>)
 - Django stack
 - Several loose components
- Good, but many recognized issues (CV, python2, datamodel, api, variables, units, features of interest)
- Issues were addressed by us in collaboration with one of ODM2 architects (Aufdenkampe) – solved many, many issues
- Will release new version as ODMX
- Not cross compatible with ODM2

ODMX

- Enhancement and substantial modification of NSF Developed ODM2 data model -> result is ODMX datamodel and associated python API. This will be released as open source in May 2019



Integrated below/aboveground (phenocam and remote sensing) data processing flow



PFLOTRAN

PFLOTRAN scheduler

HPC Resource with standard PFLOTRAN install

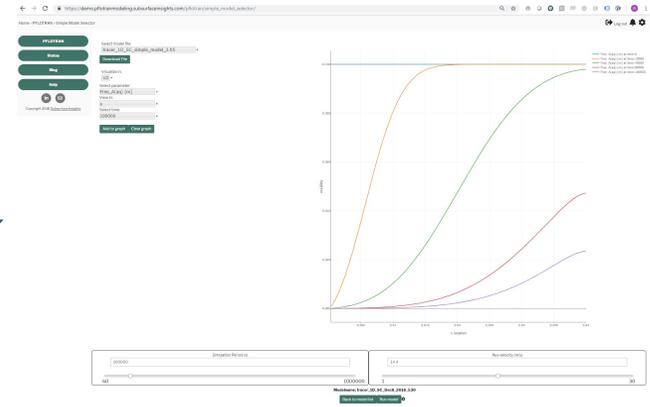
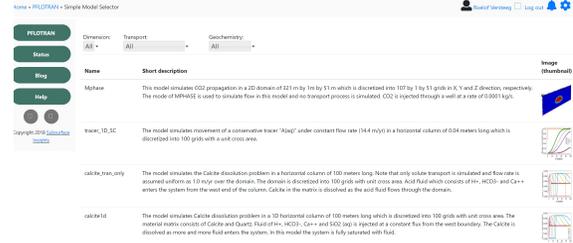


Subsurface Insights Server

Requests Jobs from server, invokes PFLOTRAN and returns data

- Model storage in relational DB
- *.in file generation using PyFlotran
- API for job control and result retrieval

Web based PFLOTRAN



- Model creation and control
- Result visualization



Standard browser

new SBIR on PAF- KBASE coupling (with Chris Henry and Kelly Wrighton)

