

# Web-Based Services: Combined and Validated GPS Data Products and Data Browsing tools

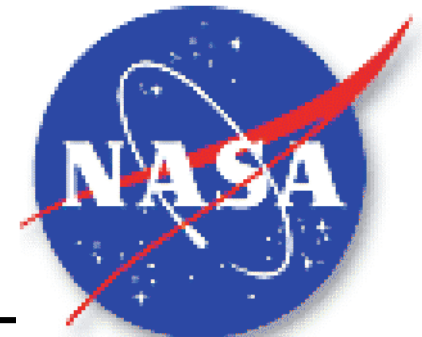
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M Scharber<sup>2</sup>, S Kedar<sup>1</sup>, S Owen<sup>1</sup>, L Prawirodirdjo<sup>2</sup>, P Fang<sup>2</sup>,  
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IGS Workshop  
Darmstadt, Germany  
09 May, 2006



# Overview

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- Background
- Web services development
- Future IT projects
- Summary

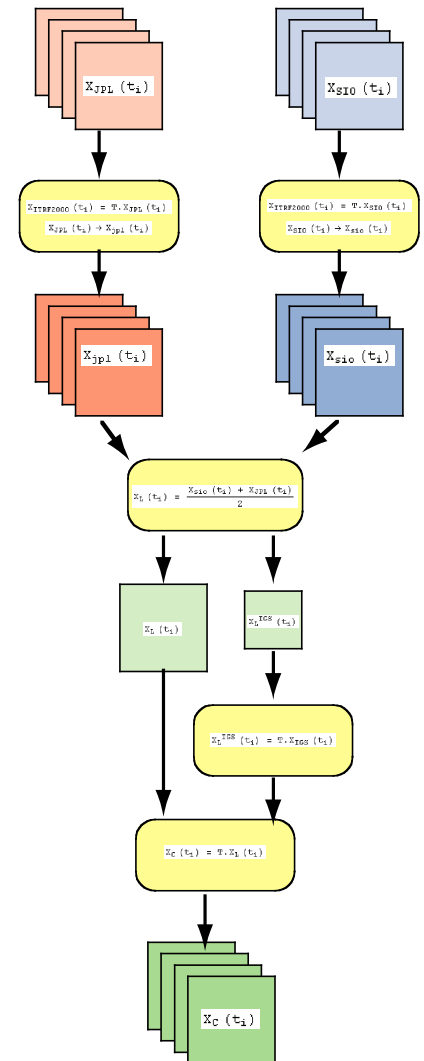
# GPS Data Products for Earth Sciences (aka SCIGN-REASoN)

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- NASA Funded project
- Going forward
  - 2 years left
- Goals
  1. Generate higher level products from SCIGN data for use by the SCIGN community
  2. Apply modern IT methodology within SCIGN to:
    - Produce and disseminate higher-level data products to a larger community of
      - a) Scientists
      - b) Government agencies (Federal, State, and Local)
      - c) Surveyors
      - d) GIS professionals
  3. Build on current capabilities within SCIGN for data archiving, information systems, and data analysis to disseminate data products:
  4. Improve capabilities in
    - Archiving
    - End-user interfaces
    - Delivery mechanisms
    - Data modeling
  5. Open source project based on a redundant, multi-tiered “Virtual Archive” for GPS applications.

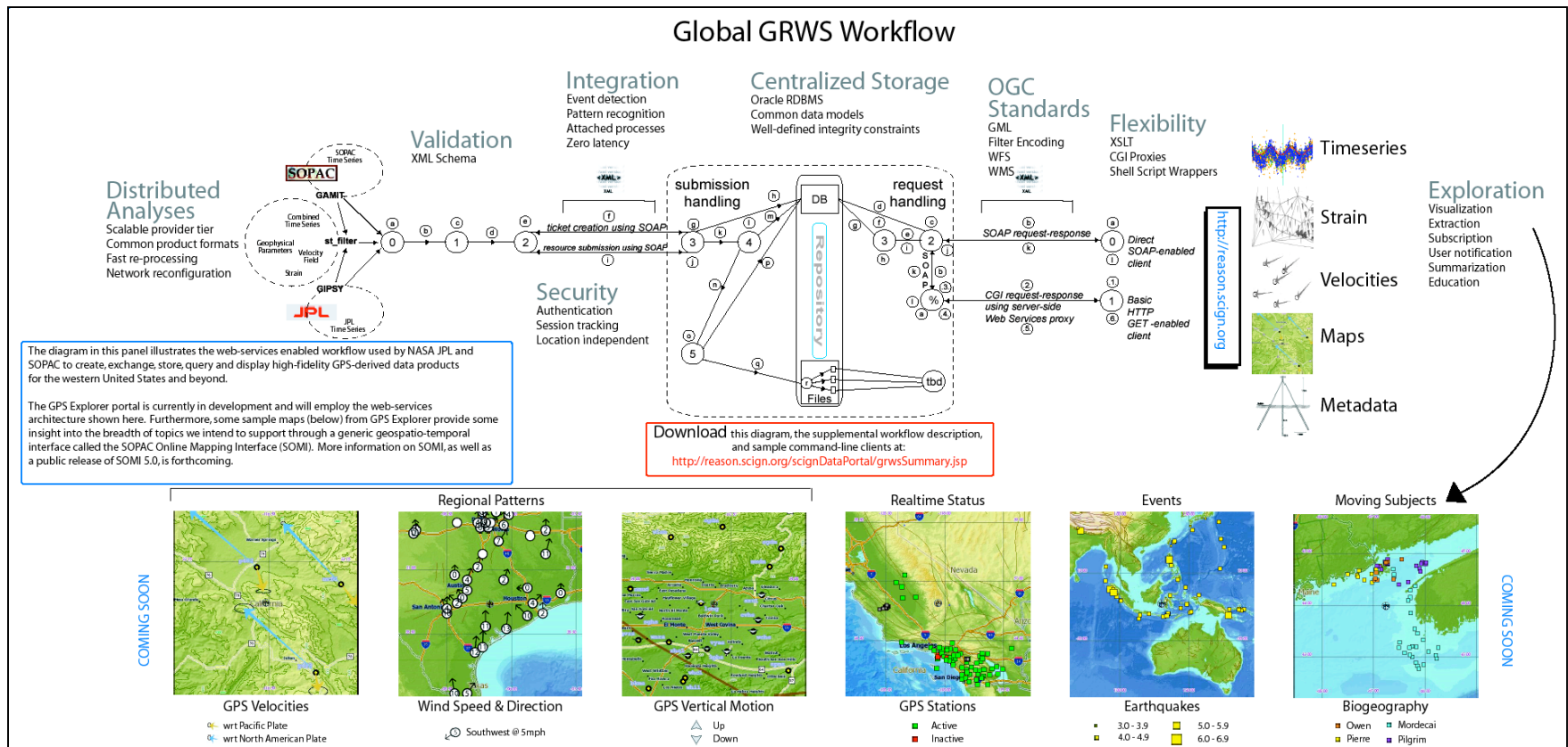
# Focus

- Portal development
- Web service development for
  - Meta data
  - Data exchange
- Combined solution generation
  - Coordinates from analysis centers
  - Time Series Calibrations
    - Time series “jumps”
  - Velocities (July '06)
  - Strain map (early FY07)
- Verification and validation of solutions
- Product delivery
  - At web site using standard http pick-up
  - Via web services
  - Quantitatively publication quality



# Geophysical Resource Web Services (GRWS)

## A Workflow for GPS-Derived Data Products



# GRWS Analysis

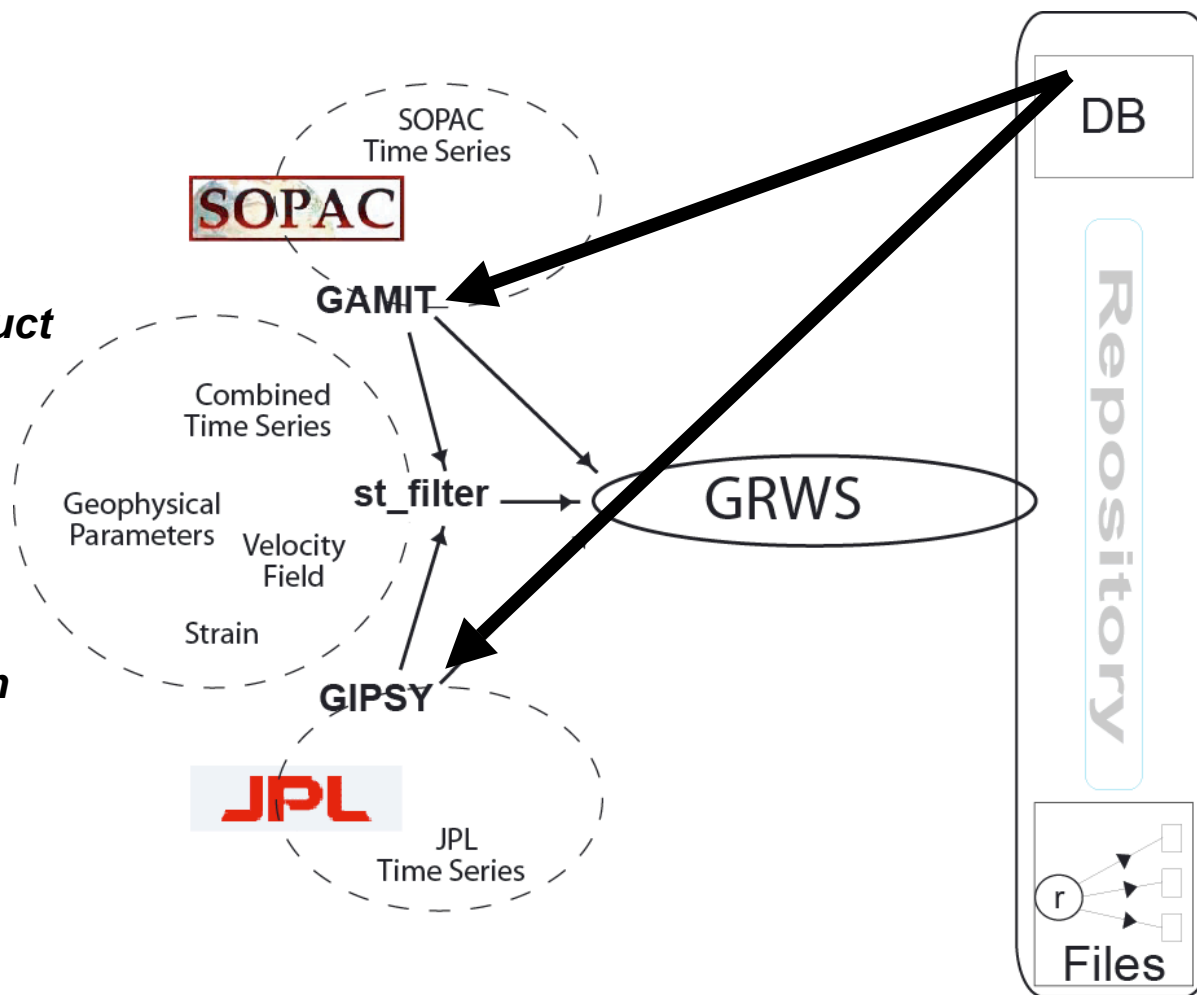
**Distributed Analyses**

**Scalable provider tier**

**Common product formats**

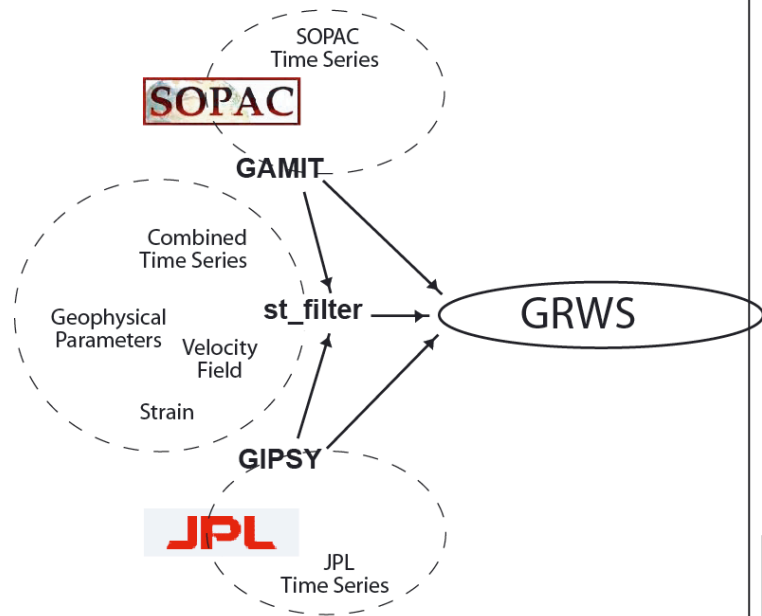
**Fast re-processing**

**Network reconfiguration**

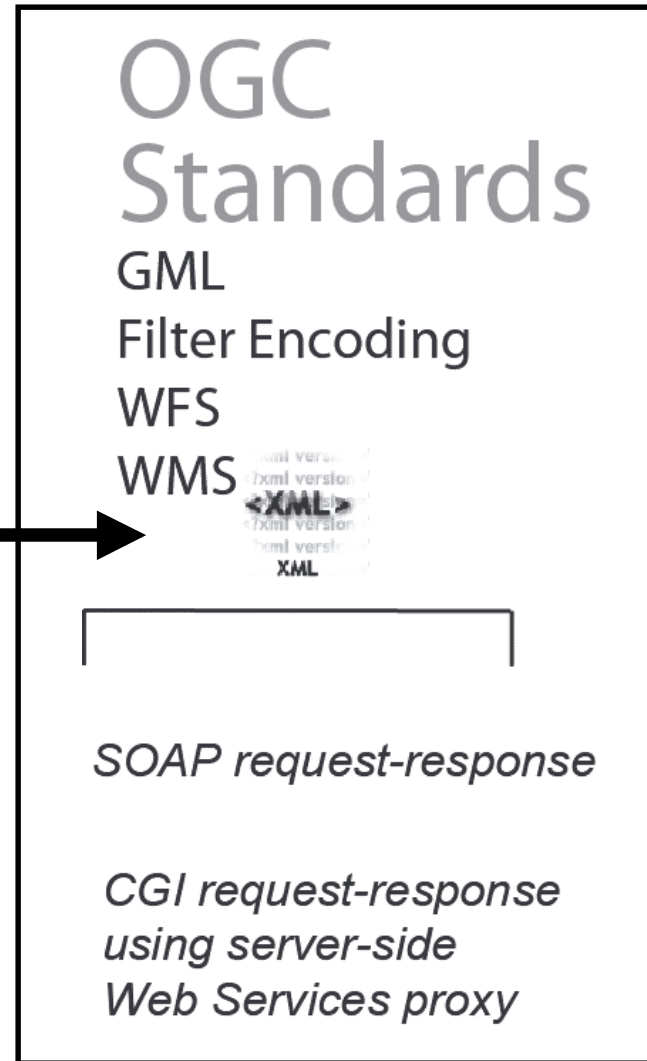


**JPL/SIO combination includes nearly complete set of Western North America sites over the last decade+**

# GRWS Centralized Storage




**Oracle RDBMS**  
**Common data models**  
**Well-defined integrity constraints**



# GRWS Exploration

**OGC Standards**  
GML  
Filter Encoding  
WFS  
WMS

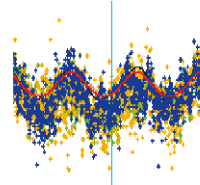


SOAP request-response

CGI request-response  
using server-side  
Web Services proxy

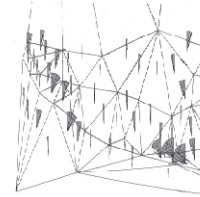


<http://reason.scign.org>



Timeseries

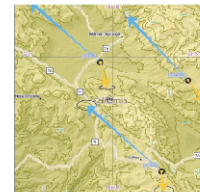
Time Series



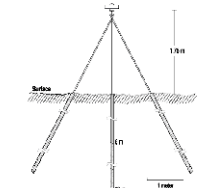
Strain



Velocities



Maps

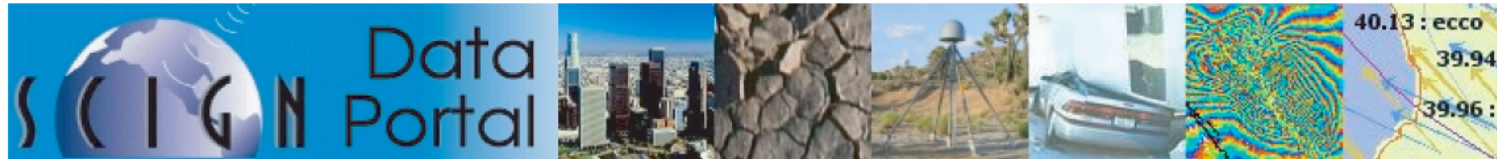


Metadata





# XYZ Coordinate Queries



## GPS Site XYZ Coordinate Query Tool

**Instructions:** provide four-character GPS site code(s), bounding box parameters (optional), and dates of interest to obtain processed coordinates. REASoN combination and SOPAC globk coordinates are currently available.

Site Code(s):  (space-delimited)

Begin Date:  (YYYY-MM-DD) End Date:  (YYYY-MM-DD)

Use Bounding Box Settings Below (optional; check box):

Minimum Latitude:

Maximum Latitude:

Minimum Longitude:

Maximum Longitude:

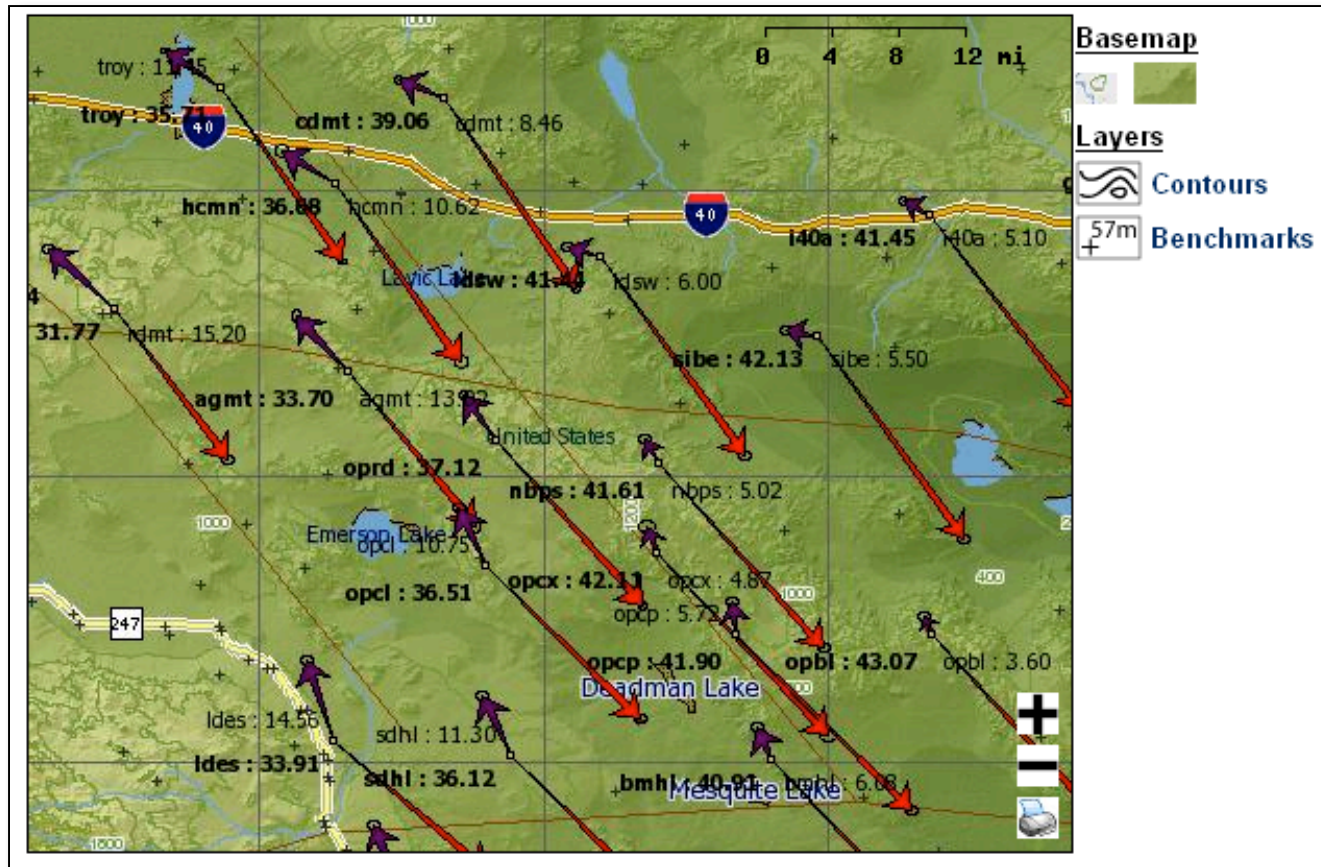
Requested Resource:  (valid options: procCoords)

Context Group:  (valid options: reasonComb | sopacGlobk | jplGipsy)

Context Id:  (for valid options, see: [catalog](#) and [valid contexts](#))

**Note:** this tool uses the [Geophysical Resource Web Services \(GRWS\)](#) framework to query and display coordinates.

# GPS Velocities



Velocities shown relative to Pacific Plate (red) and North American Plate (purple)



# GRWS Currently Developing

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1. Additions to Service Oriented Architecture for combined GPS solution product delivery, registration, request & retrieval
2. Web-accessible components for portal development
3. Prototype framework for GPS Explorer, a public portal for online GPS-related analysis, science, teaching and discovery
4. Machinery to enable complete, on-demand re-processing
5. Public, queryable project metrics and usage interface

## GRWS moving towards full automation of..

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1. Outlier removal
2. Quality reporting
3. Regional filtering
4. Spatial coherence detection
5. Integration with modeling databases (QuakeSIM)
6. Velocity & strain map generation
7. Sub-daily and real-time solutions

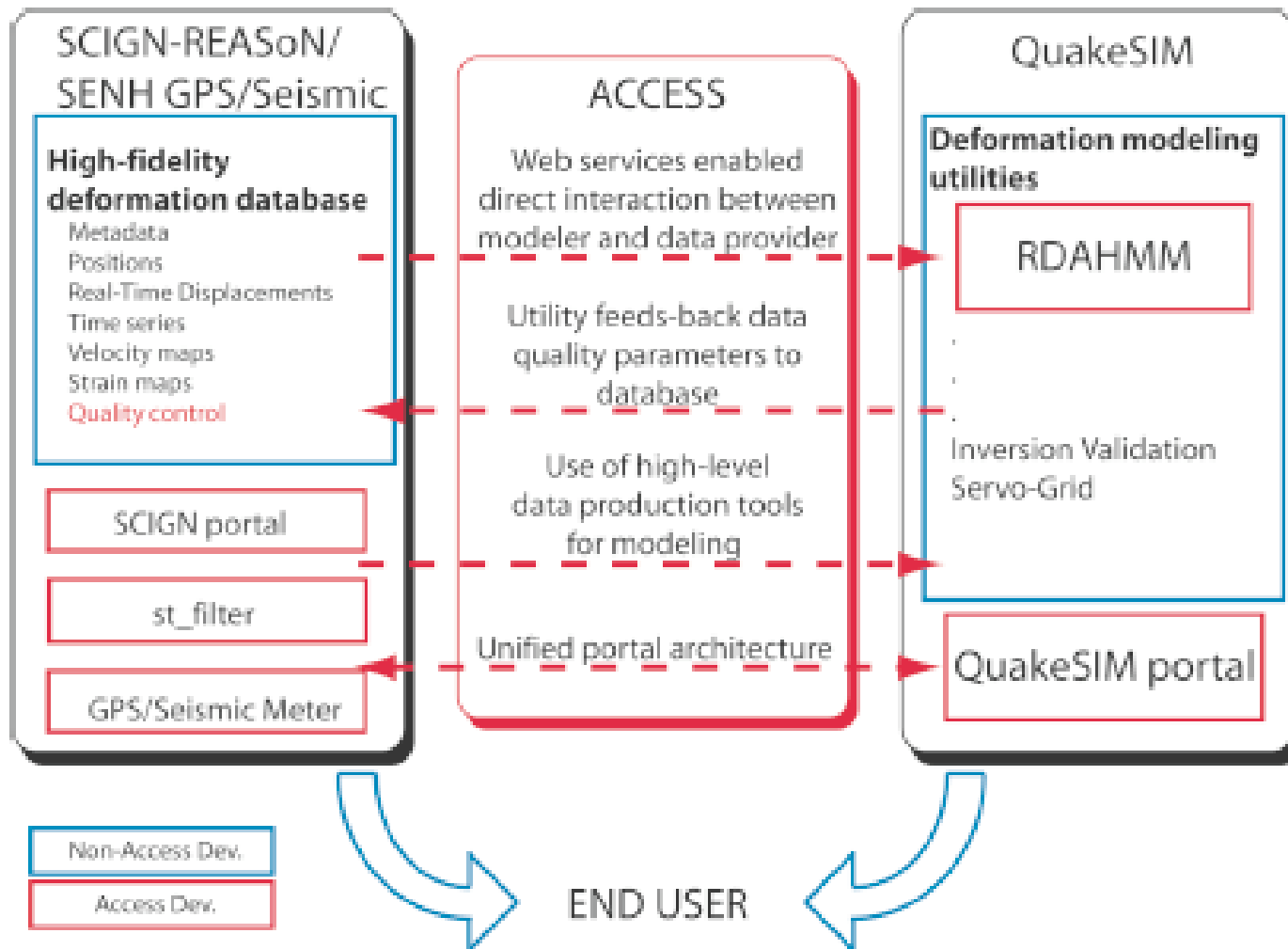
And the public release of GPS Explorer.

# New NASA IT Effort

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- Merge three related projects under one frame work (2006-2008+)
  - SCIGN-REASoN (2004-2008)
    - Combination, validation, archive, and delivery of high-level data products and data mining capabilities from space geodetic measurements, specifically continuous GPS (CPS) observations.
  - QuakeSim (2003-2006)
    - Development of linked Web service environments for supporting high performance models of crustal deformation from a variety of geophysical sensors, including GPS and seismic instruments.
  - SENH-Applications GPS/Seismic integration (2003-2005)
    - Development of a prototype real-time GPS/seismic displacement meter, for use by local agencies responsible for seismic hazard mitigation and monitoring of critical infrastructure.

# Modeling and On-the-fly Solutions for Solid Earth Sciences (MOSES): 2006-2009





# Summary

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- Have developed a web services infrastructure for GPS derived data products. Currently running on <http://reason.scign.org>
- Have forums available on website for people to participate, contribute, comment on XML schemas, desired features, tools, products and services.
- The addition of other products is imminent. This will include products such as rinex data files, station files, monument definitions.
- GPS Explorer is coming...