IGS Workshop
Bern
March 2, 2004

SOPAC IT Developments

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Scripps Institution of Oceanography

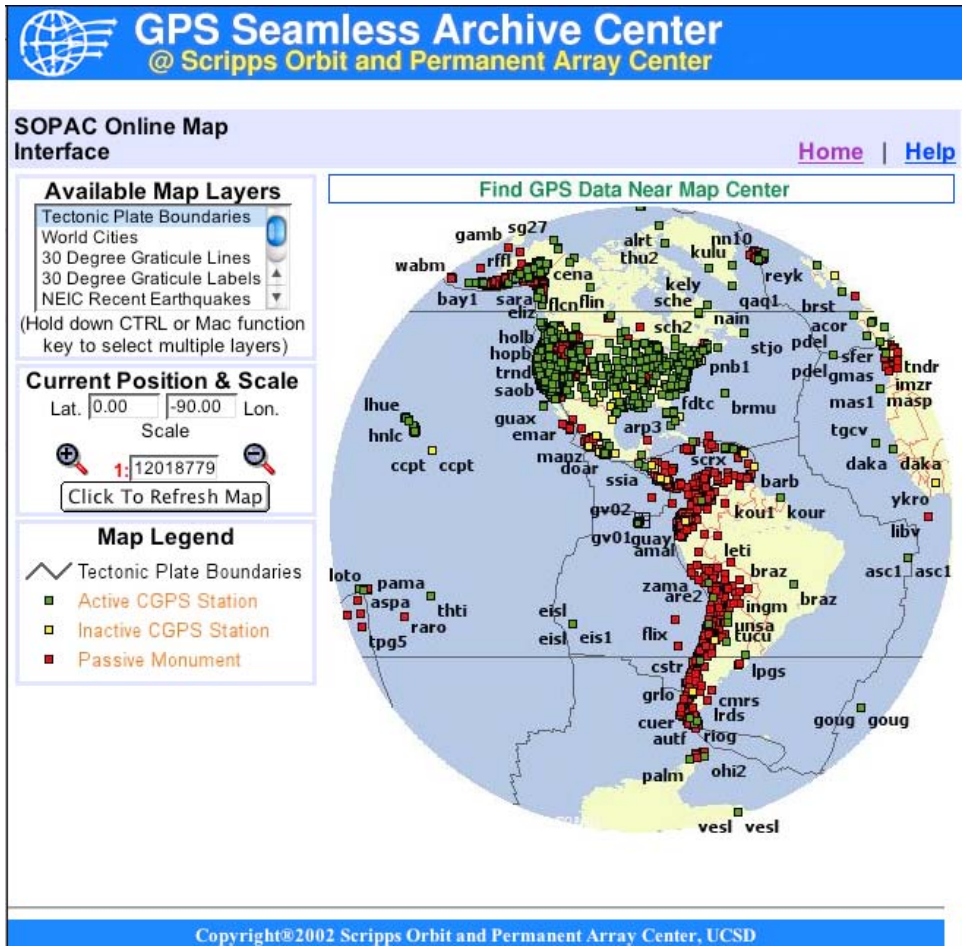
La Jolla, California USA

Outline

- **UNAVCO's GPS Seamless Archive**
  - Fully Operational
  - Funded by NSF/UNAVCO
  - Overseen by GSAC Working Group
- **SCIGN NASA REASoN Project**
  - Funded by NASA – Ongoing 5 year effort
  - Collaboration of JPL (F. Webb PI), SIO, and USGS
  - One of NASA's contributions to Earthscope

GSAC Function

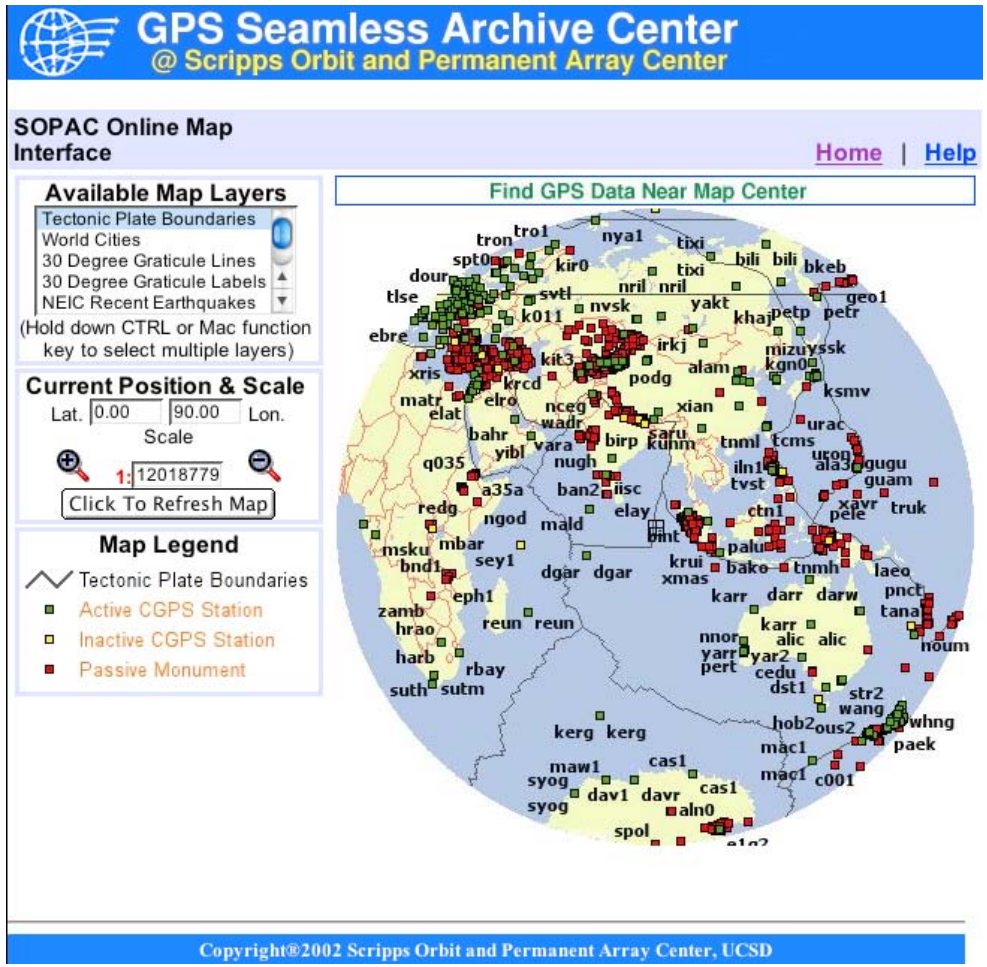
Virtual access to a globally distributed GPS dataset streamlines the discovery of GPS-related resources, relieving users of some, or all, of the burden historically involved with locating, collecting and preparing GPS data and metadata.



CGPS and GPS Monuments in Western Hemisphere

GSAC Data Holdings

Over 2 million GPS RINEX files, and more than 10,000 geodetic monuments, have been published to the GSAC - a nearly complete set of data collected between 1986 and 2003 for the global GPS network and western North America, and a significant quantity of data collected by U.S. scientists in other tectonically active regions.



CGPS and GPS Monuments in Eastern Hemisphere

GSAC Wholesalers

Network of participating archives ("Wholesalers") serves as backbone for seamless access to data.

- **Crustal Dynamics and Data Information Systems**
  Greenbelt, MD ftp://cddisa.gsfc.nasa.gov
- **Northern California Earthquake Data Center**
  Berkeley, CA ftp://quake.geo.berkeley.edu
- **Pacific Northwest Geodetic Array**
  Ellensburg, WA ftp://gsac.panga.cwu.edu
- **Scripps Orbit and Permanent Array Center**
  La Jolla, CA ftp://garner.ucsd.edu
- **Southern California Earthquake Center**
  Pasadena, CA ftp://ramsden.ucsd.edu
- **UNAVCO, Inc.**
  Boulder, CO http://www.unavco.org/facility/

GSAC Retailers

Formalized methodology facilitates a common exchange of GPS-related data and metadata among GSAC participants, enabling centralized indexing of multi-archive data holdings at top-level brokerage nodes (“Retailers”).

- **Scripps Orbit and Permanent Array Center**
  La Jolla, CA **http://gsac.ucsd.edu/**
- **UNAVCO, Inc. Facility**
  Boulder, CO **http://gsac01.unavco.org/GSACWizard**

Online GSAC Access Points

GSAC Wizard
Web Client

Interactive

Command-Line
Client

Download

Batch

Maps

GSAC Service
Interface

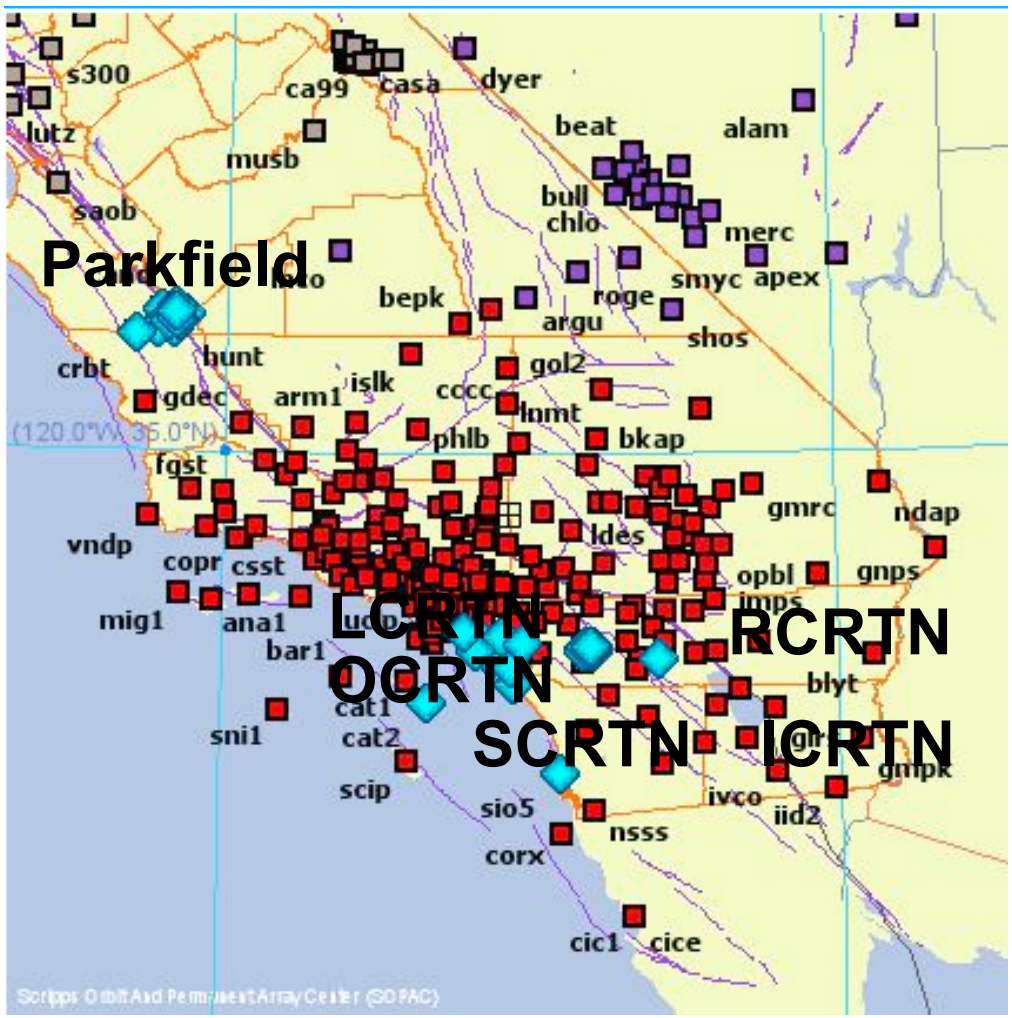
Service

http://gsac.ucsd.edu

SCIGN NASA REASoN Project

- Virtual Archive
  - Data Storage and Delivery
- Adaptive Seamless Archive
  - XML Web Services for Data Management
- GPS Explorer
  - Data Discovery (Portal)
- Spatial Services
- Hierarchical Data Products

Southern California Integrated GPS Network

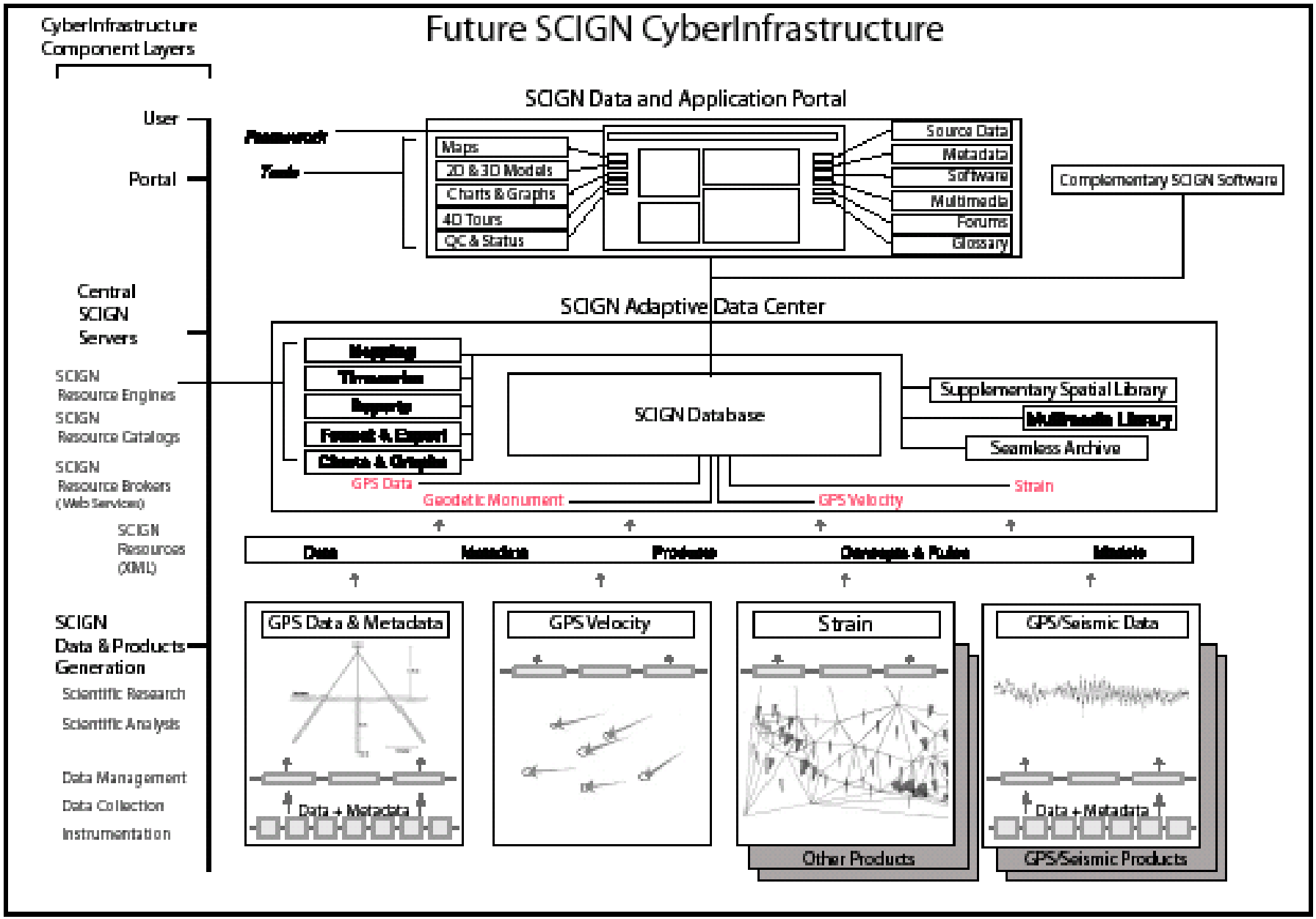


Map Legend

- Tectonic Plate Boundaries
- Nevada Faults
- Baja California Faults
- California Faults (maj quat)
- California Faults (north)
- California County Borders
- 5 Degree Graticule Lines
- 5 Degree Graticule Labels
- Realtime GPS Stations
- BARD GPS Network
- BARGN GPS Network
- SCIGN GPS Network

Diamonds: Real-Time (1 s) High-Rate (1 Hz) Sites

Squares: 6-24 hr download, 5-30 s sampling rate.


Future SCIGN CyberInfrastructure
CyberInfrastructure Component Layers
User
Portal
Central SCIGN Servers
SCIGN Resource Engines
SCIGN Resource Catalogs
SCIGN Resource Brokers (Web Services)
SCIGN Resources (XML)
SCIGN Data & Products Generation
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Scientific Analysis
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Instrumentation
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Other Products
GPS/Seismic Data
Data + Metadata
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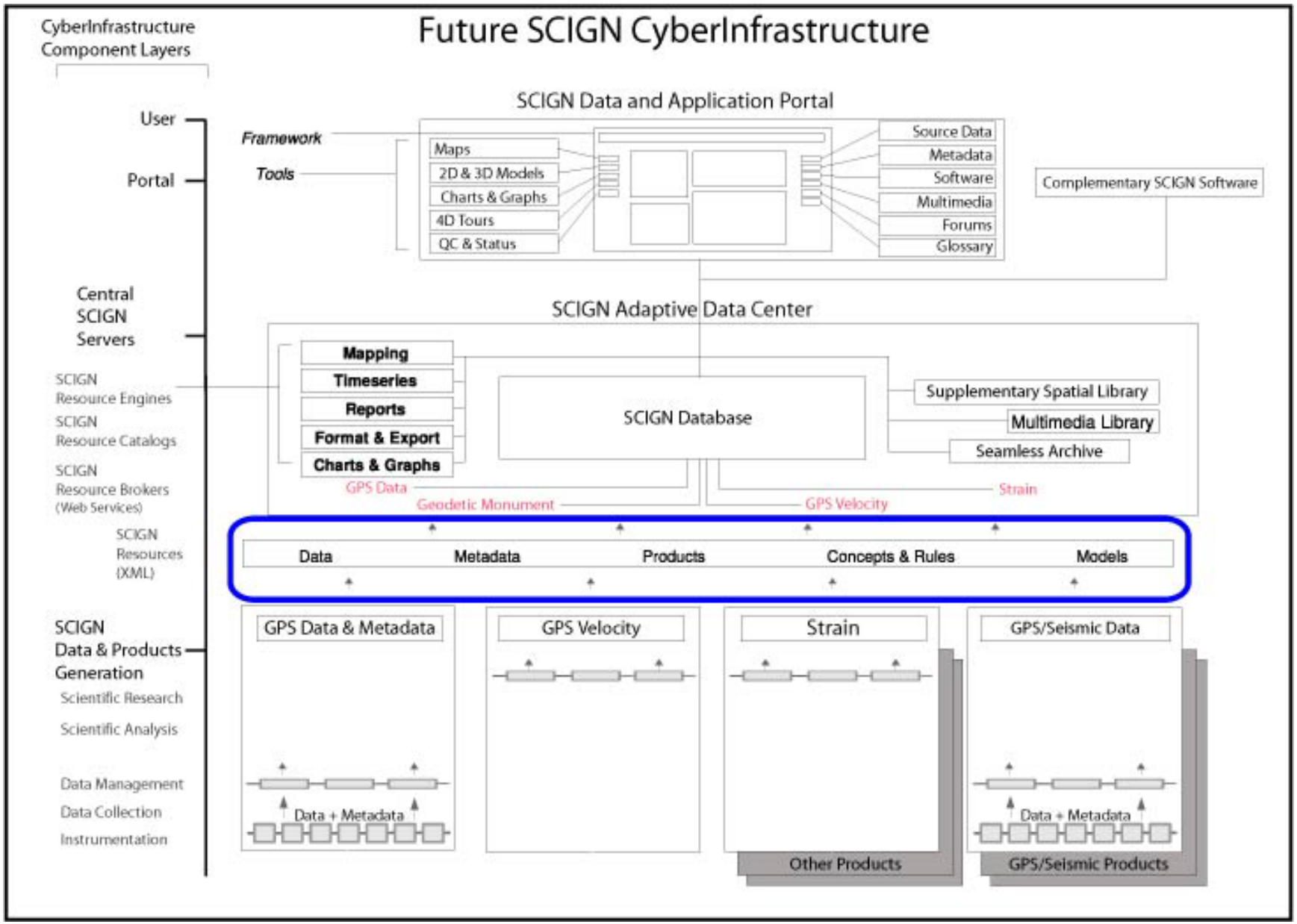
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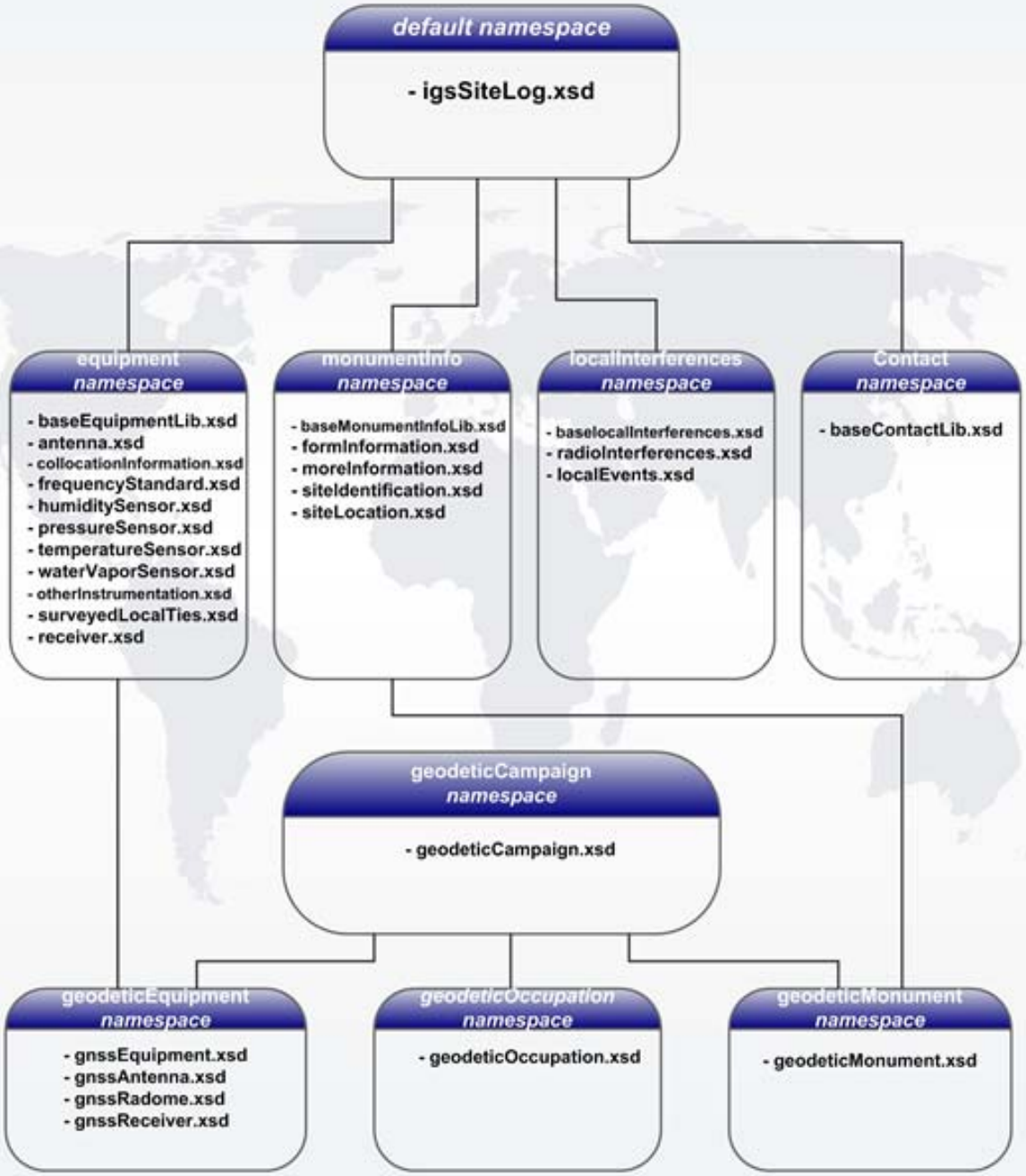
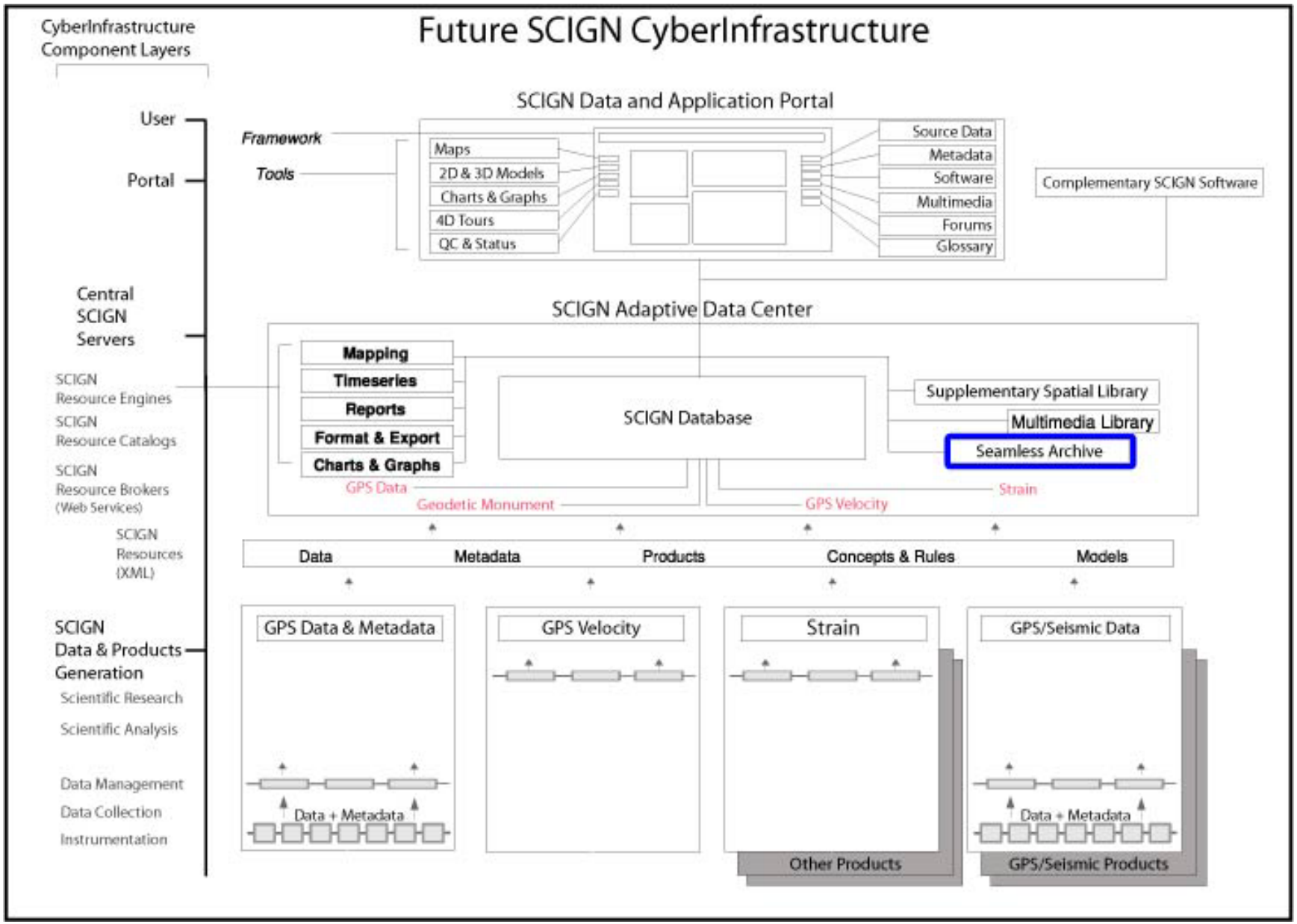
XML / Web Services

- Defines a common means of data exchange
- Multi-disciplinary approach to data modeling
- Hierarchical nature that provides flexibility and extensibility
- Distributed XML Namespace
  - Different organizations can host portions of the namespace.
- XML Site Log Schema used within NASA REASoN Project.

http://sopac.ucsd.edu/projects/xml


default namespace
- igsSiteLog.xsd
equipment namespace
- baseEquipmentLib.xsd
- antenna.xsd
- collocationInformation.xsd
- frequencyStandard.xsd
- humiditySensor.xsd
- pressureSensor.xsd
- temperatureSensor.xsd
- waterVaporSensor.xsd
- otherInstrumentation.xsd
- surveyedLocalTies.xsd
- receiver.xsd
monumentInfo namespace
- baseMonumentInfoLib.xsd
- formInformation.xsd
- moreInformation.xsd
- siteIdentification.xsd
- siteLocation.xsd
localInterferences namespace
- baselocalInterferences.xsd
- radioInterferences.xsd
- localEvents.xsd
Contact namespace
- baseContactLib.xsd
geodeticCampaign namespace
- geodeticCampaign.xsd
geodeticEquipment namespace
- gnssEquipment.xsd
- gnssAntenna.xsd
- gnssRadome.xsd
- gnssReceiver.xsd
geodeticOccupation namespace
- geodeticOccupation.xsd
geodeticMonument namespace
- geodeticMonument.xsd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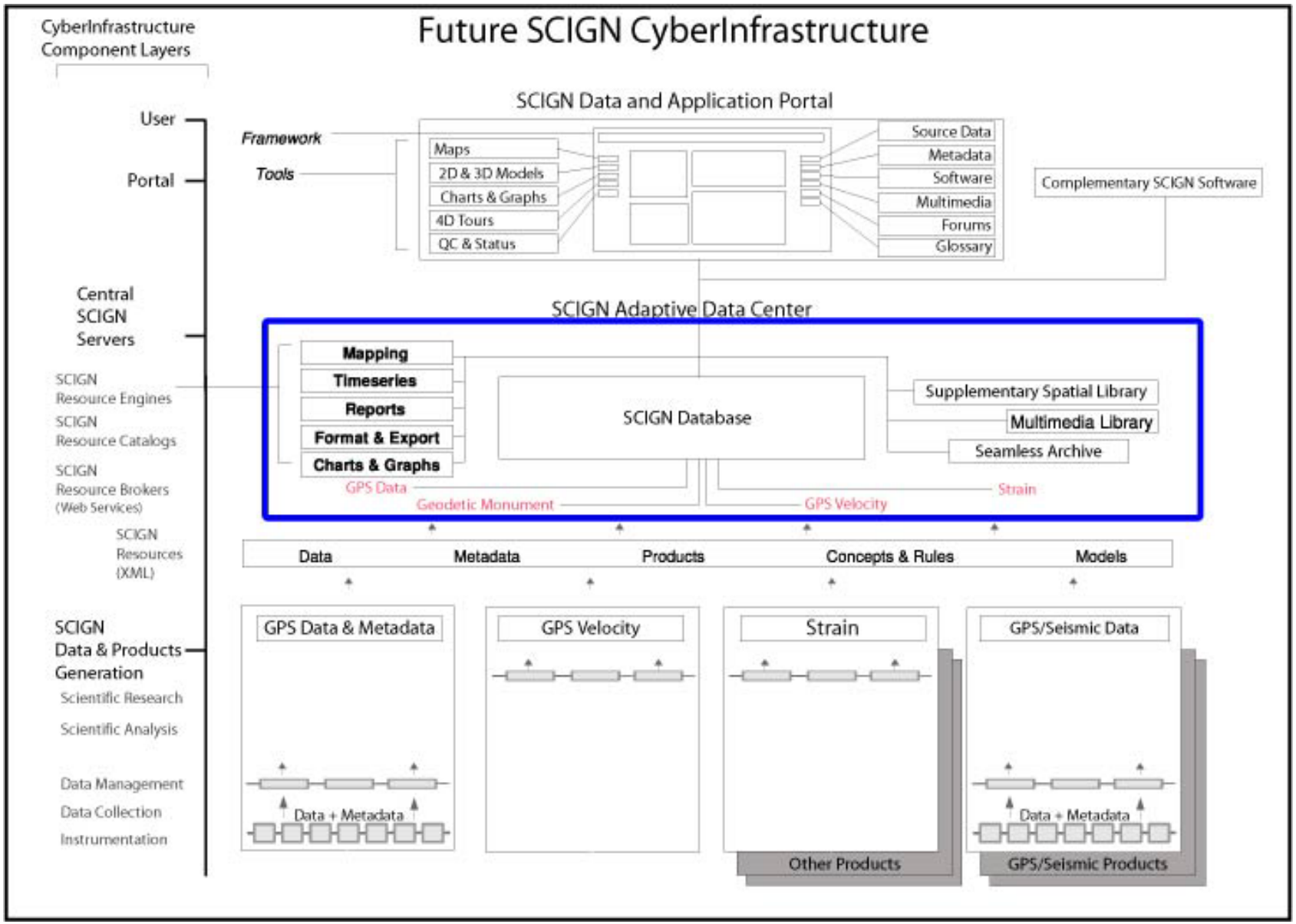
Virtual (Seamless) Archive

- Second-Generation GSAC
- Management of Data Storage
- HTTP Access to Data
- Multiple Storage Nodes (non-NFS)
- Multi-Disciplinary
- Data Redundancy
- XML/SOAP Foundation
- Open Source Project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SCIGN Adaptive Data Center

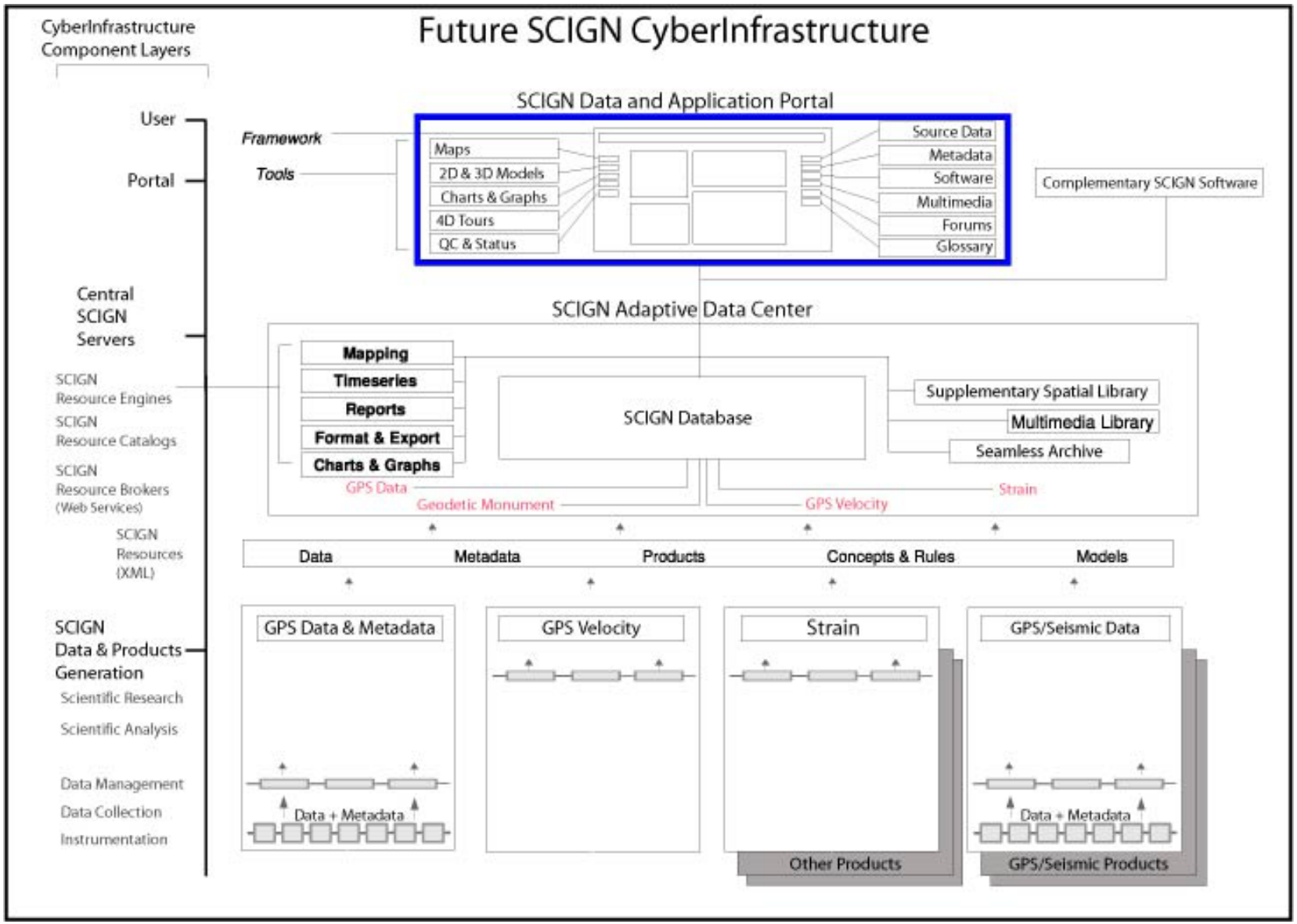
- Provide a centralized, cohesive context for diverse set of geophysical data, metadata, products, media and application logic.
- Depend on a family of "brokers" to receive/return geophysical resources using a formalized data modeling (XML) and communication strategy (SOAP).

SCIGN Adaptive Data Center

- Manage geophysical data files using a scalable, "virtual archive" approach capable of adapting to multi-terabyte growth on a yearly basis.
- Offer a publicly-available catalog of resources for use in the construction of integrative, cutting-edge scientific applications.

SCIGN Adaptive Data Center

- Contribute to, and utilize, existing geophysical data models, on-line information services, software and data clearinghouses (GSAC, GEON, IGS, EarthScope, PBO, etc)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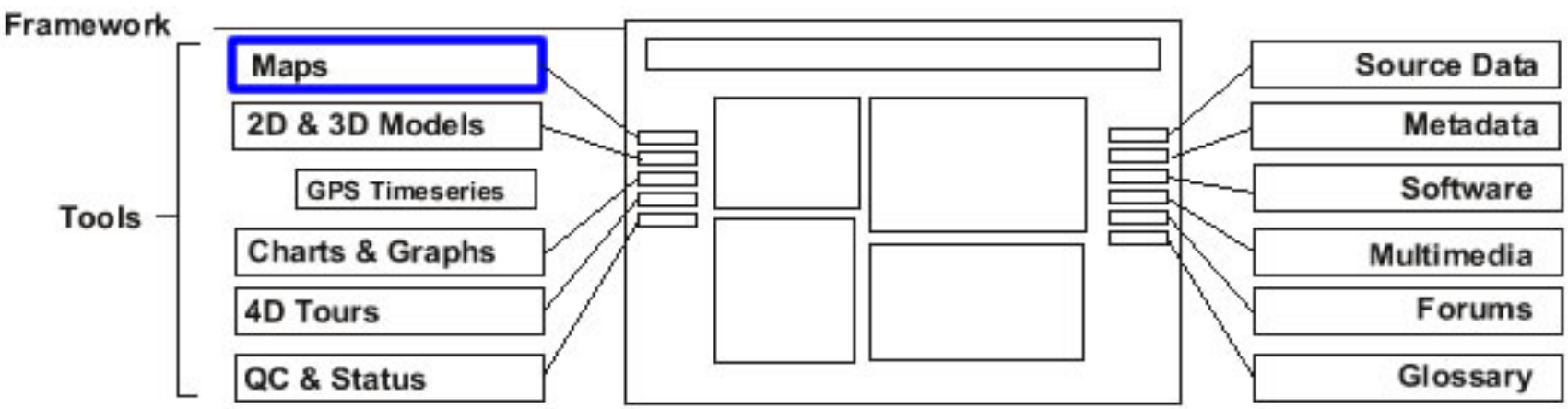
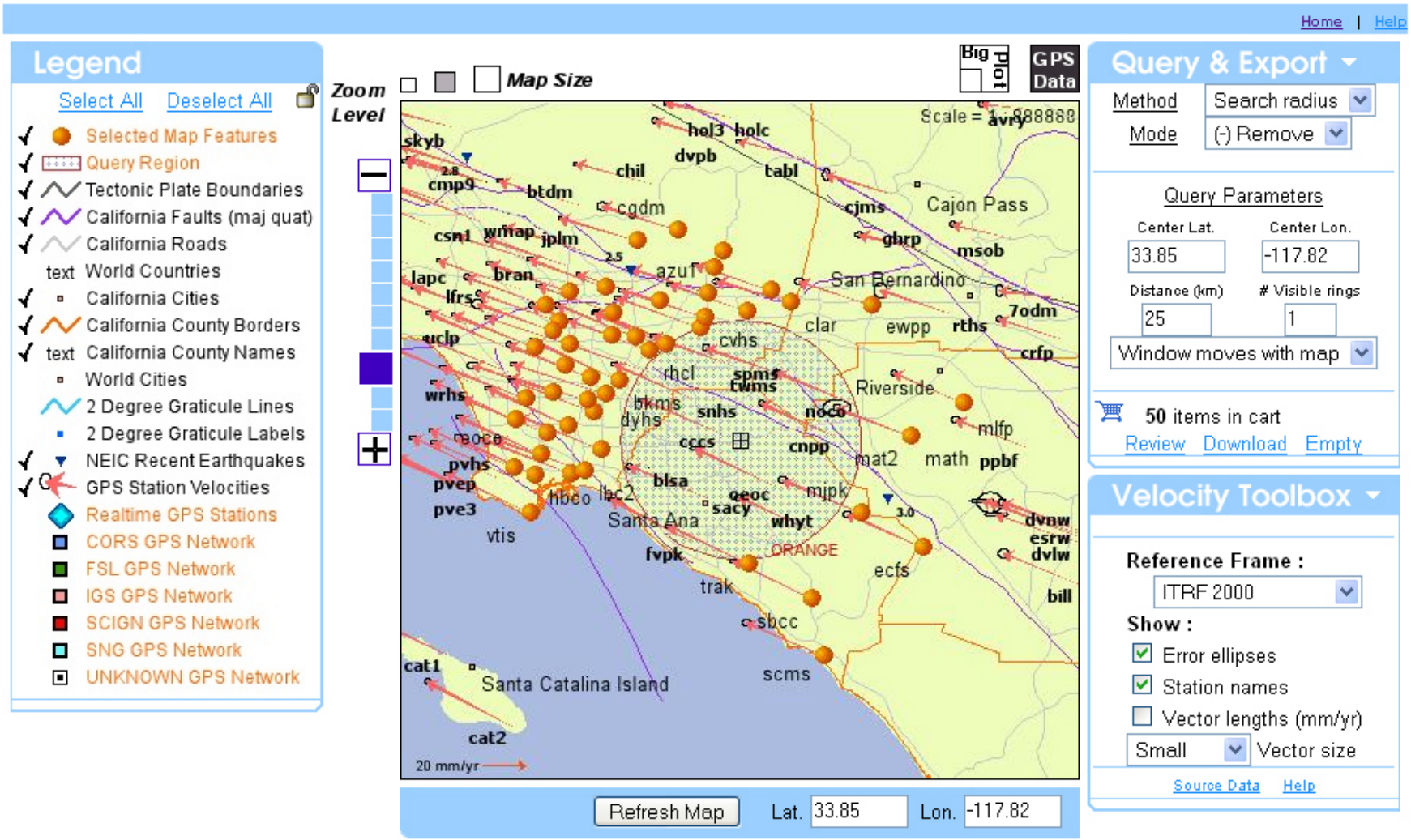
Portal – Map Server Interface




Home | Help
Legend
Select All
Deselect All
Selected Map Features
Query Region
Tectonic Plate Boundaries
California Faults (maj quat)
California Roads
text World Countries
California Cities
California County Borders
text California County Names
World Cities
2 Degree Graticule Lines
2 Degree Graticule Labels
NEIC Recent Earthquakes
GPS Station Velocities
Realtime GPS Stations
CORS GPS Network
FSL GPS Network
IGS GPS Network
SCIGN GPS Network
SNG GPS Network
UNKNOWN GPS Network
Zoom Level
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GPS Data
Scale = 1:888888
Cajon Pass
San Bernardino
Riverside
Santa Ana
ORANGE
Santa Catalina Island
20 mm/yr
Refresh Map
Lat. 33.85
Lon. -117.82
Query & Export
Method
Search radius
Mode
(-) Remove
Query Parameters
Center Lat.
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Center Lon.
-117.82
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25
Visible rings
1
Window moves with map
50 items in cart
Review
Download
Empty
Velocity Toolbox
Reference Frame :
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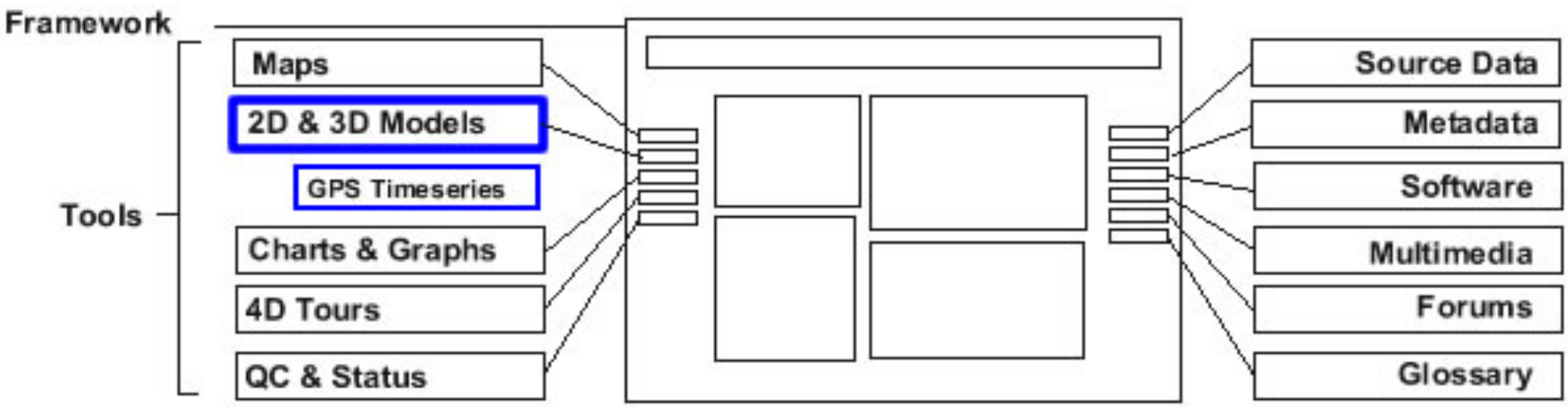
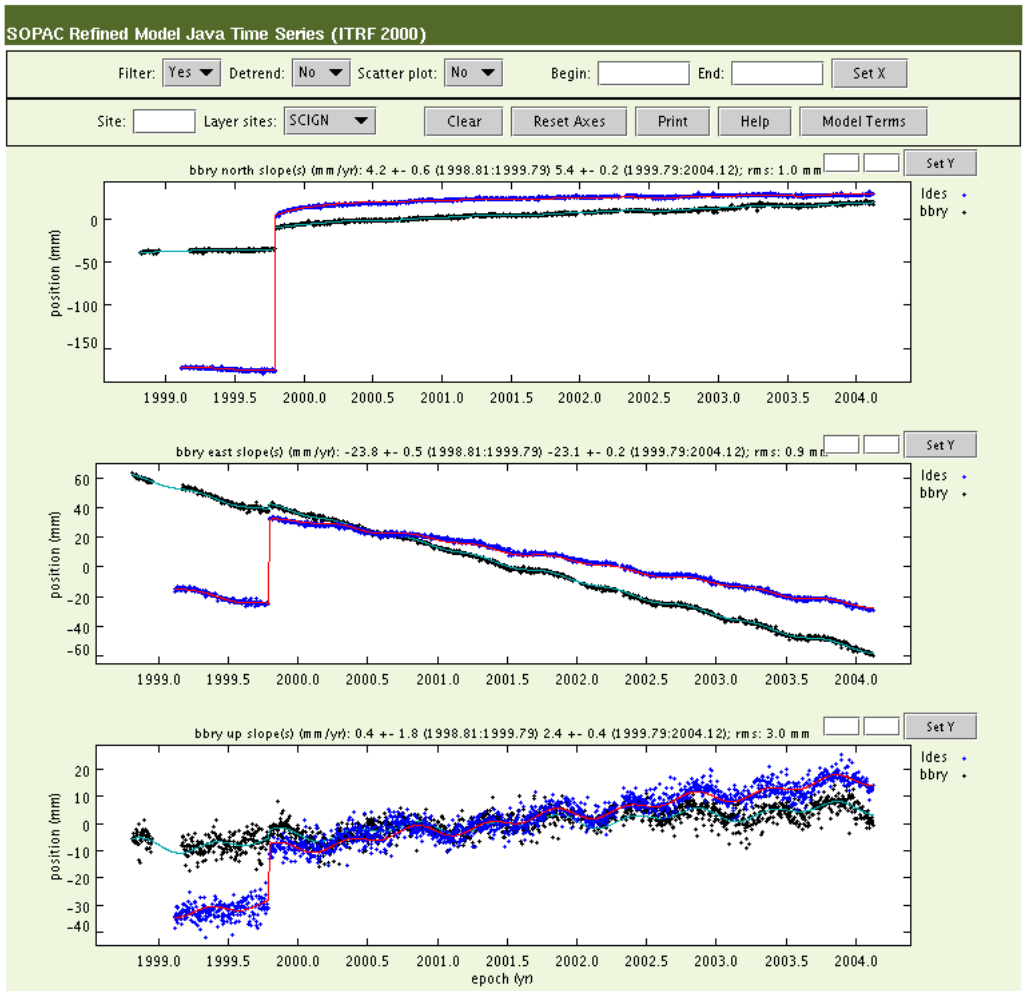
Show :
Error ellipses
Station names
Vector lengths (mm/yr)
Small
Vector size
Source Data
Help

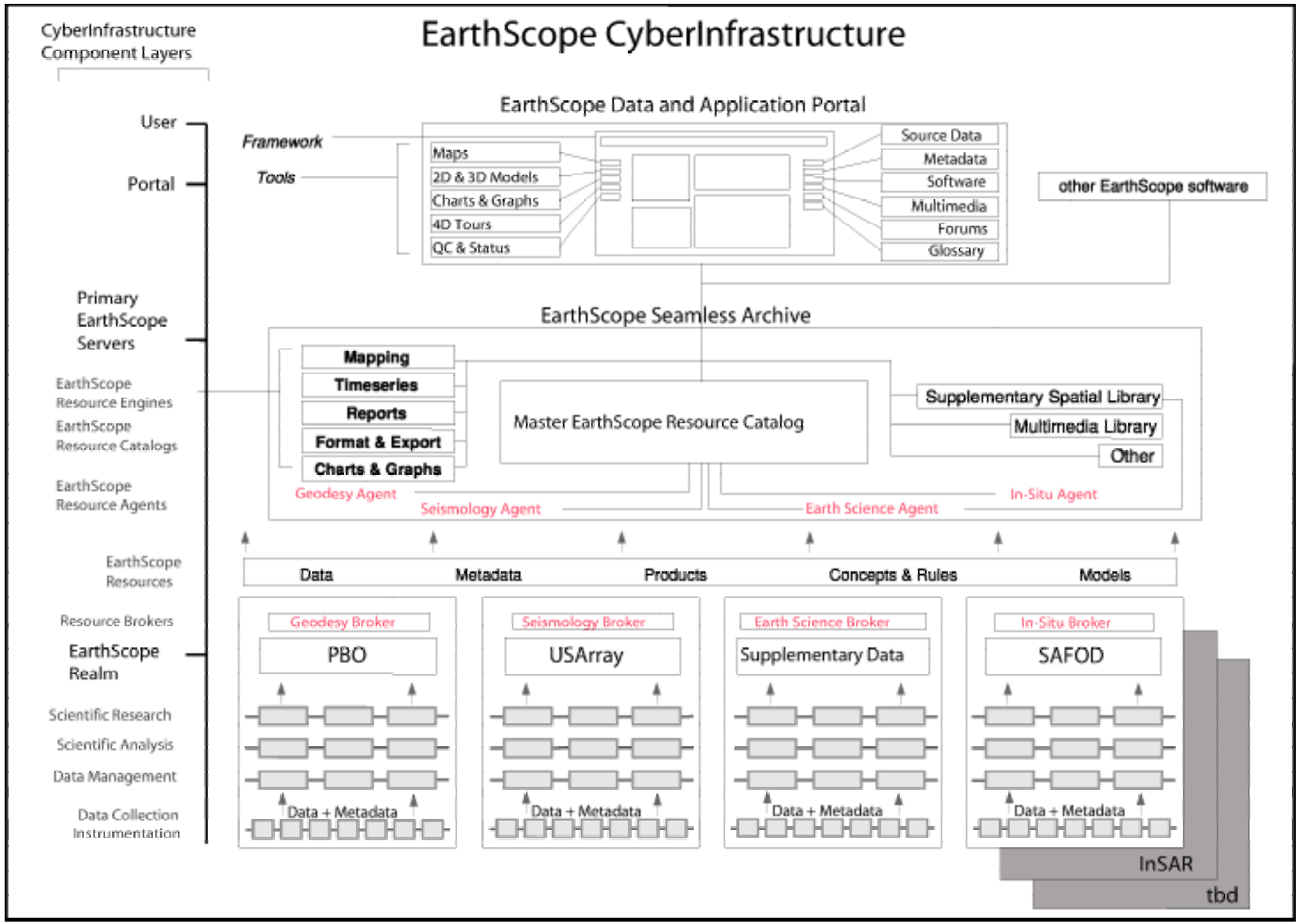
Portal 3D Models - Timeseries




SOPAC Refined Model Java Time Series (ITRF 2000)
Filter: Yes
Detrend: No
Scatter plot: No
Begin:
End:
Set X
Site:
Layer sites: SCIGN
Clear
Reset Axes
Print
Help
Model Terms
bbry north slope(s) (mm/yr): 4.2 +- 0.6 (1998.81:1999.79) 5.4 +- 0.2 (1999.79:2004.12); rms: 1.0 mm
bbry east slope(s) (mm/yr): -23.8 +- 0.5 (1998.81:1999.79) -23.1 +- 0.2 (1999.79:2004.12); rms: 0.9 mm
bbry up slope(s) (mm/yr): 0.4 +- 1.8 (1998.81:1999.79) 2.4 +- 0.4 (1999.79:2004.12); rms: 3.0 mm
Set Y
Ides
bbry
position (mm)
epoch (yr)

GPS Timeseries

- Java applet based on ptplot
- Plots time series data using xml-based files using the ptplot xml plotting definition
- Definition provides a common basis for plotting any type of data


CyberInfrastructure Component Layers
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