GINA: A Network of Geo-spatial Data and Activities

www.gina.alaska.edu

Buck Sharpton
Director
President’s Professor of Remote Sensing
Our Mission

- Provide a permanent, accessible (spinning) archive for university geo-spatial data.
- Provide policy makers and researchers with enhanced access to high-latitude geo-spatial data over the web.
- Provide soup-to-nuts, server-side analysis and visualization tools.
- Provide assistance and training in GIS and satellite image processing.
Strategy

- Planning Phase (FY 2001-2002)
- Development Phase (FY 2002-2004)
  - Design/Develop Data System
    - Including metadata service
  - Create Web Presence
    - Interface and Tools for browsing, analysis, display
  - Populate Data System
- Implementation/Expansion Phase (FY 2004-)
Standards as a foundation for information exchange

- FGDC and ISO metadata standards
- Z39.50 Communications Protocol for client/server interaction
- ESRI ArcSDE and ArcIMS implementation standards
- Additional standards as prescribed by Open GIS Consortium and other guiding organizations.
# GINA Expertise

**Technical Services Manager (Tom Heinrichs)**  
System Analyst; UNIX/Linux System Administration; System Programming; System and Network Security

**Data Systems Analyst (Cheryl Haase)**  
Database Administrator; Data Systems Design; Oracle, Sybase, Ingres Database; Administration; Database Programming (SQL, PL/SQL, Shell Scripts); ArcSDE, ArcIMS; Metadata Standards; Database Security

**Receiving Station Manager (Kevin Engle)**  
System Analyst; Senior Research Programmer; Image Processing; Network Administration, Archiving

**Web and Research Programmer (Dan Stahlke)**  
Web, Application, and Database Programming (Shell, C/C++, Perl, Java, SQL); Network Programming

**System Analyst (Dayne Broderson)**  
System Administration; Web/System Programming (Shell, C/C++, PHP, Ruby); System/Network Security

**Web Programmer (Jason Grimes)**  
Web Maintenance; Graphic Design; XML, CGI, Roxen, Perl Programming

**GIS and Research Programmer (Jay Cable)**  
Web Tool Development; Graphics Programming; C/C++, AML, IMS, XML, CGI, Perl Programming

**GIS Technician (Fred Calef; Graduate Student)**  
Custom GIS Product Development; GIS Client Assistance; ESRI Site License

**Administrative Assistant (Rosanna Campi; Undergraduate Asst.)**  
Digitizing, Web searches, satellite data input and processing, other assistance as needed.
GINA Facilities

**Receiving Stations (ION)**

**EOS/DB X-band (MODIS)**
- 3.6-m antenna
- SeaSpace Terascan capture and processing system

**HRPT (AVHRR & SeaWiFS)**
- 1.5-m antenna
- SeaSpace Terascan capture and processing system

**Production**

**Image Processing**
- Sun Enterprise 420R server
- Sun A5200 disk array 2.4 TB
- SeaSpace Terascan & MODIS IMAPP Software

**Data Server**
- Sun SunFire V880 server
- Sun T3 disk arrays 7.6 TB
- Oracle 9i database
- ESRI Arc SDE spatial data server

**Public Interface (Web)**
- Sun SunFire 280R server
- Apache Web server
- ESRI Arc IMS Mapping Server
- Custom Web Applications

**Development**

**Image Processing**: Sun V100 Terascan, IMAPP

**Data**: Sun V120 Oracle 9i, ArcSDE

**Web**: SunFire V100 Web, ArcIMS, Custom SW

**Test Environment**

**Image Processing**: Sun V100 Terascan, IMAPP

**Data**: Sun V120 Oracle 9i, ArcSDE, 500 GB RAID

**Web**: Sun SunFire, V120 Web, ArcIMS, Custom SW

**Remote Sensing/GIS Teaching Laboratory**
- 14 Sun Ultra 5 workstations
- 400 GB Network Attached Storage
- Sun Enterprise 420R Server
Enterprise Architecture

Development Environment
- New product and tool development area
- Potentially disruptive work done here
- Most recent, perhaps unstable tools available

Test Environment
- Mirrors production environment to ensure realistic testing
- “Proving ground” for new tools and software
- Fairly mature systems refined here prior to production deployment

Production Environment
- Stable interface to public and internal clients
- Only well-considered, tested changes made to production environment
- Redundant failover capabilities: single points of failure minimized
- Uptime and stability are priorities
GINA Model:

Observing Systems:
- Marine Data Sources
- AOOS Archive
- Marine AOOS
- AOOS Tools & UI

Terrestrial
Atmospheric
Subsurface
Human
Satellite ION

Geographic Information Network of Alaska (GINA)
- Metadata
- Data archives held by GINA

GINA Analysis Tools and User Interface
IMS, Browse, etc.

Models
- ARSC
- Others

Users

Internet
Data Sets/Data Systems (so far)

- Imagery from optical, polar orbiting satellites (ION)
  - >56,000 AVHRR Images + 35 passes per day
  - >4,000 MODIS Scenes + 16 passes per day
  - >5,500 SeaWiFS Scenes + 6 passes per day
  - >300 Landsat 7 Scenes

- Arctic Contaminants (AMAP)

- Invasive Species in AK

- Endangered Species in AK
Data Sets/Data Systems (so far)

- National Weather Service Observations
  - 1.5M records to date (representing 5 months of data)
- Permafrost (GI; Vladimir Romanovsky)
- Boreal Fires (Hokkaido Univ.)
- Global Topography*/Bathymetry**
- Global Impact Studies Program

*30 arc-second; **TOPEX, Poseidon, IBCAO data
Real-time Satellite Reception
- MODIS
- AVHRR
- SeaWiFS
- GLI*
- OCM*

Landsat Distribution
- AmericaView
- MRLC

Application Development
- Boreal Fire Monitoring
- Volcanic Hazards
- Coastal ANWR Circulation

Visualization and Tool Development

Training/Certification
Basic Research
  Validation Studies

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*Planned
Satellite Information Products

- Sea Surface Temperature
- Ocean Circulation
- Ocean Color*/Sediment Characterization*
- Vegetation indices*
- Land Temperature*/Thermal Anomalies
- Snow/Ice Distribution*
- Soil Moisture Estimates*
- Cloud Distribution/Properties*
- Atmospheric Water Vapor
- Atmospheric pollutants* (smoke, SO\(_x\))

*requires development/refinement of high-latitude algorithm
Partnerships Within UA:

- **UAS**
  - Environmental Sciences

- **UAA**
  - Geomatics Program
  - ENRI
  - AK Natural Heritage Program

- **UAF**
  - UA Museum
  - Arctic Region Super Computer Fac.
  - Geophysical Inst.I
  - Inst. Arctic Biology (AGC)
  - Alaska SAR Facility
  - Inst. Marine Sci. (SALMon)
  - Intern. Arctic Research Center
  - Provost’s Office
  - VP Research (ARAD)
Partnerships Outside UA:

- International
  - NASDA-Japan
  - Hokkaido Univ.
  - Russian Acad. Science
  - IUGG/IUGS

- National
  - NASA
  - NSF
  - AmericaView, Inc.
  - USGS
    - Eros Data Center
    - Alaska Science Center
    - NBII
  - MRLC

- National (cont’d)
  - US F&WS
  - DOE/ARM
  - AVO

- State
  - ADNR
  - ADEC
  - AFS (BLM)
  - AGDC

- Local
  - Kenai Peninsula Borough

- Tribal
  - Tanana Chiefs