

GEON LiDAR Workflow (GLW)

Users Guide

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<http://lidar.asu.edu>

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About LiDAR

Light Distance and Ranging (LiDAR) or Airborne Laser Swath Mapping (ALSW) data has become readily available as both technologies have increased and the emergence of Geoinformatics has occurred. LiDAR data is collected by use of an aircraft that is outfitted with a kinematic GPS, an inertial measurement unit, and a pulsed laser ranging system. The combination of these three mechanisms work in unison to produce billions of measurements of x, y, and z coordinates of the ground surface and vegetation cover. This data is referred to as the 'Point Cloud' (Crosby, 2006).

Due to the potentially large size of such data sets it can be difficult to both make the data available to others and to model such large data sets in a meaningful way. The GEON LiDAR Workflow (GLW) provides a window to a user-defined selection of raw data that may be modeled into unique, user-defined DEMs or visualizations. The GLW can do this by democratizing the data through multiple super computers. This approach provides a useful avenue to share data and to model cyber infrastructure and information technology. A generalized aerial LiDAR acquisition and processing workflow consists of the following four steps: 1) Data acquisition, 2) processing of laser ranging, GPS and IMU data to generate LiDAR point cloud, 3) point cloud classification and 4) generation, manipulation, and delivery of digital ground and vegetation models (Crosby, 2006)

For more information about LiDAR refer to:

Crosby, Christopher J. A Geoinformatics Approach to LiDAR Data Distribution and Processing with Applications to Geomorphology. Master's Thesis, Arizona State University, August 2006.

<http://activetectonics.la.asu.edu/GEONatASU/index.htm>

<http://lidar.asu.edu>

Getting Started - Register for a GEON and LiDAR account and log in

This portion of the manual will guide you through setting up an account for GEON, setting up an account for LiDAR, and will briefly discuss some options you may come across. In order to use the GEON LiDAR you will need to register with both GEON and register with LiDAR.

Registering with GEON

Step 1

Go to **www.geongrid.org**

This is the intro page for GEON. This is a good location to learn more about GEON and LiDAR by clicking on the About, Research, Resources, Educational, and Tutorials tabs.

Step 2

Click on the **Portal** button shown below. This tab will take you to the login screen.

The screenshot shows the GEON website homepage. At the top is the GEON logo and a search bar. Below the logo is a navigation menu with tabs: Home, Resources, Tutorials, Technology, Publications, Education, iGEON, About, and Portal. The 'Portal' tab is highlighted. Below the navigation menu is a large blue banner with the text: 'The Geosciences Network (GEON) project is a collaboration among a dozen PI institutions and a number of other partner projects, institutions, and agencies to develop cyberinfrastructure in support of an environment for integrative geoscience research.' To the right of this text are two buttons: 'Enter the GEON Portal' and 'New User Tutorial'. A callout box with an arrow points to the 'Enter the GEON Portal' button, containing the text 'Click here to enter'. Below the banner are several sections: 'GEON Newsletter', 'Data' (with a database icon), 'Tools' (with a hammer icon), 'Web Services' (with a globe icon), and 'Knowledge Representation' (with a book icon). At the bottom is a 'Recent News' section with two news items: 'GeoEarthScope Northern California Airborne LiDAR Data Now Available on GEON Portal' and 'AutoPointTracker (APT) - A new tool for calculating geographic paleocoordinates'.

GEON

Home Resources Tutorials Technology Publications Education iGEON About **Portal**

The Geosciences Network (GEON) project is a collaboration among a dozen PI institutions and a number of other partner projects, institutions, and agencies to develop cyberinfrastructure in support of an environment for integrative geoscience research.

Enter the GEON Portal

New User Tutorial

GEON Newsletter

Data
Data can be shared, published, and integrated with other data at the Portal

Tools
Tools can be registered, accessed, and downloaded for use

Web Services
Web services can be registered and invoked using a standard authentication system

Knowledge Representation
Controlled vocabularies, hierarchies, and more complex relationships among scientific terms can be registered and accessed

Recent News

[GeoEarthScope Northern California Airborne LiDAR Data Now Available on GEON Portal](#)
The first processed products from the GeoEarthScope Northern California Airborne LiDAR project are now available via the GEON portal. For further info and step-by-step access instructions, [click here](#).

[AutoPointTracker \(APT\) - A new tool for calculating geographic paleocoordinates](#)
APT enables users to calculate geographic paleocoordinates for their own geologic data. It is available via the PaleoIntegration Project (PIP) service in the GEON portal, and was developed by Chris Scotese (Paleomap Project) in collaboration with Allister Rees and Ashraf Memon (PIP). [Further details](#)

Step 3

The portal grants access to the GEON resources and GEON tools. The portal also provides a private workstation where you can queue jobs and return to access them again and again.

In order to have access to the GEONgrid each user must register by clicking the **Request an Account** link shown below. If you already have an account simply type your username and password into the appropriate box to gain access.

Click here if you have not requested an account and need to register.

GEON PORTAL

[Home](#) [SYNSEIS](#) [LIDAR](#) [PaleoIntegration](#) [GEON Website](#)

Welcome to the GEON Portal

The Geosciences Network (GEON) project is a collaboration among a dozen PI institutions and a number of other partner projects, institutions, and agencies to develop cyberinfrastructure in support of an environment for integrative geoscience research. GEON is funded by the NSF Information Technology Research (ITR) program.

Portal Statistics

Registered Users:	2078		
Registered Resources:	5236		
	Public	Private	
Data	4467	68	
Services	656	4	
Tools	4	1	
Ontologies	26	10	
Total	5153	83	5236

Login

Username(Email)

Password


☐ Remember my login

[Forgot your password?](#) [Request an Account](#)

What's New!

- **New myProjects feature**
The new myProject feature enables users to create projects, share ideas, and collaborate with other users via various tools like wikis, document sharing etc.
- **Improved interface for advanced search**
Improved design interface for the advanced search functionality and enhanced display for search results.
- **Resource registration enhancements**
Resource registration process now allows for multiple authors and multiple temporal coverages.
- **Job monitoring for LIDAR computations**
Detailed job monitoring functionality is in place for tracking LIDAR computations.
- **New Contributor Approval system in place**
The portal now requires users to be pre-approved as "Contributors" before they can register resources into the system.
- **Google Maps integrated into GEON Search**
Advanced Search now uses Google Maps interface for specifying spatial search conditions.
- **Synthetic seismogram computation tool updated**
SYNSEIS portlet now includes a new interactive 2D model builder. In addition, users can now compute multiple seismograms using various source parameters for the same event.

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For further information about GEON news and updates, please e-mail info@geongrid.org
For comments/questions about the geongrid.org website, please e-mail webmaster@geongrid.org



Step 4

This screen requires you to enter information about yourself. Notice, you must enter your first and last name and email address, these fields are required. You must enter a valid email address in order to receive further instructions to login. When you have entered the appropriate information click **Continue**.

The screenshot shows the 'Request an Account' form on the GEON Portal. The form is titled 'Request an Account' and includes a 'Login' section on the right. The main form area has a heading 'Please enter the following information. * fields are required.' and contains several input fields: *First name (George), *Last name (Washington), *Email address (1stpres@pres.com), Organization (United States Gov), Work phone (555-111-0001), Fax (555-111-0002), and a checkbox for 'Do you want to be a contributor for registering data resources into GEON?' (Yes is selected). Below these fields is a text area for 'Briefly describe your dataset information such as data type, file size, abstract, and so on:'. At the bottom of the form is a 'Continue' button. The 'Login' section on the right has fields for 'Username(Email)' and 'Password', a 'Remember my login' checkbox, and buttons for 'Login', 'Forgot your password?', 'Request an Account', and 'Guest Login'.

GEON PORTAL

Home SYNSEIS LIDAR PaleoIntegration GEON Website

Request an Account

Please enter the following information. * fields are required.

*First name: George
*Last name: Washington
*Email address: 1stpres@pres.com
Organization: United States Gov
Work phone: 555-111-0001
Fax: 555-111-0002
Do you want to be a contributor for registering data resources into GEON?
☒ Yes ☐ No
Briefly describe your dataset information such as data type, file size, abstract, and so on:
Write text here
Do you want to add your email to a mailing list in GEON?
☒ Yes ☐ No
Continue

Login

Username(Email):
Password:
☐ Remember my login
Login
[Forgot your password?](#) [Request an Account](#)
Guest Login

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For further information about GEON news and updates, please e-mail info@geongrid.org
For comments/questions about the geongrid.org website, please e-mail webmaster@geongrid.org

Step 5

A confirmation screen will appear with the information you entered. Take a moment to review your information and see that it is correct, if it is correct click **Submit** if it is not correct click **Edit Request**, which will return you to the previous screen.

The screenshot shows the confirmation screen on the GEON Portal. The form is titled 'Request an Account' and includes a heading 'Please confirm the following information:'. The form displays the information entered in the previous step: First name (George), Last name (Washington), Email address (1stpres@pres.com), Organization (United States Gov), Work phone (555-111-0001), Fax (555-111-0002), Contributor (Yes), and Email subscriber (Yes). Below this information is a text area for 'Briefly describe your dataset information such as data type, file size, abstract, and so on:'. At the bottom of the form are buttons for 'Edit Request' and 'Submit'.

GEON PORTAL

Home SYNSEIS LIDAR PaleoIntegration GEON Website

Request an Account

Please confirm the following information:

First name: George
Last name: Washington
Email address: 1stpres@pres.com
Organization: United States Gov
Work phone: 555-111-0001
Fax: 555-111-0002
Contributor: Yes
Briefly describe your dataset information such as data type, file size, abstract, and so on:
Write text here
Email subscriber: Yes
Edit Request **Submit**

When you have completed your request, a screen will appear like the one shown below. You will receive an email from **register@geongrid.org** with further instructions. You can close this window in your browser.

The screenshot shows the GEON Portal website. At the top is the logo "GEONPORTAL" with a globe icon. Below the logo is a navigation bar with links: "Portal Status", "Portal Info", and "Information Web site". The main content area is divided into two columns. The left column has a header "Request an Account" and a message: "Account request is submitted to GEON. Please check your email for instructions on completing your account setup." The right column has a header "Login" and a form with fields for "Username(Email)" and "Password", a checkbox for "Remember my login", a "Login" button, and a "Guest Login" button. There are also links for "Forgot your password?" and "Request an Account".

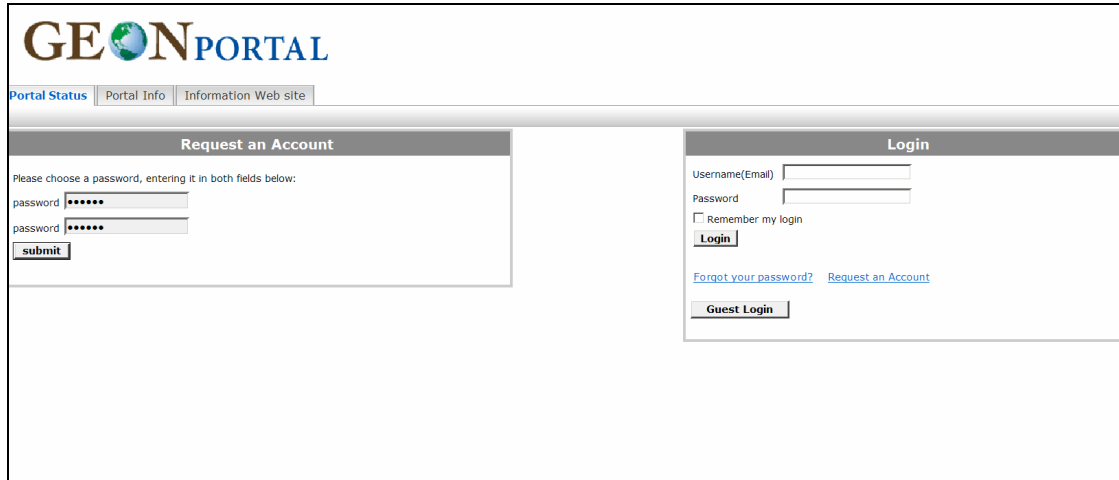
Step 6

Go to your email account and open the email sent from **register@geongrid.org**. Click on the link in this email or copy and paste the address into the address bar of your browser. This should take you to a page similar to the one shown below. Re-enter your email address.

The screenshot shows the GEON Portal website. At the top is the logo "GEONPORTAL" with a globe icon. Below the logo is a navigation bar with links: "Portal Status", "Portal Info", and "Information Web site". The main content area is divided into two columns. The left column has a header "Request an Account" and a message: "In order to finish setting up your portal account, please verify your email address:". Below this message is a text input field containing "j1stpres@pres.com" and a "submit" button. The right column has a header "Login" and a form with fields for "Username(Email)" and "Password", a checkbox for "Remember my login", a "Login" button, and a "Guest Login" button. There are also links for "Forgot your password?" and "Request an Account".

Step 7

After you have entered your email address a new screen like the one shown below will appear. You will need to choose a password and enter it into the appropriate fields, click **Submit**. You will receive a message indicating that your account is awaiting administrative approval. You can now log in and use the GEONgrid.



The screenshot shows the GEONPORTAL website interface. At the top, the logo "GEONPORTAL" is displayed, with "GEON" in brown and "PORTAL" in blue. Below the logo are three tabs: "Portal Status", "Portal Info", and "Information Web site". The main content area is divided into two columns. The left column is titled "Request an Account" and contains the text "Please choose a password, entering it in both fields below:". Below this text are two password input fields, each labeled "password" and containing six asterisks. A "submit" button is located at the bottom of this section. The right column is titled "Login" and contains a "Username(Email)" input field and a "Password" input field. Below these fields is a checkbox labeled "Remember my login" and a "Login" button. At the bottom of the "Login" section are two links: "Forgot your password?" and "Request an Account", and a "Guest Login" button.

To login, type your username and password into the appropriate fields on the right hand side of the screen and click **Login**. You may wish to have your username and password remembered, if so check the box.

Accessing the GEON LiDAR Workflow

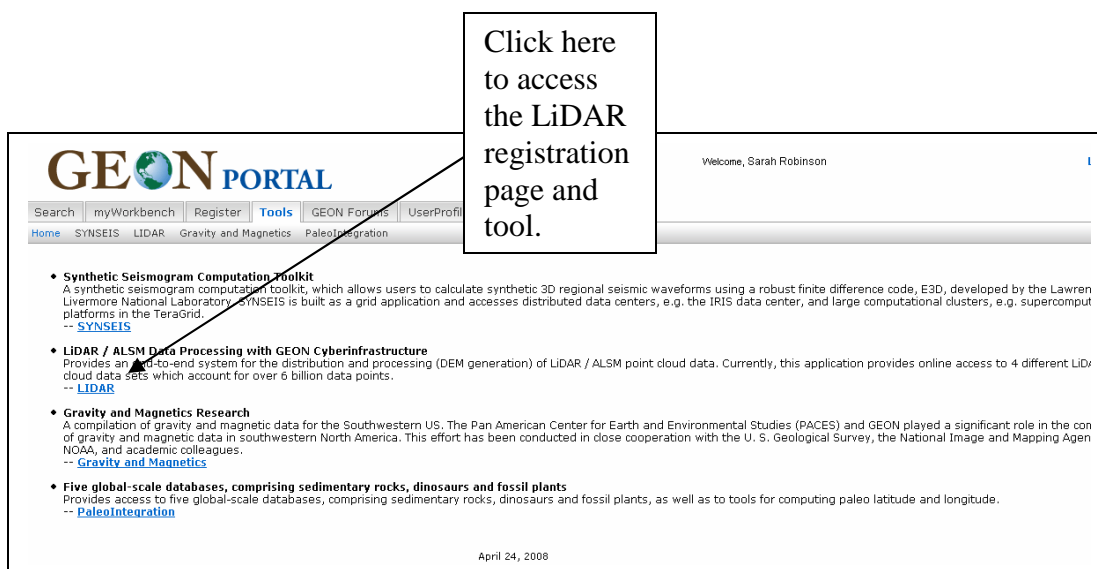
Step 8

Once you have logged into GEON portal, you should see a screen like the one shown below. To access the LiDAR data set, click on the **Tools** tab shown below.



Step 9

This will take you to a screen like the one shown below. This screen is a menu of GEON tools available for use; for more information about each tool click on the appropriate link. To access the LiDAR Workflow, click on the **GEON LiDAR** link shown below.



Step 10

It is now possible to use the LiDAR workflow trial version. To use the trial version, which limits the user to 5 million points per query, see the Data and Tutorials sections of this user's manual. In order to register for an account that will allow 50 million points per query it is necessary to fill out the form shown below (red box), when you are finished click **Submit**. Note that we have this second layer of authentication because we are using US Teragrid compute resources (<http://www.teragrid.org>). We take advantage of the GEON portal role-based authentication capabilities to manage resource use accordingly. Give this a try and if you need more, contact the GLW development team (glw@geongrid.org) and we can up your point limit.

GEONPORTAL

[Logout](#)

GEONsearch | myGEON | Contribute | **GEONtools** | UserProfile | Docs/Help

[Home](#) | [SYNSEIS](#) | [LIDAR](#) | [Atype Workflow](#) | [Gravity](#) | [Magnetics](#) | [PaleoIntegration](#)

Lidar Application

Lidar Datasets
NSAF
Mt. Rainier
ECSZ
B4

LIDAR Utilities
My LIDAR Jobs
My Jobs Submission Info

LIDAR Main Page

LiDAR / ALSM Data Processing with GEON Cyberinfrastructure

Welcome to the GEON LiDAR / ALSM processing page. This site is a proof of concept implementation of an end-to-end system for the distribution and processing (DEM generation) of LiDAR / ALSM point cloud data. This tool capitalizes on cyberinfrastructure developed by GEON as part of its effort to develop information technology for the Geosciences. The goal of this project is to provide a web-based toolset that can democratize access to these rich and computationally challenging data sets. Please note that these pages are actively under development and therefore may experience outages and poor performance. If you have problems or suggestions for improvement, we encourage you to contact us.

Current Interface is not compatible with Internet Explorer 7, We are working on a solution for it.

Please select a data set:

- [Northern San Andreas Fault \(NSAF\), CA](#)
- [West Rainier Seismic Zone, WA](#)
- [Fault systems in the Eastern California Shear Zone \(ECSZ\)](#)
- [B4: Southern San Andreas Fault](#)

Metadata documents on these data sets can be found [here](#).

*Web browser compatibility for Macintosh users: Some aspects of the GEON LiDAR processing pages may not be compatible with Apple's Safari web browser. We recommend [Firefox](#) for browsing these pages.

You currently have limited access to the GEON LiDAR Workflow.

Request full access to run LiDAR jobs:

First Name:

Last Name:

Institution:

Email:

Interest in the LiDAR GEON Workflow (up to 1000 characters):

Please write comments here

Information about us and the projects we are involved with

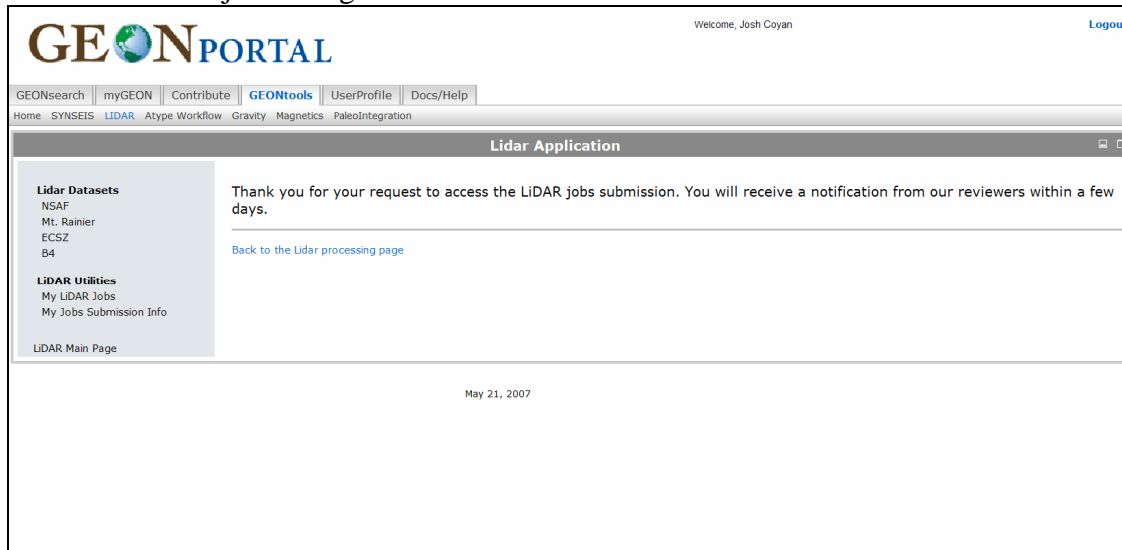
[Geoinformatics at ASU](#)

[ASU Active Tectonics Research Group](#)

[Active Tectonics Group LiDAR / ALSM research pages](#)

[The GEON Project](#)

Once you have completed the form you should see a screen that looks like the one shown below. Expect to receive an email from the GLW reviewers within 24 hours. While you are waiting, feel free to run some jobs and get used to the GLW.



The next time you return to the LiDAR page the registration form will not be a part of the screen and you can now directly access the data sets. For information on how to access the data sets see the Data and Tutorial sections of this User's Manual.

(Optional) Customize your portal

Step 11

From the GEON portal shown below, click the **UserProfile** tab. In this tab you can edit your account information, change your password, and customize your workstation. To add a LiDAR Workflow tab to your workstation click the box next to LiDAR as shown below. Then click **Save**.

GEONPORTAL

GEONsearch myGEON Contribute GEONtools **UserProfile** Docs/Help

User Settings

User Profile Manager Portlet

Edit Setting .com **Customize registered portlets below in your layout**

Last Login Time: Monday, May 21, 2007 4:28:37 PM PDT

User Name: [text box]@po.com

Full Name: George Washington

Email Address: jstpres@pres.com

Organization: United States Gov

Save

Update password

Enter original password: [text box]

Password: [text box]

Confirm password: [text box]

Save

Groups	Group Description	Role in Group
<input type="checkbox"/> gridportlets	Grid Portlets	User
<input checked="" type="checkbox"/> gama	admin group for grid accounts	User
<input type="checkbox"/> PaleoIntegration	PaleoIntegration Project	User
<input type="checkbox"/> LIDAR	LIDAR Group	User
<input type="checkbox"/> SYNSEIS	SYNSEIS portlet	User
<input type="checkbox"/> Classroom Group Account	Classroom Group Account	User
<input checked="" type="checkbox"/> gridsphere	Core GridSphere Group	User

Save

Click here to add a LiDAR tab to your workstation.

You should notice that a tab entitles LiDAR is now be located on the top of the screen as shown below.

GEONPORTAL

GEONsearch myGEON Contribute GEONtools **UserProfile** Docs/Help **LIDAR**

User Settings

User Profile Manager Portlet

Edit Setting .com **Customize registered portlets below in your layout**

Last Login Time: Monday, May 21, 2007 4:28:37 PM PDT

User Name: [text box]@po.com

Full Name: George Washington

Email Address: jstpres@pres.com

Organization: United States Gov

Save

Update password

Enter original password: [text box]

Password: [text box]

Confirm password: [text box]

Save

Groups	Group Description	Role in Group
<input type="checkbox"/> gridportlets	Grid Portlets	User
<input checked="" type="checkbox"/> gama	admin group for grid accounts	User
<input type="checkbox"/> PaleoIntegration	PaleoIntegration Project	User
<input checked="" type="checkbox"/> LIDAR	LIDAR Group	User
<input type="checkbox"/> SYNSEIS	SYNSEIS portlet	User
<input type="checkbox"/> Classroom Group Account	Classroom Group Account	User
<input checked="" type="checkbox"/> gridsphere	Core GridSphere Group	User

Save

New LiDAR workstation Tab

From the GEON portal, you can now click on the LiDAR tab to come directly to the LiDAR portal.

Information about the datasets currently available in the GEON LiDAR Workflow

Northern San Andreas Fault (NSAF), CA Data Set

The Northern San Andreas Fault data set features data along the Northern San Andreas fault and associated marine terraces in coastal Sonoma and Mendocino counties, California. This data set covers approximately 418 square kilometers and includes approximately 1.2 billion data points. Point density is 1.2 points per square meter.

This airborne laser swath mapping data was acquired in support of collaborative research by members of the U.S. Geological Survey (USGS) and the National Aeronautics and Space Administration (NASA), with funding provided by NASA's Earth Surface and Interior Focus Area. The data were acquired and processed by TerraPoint, LLC under contract to NASA's Stennis Space Center. The data are in the public domain with no restrictions on their use.

Projection: State Plane

Zone for San Andreas: California II

Horizontal units: US Survey Feet (= 1200/3937 meters ~ 0.30480061 meters)

Elevation units: International Feet (= 0.3048 meters)

Spheroid: GRS80

Horizontal Datum: NAD83, 1991 Adjustment

Vertical Datum: NAVD88

Orthometric elevations are derived from ellipsoid elevations using the National Geodetic Survey geoid model Geoid99

(https://portal.geongrid.org:8443/gridsphere/gridsphere?gs_action=lidarNSAF&cid=215)

Western Rainier Seismic Zone, WA Data Set

The Western Rainier Seismic Zone data set features data from the western Rainier seismic zone, adjacent to Mt. Rainier, in Pierce County, WA. This data set covers approximately 325 square kilometers and includes approximately a billion data points. Point density is approximately 2 points per square meter. For more information on these data please go to:
http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_67004.htm.

This airborne laser swath mapping data was acquired in support of collaborative research by members of the U.S. Geological Survey (USGS) and the National Aeronautics and Space Administration (NASA), with funding provided by NASA's Earth Surface and Interior Focus Area. The data were acquired and processed by TerraPoint, LLC under contract to NASA's Stennis Space Center. The data are in the public domain with no restrictions on their use.

Projection: State Plane

Zone: Washington North

Horizontal units: US Survey Feet (= 1200/3937 meters ~ 0.30480061 meters)

Elevation units: International Feet (= 0.3048 meters)

Spheroid: GRS80

Horizontal Datum: NAD83, 1991 Adjustment

Vertical Datum: NAVD88

Orthometric elevations are derived from ellipsoid elevations using the National Geodetic Survey geoid model Geoid99

(https://portal.geongrid.org:8443/gridsphere/gridsphere?gs_action=lidarRainier&cid=215)

Fault Systems in the Eastern California Shear Zone (ECSZ)



The Fault Systems in the Eastern California Shear Zone (ECSZ) contains data acquired by the [National Center for Airborne Laser Mapping \(NCALM\)](#) on behalf of Dr. Mike Oskin (UNC) and Dr. Lesley Perg (U of M)) as part of their NSF project on fault systems in the Eastern California Shear Zone. They have kindly agreed to make these data available to the research community through the GEON LiDAR Workflow.

Grid Coordinate System Name: Universal Transverse Mercator

UTM Zone Number: 11 N

Transverse Mercator Projection

Scale Factor at Central Meridian: 0.999600

Longitude of Central Meridian: -117.000000

Latitude of Projection Origin: 0.000000

False Easting: 500000.000000

False Northing: 0.000000

Planar Coordinate Information:

Planar Distance Units: meters

Geodetic Model

Horizontal Datum Name: D_WGS_1984

Ellipsoid Name: WGS_1984

(https://portal.geongrid.org:8443/gridsphere/gridsphere?gs_action=lidarECSZ&cid=215)

B4: Southern San Andreas Fault



B4

The B4: Southern San Andreas Fault Data Set offers access to LiDAR point cloud data of the southern San Andreas Fault acquired by the [National Center for Airborne Laser Mapping \(NCALM\)](#) through funding from the National Science Foundation (NSF) as part of the "B4 Project". The B4 Project has kindly agreed to make these data available to the research community through the GEON LiDAR Workflow. If you utilize the B4 data for talks, posters or publications, we ask that you acknowledge the B4 project.

Grid Coordinate System Name: Universal Transverse Mercator
UTM Zone Number: 11 N

Transverse Mercator Projection

Scale Factor at Central Meridian: 0.999600
Longitude of Central Meridian: -117.000000
Latitude of Projection Origin: 0.000000
False Easting: 500000.000000
False Northing: 0.000000
Planar Coordinate Information:
Planar Distance Units: meters

Geodetic Model

Horizontal Datum Name: D_WGS_1984
Ellipsoid Name: WGS_1984

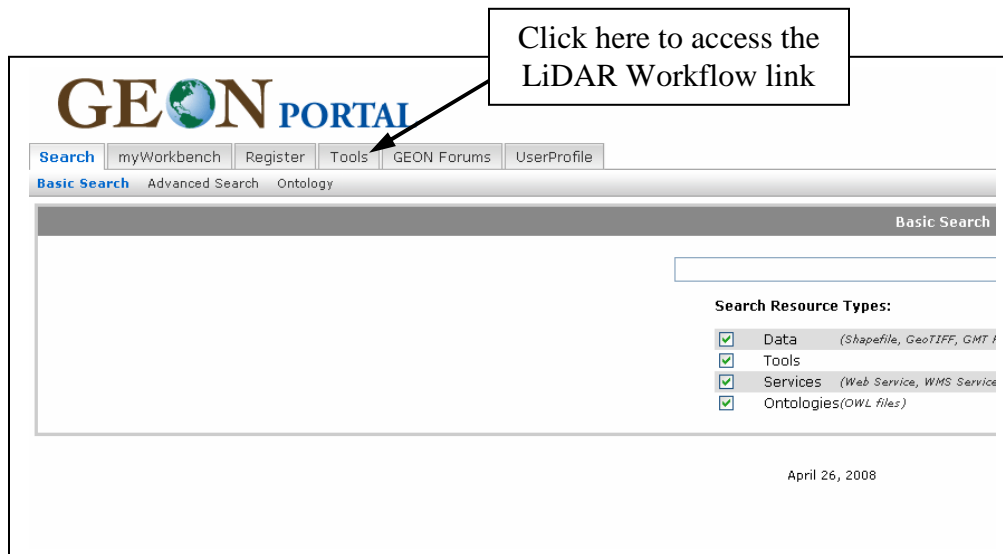
(https://portal.geongrid.org:8443/gridsphere/gridsphere?gs_action=lidarB4&cid=215)

Dataset tutorials—How to process and download data in the GEON LiDAR Workflow

Navigating to the different datasets

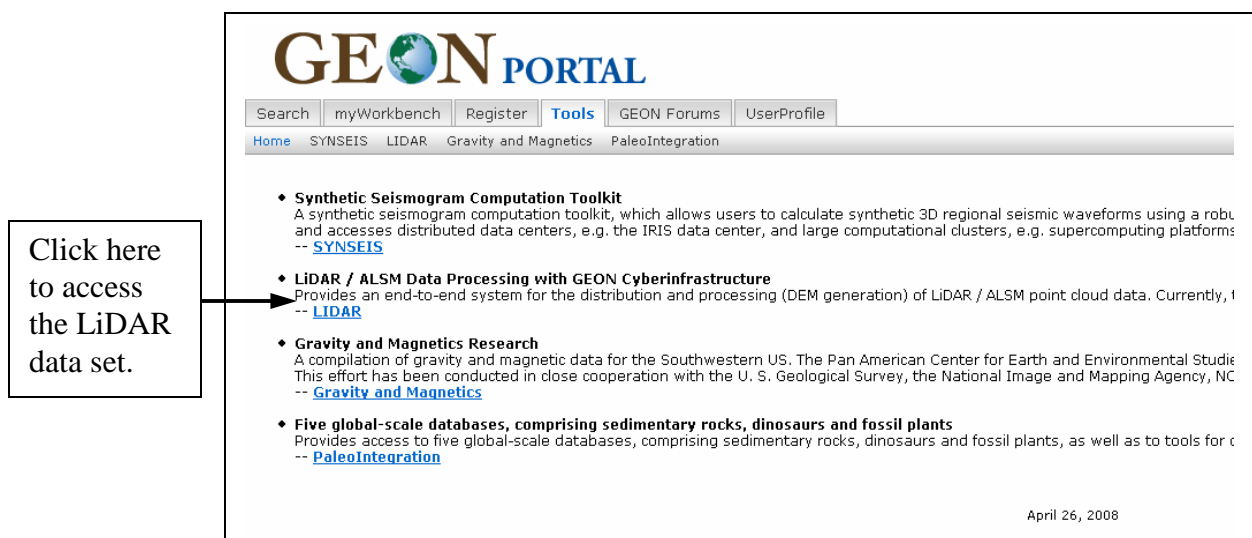
Step 1

After you have requested an account and logged into the GEON Portal click the “**Tools**” tab




Step 2

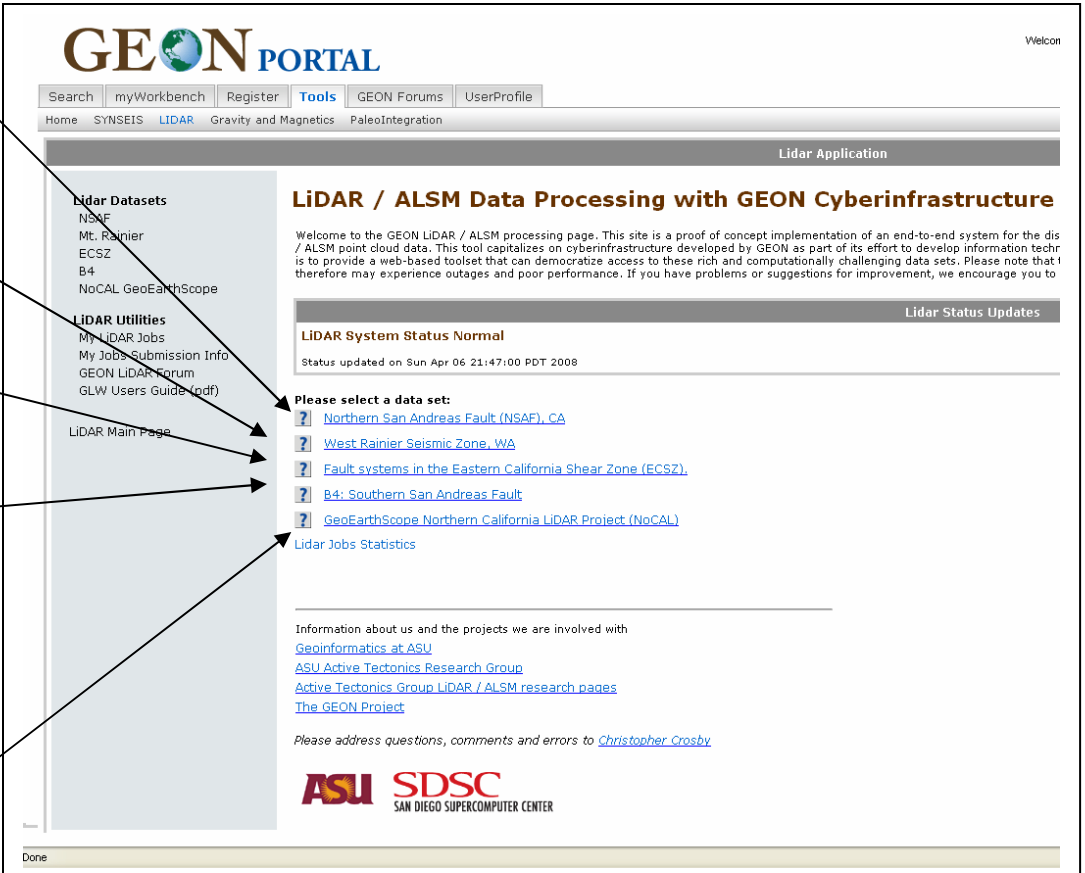
Click on the “**LIDAR**” link below.



Step 3

This page contains links to five data sets offered by the LiDAR Workflow.

When you see the symbol  you can click on them to receive more information concerning the topic that the symbol is in front of.

Click here to access the NSAF data set.	
Click here to access the West Rainier data set.	
Click here to access the ECSZ data set.	
Click here to access the B4 Southern SAF data set.	
Click here to access the GeoEarthScope Northern California data set.	

Downloading Data

This portion of the manual will guide you through downloading data from the **B4 Southern SAF** data set. The other data sets use a similar interface for downloading LiDAR data (i.e. if you know how to download data from B4, you can easily figure out how to navigate the other data sets).

Step 1

Click on the “**B4: Southern San Andreas Fault**” link.

Click
here

Lidar Datasets
NSAF
Mt. Rainier
ECSZ
B4
NoCAL GeoEarthScope

LiDAR / ALSM Data Processing with GEON

Welcome to the GEON LiDAR / ALSM processing page. This site is a proof of concept implementation of an end-to-end system for the distribution and processing (DEM generation) of LiDAR / ALSM point cloud data. This tool capitalizes on cyberinfrastructure development to provide a web-based toolset that can democratize access to these rich and computationally challenging data sets. Please note that these pages are actively under development and therefore may experience outages and poor performance. If you have problems or suggestions for improvement, we encourage you to contact us.

LiDAR System Status Normal
Status updated on Sun Apr 06 21:47:00 PDT 2008

Please select a data set:

- [? Northern San Andreas Fault \(NSAF\), CA](#)
- [? West Rainier Seismic Zone, WA](#)
- [? Fault systems in the Eastern California Shear Zone \(ECSZ\).](#)
- [? **B4: Southern San Andreas Fault**](#)
- [? GeoEarthScope Northern California LiDAR Project \(NoCAL\)](#)

[LiDAR Jobs Statistics](#)

You should enter a page that looks like the one below. This page includes information about the B4 project, and an interactive map for downloading the LiDAR data.

GEONPORTAL

Welcome, Sarah Robinson

[myWorkbench](#) [Register](#) [Tools](#) [GEON Forums](#) [UserProfile](#)

[Home](#) [SYNSEIS](#) [LiDAR](#) [Gravity and Magnetics](#) [PaleoIntegration](#)


Lidar Datasets
NSAF
Mt. Rainier
ECSZ
B4
NoCAL GeoEarthScope

LiDAR / ALSM Data Processing with GEON Cyberinfrastructure

Welcome to the GEON LiDAR / ALSM processing page. This site is a proof of concept implementation of an end-to-end system for the distribution and processing (DEM generation) of LiDAR / ALSM point cloud data. This tool capitalizes on cyberinfrastructure developed by GEON as part of its effort to develop information technology for the Geosciences. The goal of this project is to provide a web-based toolset that can democratize access to these rich and computationally challenging data sets. Please note that these pages are actively under development and therefore may experience outages and poor performance. If you have problems or suggestions for improvement, we encourage you to contact us.

This page offers access to LiDAR point cloud data of the southern San Andreas Fault acquired by the [National Center for Airborne Laser Mapping \(NCALM\)](#) through funding from the National Science Foundation (NSF) as part of the “B4 Project”. The B4 Project has kindly agreed to make these data available to the research community through the GEON LiDAR Workflow. If you utilize the B4 data for talks, posters or publications, we ask that you acknowledge the B4 project. The B4 logo can be downloaded [here](#).

Interactive spatial selection of LiDAR data



Step 2

Scroll down to view the interactive map.

Interactive spatial selection of LiDAR data

Tools for interacting with the map

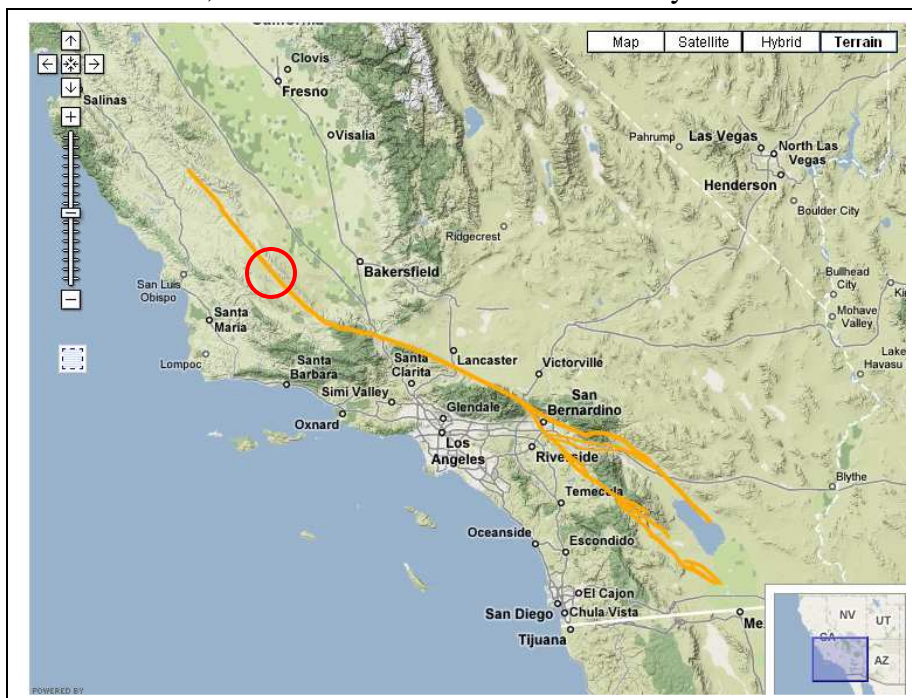
Tabs allow you to change from the terrain view to map, satellite, or hybrid views.

Yellow indicates where there should be downloadable data

Map data ©2008 LeadDog Consulting, Terracon

To download data, zoom in toward the area of interest using the button. You can also navigate north () , south () , east () , or west () on the map using the corresponding buttons, or by clicking and dragging the map with your mouse.


For this tutorial, **zoom in** to the location indicated by the red circle below.

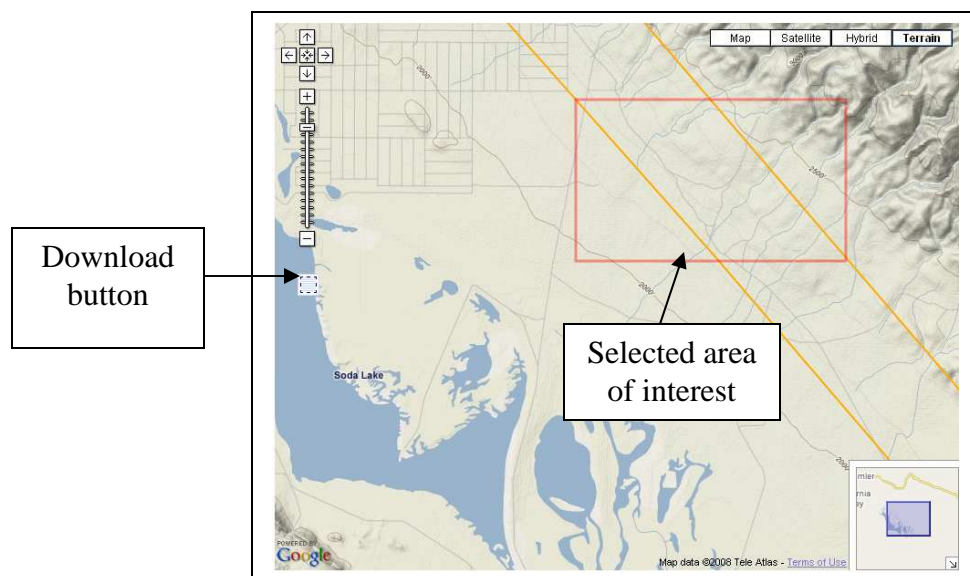


Step 3

Once you've zoomed in closer, your map should look similar to the one below.



To download data, click on the  button, and select the area that you would like to download.



Note that if you select an area too large, you will get a message which warns you that the selection area is too large for a spline algorithm. This limit does not apply to downloading point cloud data. The limit of 1.6 million points is an approximation, and may vary.

The selection area contains approximately 1,888,000 points.
Estimated processing time for the local binning algorithm is 193 seconds.
Warning, the selection area contains more than 1.6 million points. Currently, interpolation of points to an elevation product is limited to 1,600,000 points for the spline algorithm. The local binning algorithm is limited to 100,000,000 points. This limit does not apply to downloads of point cloud data. If you'd like to download the point cloud data for this selection, choose only the "download raw data" option below and submit your request.
* These estimates are based on average system load.

Step 4

Scroll down below the interactive map. This part of the page shows you the coordinates you selected while using the interactive map. These can also be entered manually. The rest of the page allows you to choose your preferences for downloading the data.

Your data selection coordinates → Data selection coordinates

Checkbox option to download raw data → ☐ Download raw data (Query result in compressed ASCII File)

Options for your DEM generation using local binning algorithms → Interpolation Method and Product Download Format

You can click on the button to view options for generating a DEM via spline interpolation algorithm, which is explained later in this tutorial → DEM Generation via Spline Interpolation Algorithm

Data selection coordinates

MinX: MinY:
MaxX: MaxY:

Point Cloud Data Download

☐ Download raw data (Query result in compressed ASCII File)

DEM Generation via Local Binning Algorithms

Interpolation Method	Product Download Format
<input type="checkbox"/> Min	<input type="checkbox"/> Arc Grid <input type="checkbox"/> Ascii Grid
<input type="checkbox"/> Max	<input type="checkbox"/> Arc Grid <input type="checkbox"/> Ascii Grid
<input type="checkbox"/> Mean	<input type="checkbox"/> Arc Grid <input type="checkbox"/> Ascii Grid
<input type="checkbox"/> IDW	<input type="checkbox"/> Arc Grid <input type="checkbox"/> Ascii Grid
<input type="checkbox"/> Point Count	<input type="checkbox"/> Arc Grid <input type="checkbox"/> Ascii Grid

Algorithm Parameters

Grid Resolution (Default=1 meter)

Enter radius value (Default=MIN{1 meter, ($\sqrt{2}/2$ * Resolution)})

DEM Generation via Spline Interpolation Algorithm

For more information on binning algorithms, see the following:

http://lidar.asu.edu/KnowledgeBase/LocalBinning_one-pager.pdf

http://lidar.asu.edu/KnowledgeBase/GLW_Search_Radius/

<http://lidar.asu.edu/KnowledgeBase/WCptcount/>

http://lidar.asu.edu/KnowledgeBase/Notes_on_Lidar_interpolation.pdf

For this tutorial, we want to check the “**IDW**” box, enter **0.5** into the “**Grid Resolution**” text box, and **1** into the “**Enter radius value**” text box. Your screen should like the one below.

Check this box

Data selection coordinates

MinX <input type="text" value="241288.5147"/>	MinY <input type="text" value="3904576.3224"/>
MaxX <input type="text" value="245989.2076"/>	MaxY <input type="text" value="3907459.1587"/>

Point Cloud Data Download

☐ Download raw data (Query result in compressed ASCII File)

- DEM Generation via Local Binning Algorithms

Interpolation Method	Product Download Format	
<input type="checkbox"/> Min	<input type="checkbox"/> Arc Grid	<input type="checkbox"/> Ascii Grid
<input type="checkbox"/> Max	<input type="checkbox"/> Arc Grid	<input type="checkbox"/> Ascii Grid
<input type="checkbox"/> Mean	<input type="checkbox"/> Arc Grid	<input type="checkbox"/> Ascii Grid
<input checked="" type="checkbox"/> IDW	<input checked="" type="checkbox"/> Arc Grid	<input checked="" type="checkbox"/> Ascii Grid
<input type="checkbox"/> Point Count	<input type="checkbox"/> Arc Grid	<input type="checkbox"/> Ascii Grid

Algorithm Parameters

Grid Resolution (Default=1 meter)

Enter radius value (Default=MIN{1 meter, $(\sqrt{2})/2 * \text{Resolution}$ })

+ DEM Generation via Spline Interpolation Algorithm

Enter these values

Grid Resolution

Enter radius value

Step 5

Scroll down, and enter a job title and job description.

Job Description

Enter job title

Job description (up to 500 characters):

Learning how to use this website

Email Address

Enter your e-mail address for notification upon completion of processing

When you are done, press “**Submit**”. Note that you must have your email entered in order to receive a notification when your request is done processing. Processing your job could take a significant amount of time.

Job management

One of the advantages of the cyberinfrastructure approach that we employ is the opportunity to watch your jobs as they progress through the GLW, to archive your jobs, and to find them again and modify them and rerun them if desired.

The screenshot shows the GEON Portal website. At the top, the GEON logo is on the left, and navigation links (GEONsearch, myGEON, Contribute, GEONtools, UserProfile, Docs/Help) are on the right. Below these are links for Home, SYNSEIS, LIDAR, Attype Workflow, Gravity, Magnetism, and PaleoIntegration. The main header reads "Lidar Application".

On the left sidebar, under "Lidar Datasets", are links for NSAF, Mt. Rainier, ECSZ, and B4. Under "LIDAR Utilities", are links for My LIDAR Jobs and My Jobs Submission Info. A link for "LIDAR Main Page" is at the bottom of the sidebar.

The main content area has the title "LiDAR / ALSM Data Processing with GEON Cyberinfrastructure". Below the title is a welcome message: "Welcome to the GEON LiDAR / ALSM processing page. This site is a proof of concept implementation of an end-to-end system for the distribution and processing (DEM generation) of LiDAR / ALSM point cloud data. This tool capitalizes on cyberinfrastructure developed by GEON as part of its effort to develop information technology for the Geosciences. The goal of this project is to provide a web-based toolset that can democratize access to these rich and computationally challenging data sets. Please note that these pages are actively under development and therefore may experience outages and poor performance. If you have problems or suggestions for improvement, we encourage you to contact us."

Below the welcome message is a red warning: "Current Interface is not compatible with Internet Explorer 7, We are working on a solution for it." This is followed by the instruction "Please select a data set:" and a list of four data sets, each with a question mark icon: "Northern San Andreas Fault (NSAF), CA", "West Rainier Seismic Zone, WA", "Fault systems in the Eastern California Shear Zone (ECSZ)", and "B4: Southern San Andreas Fault".

Below the data sets, it says "Metadata documents on these data sets can be found [here](#)." and a note about Macintosh compatibility: "Web browser compatibility for Macintosh users: Some aspects of the GEON LiDAR processing pages may not be compatible with Apple's Safari web browser. We recommend Firefox for browsing these pages."

At the bottom, there is a section "Information about us and the projects we are involved with" with links to "Geoinformatics at ASU", "ASU Active Tectonics Research Group", "Active Tectonics Group LiDAR / ALSM research pages", and "The GEON Project". A note says "Please address questions, comments and errors to [Christopher Crosby](#)". At the very bottom are the logos for ASU and SDSC (San Diego Supercomputer Center).

Two callout boxes are present: one pointing to the "My Jobs Submission Info" link with the text "To view access jobs submitted or status of jobs submitted click here.", and another pointing to the "My LIDAR Jobs" link with the text "To view a summary of your LiDAR jobs submissions click here."

When you click on **My LiDAR Jobs** you will see a screen like the one shown below. This screen lists your submitted jobs by Id number, Dataset, Title, and Submission Date. The status of your job is also listed. You can click on the status link of each job to get a more detailed description of your job's status.

GEONPORTAL Logout

GEONsearch | myGEON | Contribute | **GEONtools** | UserProfile | Docs/Help

Home | SYNSEIS | **LIDAR** | Attype Workflow | Gravity | Magnetics | PaleoIntegration

SAF Data Set

Lidar Datasets
NSAF
Mt. Rainier
ECSZ
B4

LIDAR Utilities
My LIDAR Jobs
My Jobs Submission Info

LIDAR Main Page

LiDAR Job Manager

List of your submitted jobs

Select	Job Id	Dataset	Title	Submission Date	Job Status
<input type="checkbox"/>	1179798110623544847844	NSAF	SAF Data Set	Mon May 21 18:41:51 PDT 2007	querying
<input type="checkbox"/>	1179798013922190724285204	B4	B4 data Set	Mon May 21 18:40:14 PDT 2007	empty query response
<input type="checkbox"/>	1179797825868804882996	ECSZ	ECSZ Data Set	Mon May 21 18:37:06 PDT 2007	querying
<input type="checkbox"/>	1179797381491203696322	RAINIER	Rainier Data Set	Mon May 21 18:29:41 PDT 2007	bin processing
<input type="checkbox"/>	1179797253184332471448	NSAF	SAF Data Set	Mon May 21 18:27:34 PDT 2007	done

Displayed records: 1 - 5 of 5

Delete Jobs | Clear All | Select All

This is your unique Job Id number based on the time that you submit your request. This Id number ensures that your job will never be mixed up with anyone else.

This is the data set that the selected data is from.

This is the title that you chose for your job.

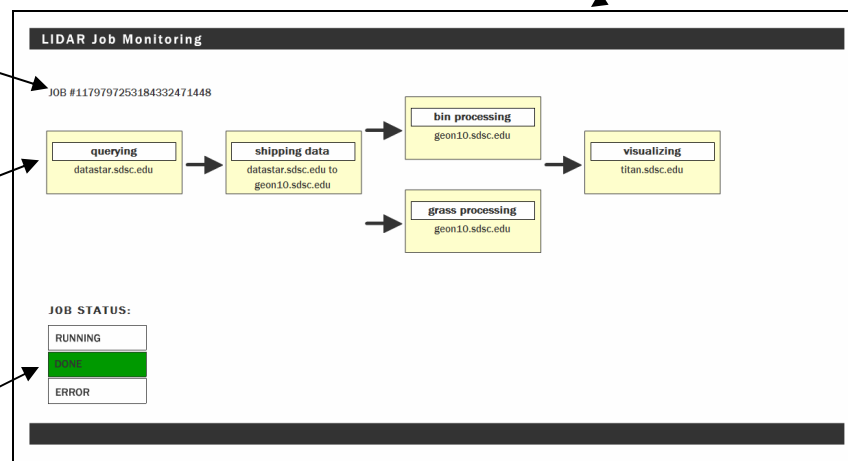
This is the date and time that you submitted your request.

This is the status of your request. By clicking on the link for each job you can view a detailed description of your request. An example is shown below.

This is the job's unique Id number.

This is the position your job is in during processing.

This is the status of your job. If there is an error, click on **Error** to see the error.



If you click on **My Jobs Submission Info** you will be taken to a screen that looks like the one shown below.

This screen gives a summary of your usage history. The top section is your total usage history. The mid-section is a summary of your usage over the past week. Finally, the bottom section is your usage history over the last month.

The screenshot shows the GEON Portal interface. At the top is the GEON Portal logo and a 'Logout' link. Below the logo is a navigation bar with links: GEONsearch, myGEON, Contribute, GEONtools, UserProfile, and Docs/Help. A secondary navigation bar includes Home, SYNSEIS, LIDAR (highlighted), Atype Workflow, Gravity, Magnetism, and PaleoIntegration. The main content area is titled 'Lidar Application' and contains a sidebar on the left and a main panel on the right. The sidebar lists 'Lidar Datasets' (NSAF, Mt. Rainier, ECSZ, B4) and 'Lidar Utilities' (My LIDAR Jobs, My Jobs Submission Info, LIDAR Main Page). The main panel is titled 'My LIDAR Job Submission Information' and displays usage statistics. It shows a total of 6 jobs submitted, processing 11,810,240 points, with a breakdown by dataset: 3 NSAF jobs (5,152,892 points), 1 RAINIER job (665,293 points), 1 ECSZ job (5,992,055 points), and 1 B4 job (0 points). It also provides a summary for the past week (May 14, 2007 7:26:21 PM - May 21, 2007 7:26:21 PM) and the past month (Apr 21, 2007 7:26:21 PM - May 21, 2007 7:26:21 PM), both showing 6 jobs submitted with the same dataset breakdown.

GEONPORTAL [Logout](#)

[GEONsearch](#) [myGEON](#) [Contribute](#) [GEONtools](#) [UserProfile](#) [Docs/Help](#)

[Home](#) [SYNSEIS](#) [LIDAR](#) [Atype Workflow](#) [Gravity](#) [Magnetism](#) [PaleoIntegration](#)

Lidar Application

Lidar Datasets
NSAF
Mt. Rainier
ECSZ
B4

Lidar Utilities
My LIDAR Jobs
My Jobs Submission Info
LIDAR Main Page

My LIDAR Job Submission Information

A total of 6 jobs were submitted processing of 11,810,240 points.
3 NSAF jobs were submitted processing of 5,152,892 points.
1 RAINIER jobs were submitted processing of 665,293 points.
1 ECSZ jobs were submitted processing of 5,992,055 points.
1 B4 jobs were submitted processing of 0 points.

Info for the past week (May 14, 2007 7:26:21 PM - May 21, 2007 7:26:21 PM)
6 jobs were submitted
3 NSAF jobs were submitted
1 Rainier jobs were submitted
1 ECSZ jobs were submitted
1 B4 jobs were submitted

Info for the past month (Apr 21, 2007 7:26:21 PM - May 21, 2007 7:26:21 PM)
6 jobs were submitted
3 NSAF jobs were submitted
1 Rainier jobs were submitted
1 ECSZ jobs were submitted

Generating a DEM via spline

This section explains how to generate a DEM via spline. This is not done very often, and is only good for relatively small areas. They are good if the grid resolution is less than the shot density (in other words for B4 data it is good for a 25 cm DEM) and for the NSAF and Ranier, it is good for under the trees where there are many fewer ground returns.

In the interactive map page for B4, click on the button. This will reveal spline options.

The screenshot shows a web interface titled "DEM Generation via Spline Interpolation Algorithm". It is divided into two main sections: "DEM and Derived Product" and "Algorithm Parameters".

DEM and Derived Product

Product	Arc Grid	Ascii Grid	GeoTIFF
<input type="checkbox"/> Elevation (Spline)	<input type="checkbox"/> Arc Grid	<input type="checkbox"/> Ascii Grid	<input type="checkbox"/> GeoTIFF
<input type="checkbox"/> Slope	<input type="checkbox"/> Arc Grid	<input type="checkbox"/> Ascii Grid	<input type="checkbox"/> GeoTIFF
<input type="checkbox"/> Aspect	<input type="checkbox"/> Arc Grid	<input type="checkbox"/> Ascii Grid	<input type="checkbox"/> GeoTIFF
<input type="checkbox"/> PCurv	<input type="checkbox"/> Arc Grid	<input type="checkbox"/> Ascii Grid	<input type="checkbox"/> GeoTIFF

Algorithm Parameters

Grid Resolution (Default=1 meter)

Enter dmin value (Default=0.1)

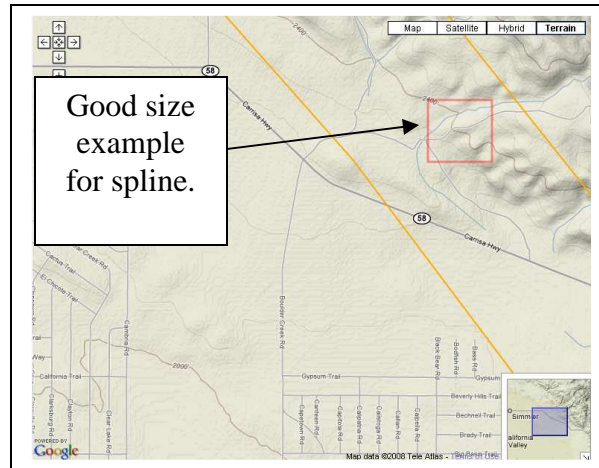
Enter spline tension (Default=40)

Enter spline smoothing (Default=0.1)

Explanatory callouts with arrows pointing to the interface:

- Elevation**: Points to the "Elevation (Spline)" checkbox.
- Slope**: Points to the "Slope" checkbox.
- The map direction that the slope faces**: Points to the "Aspect" checkbox.
- The profile curvature**: Points to the "PCurv" checkbox.
- DEM resolution**: Points to the "Grid Resolution" input field.
- The minimum spacing between data points in the map units**: Points to the "Enter dmin value" input field.
- Control the spline behavior between the points**: Points to the "Enter spline tension" and "Enter spline smoothing" input fields.

Be sure to select a relatively small area for the spline.



Enter information as is shown in the window below.

DEM Generation via Spline Interpolation Algorithm ?

DEM and Derived Product

?

☒ Elevation (Spline)

?

☒ Slope

?

☒ Aspect

?

☒ PCurv

Product Download Format ?

☒ Arc Grid

☐ Ascii Grid

☐ GeoTIFF

☒ Arc Grid

☐ Ascii Grid

☐ GeoTIFF

☒ Arc Grid

☐ Ascii Grid

☐ GeoTIFF

☒ Arc Grid

☐ Ascii Grid

☐ GeoTIFF

Algorithm Parameters

?

Grid Resolution (Default=1 meter)

?

Enter dmin value (Default=0.1)

?

Enter spline tension (Default=40)

?

Enter spline smoothing (Default=0.1)

Job Description

Enter job title

Job description (up to 500 characters):

Email Address

Enter your e-mail address for notification upon completion of processing

Submit

Clear All

You will receive an email similar to the one shown in the “Downloading the LiDAR Data” section of this user guide.

Downloading the LiDAR Data

Once the geongrid website is done processing your request, you should receive an email that gives you links to your data:

Thank you for using the GEON LiDAR Workflow running on the GEONgrid.

Your results are available at

<http://portal.geongrid.org:8405/lidar/data/tmp/output1209245629732120899795.html>.

The processing selections of your job are available at

<http://portal.geongrid.org:8405/lidar/data/metadata/metadata1209245629732120899795.html>.

Please note that the results will expire after 48 hours.

The GEON project

If you click on the second link, you will get a page that looks like the one below, giving you information about your run (metadata).

```
Job Title: b4_job1
Description: Learning how to use this website
Dataset: B4
projection: utm/z11/wgs84
units: meters
Grid Coordinate System Name: Universal Transverse Mercator
UTM Zone Number: 11 N
Transverse Mercator Projection
Scale Factor at Central Meridian: 0.999600
Longitude of Central Meridian: -117.000000
Latitude of Projection Origin: 0.000000
False Easting: 500000.000000
False Northing: 0.000000

Planar Coordinate Information:
Planar Distance Units: meters

Geodetic Model
Horizontal Datum Name: D_WGS_1984
Ellipsoid Name: WGS_1984

Envelope Information:
Min X: 11241288.5147
Max X: 11245989.2076
Min Y: 3904576.3224
Max Y: 3907459.1587

Processing of 16176266 points in LiDAR point cloud.

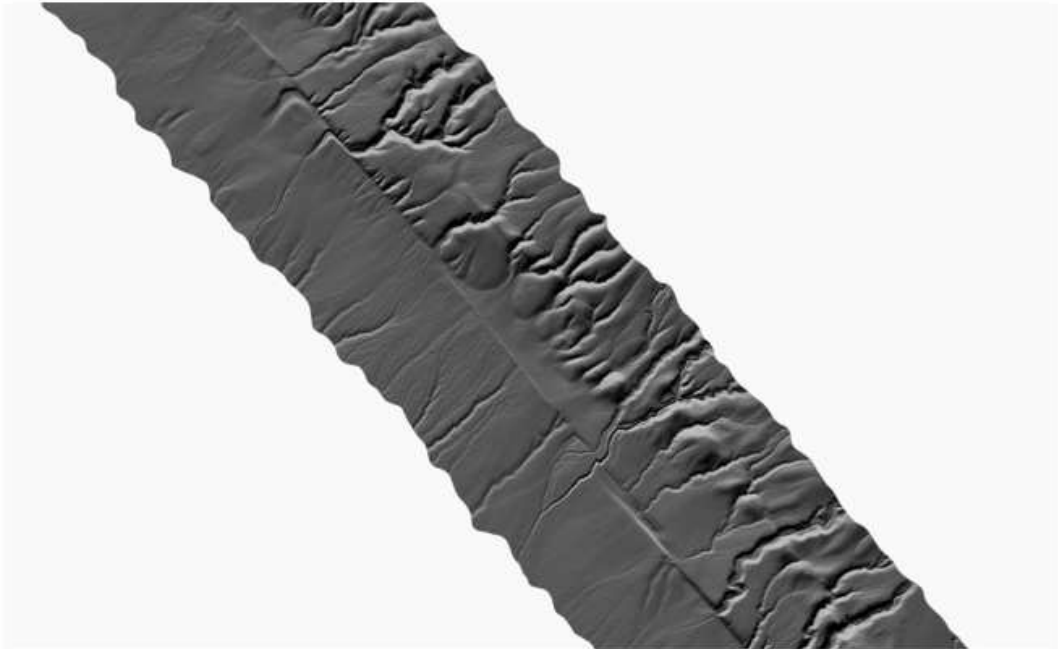
Selected Processings:
Bin Algorithm:
idw Arc Grid
resolution: 0.5
radius: 1.0
```

Clicking on the first link in your email will send you to the page below.

LiDAR Processing Workflow Outputs

Processing of 16176266 points in Lidar point cloud.

IDW



Below you can download an archive file (tgz format) with the results of your job

[Results](#)

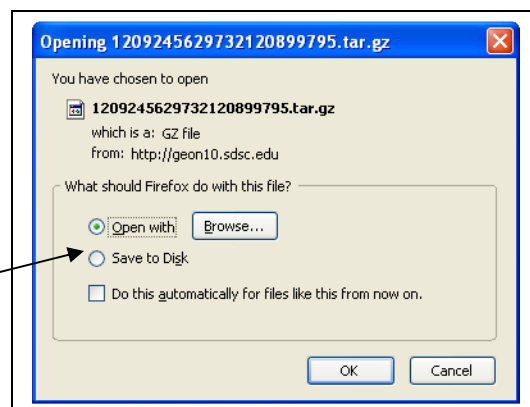
The processing selections of your job are available at [metadata](#).

Step 1

Click on the “**Results**” link.

You should get a pop-up window that looks like this:

Choose the “**Save to Disk**” option, and save on your desktop (or wherever you want)



Step 2

The file you downloaded is compressed, so you will need to **decompress the file** before you can work with it in ARC GIS. You can do this by right-clicking on the icon you downloaded.

See GEON LiDAR Workflow (GLW) output and ArcMap Users Guide for information on using the downloaded data in Arc Map.