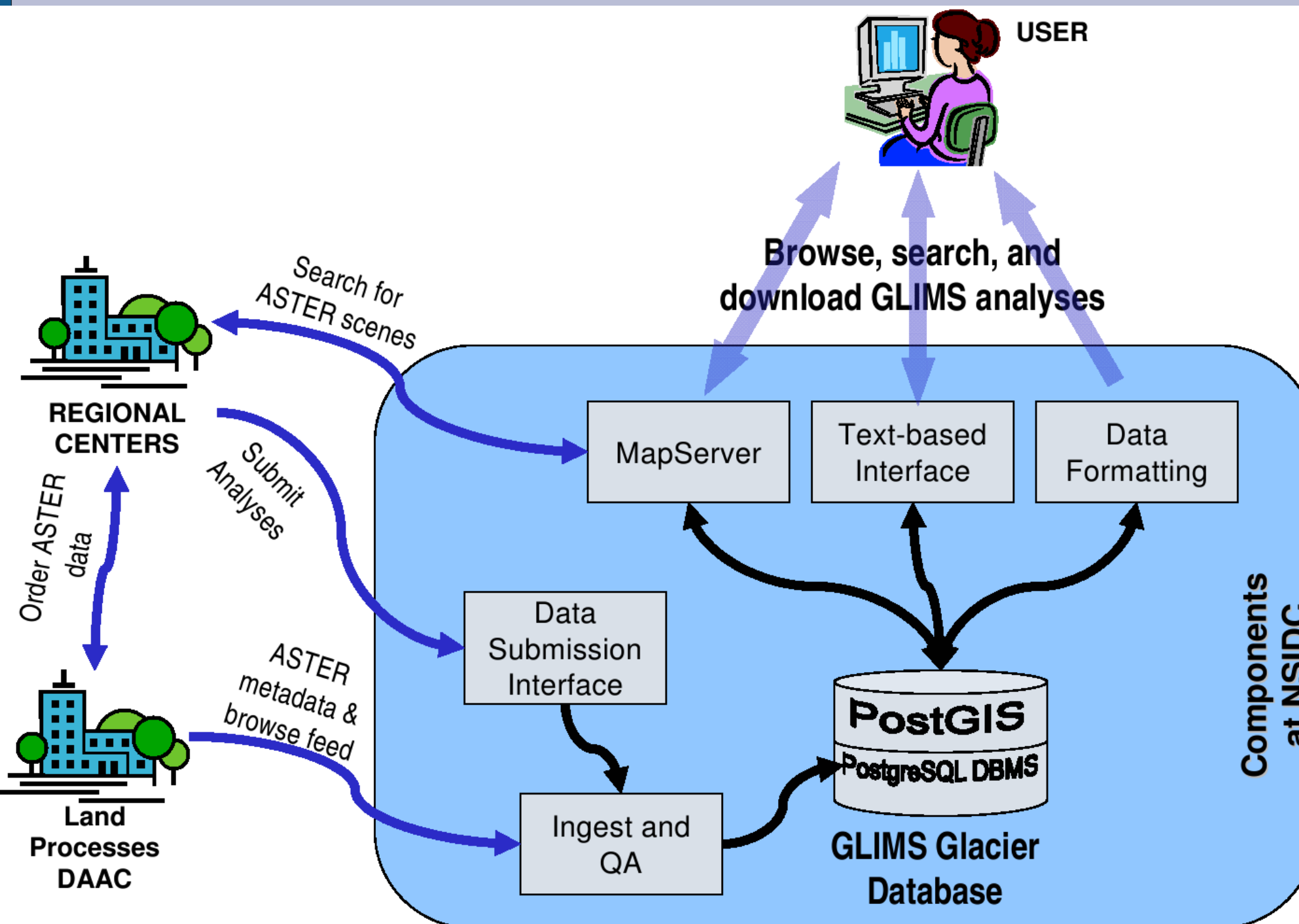


GLIMS Glacier Database status

Bruce H. Raup
GLIMS Workshop
Perugia, Italy
2007-07-06

Topics

- GLIMS Glacier Database contents
- Interface Improvements
- Clip-and-ship download function
- ASTER Browse image viewing tools
- Web-based tools



[Become a registered user of GLIMS data!](#)

New: [Access the GLIMS ASTER Browse Imagery](#)

The GLIMS Glacier Viewer

The GLIMS Glacier Viewer was developed to provide a "front-end" mapping interface to the GLIMS Glacier Database. A number of different layers in this interface can be viewed and spatially queried including: GLIMS Glacier Outlines, ASTER Footprints, Regional Center Locations, the [World Glacier Inventory](#), and others. The GLIMS Glacier Outlines layer contains the results of GLIMS glacier analyses. Each polygon in this layer represents the extent of a particular glacier at a given point in time as well as other information related to glaciers such as the extents of debris cover and the location of supra-glacial lakes. The GLIMS Glacier outlines can also be downloaded as ESRI Shapefiles, MapInfo tables, Geographic Mark-up Language (GML) files, Keyhole Mark-up Language (KML, Google Earth), and the Generic Mapping Tools (GMT) multi-segment format.

Note that the GLIMS Glacier Viewer requires 'pop-ups' to be enabled and Java/Javascript to run properly.

If you don't already have an updated version of the Java Runtime Environment please download the latest version at <http://www.java.com/en/download/manual.jsp>

[Start GLIMS Glacier Viewer](#)



GLIMS Text Search Interface

This interface provides access to the GLIMS Glacier Database through a text-based search form. The parameters one can search on, as well as the result fields that can be returned, are fully customizable. This allows the user to search on and return only the criteria that are relevant to their needs.

Query results in this interface can be downloaded individually or as part of the larger result set. Downloaded data are available in the same GIS formats as from the mapserver interface (above).

[Search the GLIMS Glacier Database](#)

[View Help](#) [View Legend](#)

  Database Layers:

- [GLIMS Glaciers](#)
- [ASTER Footprints](#)
 - Day Images Only
- Regional Center Outlines
- GLIMS Participants
- [Glaciers from DCW](#)
- World Glacier Inventory
- [STAR Polygons](#)
- Countries

Background Imagery

- MODIS Blue Marble
- Source Images

[Temporally Constrain Data](#)

- GLIMS Glaciers
- ASTER Footprints

Start Date: 1910-01-01

Year Month Day

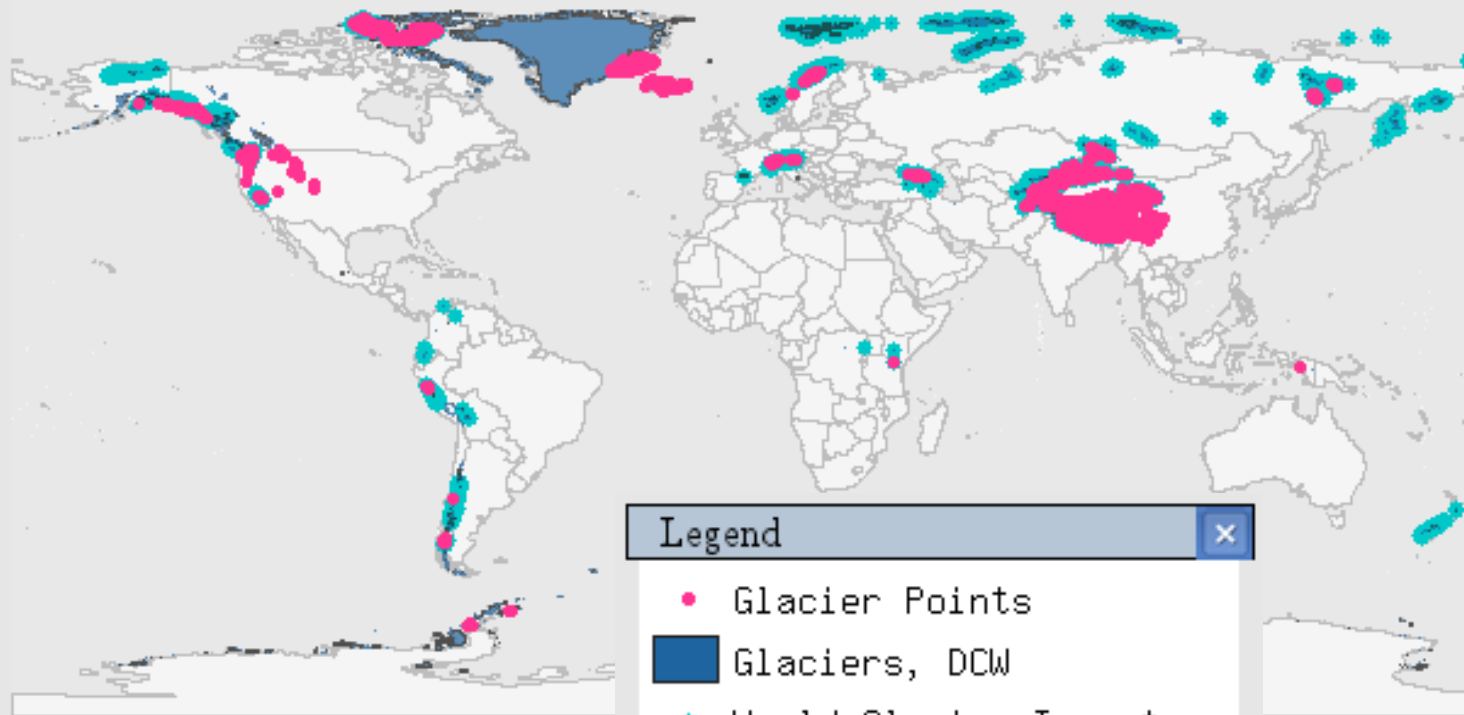
End Date: 2007-12-31

Year Month Day

[GLIMS](#) Glacier Database



Zoom to... Map Size...



Legend

- Glacier Points
- Glaciers, DCW
- World Glacier Inventory
- Countries

0 6100 12200 18300 24400 km

[Download Data in Current View](#)

Latitude:
Longitude:



[View Help](#) [View Legend](#)

Database Layers:

- [GLIMS Glaciers](#)
- [ASTER Footprints](#)
 - Day Images Only
- Regional Center Outlines
- GLIMS Participants
- [Glaciers from DCW](#)
- World Glacier Inventory
- [STAR Polygons](#)
- Countries

Background Imagery

- MODIS Blue Marble
- Source Images

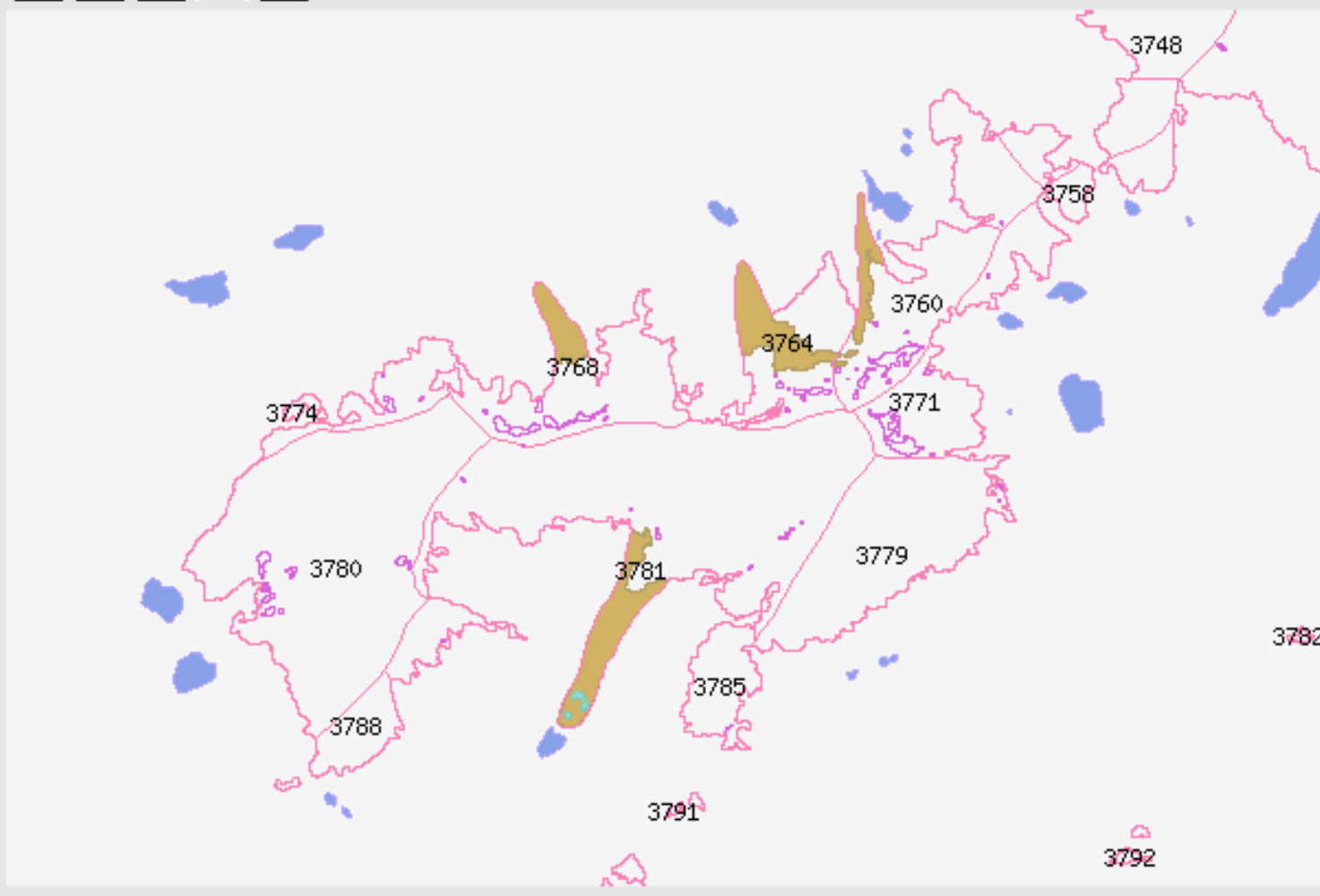
[Temporally Constrain Data](#)

- GLIMS Glaciers
- ASTER Footprints

Start Date: 1910-01-01
Year Month Day

End Date: 2007-12-31
Year Month Day

GLIMS Glacier Database





0 2 4 6 8 km

[Download Data in Current View](#)
Latitude: -9.425
Longitude: -77.378



[View Help](#) [View Legend](#)

  Database Layers:

- [GLIMS Glaciers](#)
- [ASTER Footprints](#)
 - Day Images Only
- Regional Center Outlines
- GLIMS Participants
- [Glaciers from DCW](#)
- World Glacier Inventory
- [STAR Polygons](#)
- Countries

Background Imagery

- MODIS Blue Marble
- Source Images

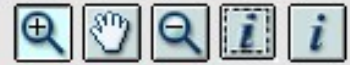
[Temporally Constrain Data](#)

- GLIMS Glaciers
- ASTER Footprints

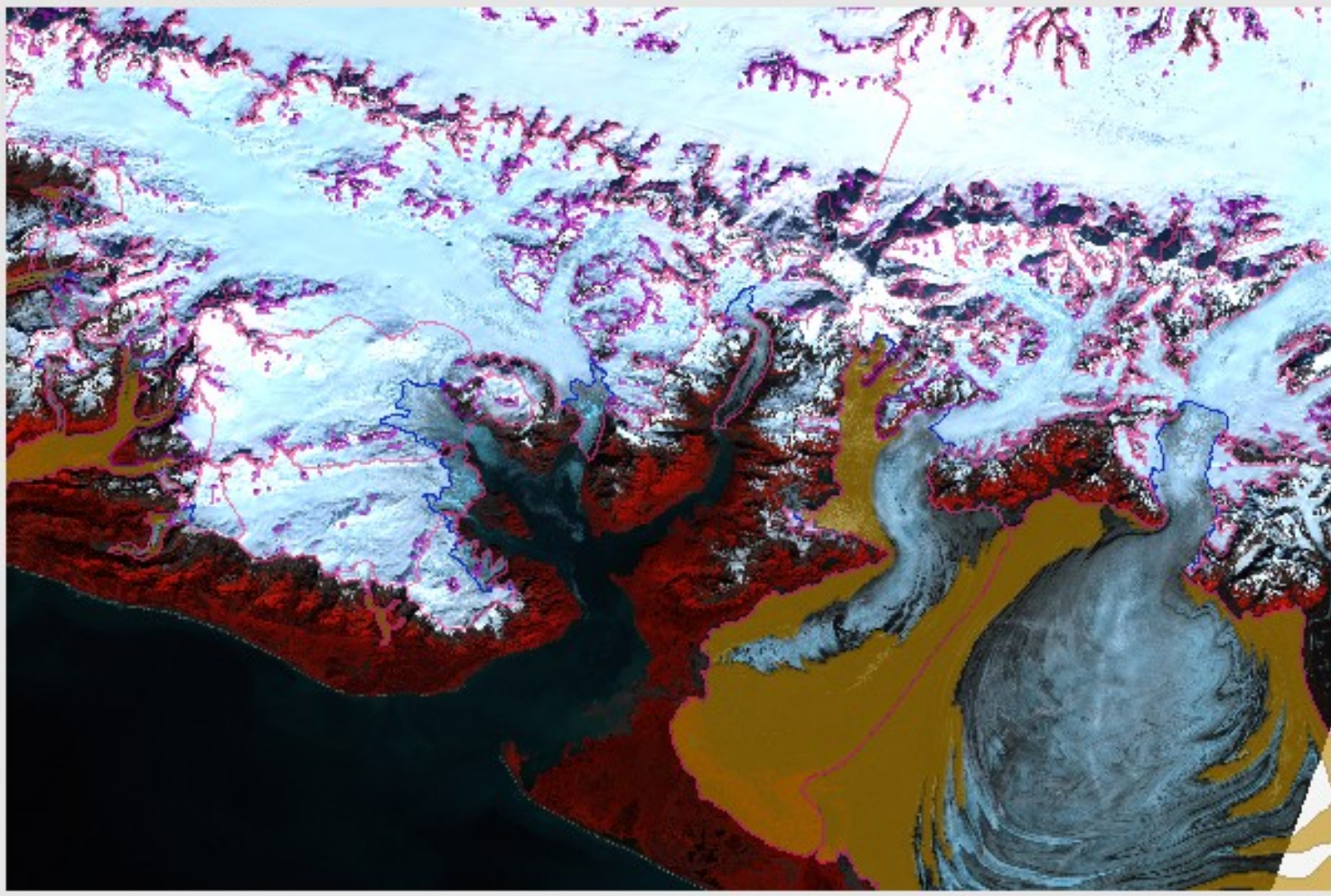
Start Date: 1910-01-01
Year Month Day

End Date: 2007-12-31
Year Month Day

[GLIMS](#) Glacier Database



Zoom to... Map Size...





[Download Data in Current View](#)

Latitude: 60.54
Longitude: -140.519



[View Help](#) [View Legend](#)

  Database Layers:

- [GLIMS Glaciers](#)
- [ASTER Footprints](#)
 - Day Images Only
- Regional Center Outlines
- GLIMS Participants
- [Glaciers from DCW](#)
- World Glacier Inventory
- [STAR Polygons](#)
- Countries

Background Imagery

- MODIS Blue Marble
- Source Images

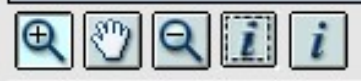
[Temporally Constrain Data](#)

- GLIMS Glaciers
- ASTER Footprints

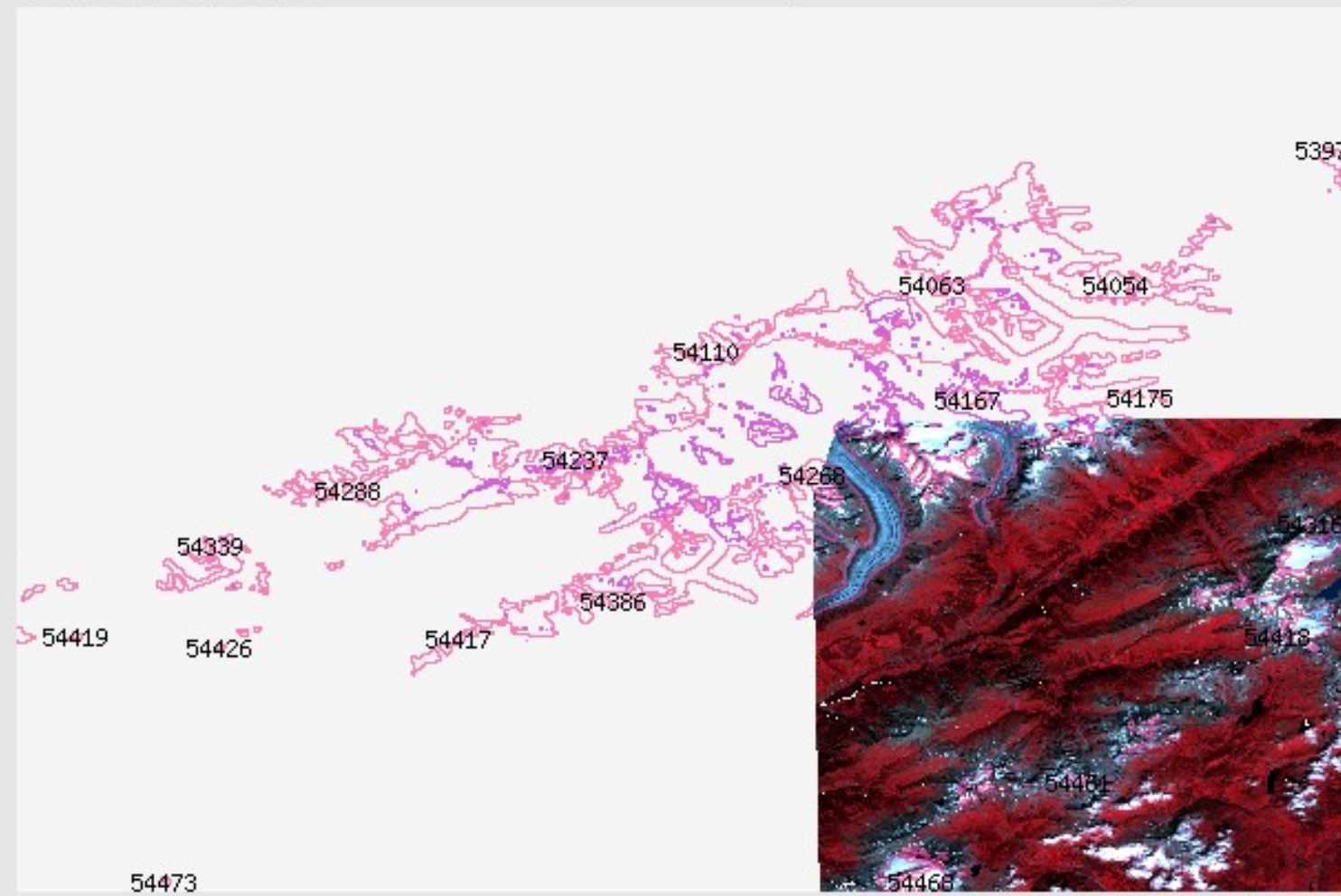
Start Date: 1910-01-01
Year Month Day

End Date: 2007-12-31
Year Month Day

[GLIMS](#) Glacier Database



Zoom to... Map Size...





[Download Data in Current View](#)

Latitude:
Longitude:



Clip-and-ship download

  Database Layers:

- [GLIMS Glaciers](#)
- [ASTER Footprints](#)
 - Day Images Only
- Regional Center Outlines
- GLIMS Participants
- [Glaciers from DCW](#)
- World Glacier Inventory
- [STAR Polygons](#)
- Countries

Background Imagery

- MODIS Blue Marble
- Source Images

Temporally Constrain Data

- GLIMS Glaciers
- ASTER Footprints

Start Date: 1910-01-01

Year Month Day

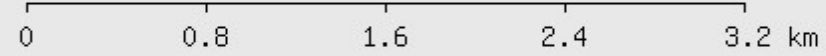
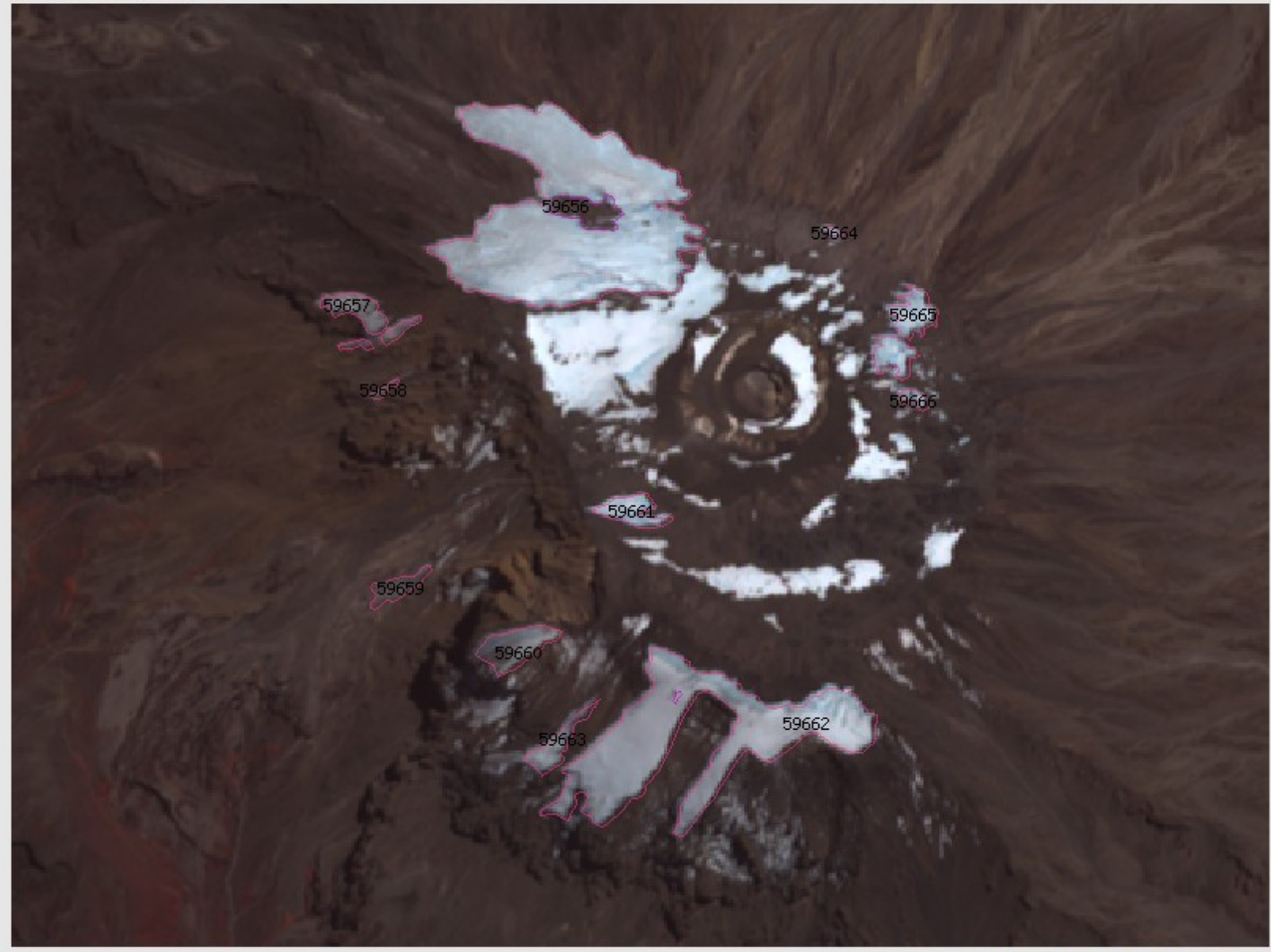
End Date: 2007-12-31

Year Month Day

[GLIMS](#) Glacier Database



Zoom to... Map Size...



[Download Data in Current View](#)

Latitude: -3.073
Longitude: 37.384



GLIMS Data Export

GLIMS Data are available in a few different GIS file formats, currently:

- [ESRI Shapefile](#)
- MapInfo Table Format
- GML ([Geography Mark-up Language](#))
- KML (for viewing in [Google Earth](#))
- GMT ([Generic Mapping Tools](#))

Because the GLIMS Database is very extensive a pre-defined set of attributes has been created to accompany the data. Not all fields are populated for all glaciers. The fields are:

- | | |
|---------------------|---------------------------------------|
| ● Glacier Name | ● Analysis Date |
| ● Glacier ID | ● Area in Sq. km. |
| ● WGMS ID | ● Analyst's Name |
| ● Contributor's ID | ● Analyst's Institutions |
| ● GLIMS Analysis ID | ● Data URL |
| ● Line Type | ● Data Creation Description (process) |

The final downloaded dataset is a set of polygons. For each glacier analysis there is a polygon that represents the glacier boundary and (where they are present) there are polygons representing the locations of internal rocks that are contained within the boundaries of the glacier. The internal rock polygons are attributed as 'intrnl_rock' in the line_type attribute field.

Citing GLIMS Data:

- A citation text file will accompany your downloaded dataset. This file provides data-specific citations grouped by the downloaded data's analysis_ids.
- Before you download GLIMS data, please read the NSIDC [citation requirements](#).

Please select the file format and archive type for your data:

File format:

Zip Format Tar Format

Download Data

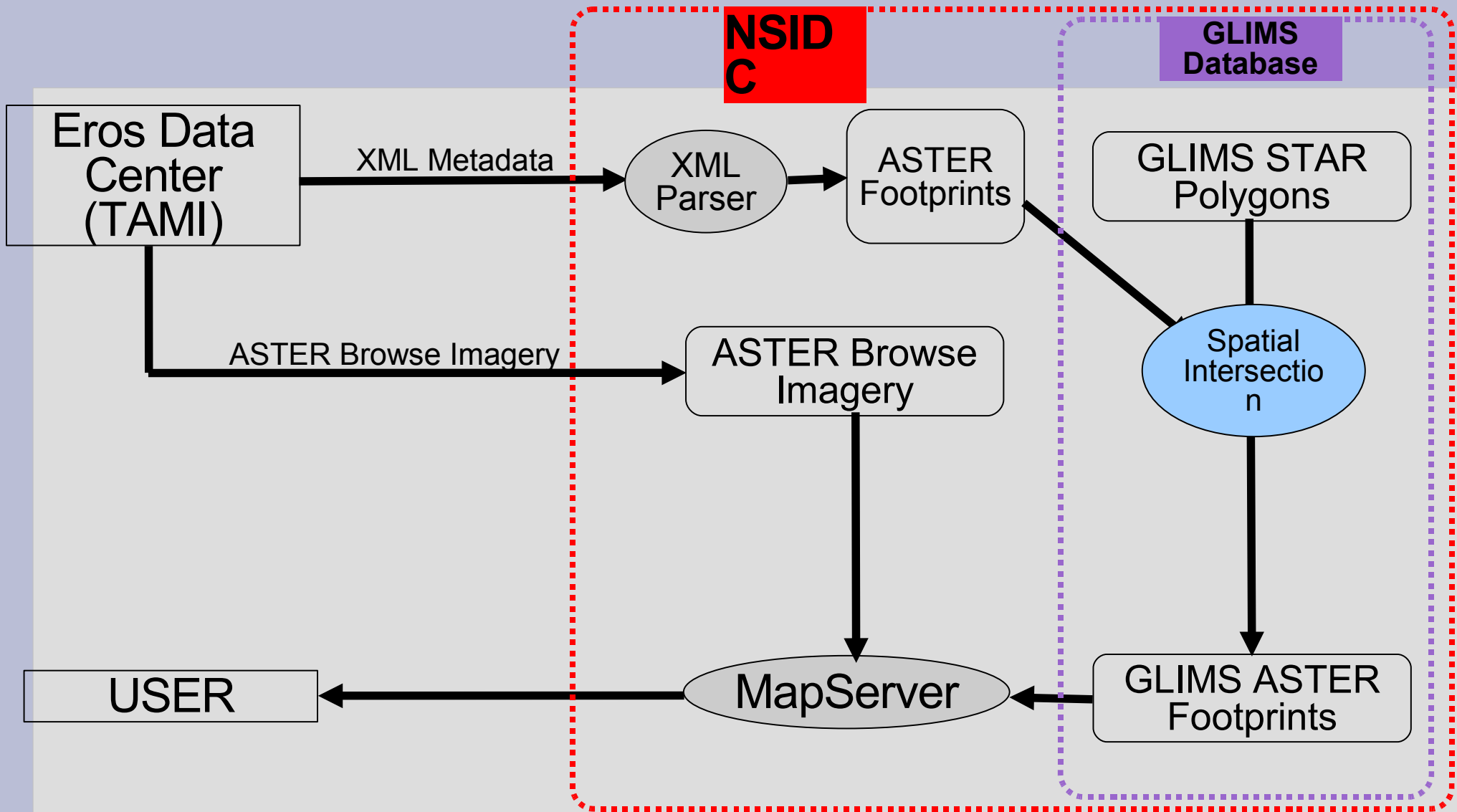
Cancel

ASTER Browse Tools

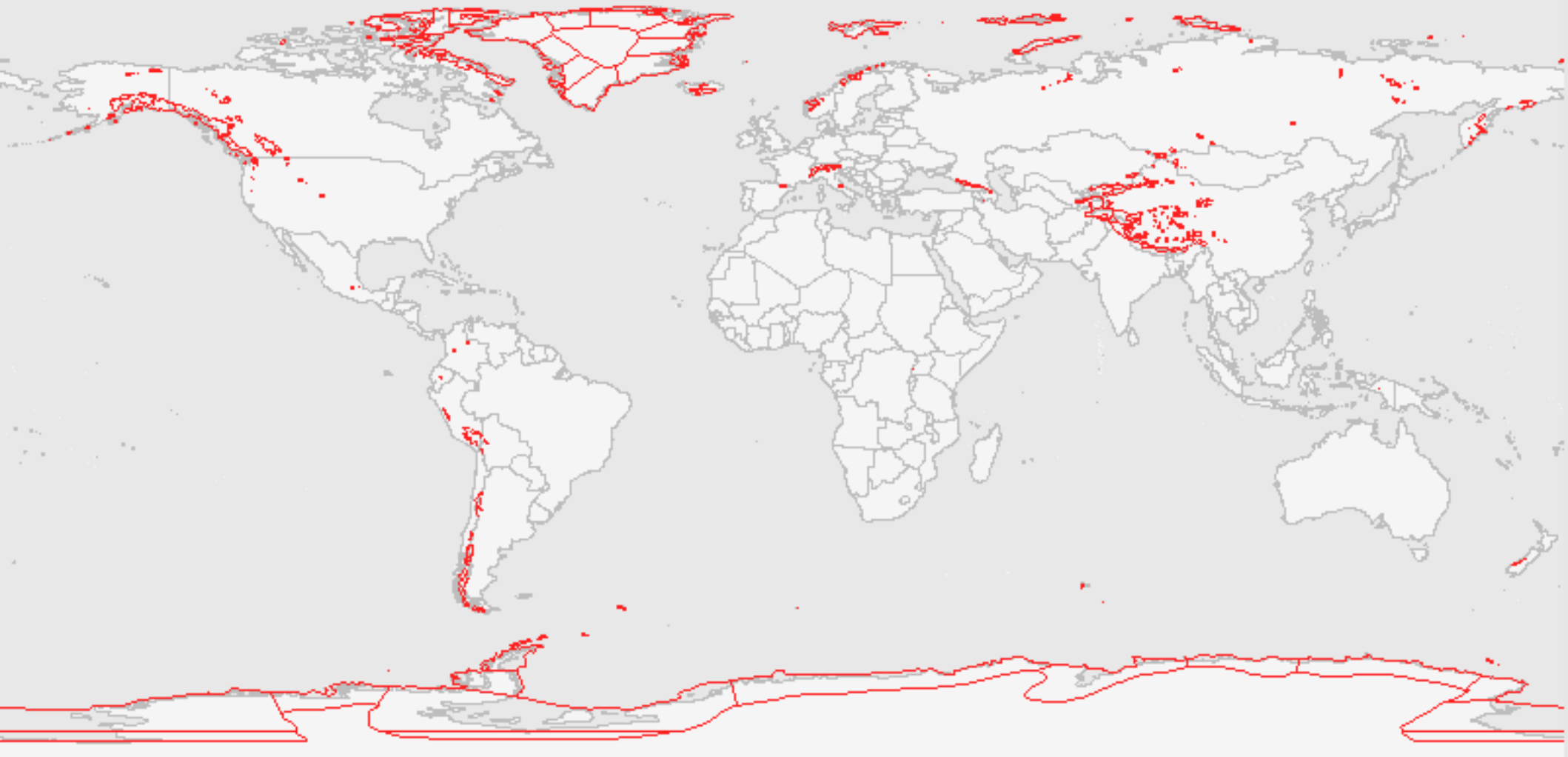
Interfaces:

- MapServer
- Google Earth

Extracting GLIMS Footprints



GLIMS STAR polygons





User Access

- **Mapserver**

- Footprints (scene locations)
- Metadata
- Browse image viewing
- One touch ordering

GLIMS ASTER Footprints							
Granule ID	EDC ID	Short Name	Day or Night	Capture Date	Cloud Cover %	Gain Settings	View Browse
SC:AST_L1A.003:2014101457	2014101457	AST_L1A	Day	2003-05-20	0	01 LOW, 02 LOW, 3N LOW, 3B LOW, 04 HGH, 05 HGH, 06 HGH, 07 HGH, 08 HGH, 09 HGH	View Image
SC:AST_L1A.003:2014101473	2014101473	AST_L1A	Day	2003-05-20	0	01 LOW, 02 LOW, 3N LOW, 3B LOW, 04 HGH, 05 HGH, 06 HGH, 07 HGH, 08 HGH, 09 HGH	View Image
SC:AST_L1A.003:2015776066	2015776066	AST_L1A	Day	2003-08-01	41	01 NOR, 02 NOR, 3N NOR, 3B NOR, 04 NOR, 05 NOR, 06 NOR, 07 NOR, 08 NOR, 09 NOR	View Image
SC:AST_L1A.003:2015776067	2015776067	AST_L1A	Day	2003-08-01	62	01 NOR, 02 NOR, 3N NOR, 3B NOR, 04 NOR, 05 NOR, 06 NOR, 07 NOR, 08 NOR, 09 NOR	View Image

[View Help](#) [View Legend](#)

  Database Layers:

- [GLIMS Glaciers](#)
- [ASTER Footprints](#)
 - Day Images Only
- Regional Center Outlines
- GLIMS Participants
- [Glaciers from DCW](#)
- World Glacier Inventory
- [STAR Polygons](#)
- Countries

Background Imagery

- MODIS Blue Marble
- Source Images

[Temporally Constrain Data](#)

- GLIMS Glaciers
- ASTER Footprints

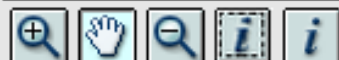
Start Date: 1910-01-01

Year Month Day

End Date: 2007-12-31

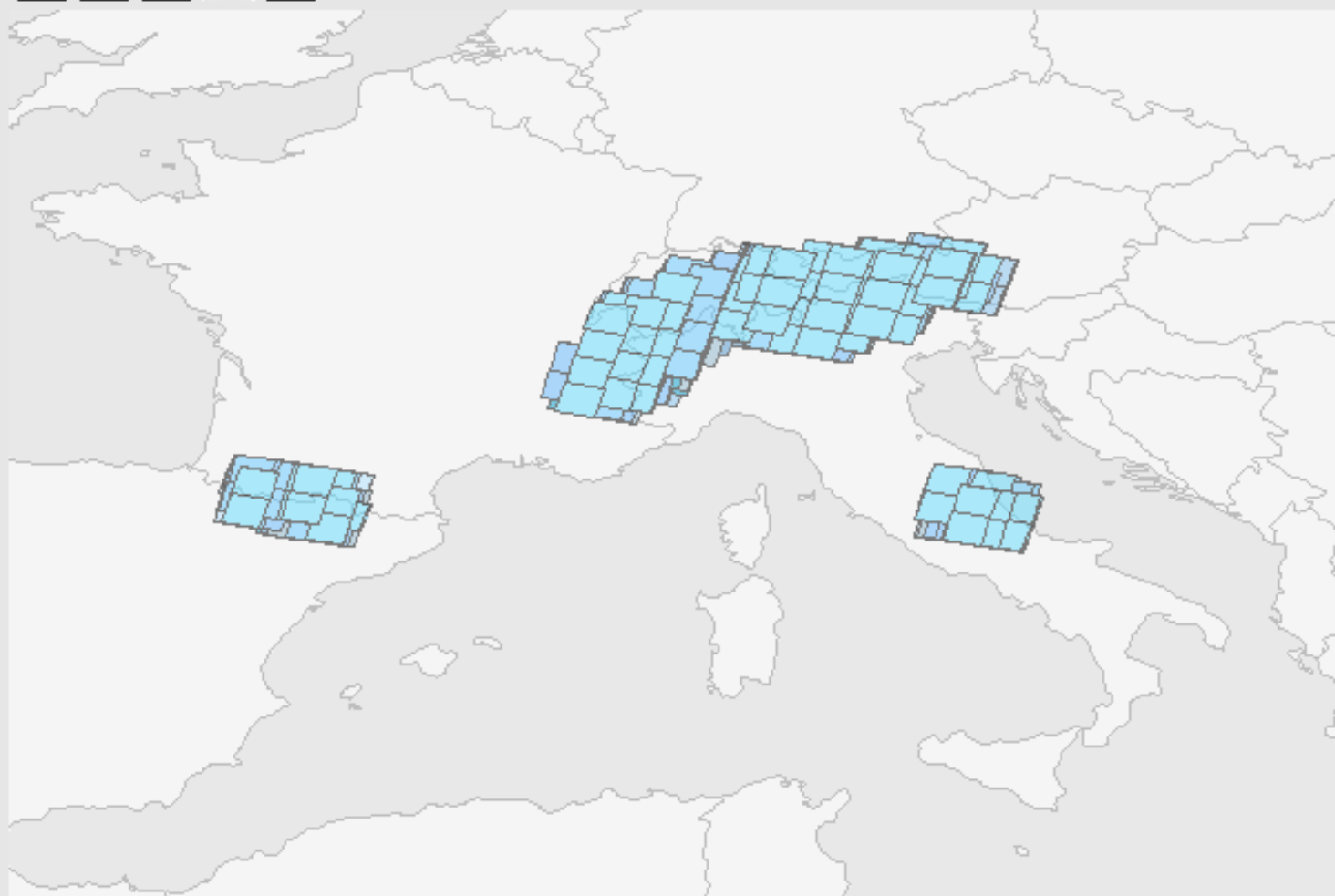
Year Month Day

[GLIMS](#) Glacier Database



Zoom to...

Map Size...



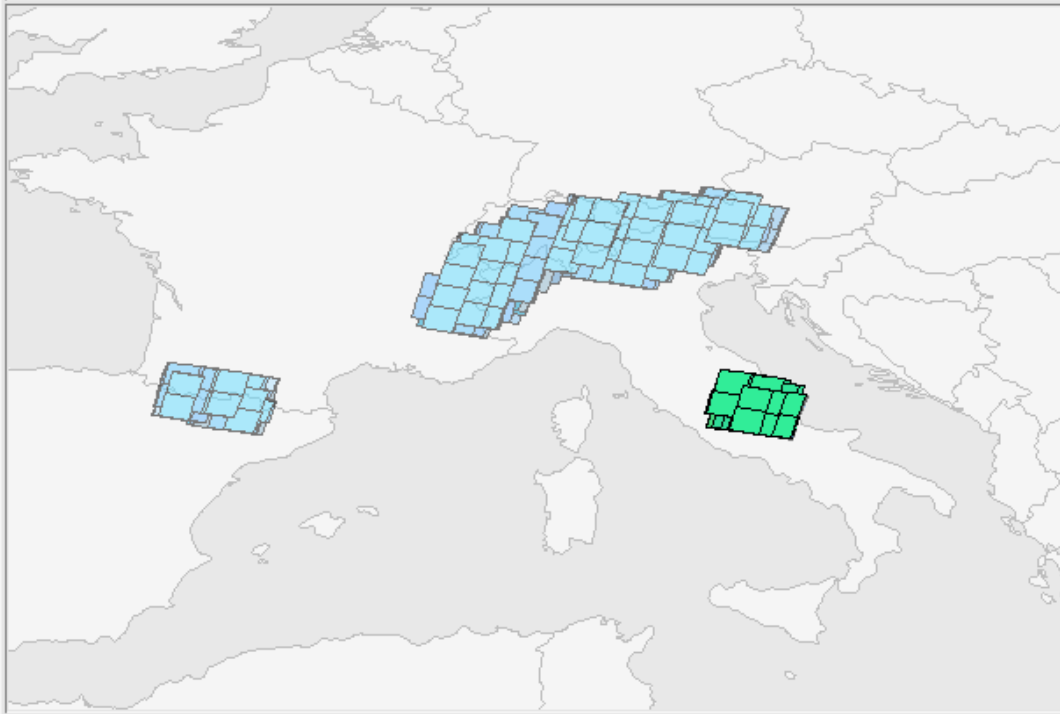
Latitude: 40.644

Longitude: -4.231

[Download Data in Current View](#)



Selected Features

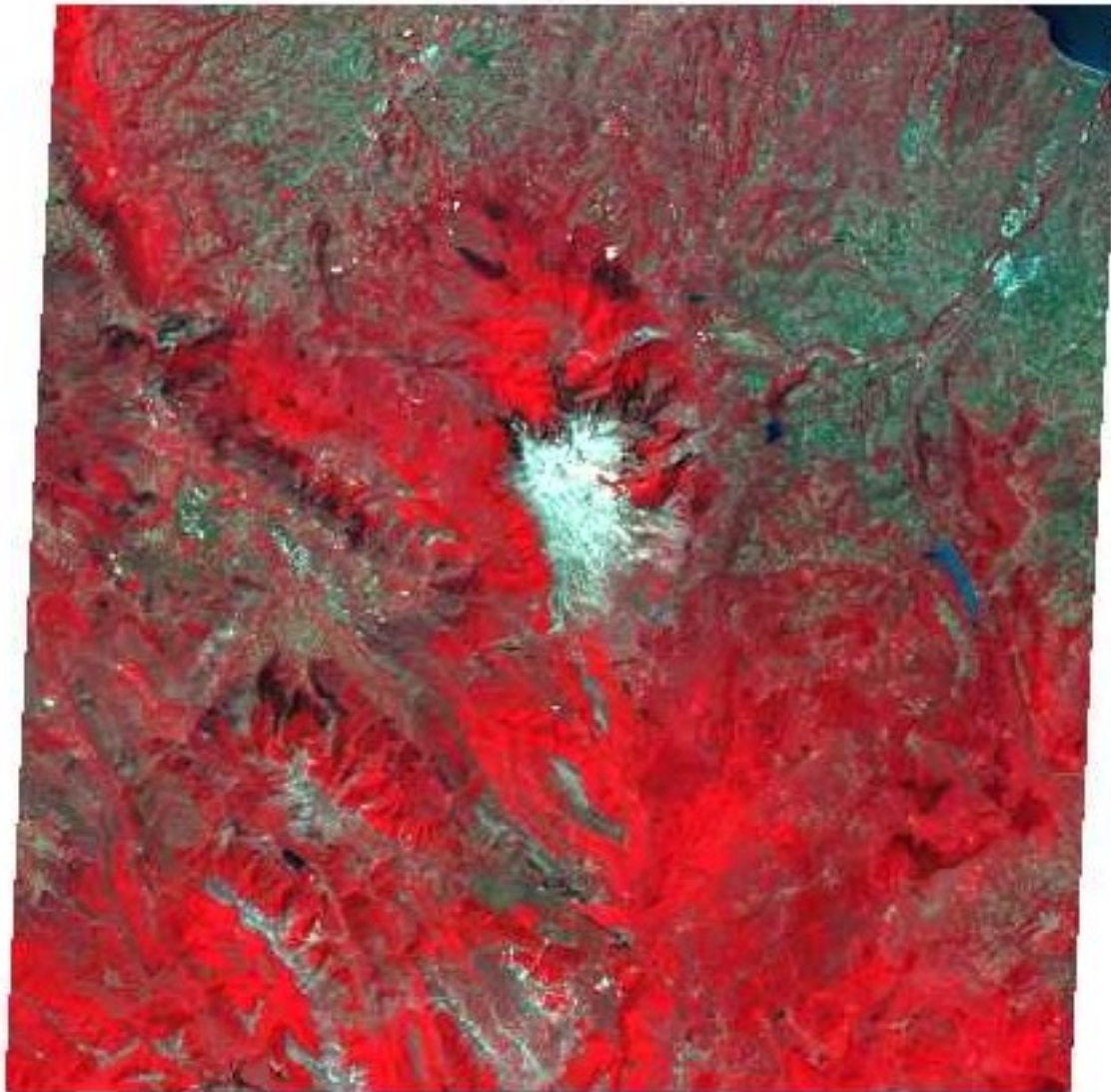


GLIMS ASTER Footprints

Granule ID	EDC ID	Short Name	Day or Night	Capture Date	Cloud Cover %	Gain Settings	View Browse	Order Scene
SC:AST_L1A.003:2022150638	2022150638	AST_L1A	Day	2000-10-05	67	01 HGH, 02 HGH, 3N NOR, 3B NOR, 04 NOR, 05 NOR, 06 NOR, 07 NOR, 08 NOR, 09 NOR	View Image	Order
SC:AST_L1A.003:2022150647	2022150647	AST_L1A	Day	2000-10-05	77	01 HGH, 02 HGH, 3N NOR, 3B NOR, 04 NOR, 05 NOR, 06 NOR, 07 NOR, 08 NOR, 09 NOR	View Image	Order
SC:AST_L1A.003:2003702786	2003702786	AST_L1A	Day	2000-12-15	37	01 HGH, 02 HGH, 3N NOR, 3B NOR, 04 NOR, 05 NOR, 06 NOR, 07 NOR, 08 NOR, 09 NOR	View Image	Order
SC:AST_L1A.003:2003702788	2003702788	AST_L1A	Day	2000-12-15	56	01 HGH, 02 HGH, 3N NOR, 3B NOR, 04 NOR, 05 NOR, 06 NOR, 07 NOR, 08 NOR, 09 NOR	View Image	Order
SC:AST_L1A.003:2005828714	2005828714	AST_L1A	Day	2001-06-09	0	01 NOR, 02 NOR, 3N NOR, 3B NOR, 04 NOR, 05 NOR,	View Image	Order

13.8169 42.3819

14.5565 42.272



13.634 41.8307

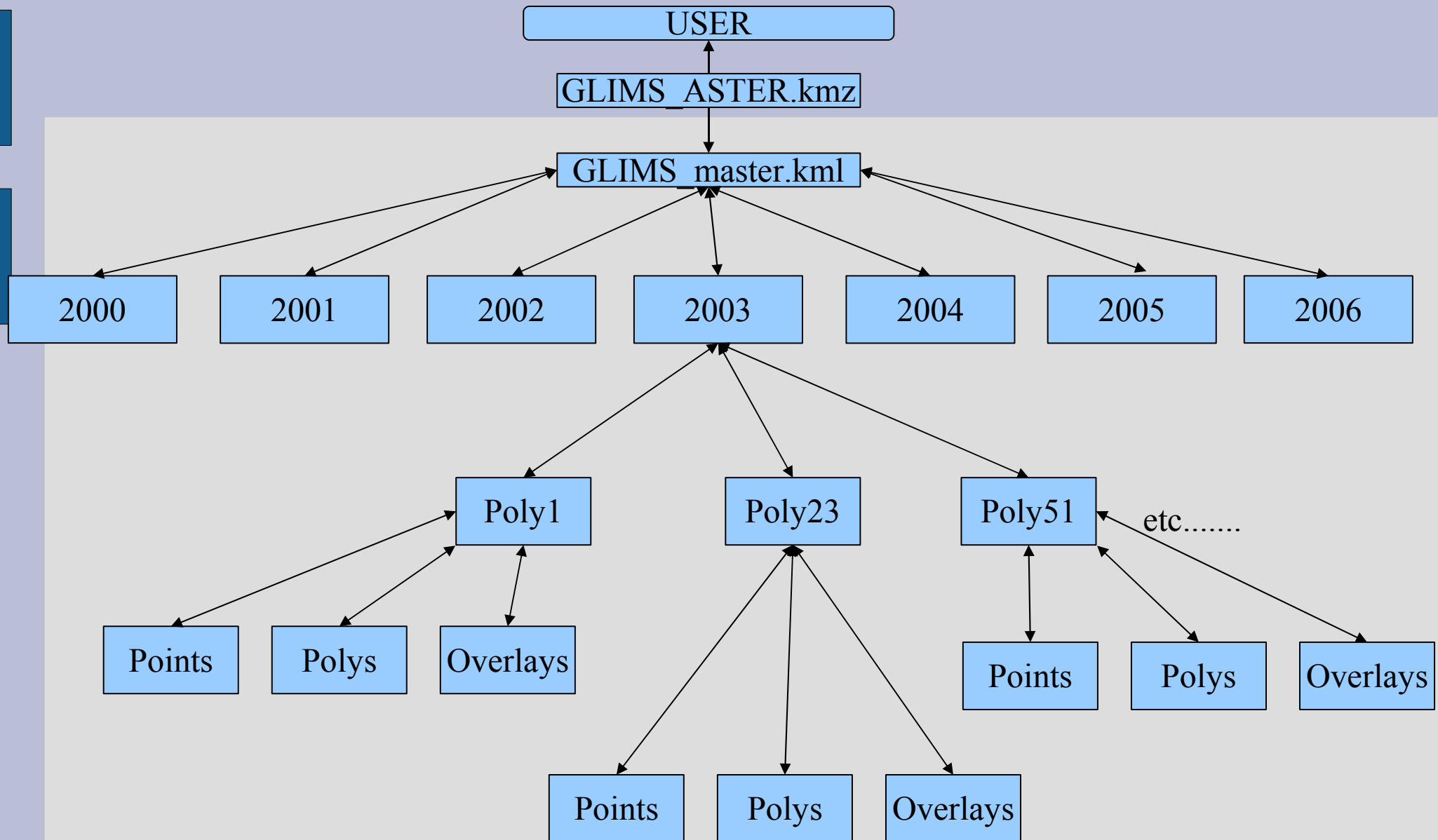
14.3674 41.7218

Image Date: 2001-06-09

[Go Back](#)

Google Earth

- Each Browse Image Becomes a Ground Overlay



Search

Fly To Find Businesses Directions

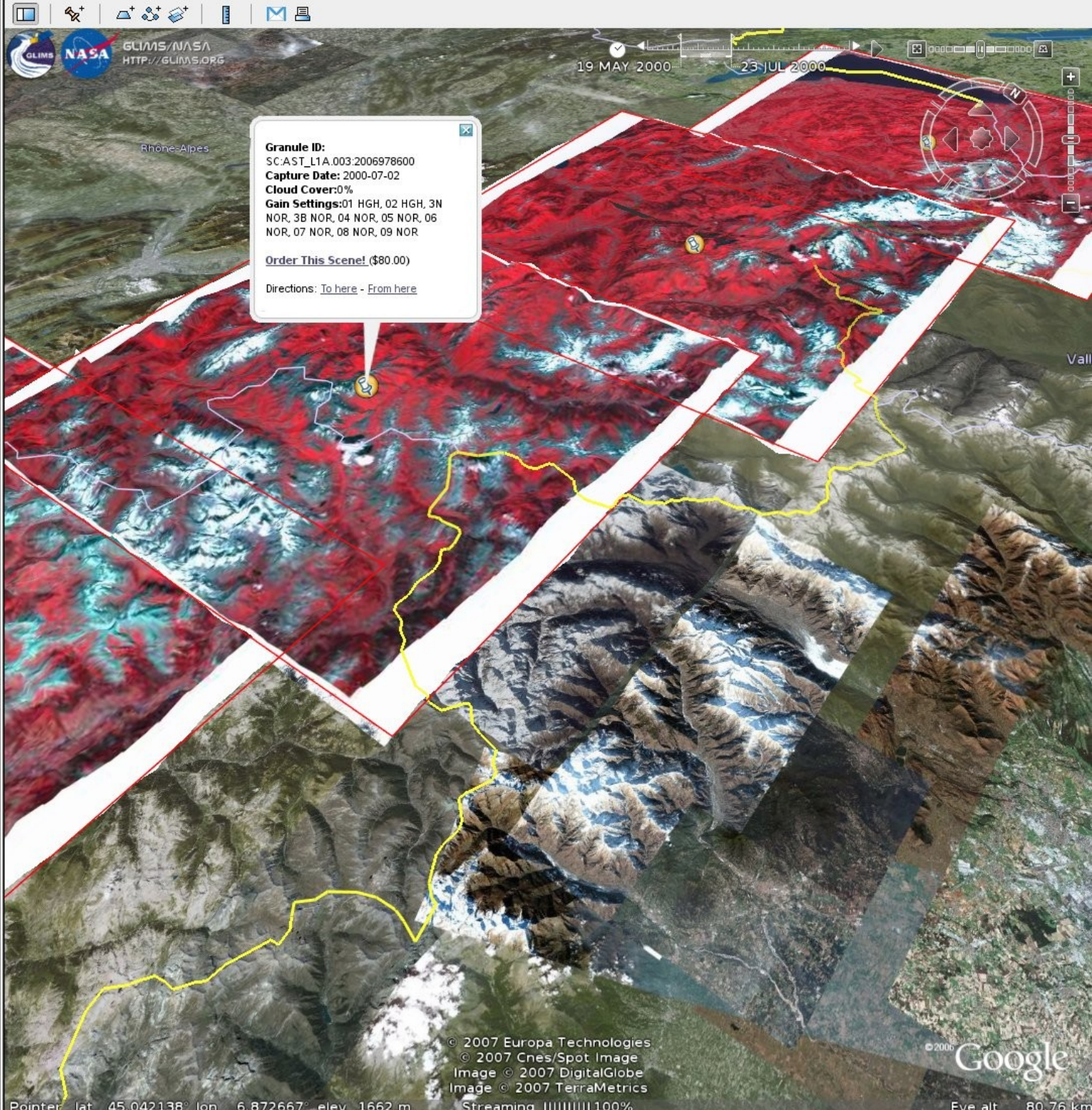
e.g., 37.407229, -122.107162

Places

- My Places
- ant_pen_IDs.kml
- Liliigo Glacier
- My_house.kmz
- kilimanjaro_helm.kml
- GLIMS ASTER Footprints
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- NASA/GLIMS Logo
- Sightseeing
- Select this folder and click on the 'Play' button below, to start th
- default
- Temporary Places

Layers

- View: Core
- Primary Database
 - Terrain
 - Geographic Web
 - Featured Content
 - Global Awareness
 - roads
 - 3D Buildings
 - borders
 - Populated Places
 - Alternative Place Names
 - Dining
 - Lodging
 - Google Earth Community
 - Shopping and Services
 - Transportation
 - Geographic Features
 - Travel and Tourism
 - Parks and Recreation Areas
 - Community Services
 - US Government
 - DigitalGlobe Coverage



GLIMS NASA
 HTTP://GLIMS.ORG

19 MAY 2000 23 JUL 2000

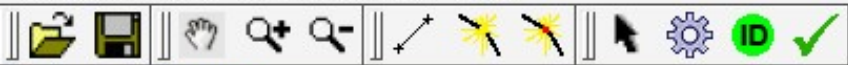
Granule ID:
 SC AST_L1A.003.2006978600
Capture Date: 2000-07-02
Cloud Cover: 0%
Gain Settings: 01 GHG, 02 GHG, 3N
 NOR, 3B NOR, 04 NOR, 05 NOR, 06
 NOR, 07 NOR, 08 NOR, 09 NOR

Order This Scene! (\$80.00)

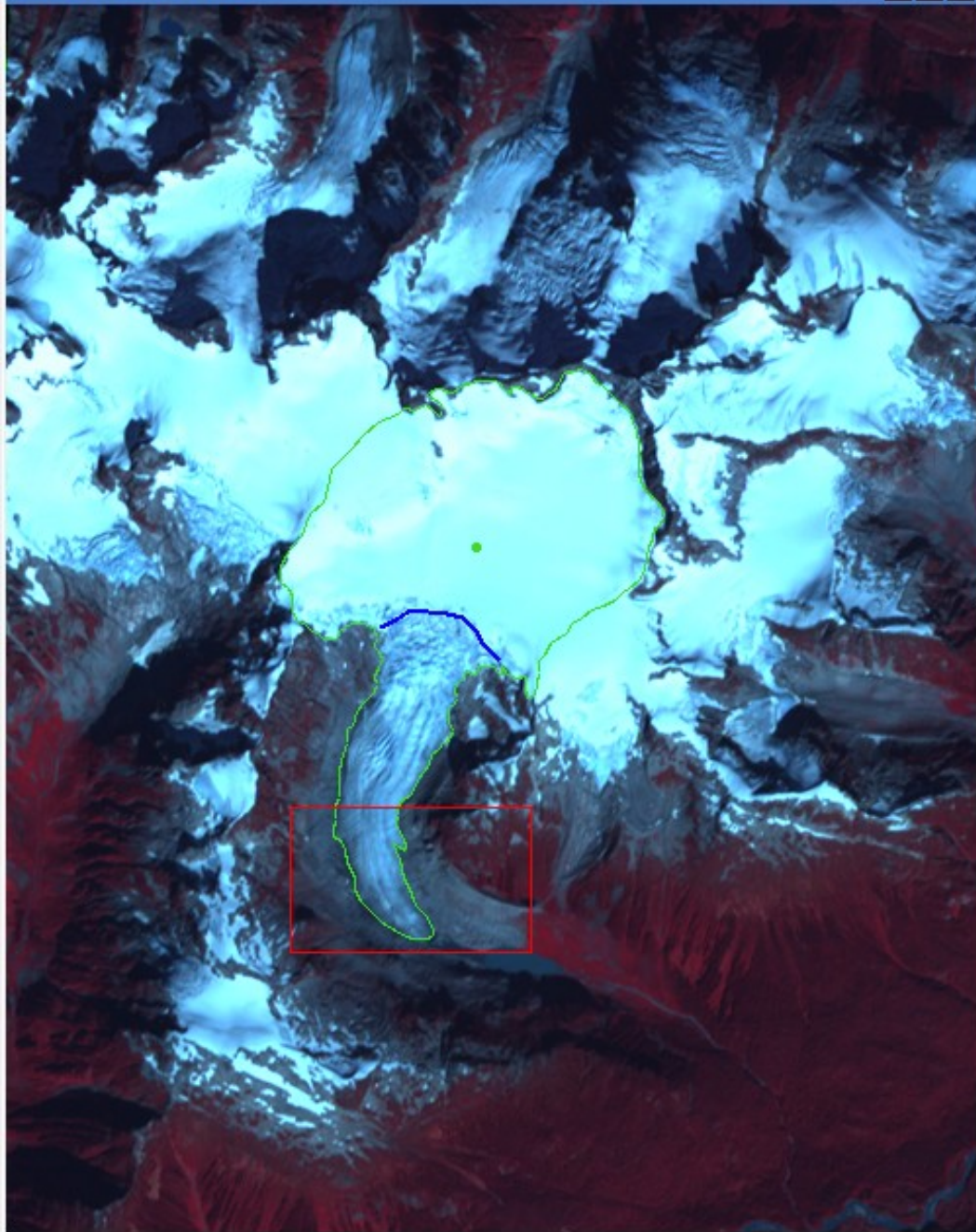
Directions: [To here](#) - [From here](#)

GLIMS Tools

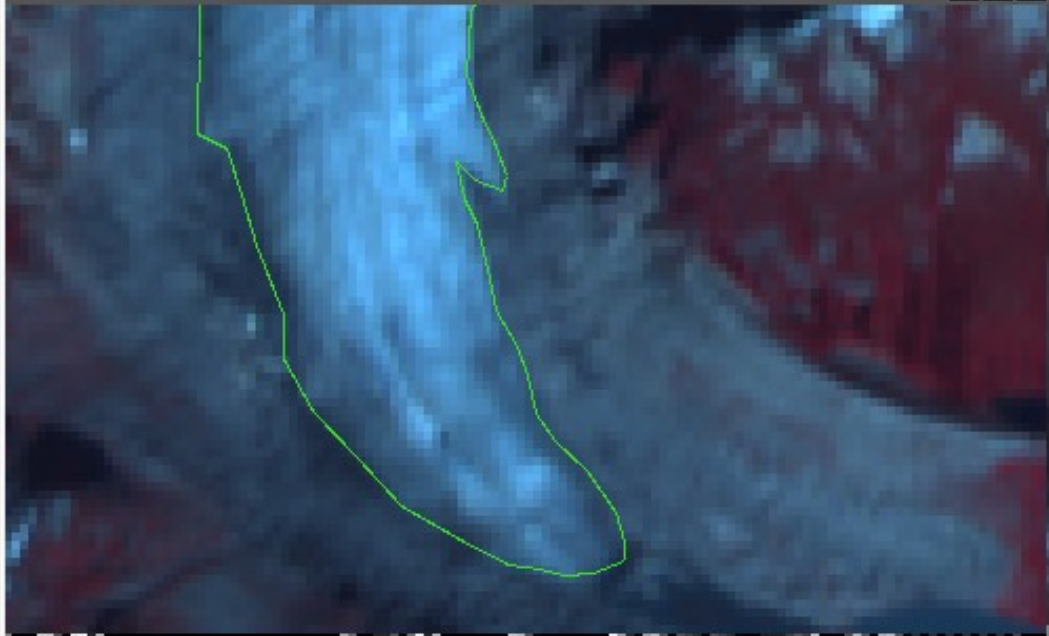
- GLIMSView
- Web-based tools
- GLIMS Analysis Tutorial



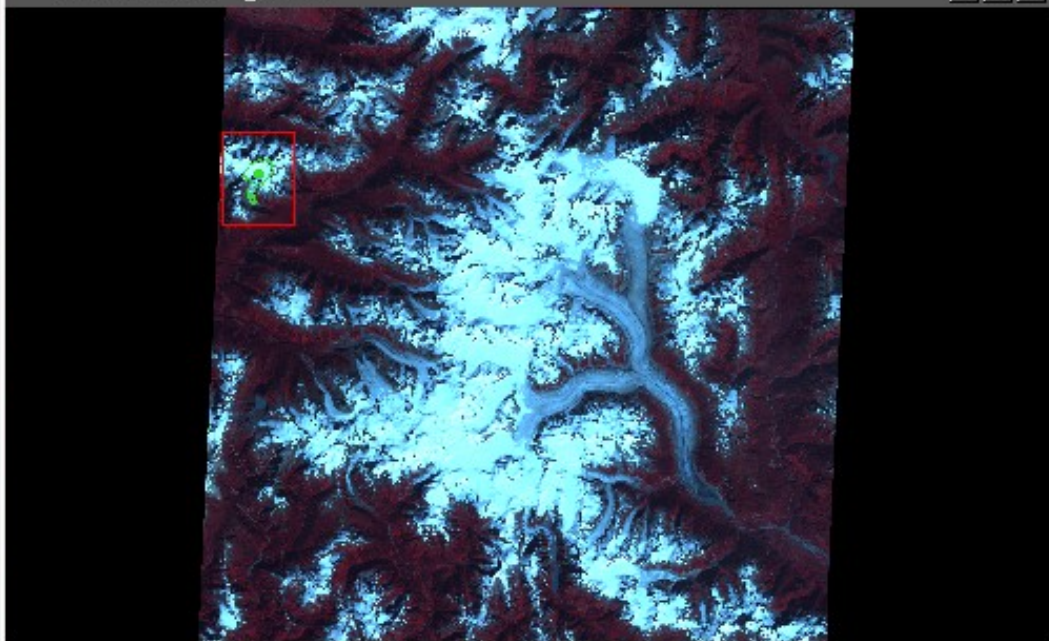
Fixed @100.00

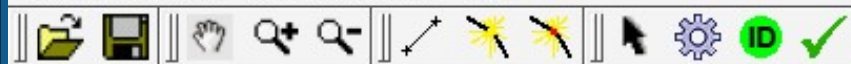


Zoom View @400.00



Whole View @7.19





Fixed @100.00

Zoom View @400.00

Configuration

Line Config | Glacier Config | Session | Image Info

Color	Glacier Type	Segment Label	Left Mat	Right Mat	Style	Width	Measured
Blue	snow_line	nul	snw	ice	Solid Line 2	m	
Yellow	glac_bound	nul	nul	nul	Solid Line 2	m	
Gold	glac_bound	trm	nul	nul	Solid Line 2	m	
Blue	glac_bound	trm	ice	wtr	Solid Line 2	m	
Purple	glac_bound	hed	nul	nul	Solid Line 2	m	
Purple	glac_bound	hed	nul	nul	Dash Line 1	a	
Green	glac_bound	lat	ice	rck	Solid Line 1	a	
Green	glac_bound	lat	ice	rck	Dash Line 1	m	
Blue	glac_bound	eod	nul	nul	Dot Line 1	a	
Red	centerline	cnt	nul	nul	Solid Line 1	m	
Blue	intrnl_rock	nul	ice	rck	Dash Line 2	m	

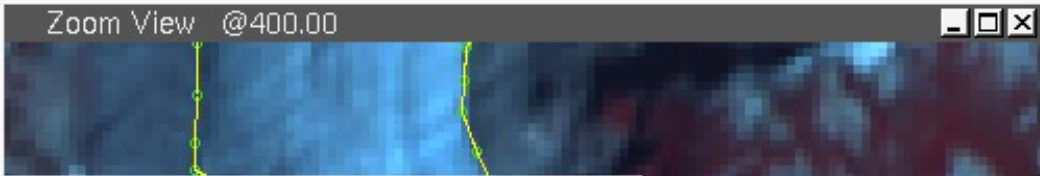
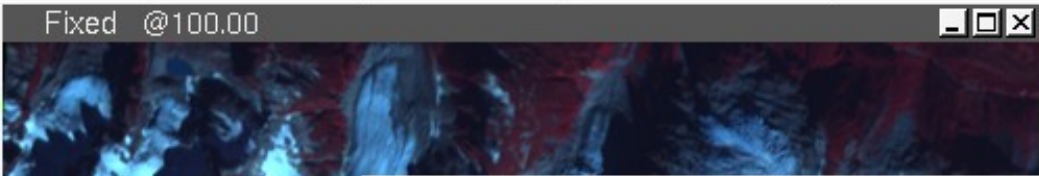
New

Edit

Change Line

Export

Import



Configuration

Line Config | Glacier Config | Session | Image Info

GID	Name	Local ID	WGMS ID	Parent ID
G2336886E51695N				

glimsview

Lat: 51.6951 Lon: -126.3141

Name: WGMS ID:

Local ID: Parent ID:

Primary Classification: Form:

Null Null

Frontal Characteristics: Longitudinal Characteristics:

Null Null

Dominant Mass Source: Tongue Activity:

Null Null

Width (m): 0.00 Length (m): 0.00 Area (km²): 0.00

Abzone Area (km²): 0.00 Speed (m/a): 0.00 ELA: 0.00

ELA Description:

Snowline Elevation (m): 0.00

Record Status:

New Glacier ID

Update Cancel

Utility tools for GLIMS

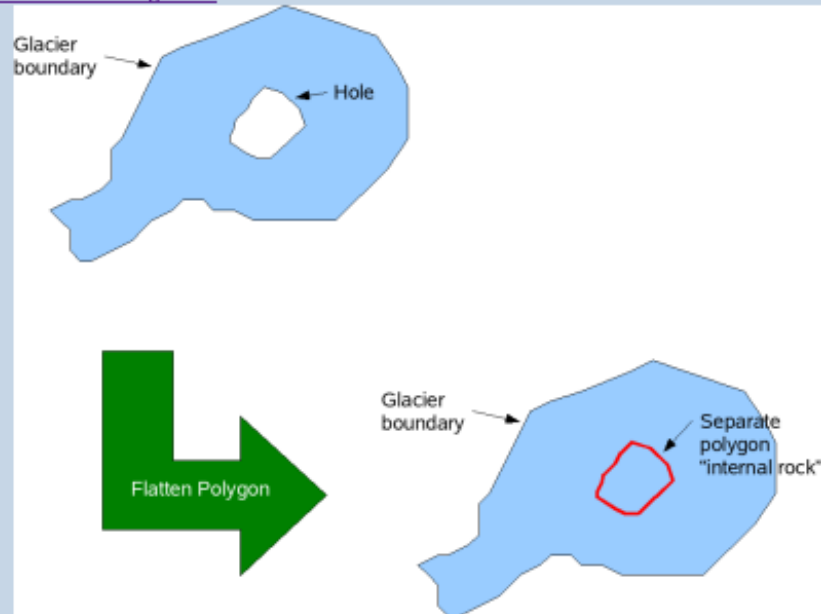
These tools are designed to be used by the GLIMS community.

Tools

[ASTER gain calculator](#)

An on-line tool to calculate ASTER gain settings appropriate for snowy targets as a function of day-of-year, latitude, and ASTER band number.

[Shapefile flattening tool](#)

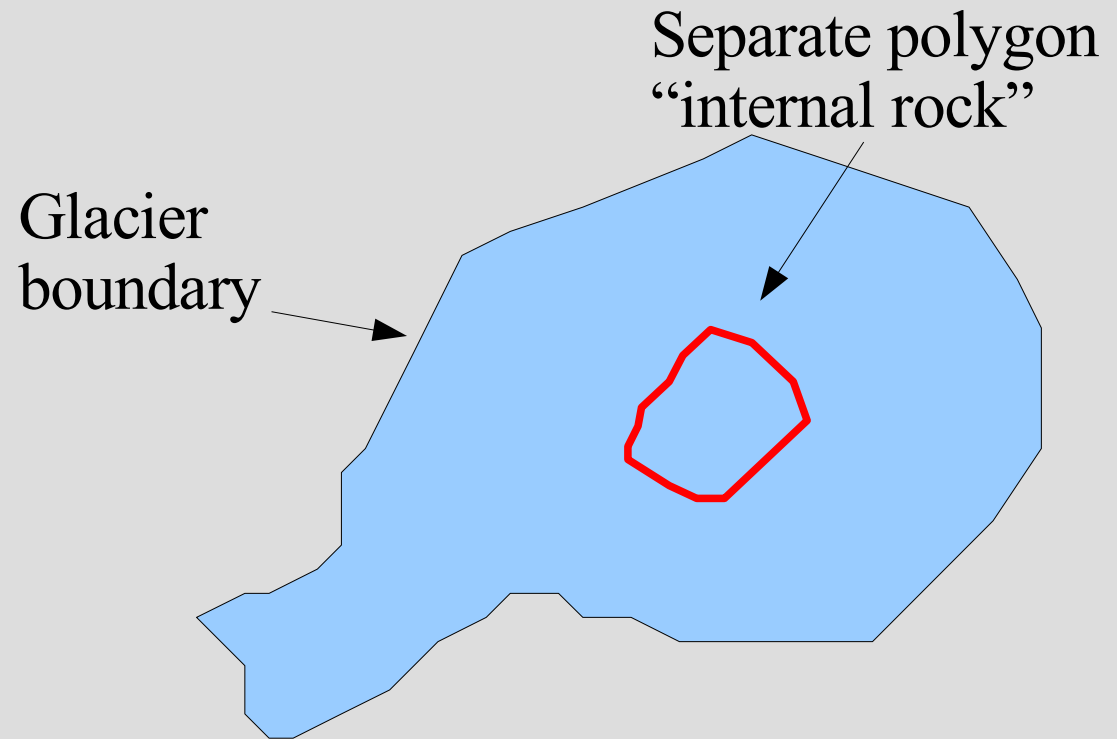
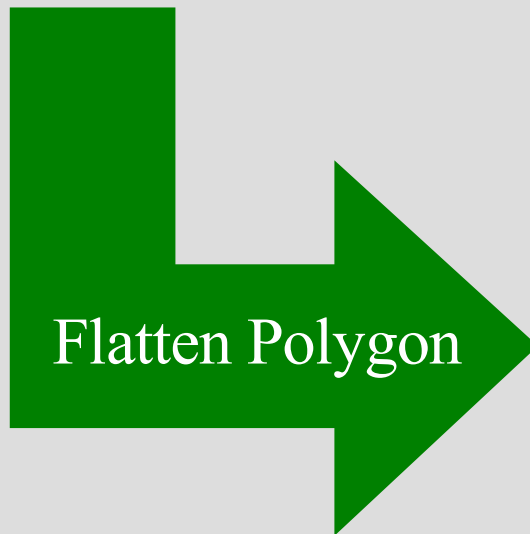
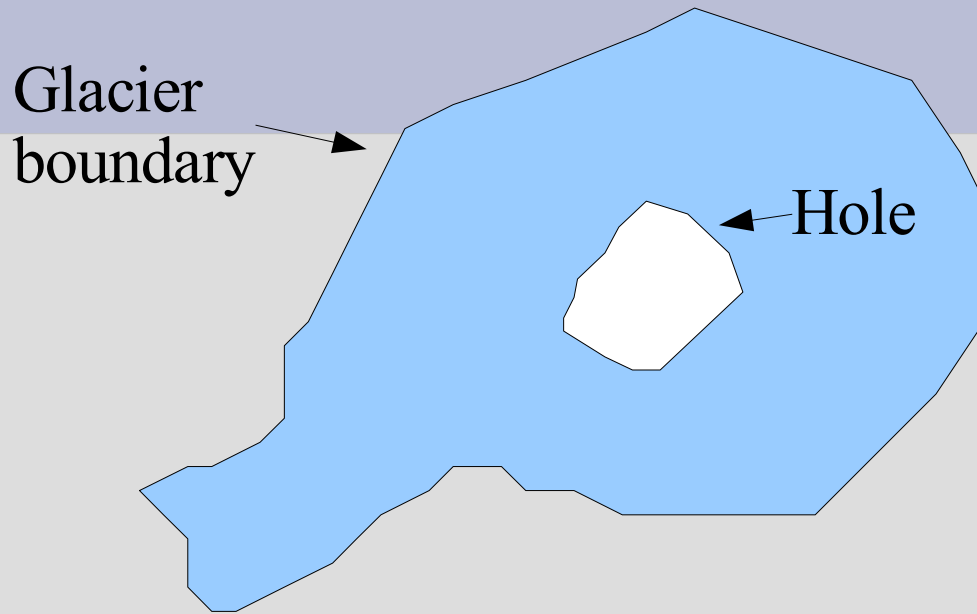


An on-line tool to "flatten" shapefiles. Some people have digitized glaciers in such a way that internal rock outcrops (nunataks) have been represented by "holes" in the glacier polygon. In the shapefile itself, these "holes" are sub-parts to the main glacier polygon, and share attributes with it. The GLIMS [Data Transfer Specification](#), however, requires that internal rock outcrops be represented by their own top-level polygons, so that they can be individually attributed. This tool converts shapefiles with glacier polygons containing holes into shapefiles where the holes have been made into top-level polygons. These new polygons inherit all the attributes of their parents, except that the "category" attribute is set to "intrnl_rock". For best results, the input shapefile(s) should already have the attribute "ID" populated with GLIMS glacier IDs, and the attribute "category" populated with "glac_bound".

Upload a tar or zip archive of one or more 'segments' shapefiles. The archive may contain subdirectories.

<http://glims.colorado.edu/tools/>

Glacier polygon “flattening” tool



GLIMS Analysis Tutorial

Contents

1	Introduction	
2	Tools	
3	Acquiring ASTER Imagery	
4	Input Image(s)	
5	Definition of a Glacier	
6	Defining glacier outlines and their attributes	
7	Definition of "left" and "right" of segments	
8	Assigning GLIMS Glacier IDs	
	Background	
	Definition	
	Choosing the Location for a GLIMS Glacier ID	
9	Population of Other Fields (including Null values)	
	Null values	
	As-of time (source time) of glacier outlines	
10	Creating a "mugshot"/Submitting the source image of a glacier	
11	Measurement uncertainty	
12	Using GLIMSView as a filter	
13	Working with multiple images	
14	How the Ingest Process Works	
1	References	

1 Introduction

This document contains guidelines for preparing a glacier out for insertion into the GLIMS Glacier Database. While other documents describe the details of the database design and other aspects of the database, this document is designed to assist the process of doing a "GLIMS Session" and producing files that are optimally configured for the GLIMS Glacier Database. We also describe preparing an set, such as one derived from maps, for GLIMS.

A GLIMS Analysis Session is defined as the activity of producing glacier outlines, together with GLIMS attribute data, usually from a satellite image. A GLIMS Analysis (without the "Session") is one snapshot of a glacier. Each record in the Glacier_Dynamic table corresponds to a single glacier.

2007-05-22

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5 Definition of a Glacier

Through 2005, the GLIMS policy was to allow the analyst to decide how and how to break up an ice mass with a branching structure into individual glaciers, because different branches of a given ice mass may historically have been treated as separate glaciers and given different names. However, this approach leads to inconsistencies in how glaciers are treated, which greatly complicates large-scale analysis of the GLIMS Glacier Database. It was recognized that a standard definition was needed: 1) to guide the delineation of, and separation into individual glaciers, i.e. bodies of ice that all glaciologists would agree are glacier ice, and 2) to guide the GLIMS analyst in determining what is glacier ice and what is not. As a result, the GLIMS Team has decided upon the following definition of a "glacier" for the purposes of GLIMS. Note that the definition is tailored to remote sensing and thus does not involve motion of ice. However, it is compliant with the World Glacier Monitoring Service (WGMS) standards with respect to sites as defined in the observing strategy of the Global Terrestrial Network for Glaciers (GTN-G). This definition is also not intended to be used in a legal context. Given the limitations of current remote sensing technology, we recognize that this definition may lead to the inclusion in certain cases, of what would generally be considered "perennial snow masses". Definitions of "glacier" for other purposes outside of GLIMS are elsewhere. The GLIMS definition of a glacier is:

A glacier or perennial snow mass, identified by a single GLIMS glacier ID, consists of a body of ice and snow that is observed at the end of the melt season, or, in the case of tropical glaciers, after transient snow melts. This includes, at a minimum, all tributaries and connected feeders that contribute ice to the main glacier, plus all debris-covered parts of it. Excluded is all exposed ground, including nunataks. An ice shelf (see item 9 below) shall be considered as a separate glacier.

The following consequences and observations must be kept in mind:

1. Bodies of ice above the bergschrund that are connected to the main glacier shall be considered part of the glacier, because they contribute (through avalanches) and ice (through creep flow) to the glacier.
2. A tributary in a glacier system that has historically been treated (and named) as a separate glacier should, within the GLIMS framework, be included as part of the glacier into which it flows. The name field for the glacier should be populated with all relevant names of tributaries.

2007-05-22

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Some points from the above are illustrated in Figure 1, which illustrates

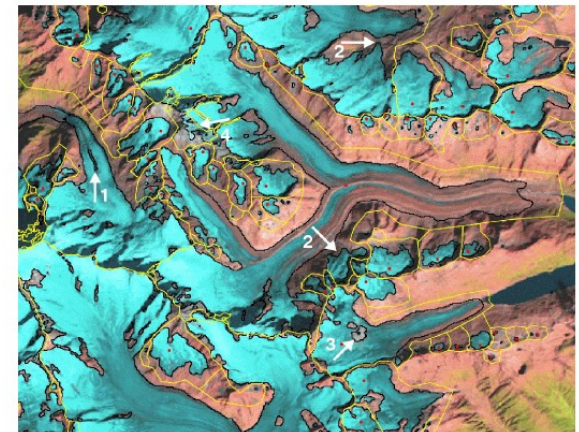


Figure 1: Landsat Thematic Mapper band 5,4,3 (red, green, blue) composite image of Unteraarglacier and surroundings, acquired 1998-08-31, with glacier outlines (black) and glacier basins (yellow) overlaid. The latter define ice divides and include all glacier parts that are related to a former glacier. Basin boundaries are not a required part of a GLIMS analysis. Red dots mark basins that have been included in the new Swiss glacier inventory. Arrows denote: 1: Medial moraine outcrop (which analyst should remove or (better) attribute as a "debris-cover" polygon), 2: now disconnected glaciers, but included in the same basin for consistency, 3: a small cloud that hides a part of the glacier area (which will not be part of a GLIMS dataset), 4: the ice divide is used here to correct for misclassified seasonal snow. Image and caption courtesy of Frank Paul.

Some decisions made by Frank Paul in his work with the Swiss Regional Center.

6 Defining glacier outlines and their attributes

Two important considerations for producing a set of glacier outlines and metadata for GLIMS are 1) the data model, and 2) the file formats. The discussion below touches on both these aspects. For details on the GLIMS Data Transfer Format, see the specification (Refs). That file describes the shapefiles and their attributes that form the basis for transferring data to the GLIMS Glacier Database.

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