

Photogrammetrie in der Glaziologie (VAW / ETH)

ERDAS User Forum CH 2014

Yvo Weidmann

Solothurn, 15.10.2009



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

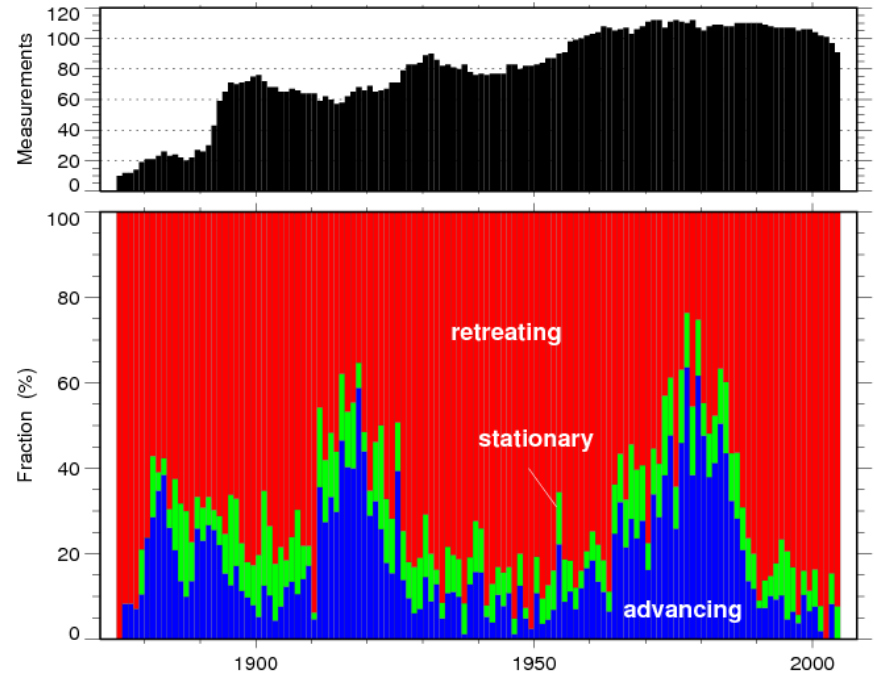
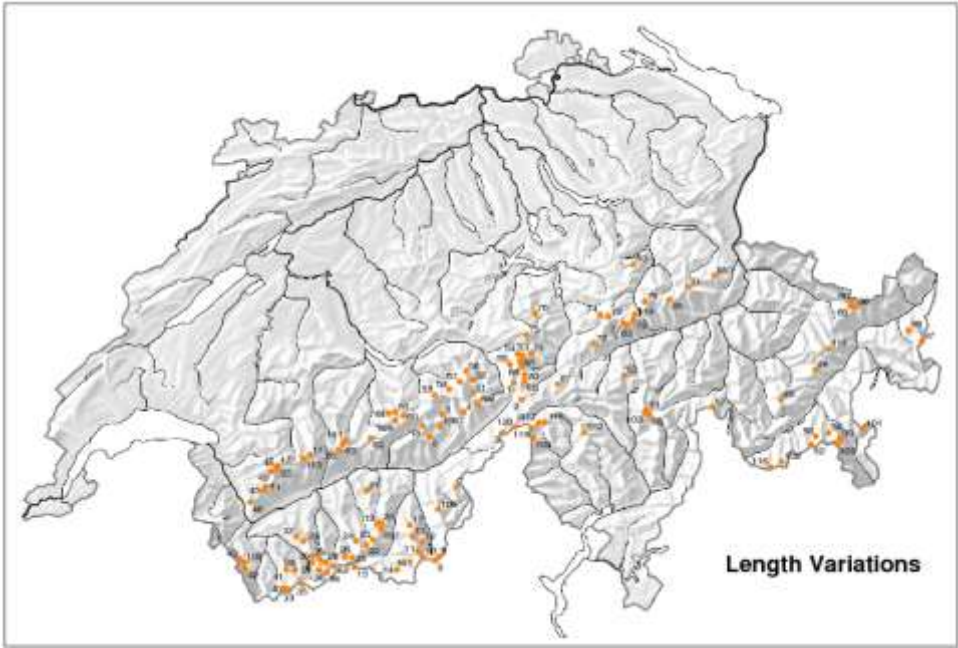


Inhalt

- **Hintergrund und Anwendungen**
- **Geschichte**
- **Datenquellen**
- **Datenmodell**
- **Datenfluss**
- **Fazit und Aussichten**

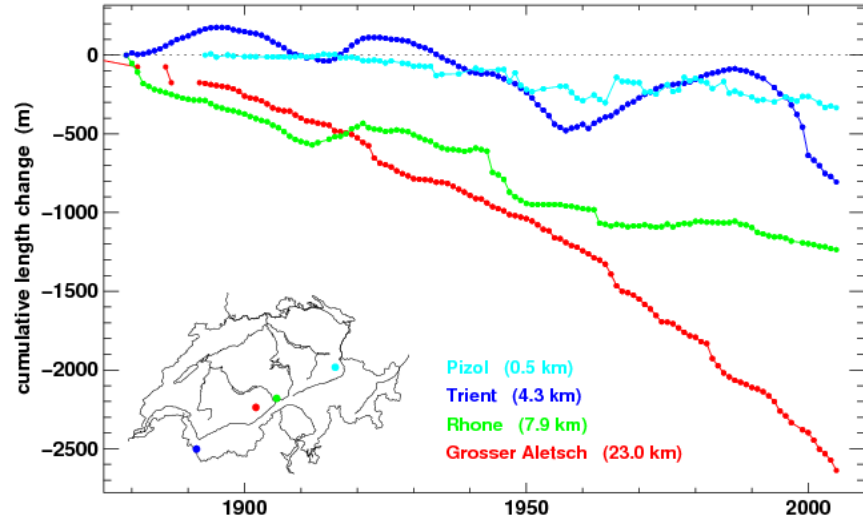
Hintergrund und Anwendungen

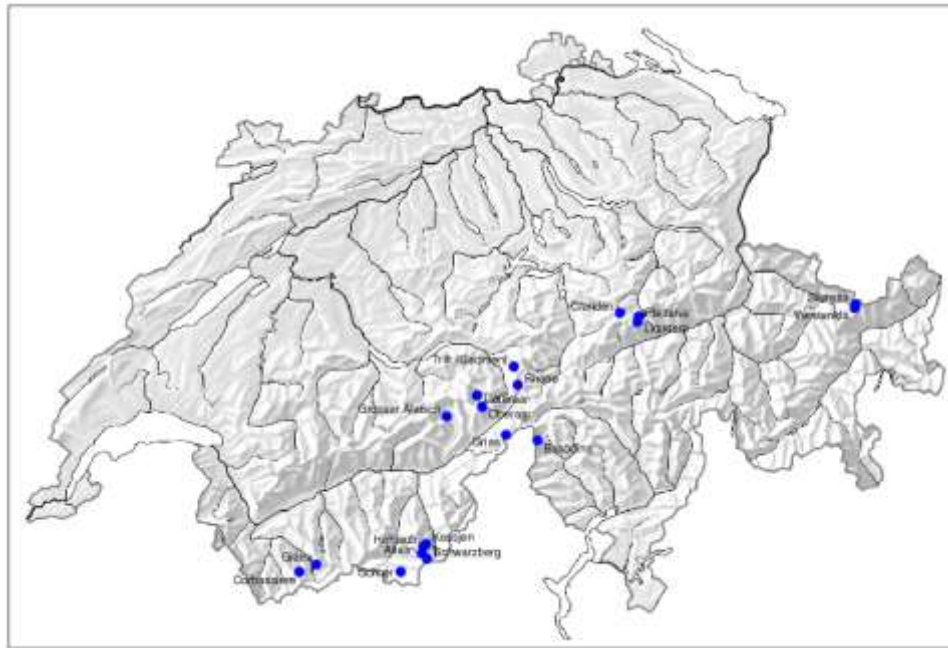




Observations of frontal variations:

~ 100 glaciers annually since 1880



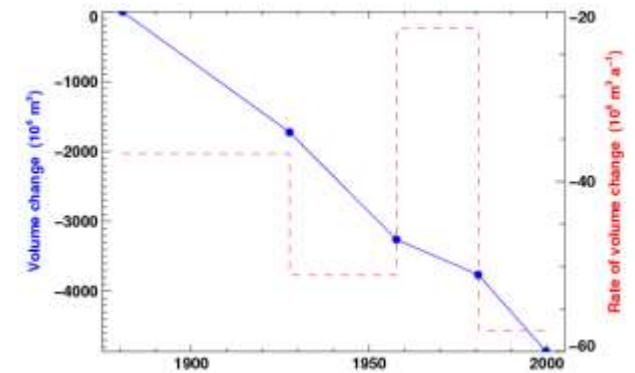
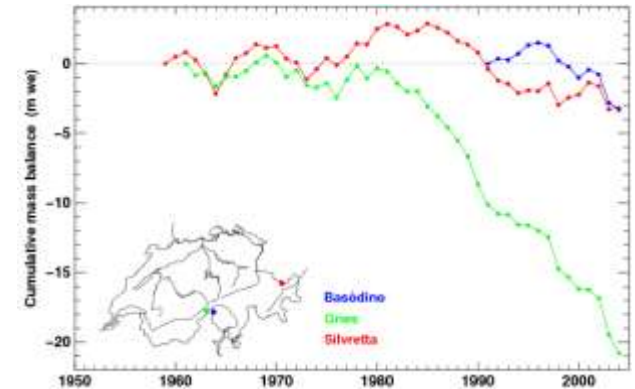
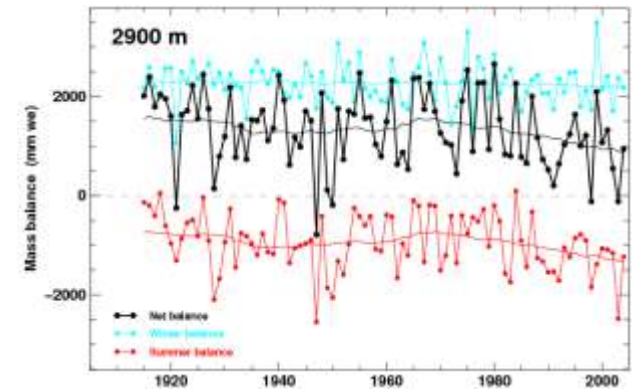


Mass balance:

4 points since 1910s
 3 glaciers (ongoing >10y)

Volume change:

~ 20-30 glaciers over last century

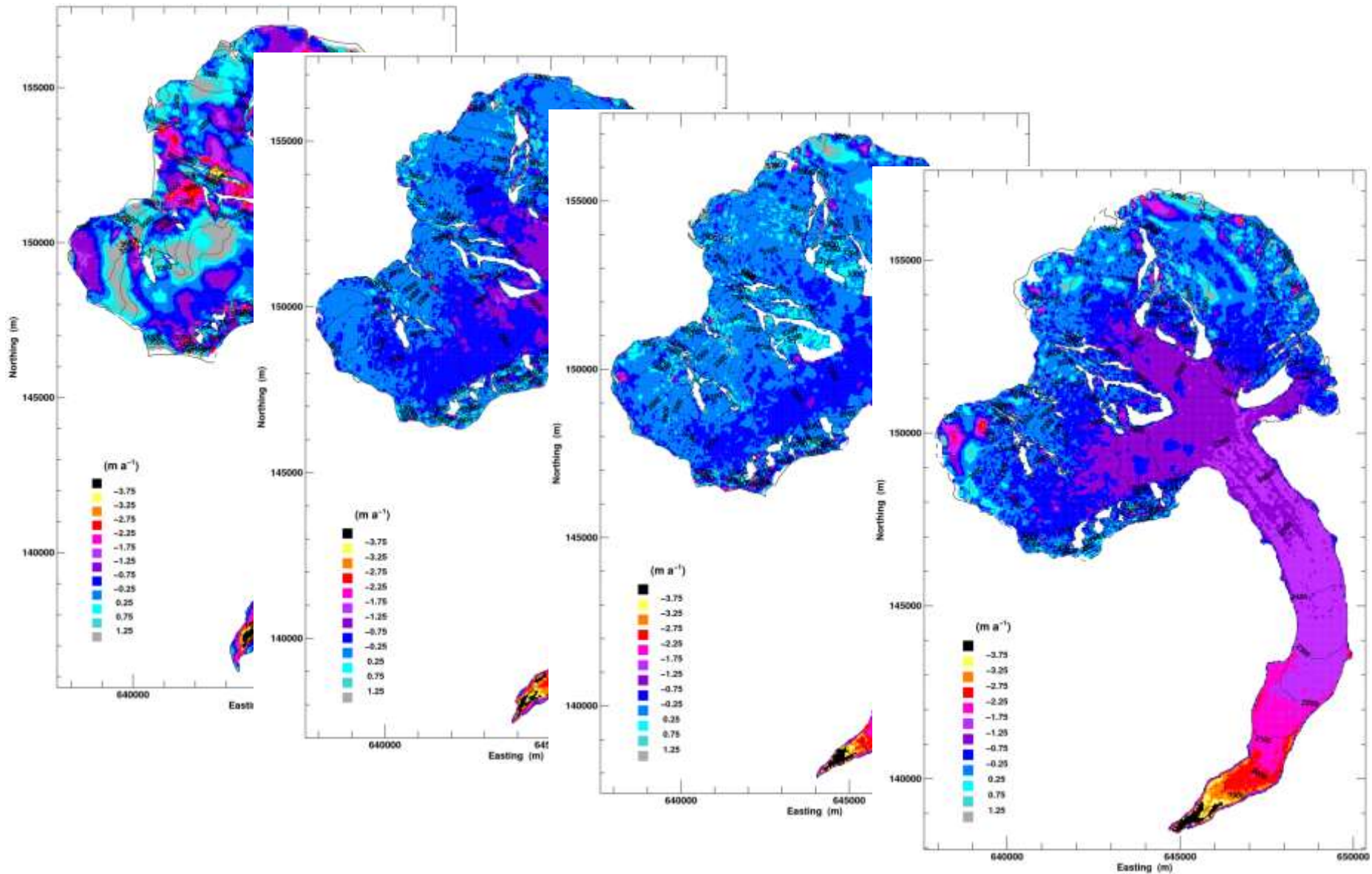


1880-1927

1927-1957

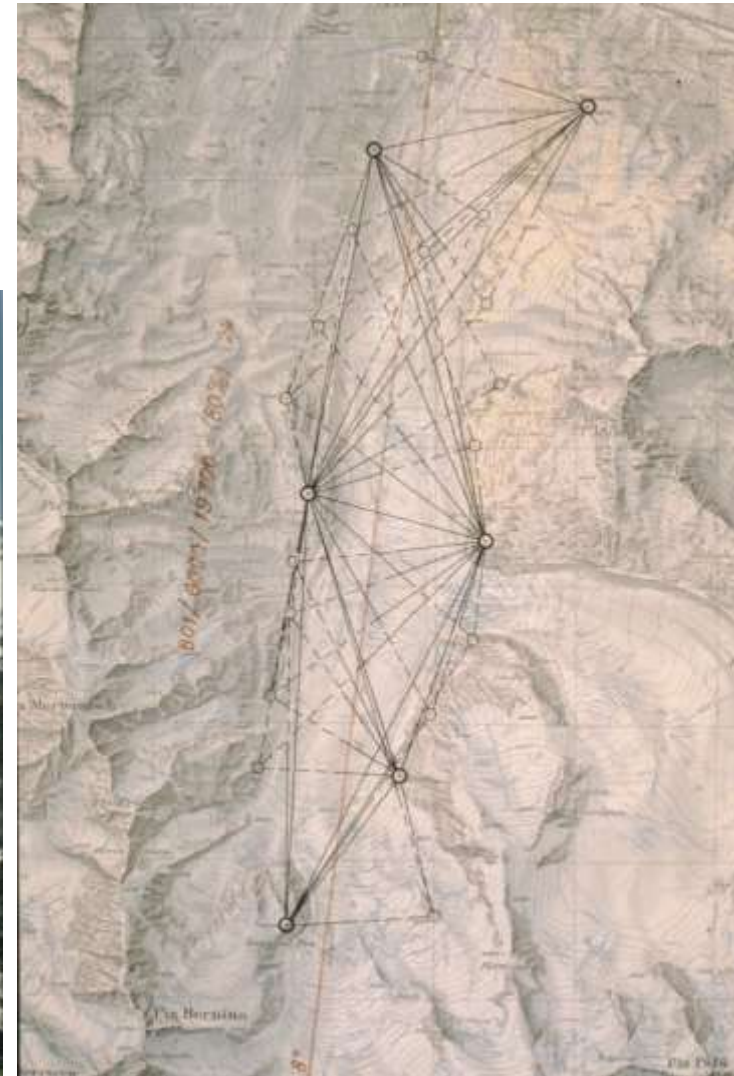
1957-1980

1980-1999



Geschichte

- Vor 1980: Externe Auswertungen (ETH)
- Ab 1980: Auswertungen am Wild AG 1
- 1988: Beschaffung Kern DSR 15
- Bis ~2008: Auswertungen am DSR 15



Geschichte

- ~1998: Start digitale Photogrammetrie
- Ab 1998: SOCET SET + ORIMA
- Ab 2004: ERDAS LPS + ORIMA und SOCET SET
- 2013: Start GIS und Geodatenbank



Datenquellen Photogrammetrie

ADS ab 2011



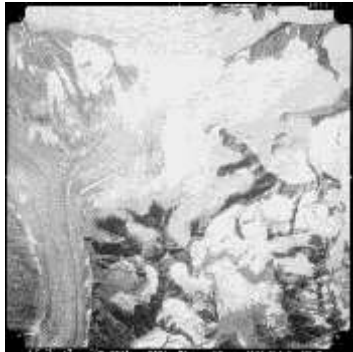
Historische Karten > 1840



LK50 1920 - 1930



Framebilder ca. 1940 - 2010



UltraCam ab 2011



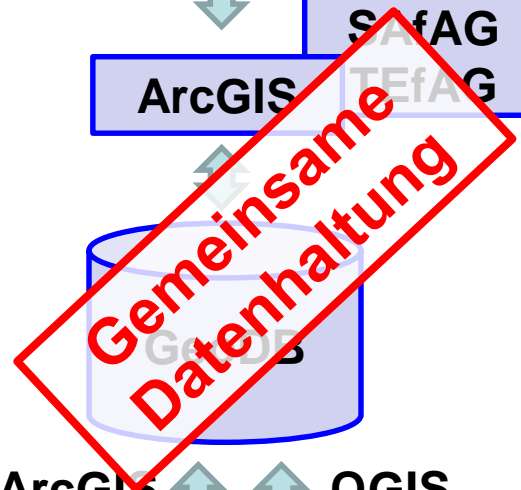
Nahbereich



LPS, ATE



SafAG
TEfAG
ArcGIS



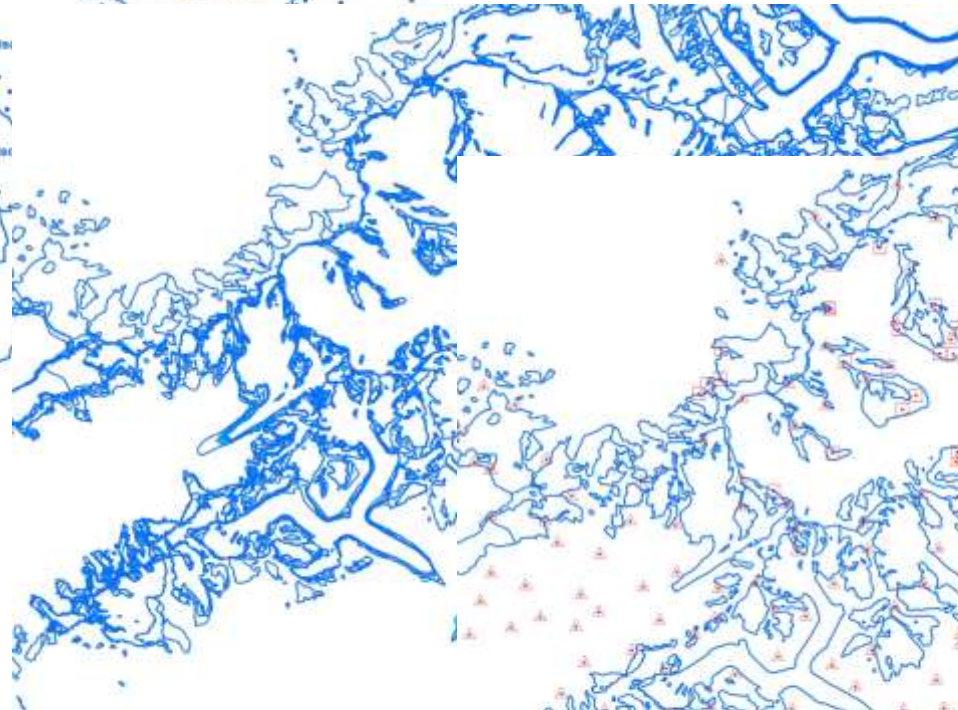
ArcGIS rw ↔ ↑ QGIS r



Datenmodell Geodatenbank Photogrammetrie



Lokalitäten,
Einzugsgebiete,
Inventare



Gletscherumrisse,
-zungen,
Oberflächen

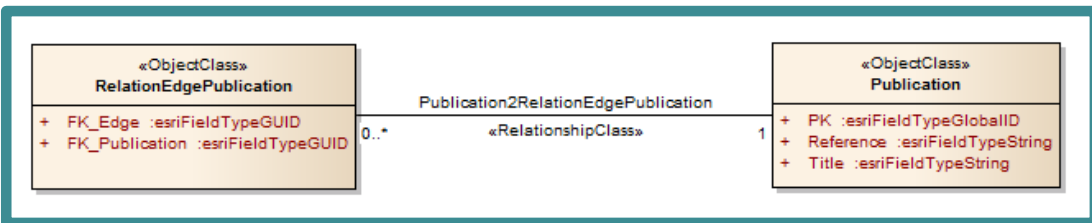
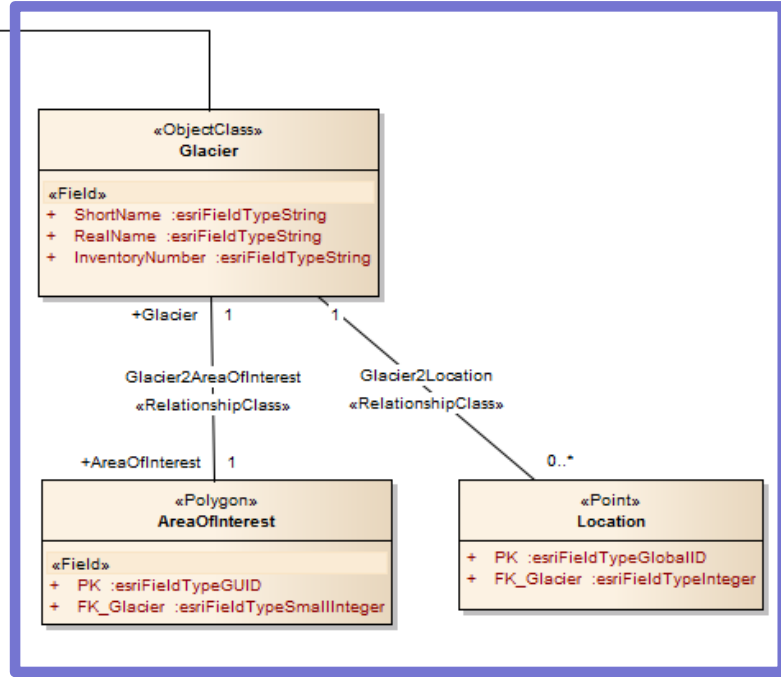
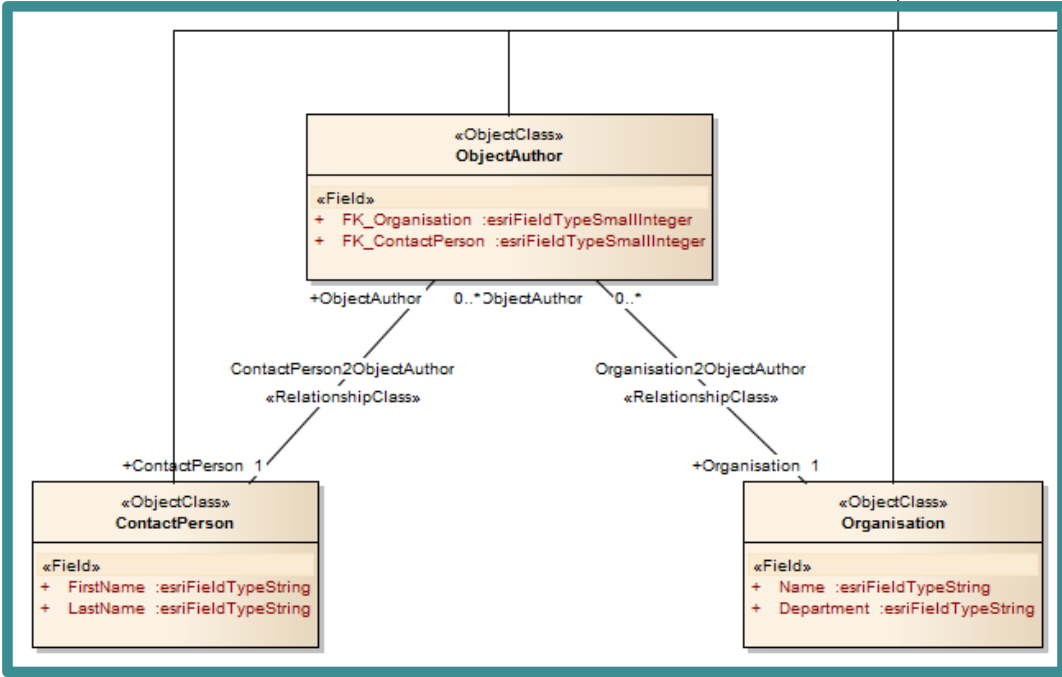


Passpunkte
Beobachtungen

Datenmodell Geodatenbank Photogrammetrie

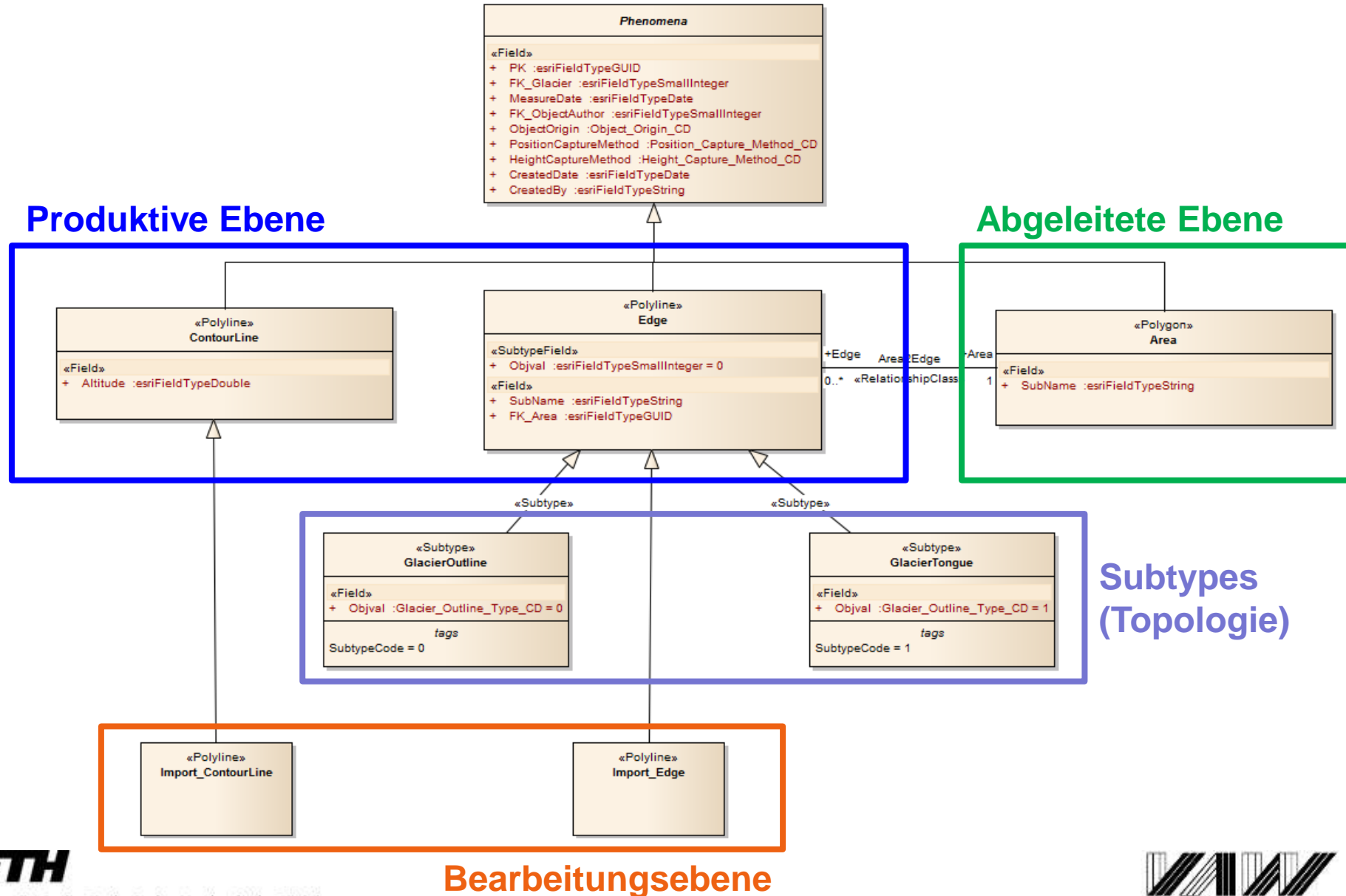
Metadaten Datenerfasser

Gletscherverzeichnis

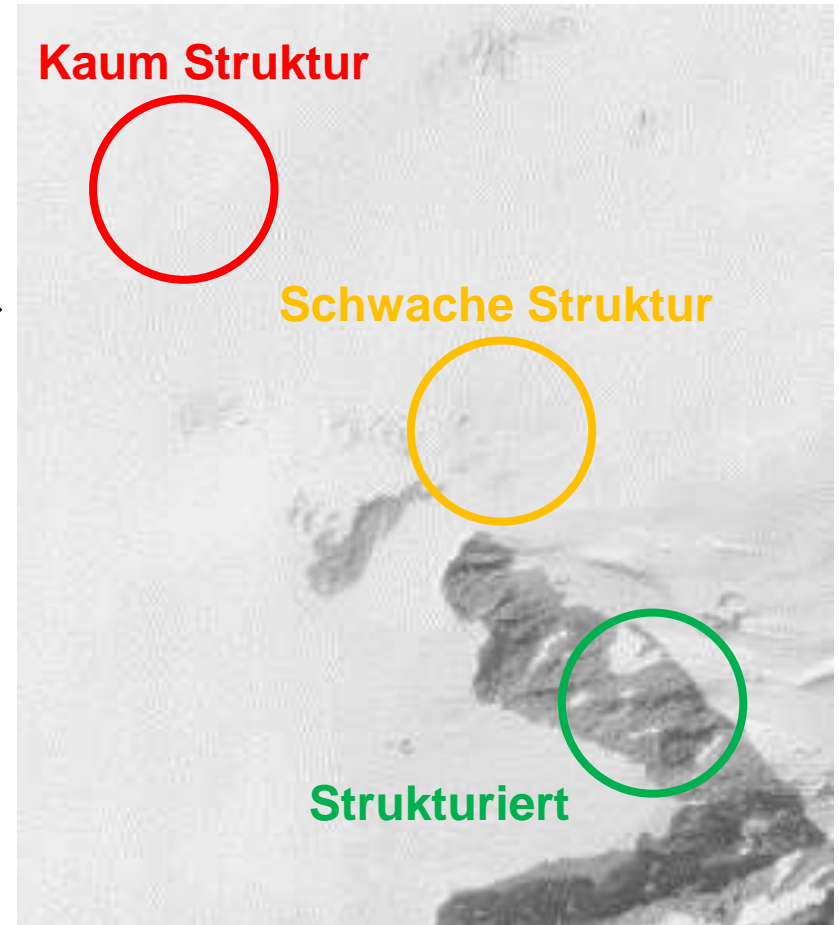


Metadaten Publikation

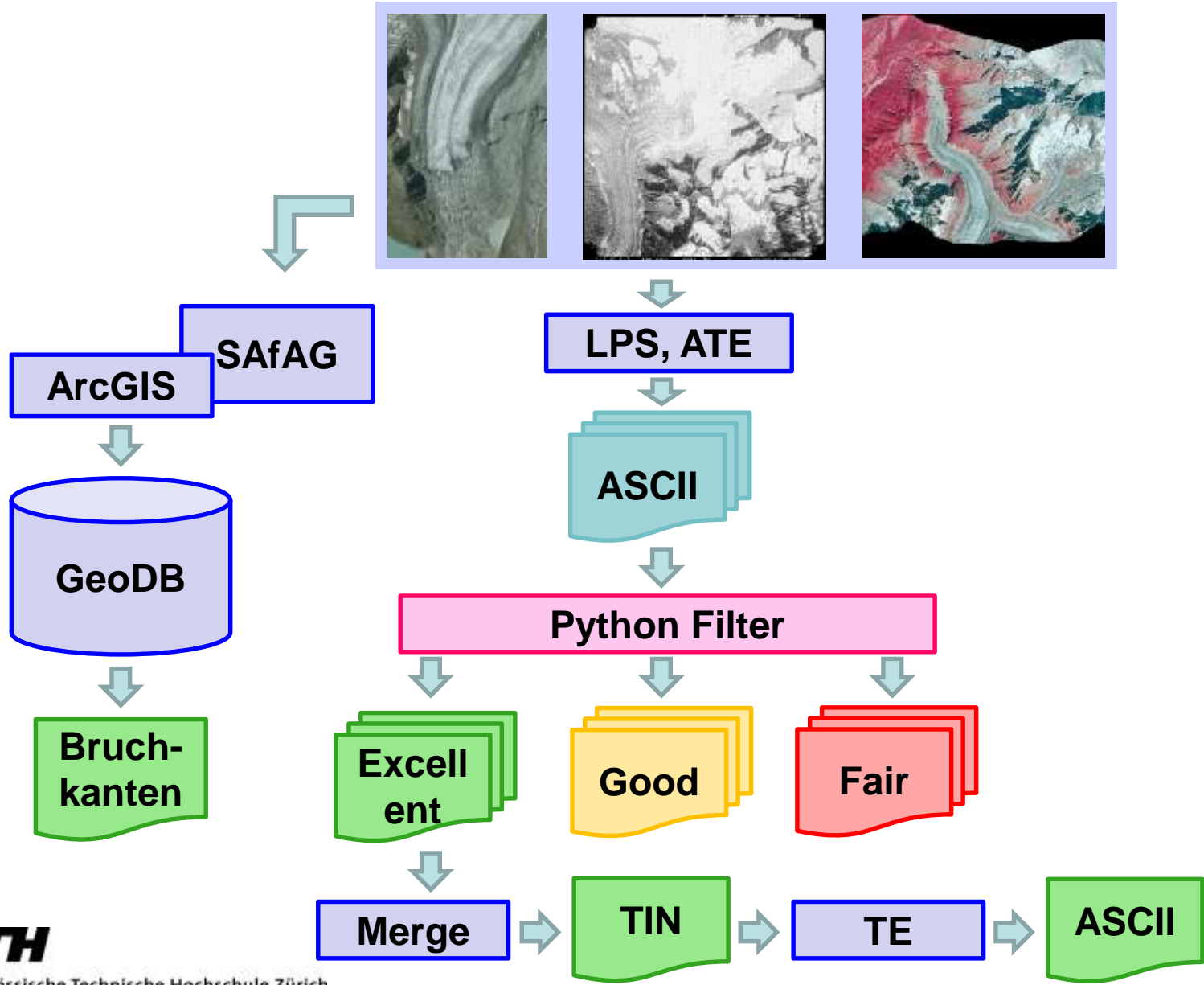
Datenmodell Geodatenbank Photogrammetrie



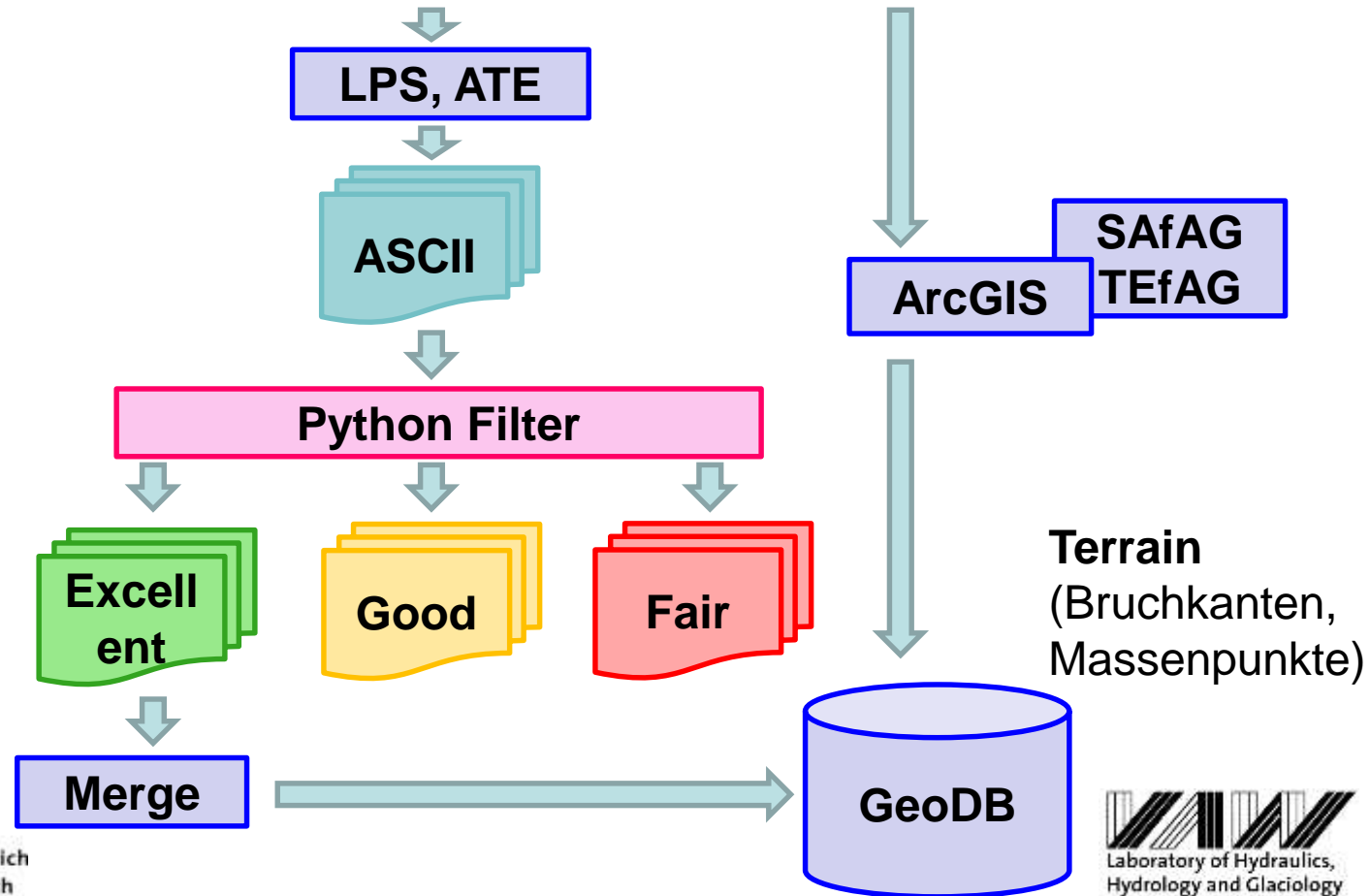
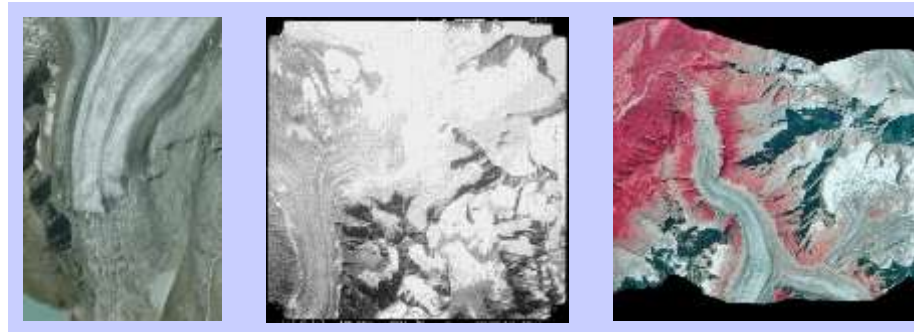
Datenfluss Höhenmodelle



Datenfluss Höhenmodelle



Datenfluss Höhenmodelle



Datenfluss Vektordaten

Topologie

- Import_Edge
 - Area Errors
 - Line Errors
 - Point Errors
- Import_Edge
 - <all other values>
 - Objval
 - Edge
 - Tongue

Bearbeitungsebene

- Geodetic points (FPI)
- Ground Control Poi

Produktive Ebene

- Edge
 - <all other values>
 - Objval
 - Edge
 - Tongue

Attributes

OBJECTID	6667
PK	{3681E530-9A3A-11
FK_Glacier	164
MeasureDate	18.08.1981
SubName	<Null>
CreateDate	20.02.2014
CreatedBy	yvow
FK_ObjectAuthor	14
Objval	Edge
SHAPE_Length	16535.617212
ObjectOrigin	Stereo aerial photog
PositionCaptureM	Stereo digitising
HeightCaptureM	Stereo digitising

Topologie

Error Inspector

Show: <Errors from all rules> 1 error Search Now Errors Exceptions Visible Extent only

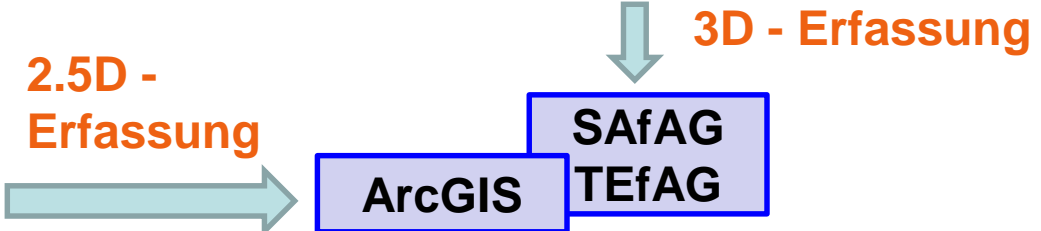
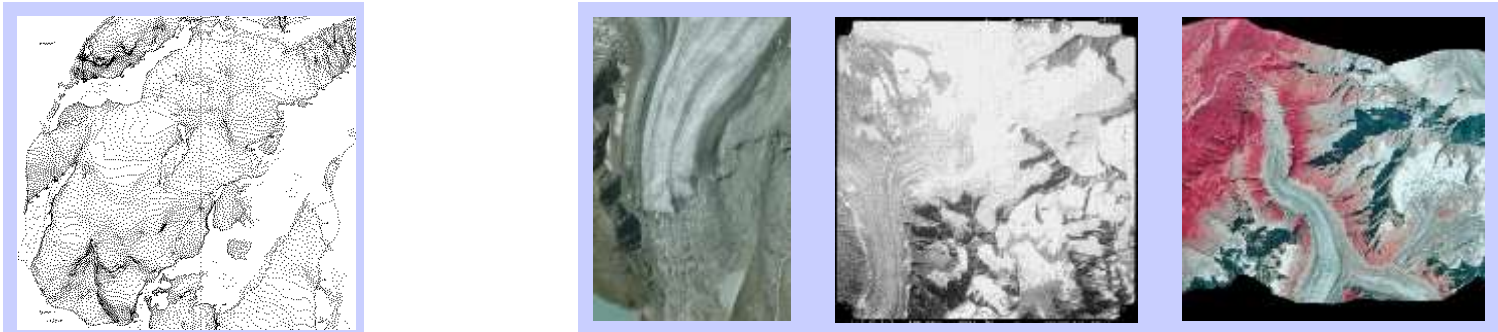
Rule Type	Class 1	Class 2	Shape	Feature 1	Feature 2	Exception
Must Not Self-Intersect	Import_Edge		Point	6667	0	False

660200.382 151845.628 Meters

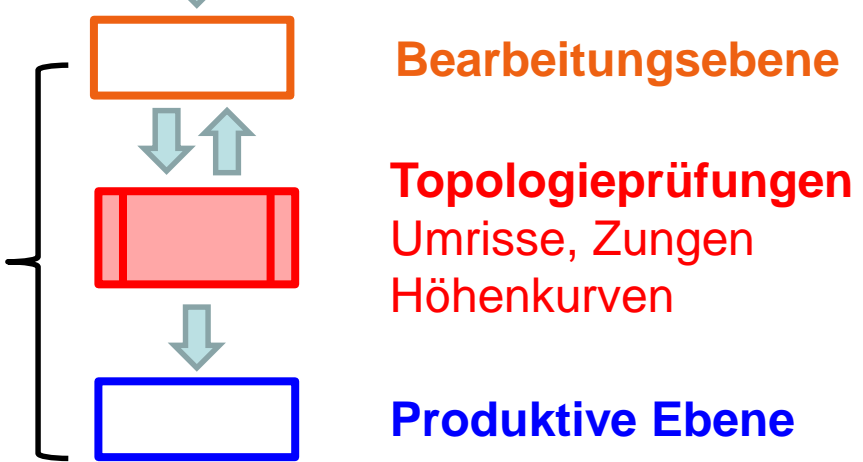
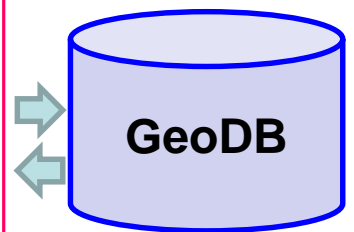
2D- oder 3D-Erfassung

Beziehungen
Attribute
Metadaten

Datenfluss Vektordaten



- GlaciologyDatabase
 - Maintenance
 - Copy database into empty structure
 - Set altitude of vertex based on attribute
 - Set Guid values
 - Photogrammetry
 - Export of orientation parameters from SUP files
 - Exports GCP to LPS
 - Convert edge
 - Convert edge to area
 - Convert polygon to polyline
 - Convert polyline to xyzn text file
 - Convert xyzn text file to polyline
 - Import glacier edge
 - Import glacier tongue



Fazit und Aussichten

- **Sehr angenehmer und sinnvoller Arbeitsablauf zwischen Photogrammetrie, GIS und weiteren Modellrechnungen.**
- **Erweiterung des Datenmodelles**
(z.B. Splittung der Gletscherränder in Abschnitte gleicher Erfassungsqualität, ...).
- **Verbesserung der Matching-Strategien** (Gebirge, Schnee).
- **Verbesserung des L2-Datenfluss und -archiv.**
- **Bessere Arbeitsabläufe hinsichtlich den Koordinatensystemen LV03 / LV95 und LN02 / E.**
- **Datenmodell für TIN und Rasterdaten.**
- **Neue Erfassungsmethoden** (Drohnen, Radar).
- **Migration nach LV95.**

Vielen Dank für die Aufmerksamkeit

