Satellite-Assisted Archaeological Survey in the Silvretta Alps: the Very First Steps

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Silvretta study region: Switzerland / Austria - 500 km² - 1500 to 3312 masl
Silvretta Historica Project

• Sub-projects:
  – Archaeology
  – History
  – Cultural tourism

• Satellite-assisted archaeological survey
  – High-resolution images

• 2010 to 2013

Excavation, Fimba Valley, Sept. 3, 2010
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Fimba / Fenga Valley near Heidelberger Hütte, looking north
Alpwirtschaft: Alpine Pasture Economy

- Origins: Bronze age or earlier?

- *Alpwirtschaft* infrastructure:
  - Cattle enclosures
    - Shelters, fire places
  - Huts, cabins
    - Installations for dairy farming
  - Roads, trails
  - Boundary markers
Why Satellite Images?

- New sensors and data
- Advances in image analysis
  - Earth observation
  - Medical imaging
  - Surveillance
- Automated extraction of "uncooperative" features
Automated Feature Extraction

• Model building: from physical properties of archaeological features to search algorithms

• Silvretta:
  – Typical features with recurring properties
  – Neither covered by trees nor built over

Menze et al. 2007: Spectral signatures

Trier et al. 2009: Shape, size
Iron Age cattle enclosure, Plan d’Aigl, Tasna Valley, ground view
Iron Age cattle enclosure, Plan d’Aigl, Tasna Valley, aerial view
Iron Age cattle enclosure, Plan d‘Aigl, Tasna Valley, artist’s rendering
Huts, Cabins, Cheese Cellars

Iron Age hut, Fimba Valley

Early Modern Age huts, Fimba Valley
Three generations of huts, Marangun d’Urexxas, Tasna Valley
Roads, Trails, Boundary Markers

Ancient road, Fimba Valley

Boundary marker, Tasna Valley
Terraces

Plan d‘Aigl, Tasna Valley
Rock Shelters

Fire places below rock shelters, Plan da Mattun, Tasna Valley
Fire places beneath rock shelters, Plan da Mattun, Tasna Valley
Abri Frey and other potential rock shelters, Tuoi Valley
Very First Steps

• Model building
• GPS measurements of ground control points
• GIS database
• PhD candidate from January, 2011
• Image acquisition in July / August, 2011
Satellite Images in the Silvretta Alps

- Focus on methodology
- Automated feature extraction
- Spectral and geometric properties
- 2D / 3D analysis

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