

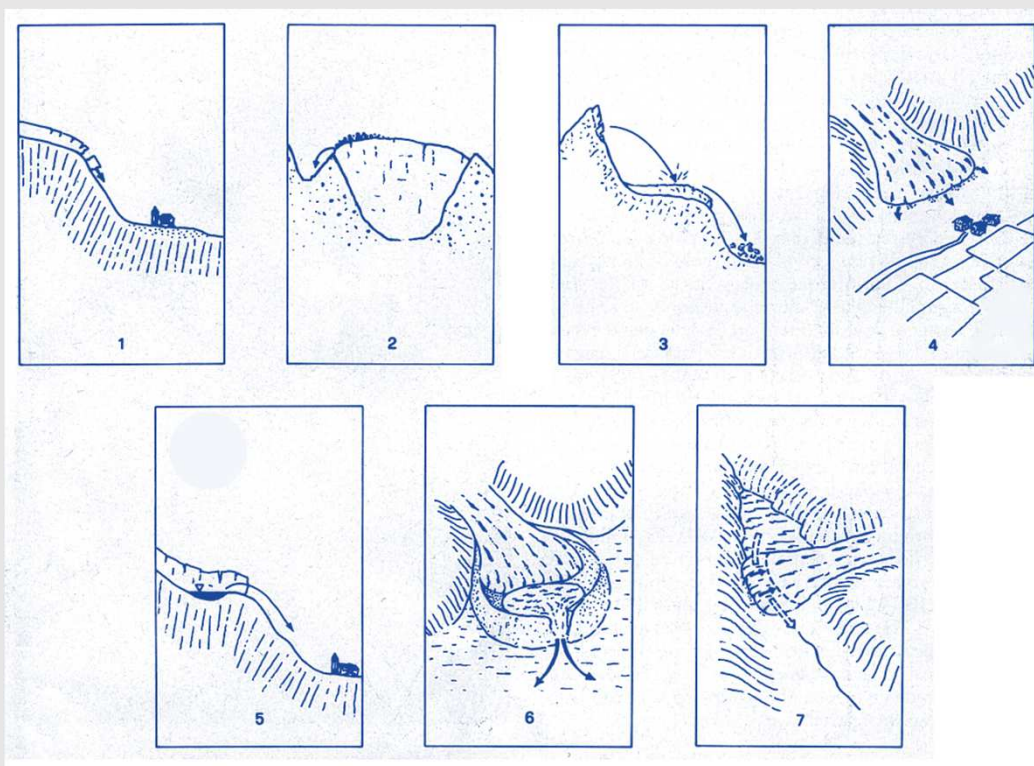
La dinamica geomorfologica degli ambienti glaciali e periglaciali: forzanti climatiche e rischi



Criosfera:

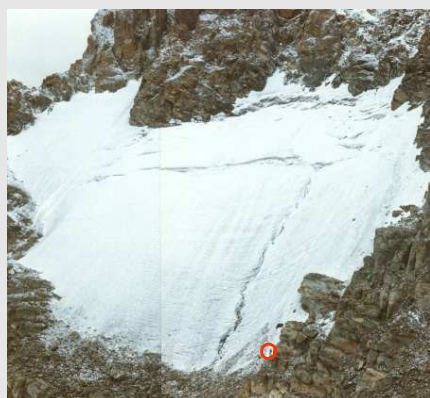
■ Dinamica dell'ambiente glaciale e periglaciale e rischi associati

1. Crollo di ghiaccio
2. Caduta di blocchi dalla morena galleggiante
3. Frana con traslazione su ghiacciaio
4. Rapida avanzata di fronte glaciale
5. Svuotamento di serbatoio endoglaciale/attività torrentizia di corso d'acqua ad alimentazione glaciale
6. Svuotamento di lago proglaciale
7. Svuotamento di lago di sbarramento glaciale



Dutto F., Mortara G. (1992) - Rischi connessi con la dinamica glaciale nelle Alpi Italiane. Geografia Fisica e Dinamica Quaternaria, 15, 85-99.

Criosfera:



■ La torrida estate 2003



Criosfera:

Fenomeni d'instabilità:

- **FATTORE DI RISCHIO**
- **INDICATORI TERRESTRI** del cambiamento climatico in atto

1. Documentazione
catalogazione
archiviazione (*banche dati*)



Criosfera:

Fenomeni d'instabilità:

- **FATTORE DI RISCHIO**

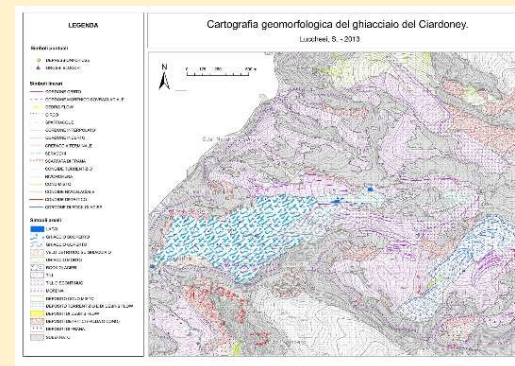
- **INDICATORI TERRESTRI** del cambiamento climatico in atto

2. Identificazione dei fattori predisponenti



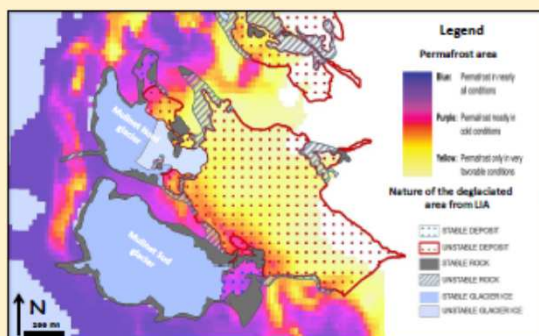
Lucchesi et al., 2014

2.1 Ubicazione e caratterizzazione delle aree glacializzate e recentemente deglacializzate



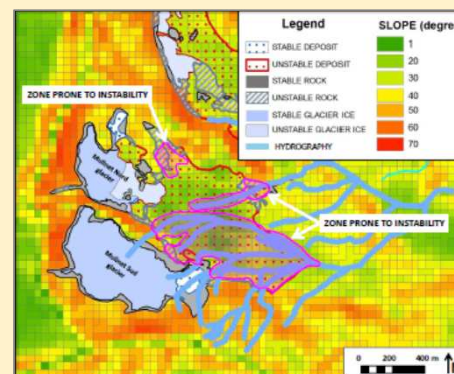
Criosfera:

3. Analisi dati territoriali con strumenti GIS (es. pendenza, quota, esposizione, permafrost...)



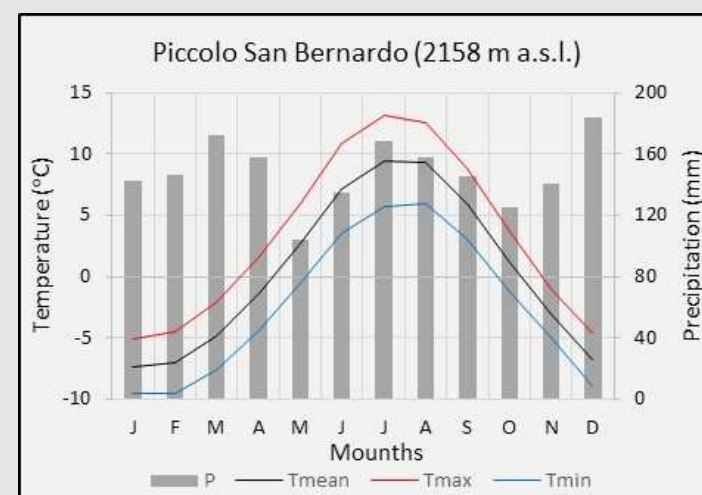
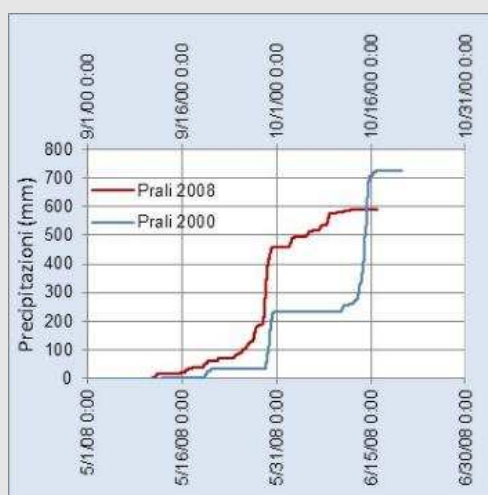
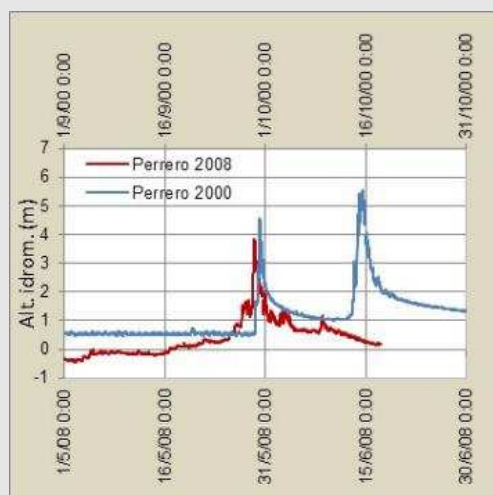
Lucchesi et al., 2014

Chiarle et al., 2014



Clima:

- Caratterizzazioni climatiche ed idrologiche a scala locale e di bacino

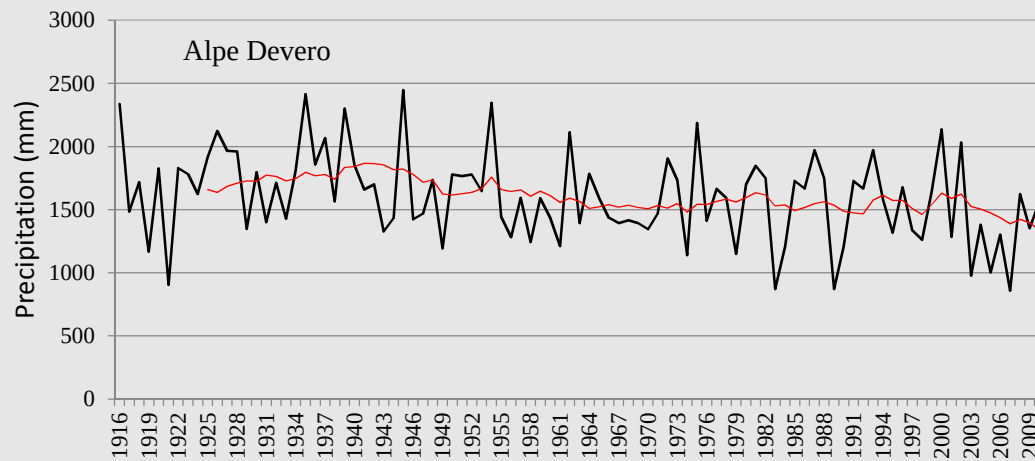


- Afflussi/deflussi, piogge pregresse, risposta del bacino
- Regimi, classificazioni climatiche

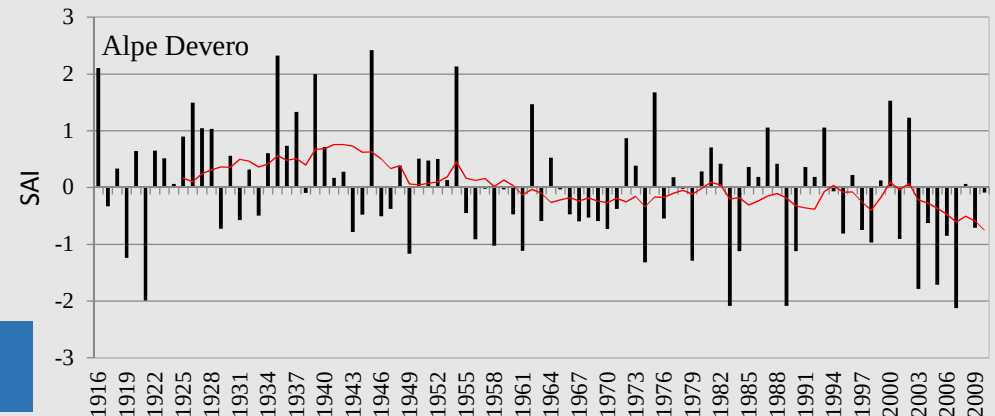
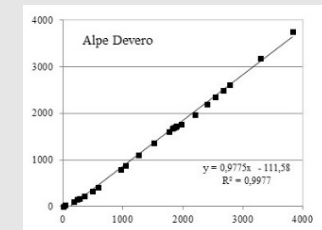
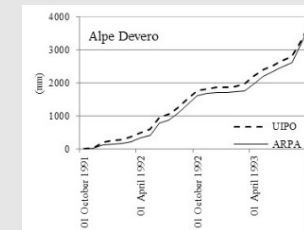
Nigrelli G., Audisio C. (2009) – The May 2008 extreme rain event in the Germanasca Valley (Italian Western Alps): processes and effects observed along the hydrographic network and valley slopes. *Geografia Fisica e Dinamica Quaternaria*, 32 (2), 157-166.

Clima:

- Costruzione e analisi di serie storiche (P e T), analisi di trend



➤ Variabilità e tendenze del clima attuale



Nigrelli G., Collimedaglia M. (2012) - Reconstruction and analysis of two long-term precipitation time series: Alpe Devero and Domodossola (Italian Western Alps). Theoretical and Applied Climatology, 109, 397-405

Clima:

Relazioni clima-ghiacciai (post PEG)

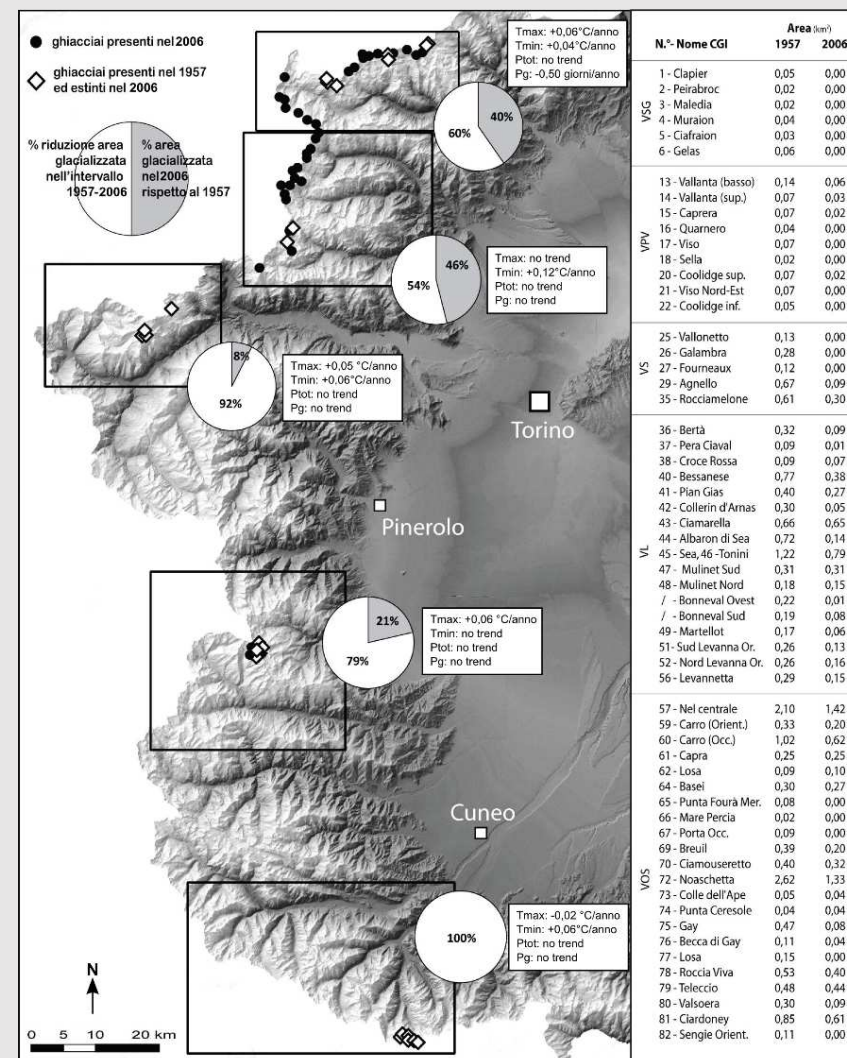


Ghiacciaio della Bessanese, Alpi Graie.



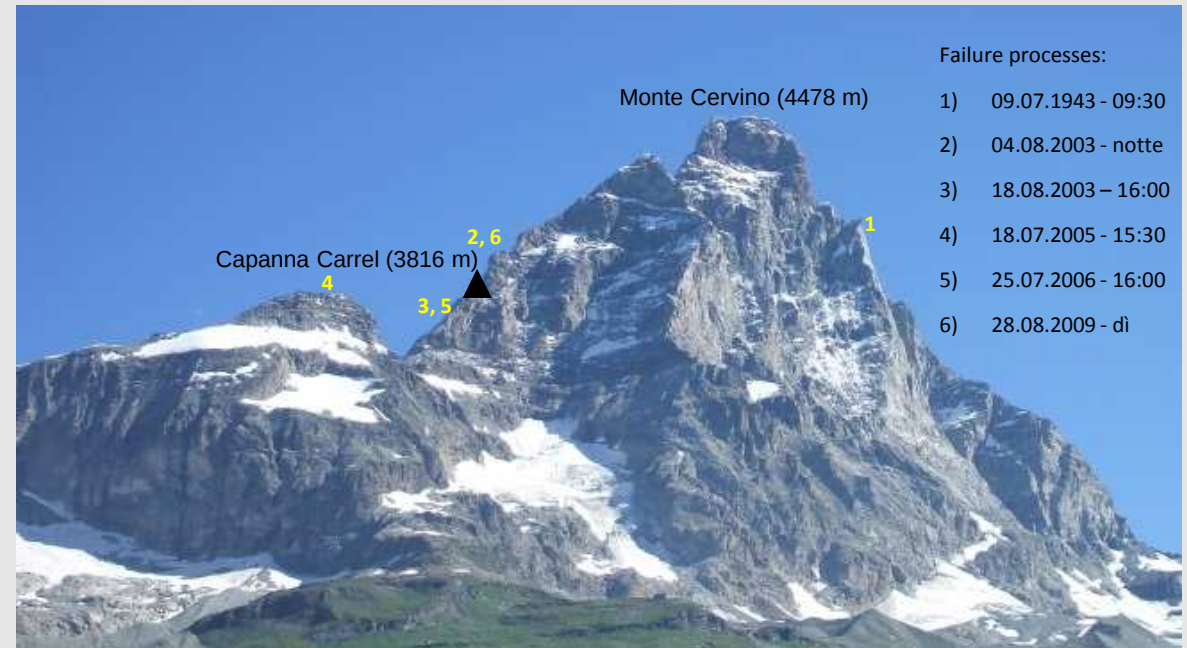
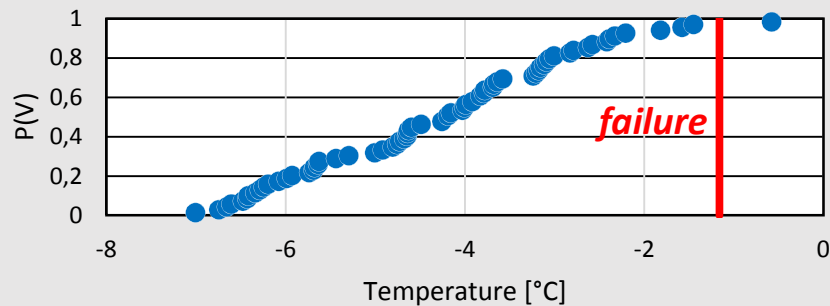
➤ Individuazione dei parametri climatici maggiormente responsabili delle riduzioni delle masse glaciali

Nigrelli G., Lucchesi S., Bertotto S., Fioraso G., Chiarle M. (2014) - Climate variability and Alpine glaciers evolution in Northwestern Italy from the Little Ice Age to the 2010s. Theoretical and Applied Climatology, on line first.



Clima:

■ Relazioni clima-crolli in alta montagna



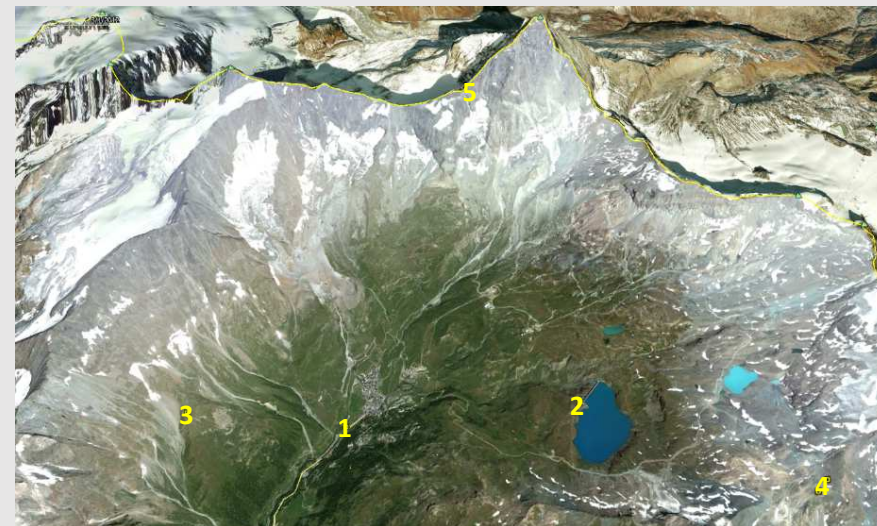
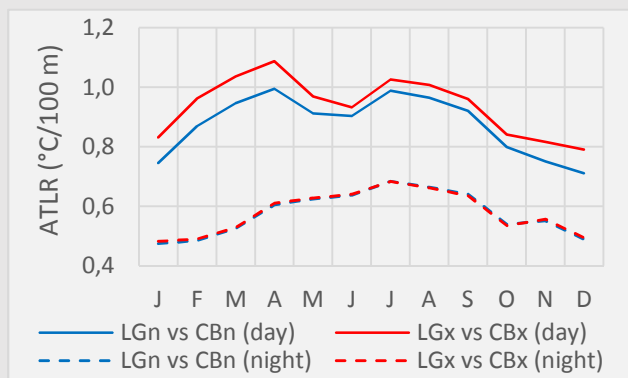
We applied a simple statistical approach based on a cumulative probability function P associated to the variable V .

➤ Individuazione dei parametri climatici maggiormente responsabili dei processi di instabilità naturale in alta quota (-> relazioni con le T dei mezzi saturi ed insaturi)

1. Paranunzio R., Laio F., Nigrelli G., Chiarle M., Guzzetti F. (2014) - The impact of climatic factors on slope instability processes in permafrost areas: the case study of the Matterhorn (Northwestern Alps). EUCOP4 – 4th European Conference on Permafrost, 18-21 June 2014 - Évora, Portugal.
2. Paranunzio R., Laio F., Nigrelli G., Chiarle M. (2014) - A method to reveal climatic variables triggering slope failures at high elevation. Natural Hazards, Volume 76, Issue 2, pp 1039-1061.

Clima:

- Studi sul gradiente termico verticale (valori orari)



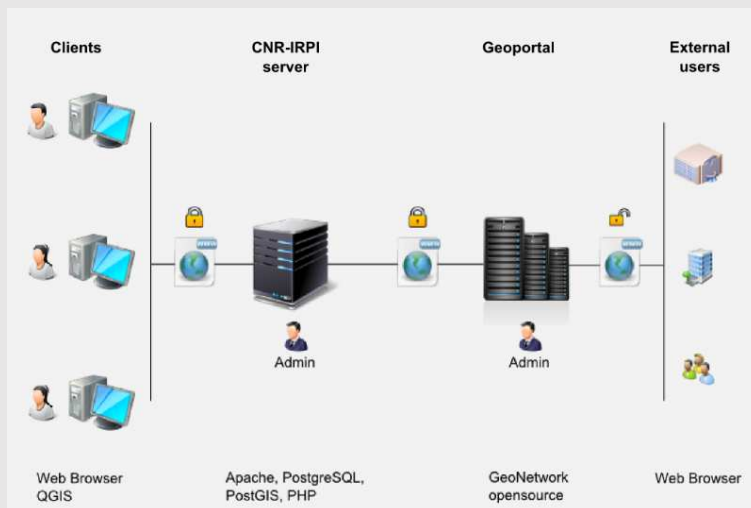
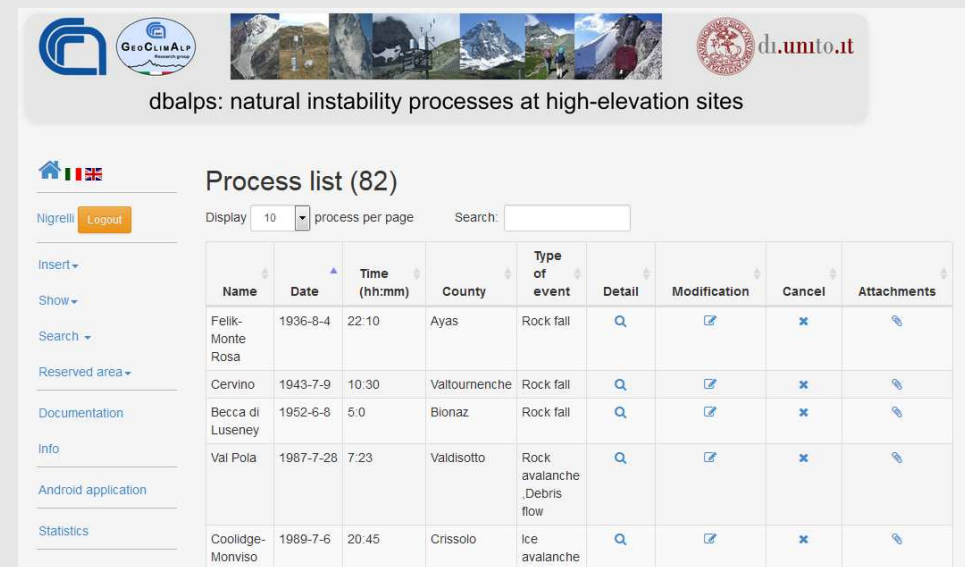
AWS: 1. Breuil Cervinia (1998 m); 2. Lago Goillet (2541 m); 3. Grandes Murailles (2566 m); 4. Cime Bianche (3100 m); 5. Capanna Carrel (3816 m).

- Stimare le condizioni termiche nelle aree di alta quota oggetto di crolli
- Interpolare ma non estrapolare...

Nigrelli G., Silvestri P., Chiarle M. (2015) – The altitudinal temperature lapse rates applied to high elevation rock falls: a case study in the Conca di Cervinia (NW Italian Alps). ICAM 2015, Innsbruck, 31 Agosto-4 settembre, poster.

Database:

■ Gestione interoperativa dei dati ambientali...

dbalps: natural instability processes at high-elevation sites

Process list (82)

Display 10 process per page Search:

Name	Date	Time (hh:mm)	County	Type of event	Detail	Modification	Cancel	Attachments
Felik-Monte Rosa	1936-8-4	22:10	Ayas	Rock fall	Q	E	X	A
Cervino	1943-7-9	10:30	Valtournenche	Rock fall	Q	E	X	A
Becca di Luseney	1952-6-8	5:0	Bionaz	Rock fall	Q	E	X	A
Val Pola	1987-7-28	7:23	Valdisotto	Rock avalanche Debris flow	Q	E	X	A
Coolidge-Monviso	1989-7-6	20:45	Crissolo	Ice avalanche	Q	E	X	A

- Archiviare, conservare, analizzare, fruire e condividere le risorse
- Utilizzare sistemi di gestione delle informazioni low-cost

Nigrelli G., Chiarle M. (2014) - Relevance of Database for the Management of Historical Information on Climatic and Geomorphological Processes Interacting with High Mountain Landscapes. In: "Engineering Geology for Society and Territory – Volume 1, Climate Change and Engineering Geology", Lollino G., Manconi A., Clague J., Shan W., Chiarle M. Editors, Springer, ISBN 978-3-319-09407-6;

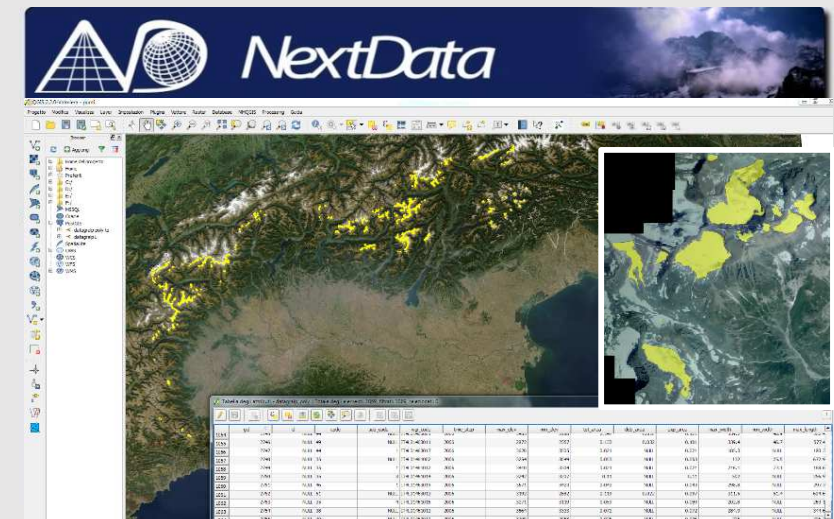
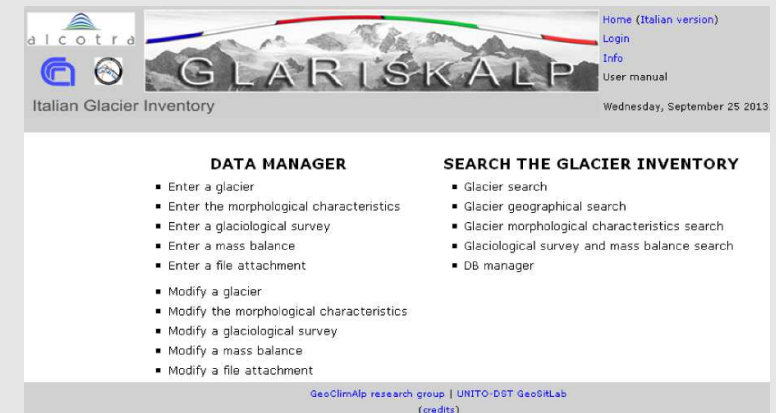
Database:

... altri esempi



Nigrelli G., Marino A.L.L. (2012) - Dbclim: A web-based, open-source relational database for rainfall event studies. Computers & Geosciences, 48, 337–339.

Nigrelli G., Chiarle., Nuzzi A., Perotti L., Torta G., Giardino M. (2013) - A web-based, relational database for studying glaciers in the Italian Alps. Computers & Geosciences, 51, 101–107.



DATAGRALP - DATABASE for reconstructing the spatial-temporal evolution of the Glacial Resource in the Italian ALPs over the last 100 years in the Framework of the NextData Project.

Grazie!



Bacino del Breuil, La Thuile (AO), 28.08.2014.