



Università
degli Studi
di Ferrara

Dipartimento di Studi
Umanistici



Ecologia Preistorica

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Lezione 6 - Ambienti periglaciali e
Loess

In geomorfologia, il termine PERIGLACIALE è utilizzato per indicare una serie di fenomeni e processi che avvengono nelle regioni a clima freddo, in un areale esterno a quello del limite delle nevi persistenti, dove si alternano continue fasi di gelo e disgelo.

Gli agenti principali che dominano in un sistema p. sono:

- a) la **temperatura**, che provoca il congelamento e lo scioglimento delle acque così come il congelamento del terreno per determinati periodi di tempo;
- b) la **neve**, che agisce sia direttamente attraverso l'erosione meccanica e chimica sia indirettamente ostacolando lo sviluppo di altri processi p.;
- c) il **vento**.

Frost shattering due to freezing-thawing action



Crioclastismo



Crioclastismo



Nunataks subjected to frost shattering

Results of frost shattering



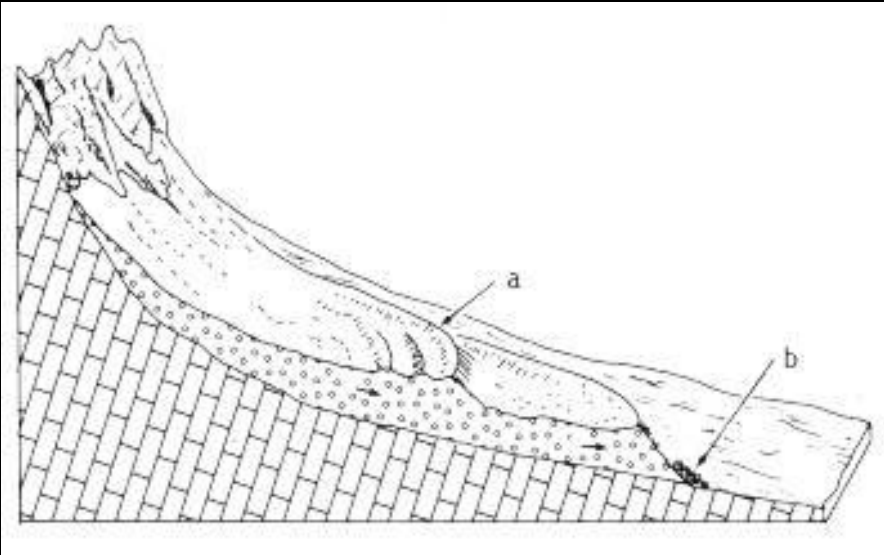
Crioclastismo/gelifrazione

Rock glacier



Rock glacier

Ghiacciaio di roccia



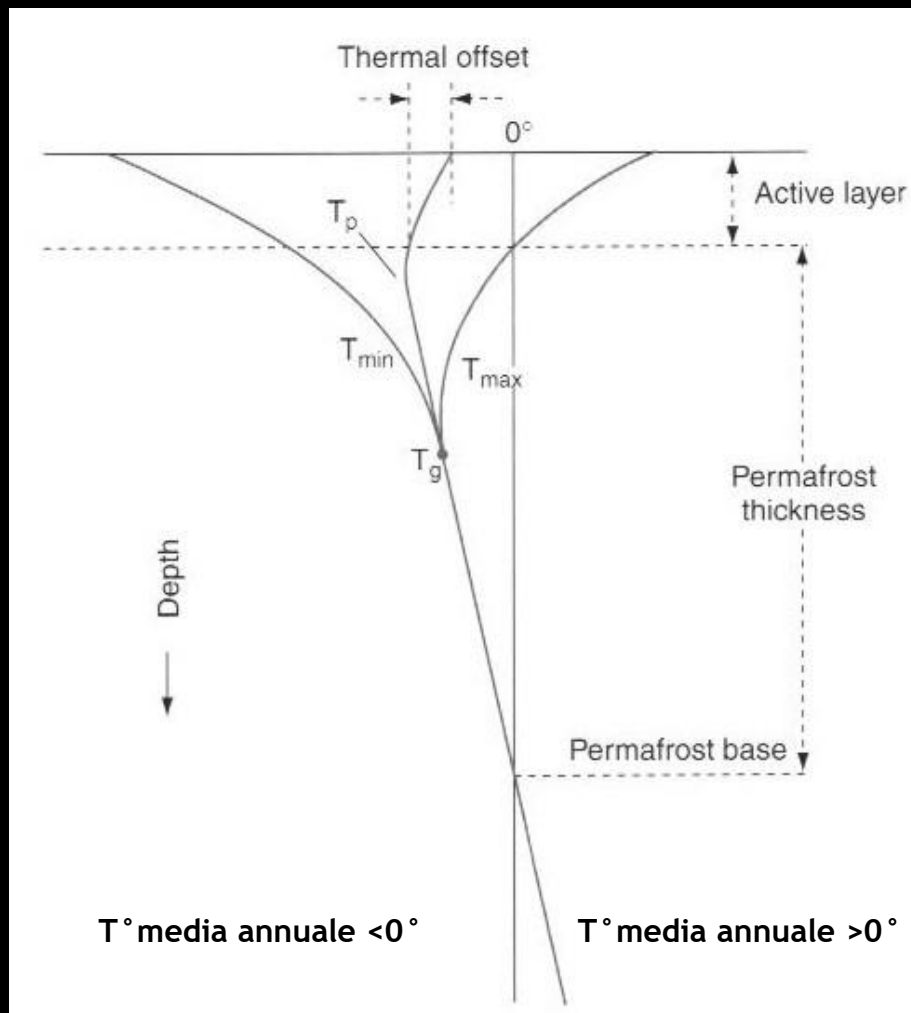
Permafrost

Strato di terreno permanentemente gelato che si trova, a profondità non minori di qualche metro, nel sottosuolo di varie zone, specialmente ad alta latitudine e ad alta quota; si stima che il p. si estenda sotto circa un quinto delle terre emerse a latitudini maggiori di circa 60° e, indipendentemente dalla latitudine, alle alte quote delle grandi montagne.

Permafrost



Distribuzione del calore nel sottosuolo e profondità del Permafrost



↑ T° media annuale



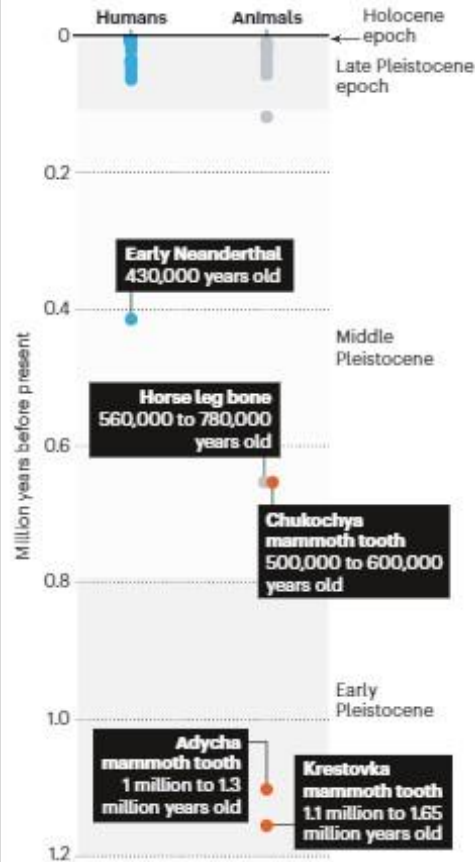
Effetti del Permafrost

Estensione del Permafrost

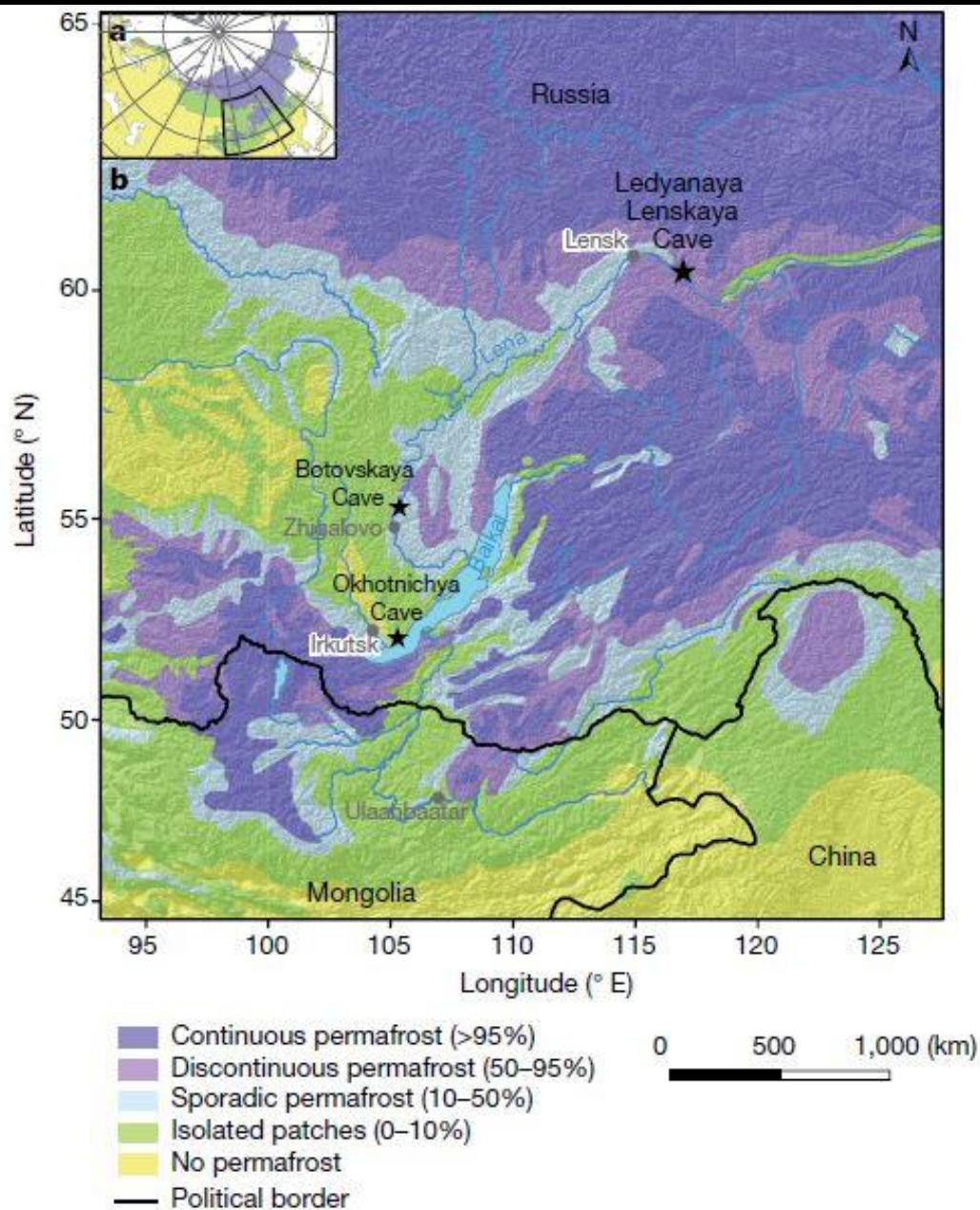


ANCIENT GENOMES

Scientists have for the first time sequenced DNA that is more than one million years old — from mammoths. The oldest DNA sequenced previously dates from between 560,000 and 780,000 years ago.



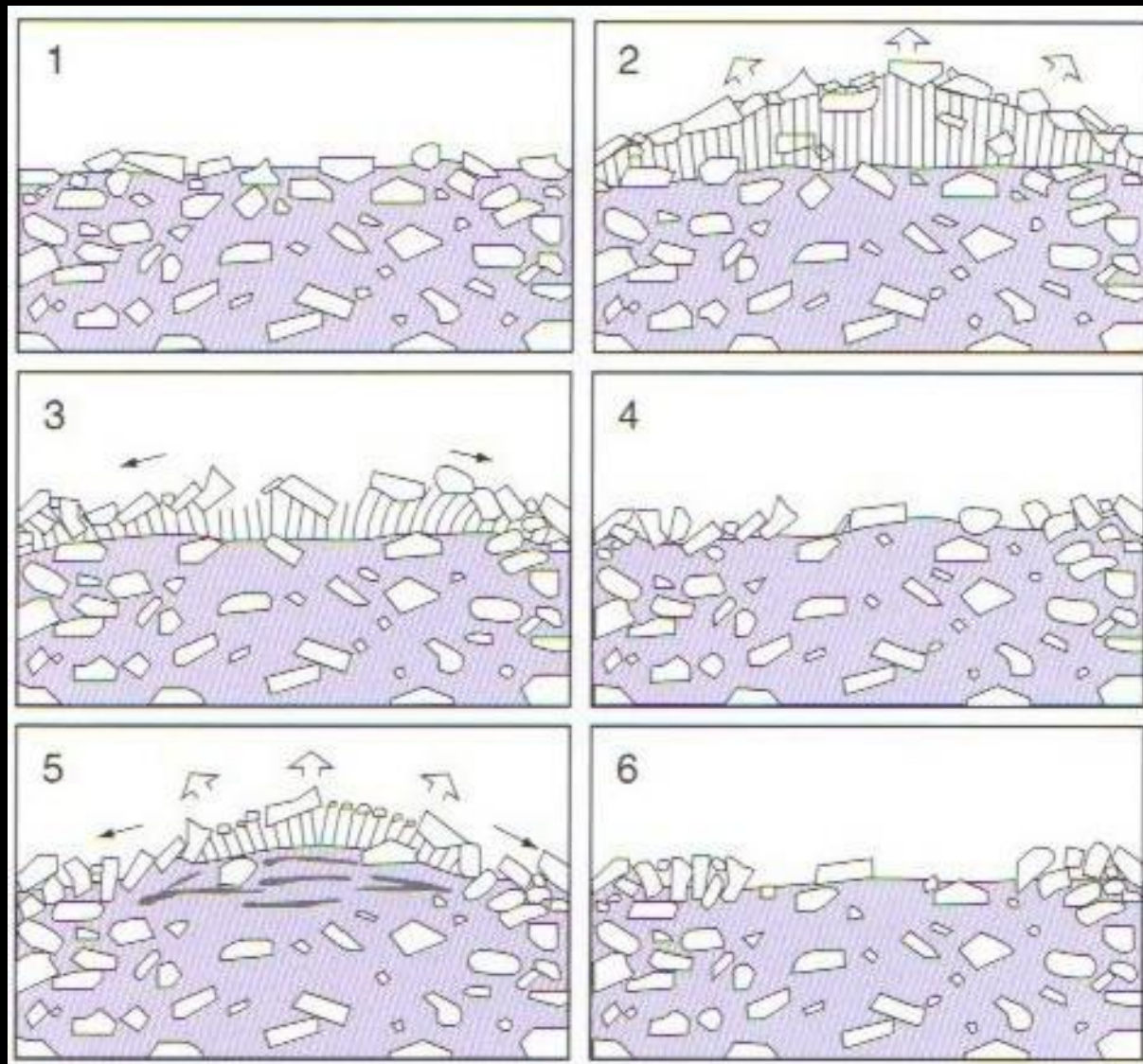
The upper age bound for the mammoth tooth is based on a genetic dating method; the lower bound is based on the age of the sediments in which the tooth were found.



Permafrost e cerchi di pietre



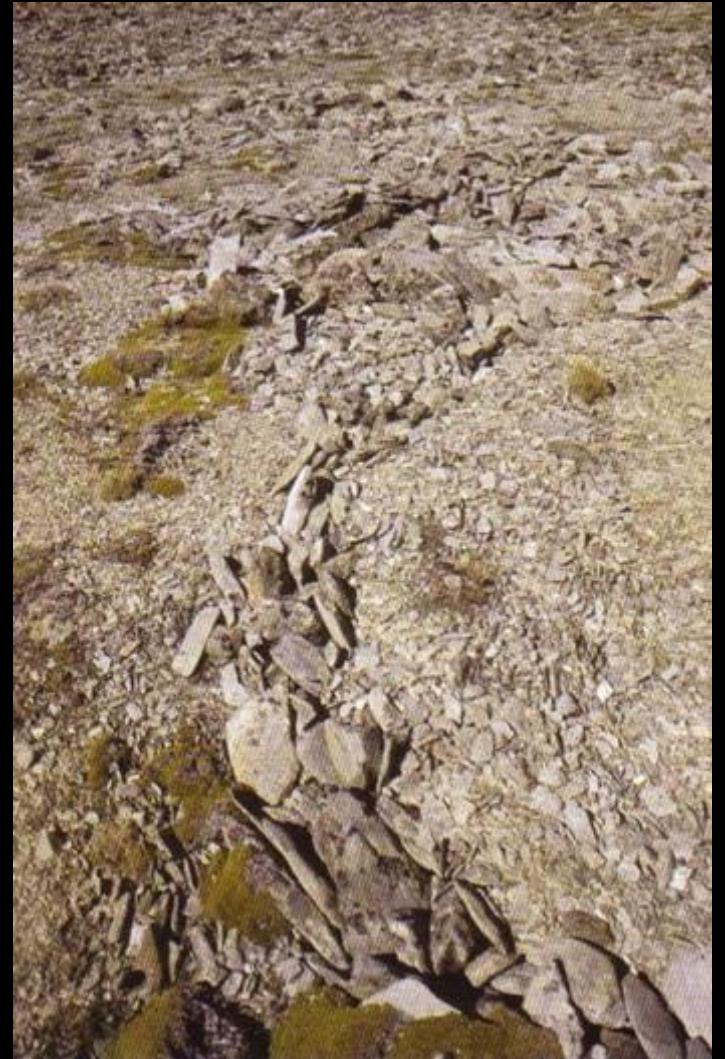
Formazione di un poligono di pietre



Poligono di pietre, Dolomiti di Brenta



Poligoni di pietre



Cunei di ghiaccio (ice wedges)



Cunei di ghiaccio (ice wedges)

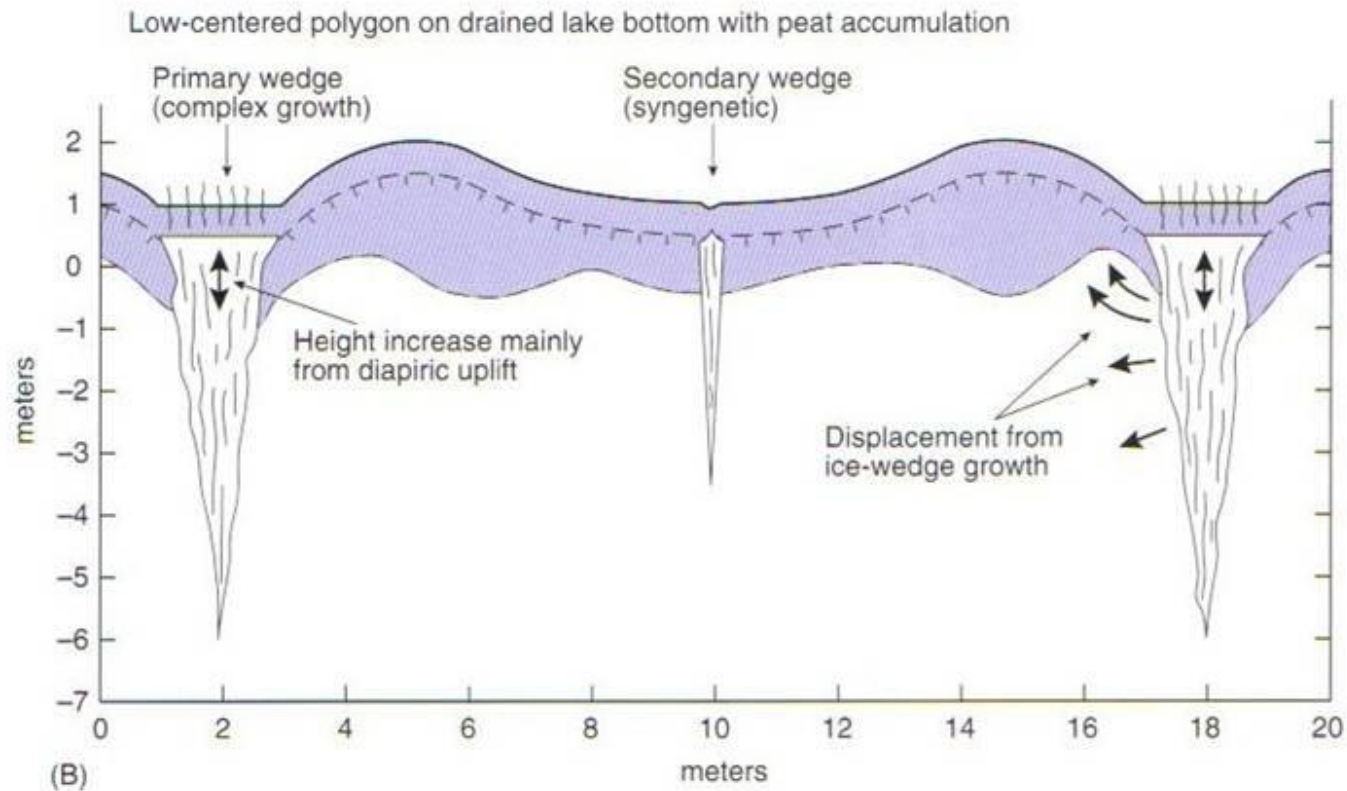
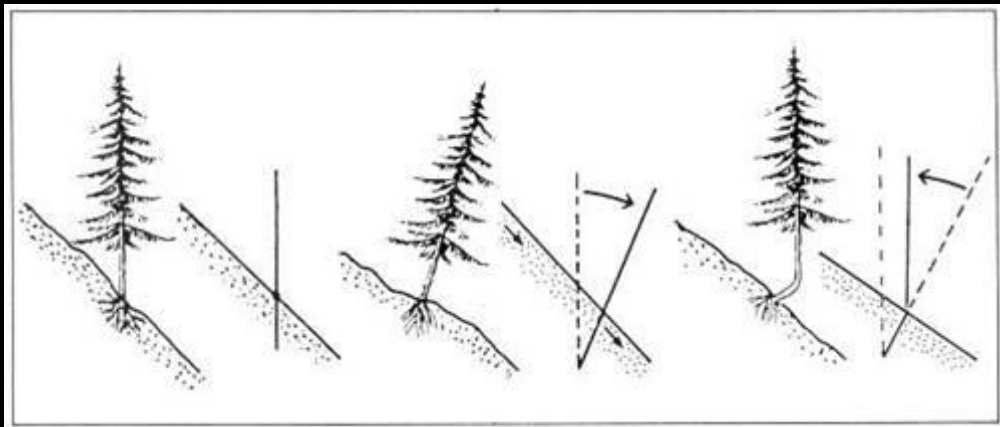
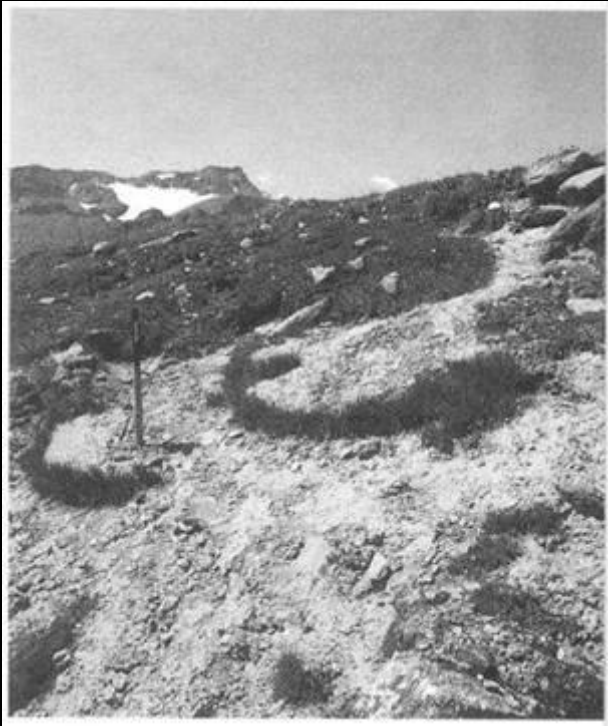


Figure 3 (A) Schematic diagram showing the growth of primary epigenetic ice wedges beneath a newly drained lake bottom. The tops of the wedges commence growth 0.7 m below zero datum. (B) After accumulation of 1–2 m of peat, the tops of the primary ice wedges are now 0.5 m above zero datum (the mean level of the peat-soil contact). Thus the tops have moved upward 1.2 m, although there is no evidence for syngenetic growth. A secondary, syngenetic ice wedge has commenced growth in the polygon center. Reproduced from Mackay JR (1992) The frequency of ice-wedge cracking (1967–1987) at Garry Island, western Arctic coast, Canada. *Canadian Journal of Earth Sciences* 29: 236–248.

Geliflusso/soil creep



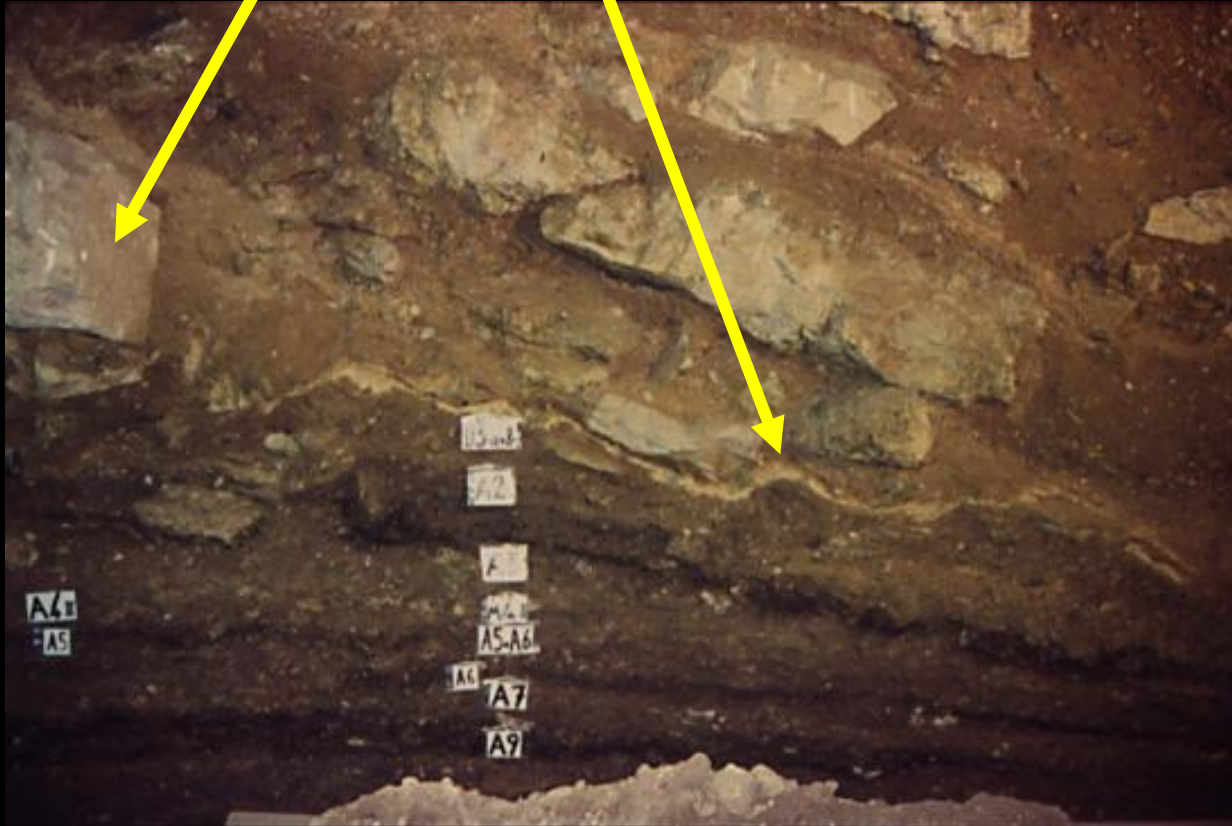
Massi lavoratori



1, masso; 2, suolo compresso e deformato; 3, solco posteriore

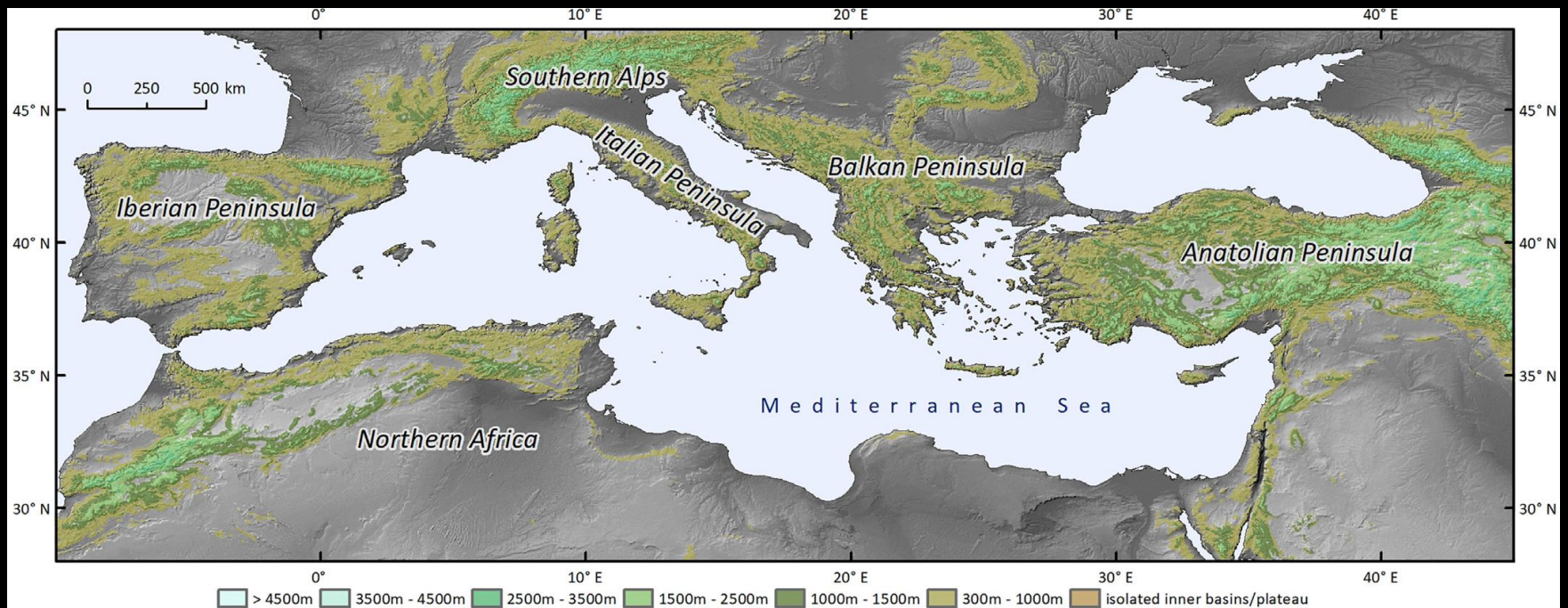
Massi lavoratori (Grotta di Fumane)

1, masso; 2, suolo compresso e deformato



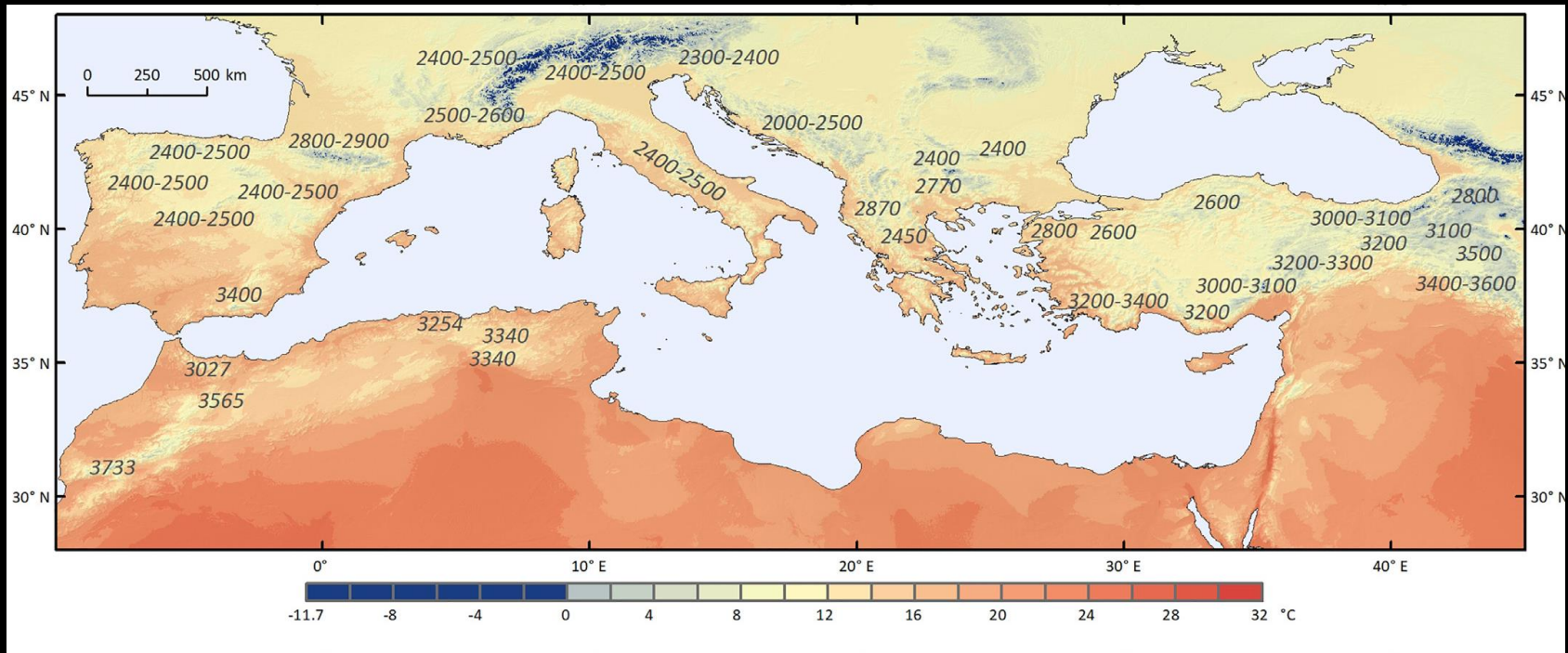
Permafrost conditions in the Mediterranean region since the Last Glaciation

M. Oliva^{a,*}, M. Žebre^b, M. Guglielmin^c, P.D. Hughes^d, A. Çiner^e, G. Vieira^f, X. Bodin^g, N. Andrés^h, R.R. Colucciⁱ, C. García-Hernández^j, C. Mora^f, J. Nofre^k, D. Palacios^h, A. Pérez-Alberti^l, A. Ribolini^m, J. Ruiz-Fernández^j, M.A. Sarıkaya^e, E. Serranoⁿ, P. Urdea^o, M. Valcárcel^l, J.C. Woodward^d, C. Yildirim^e

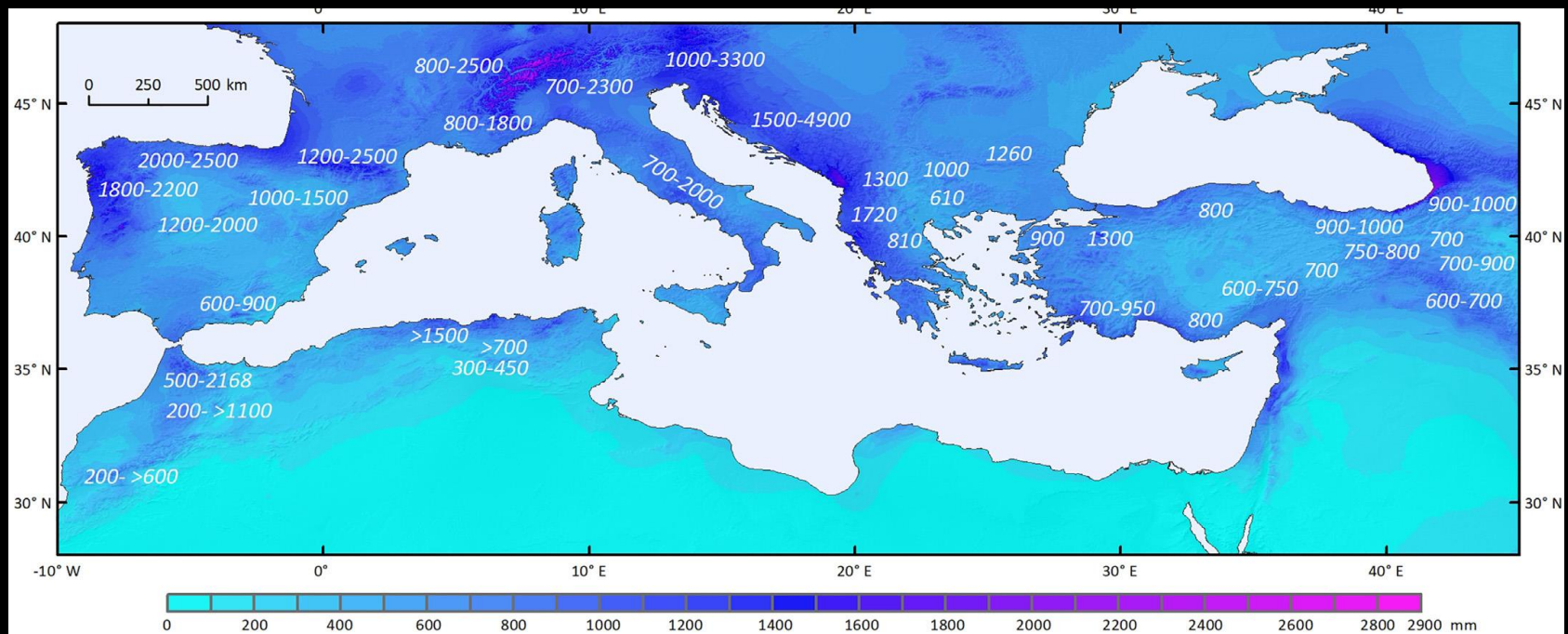


Location of the different study areas examined in this paper within the Mediterranean region

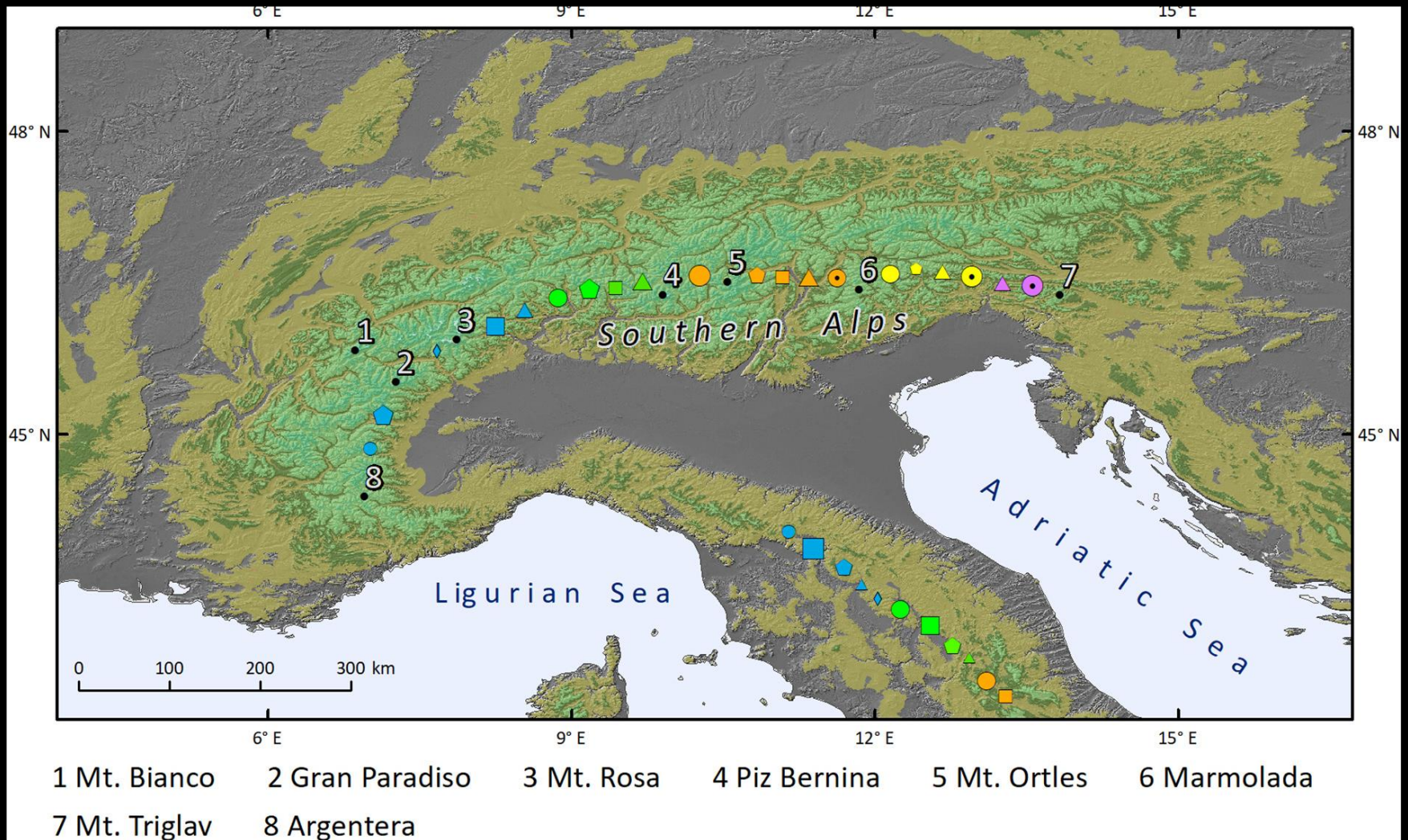
Mean annual temperatures and altitudes where the 0 °C isotherm is located



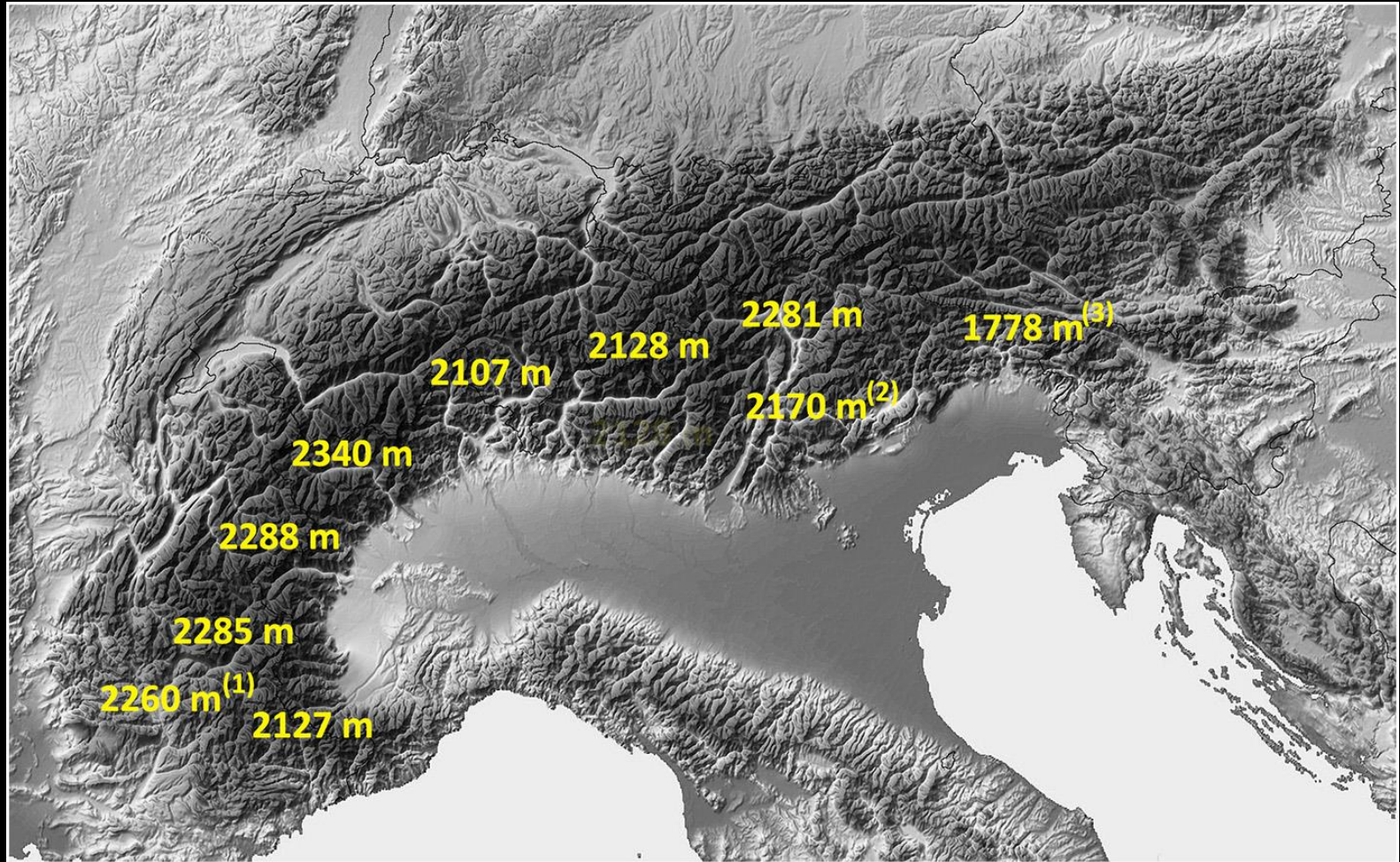
Annual precipitations with values for each of the mountain ranges considered in this study



Distribution of permafrost-related features since the Last Glaciation in the southern Alps.



Minimum mean altitude of the relict rock glacier fronts in the southern side of the Alps.



Examples of periglacial and permafrost-related landforms generated during different phases in the southern Alps



LGM (relict rock glacier, central Alps)
Photo: M.Guglielmin



Deglaciation (patterned ground; central Alps)
Photo: M. Guglielmin



Holocene (active rock glacier; central Alps)
Photo: R.R.Colucci

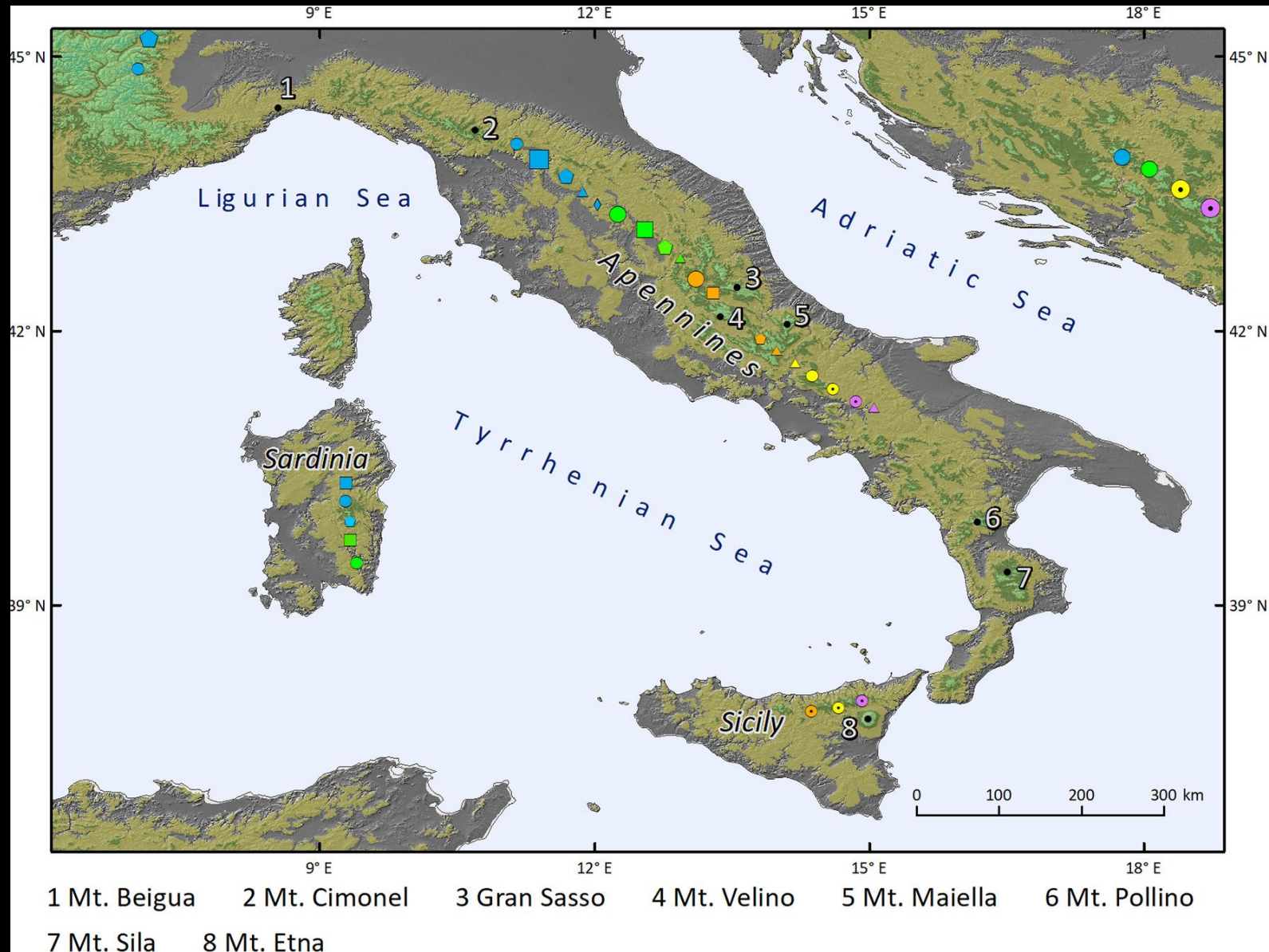


LIA (active rock glacier; Dolomites)
aerial view from free BingMaps



Present-day (ground ice, ice cave; eastern Alps)
Photo: R.R.Colucci

Distribution of permafrost-related features since the Last Glaciation in the Italian Peninsula



Examples of permafrost-related landforms generated during different phases in the Apennines and Italian Peninsula



LGM (block stream; Apennines)
Photo: M.Guglielmin



Deglaciation (relict rock glacier; Apennines)
aerial view from free BingMaps



Holocene (protalus lobe; Apennines)
Photo: R.R.Colucci

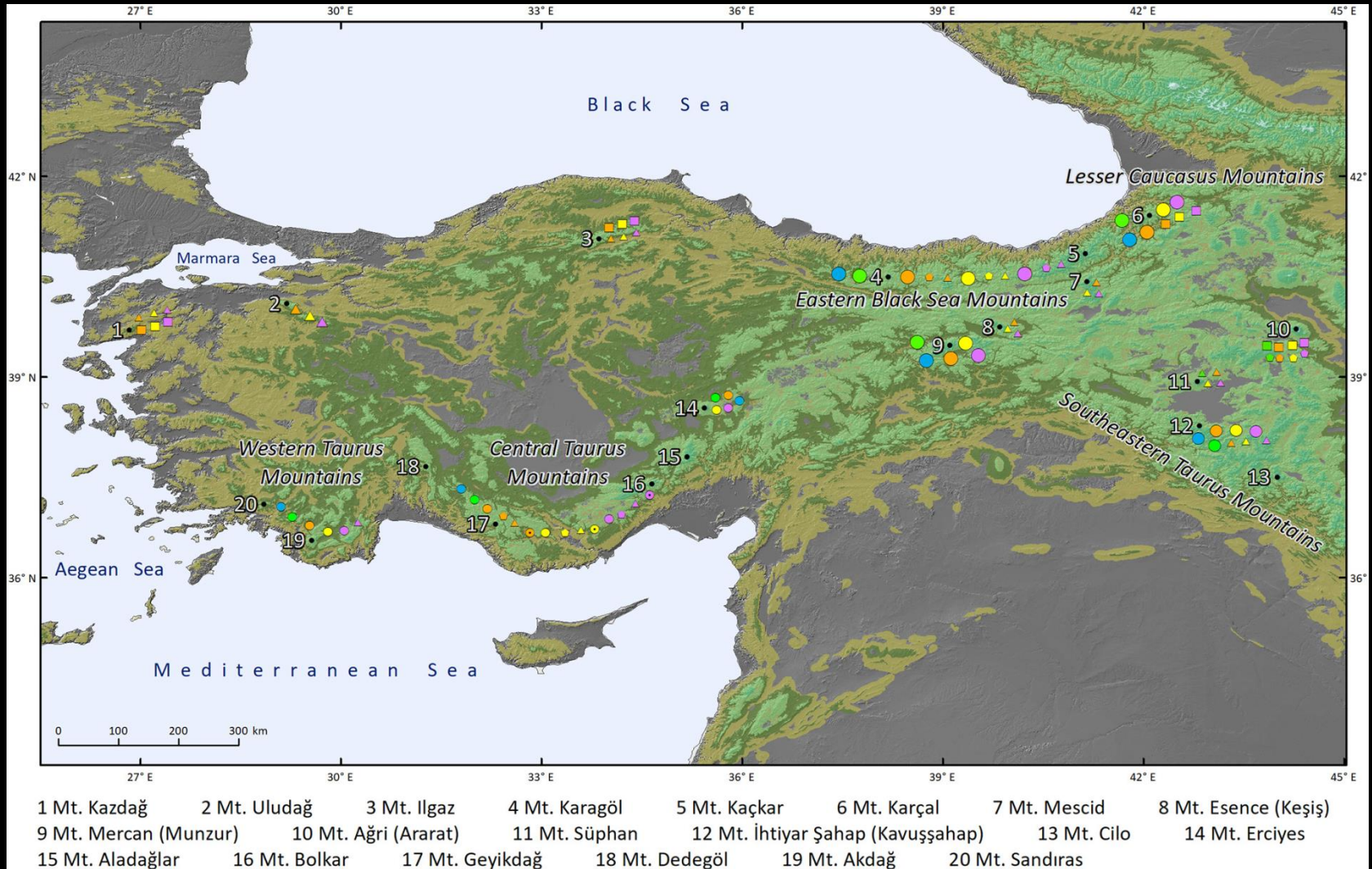


LIA (active rock glacier; Apennines)
Photo: M.Leoni

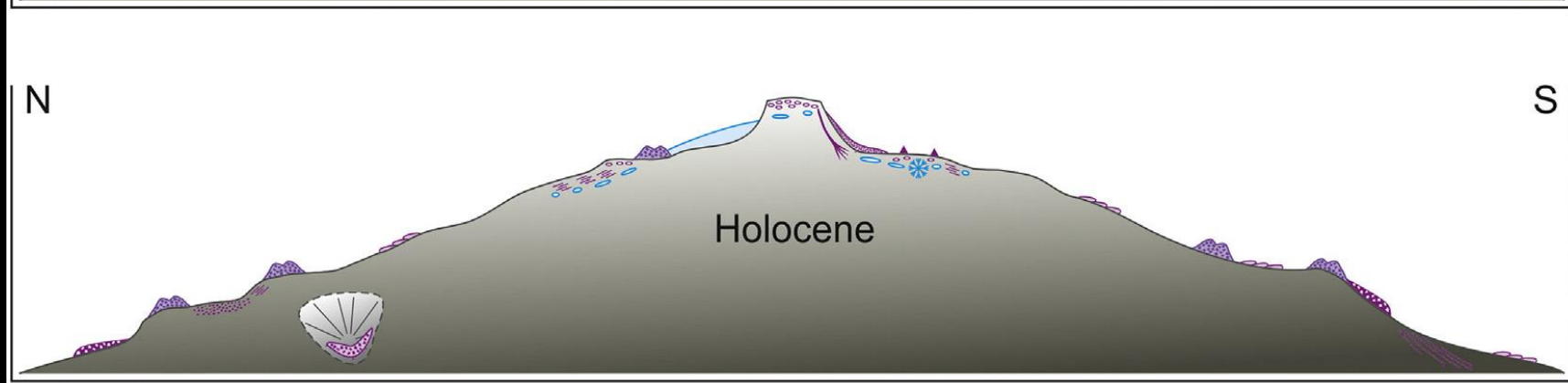
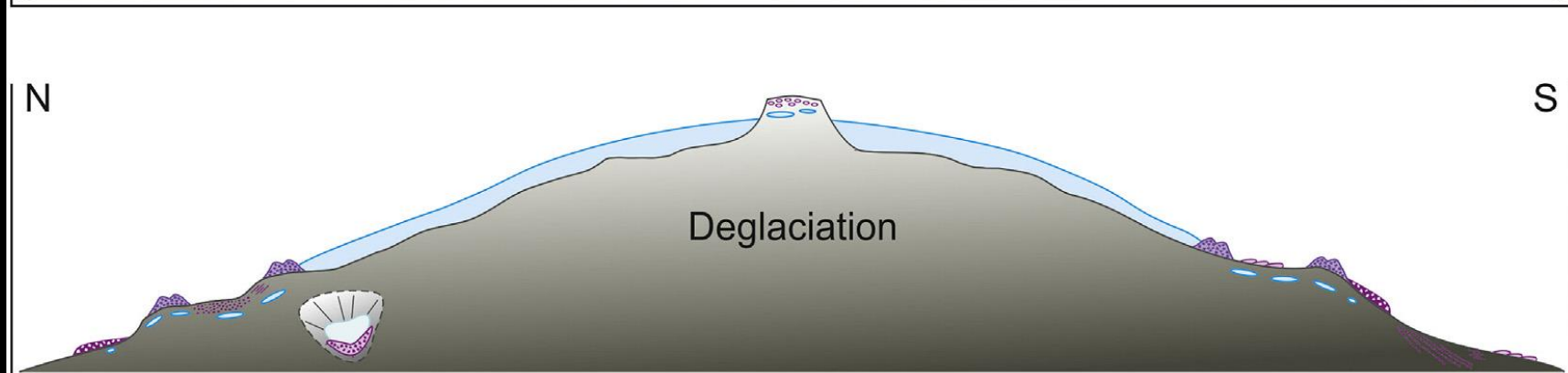
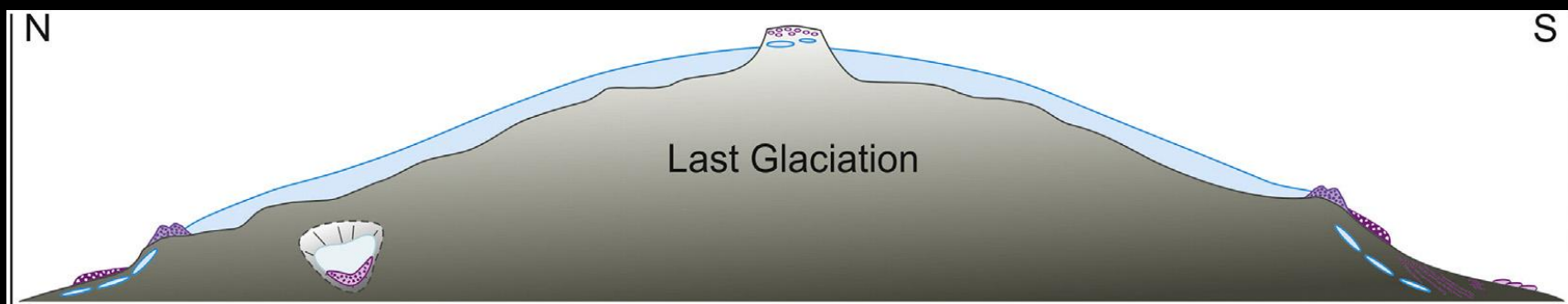


Present-day (ground ice, ice cave; Sicily)
Photo: M.Restivo

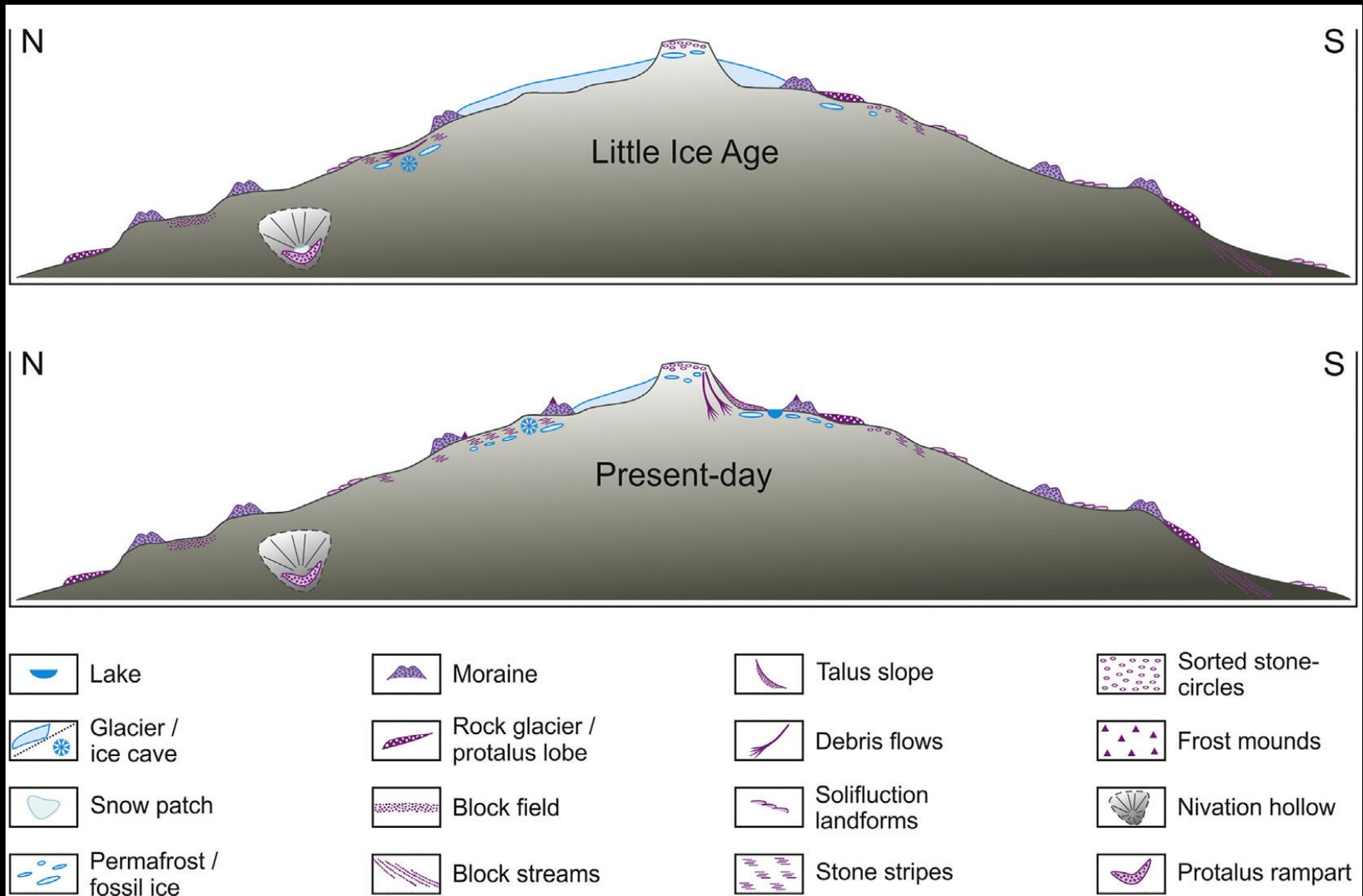
Distribution of permafrost-related features since the Last Glaciation in the Anatolia Peninsula







Geomorphological sketch of the formation of different generations of permafrost-related features in Mediterranean mountains since the Last Glaciation.



Loess

Deposito di colore giallastro, **non stratificato**, costituito in prevalenza da **particelle siltose** a spigoli vivi di **quarzo**, calcite, **mica**, minerali femici, idrossidi di ferro e minerali argillosi. La genesi del L. è legata all'accumulo di questo pulviscolo finissimo che è trasportato dal vento nelle regioni steppiche e circum desertiche, dove la vegetazione erbacea ostacola le correnti aeree nelle vicinanze del suolo e trattiene allo stesso tempo le particelle che esse trasportano. Il L. è **molto poroso** e si presenta coesivo dove c'è una parziale cementazione a opera del carbonato di calcio.

Loess e polveri eoliche

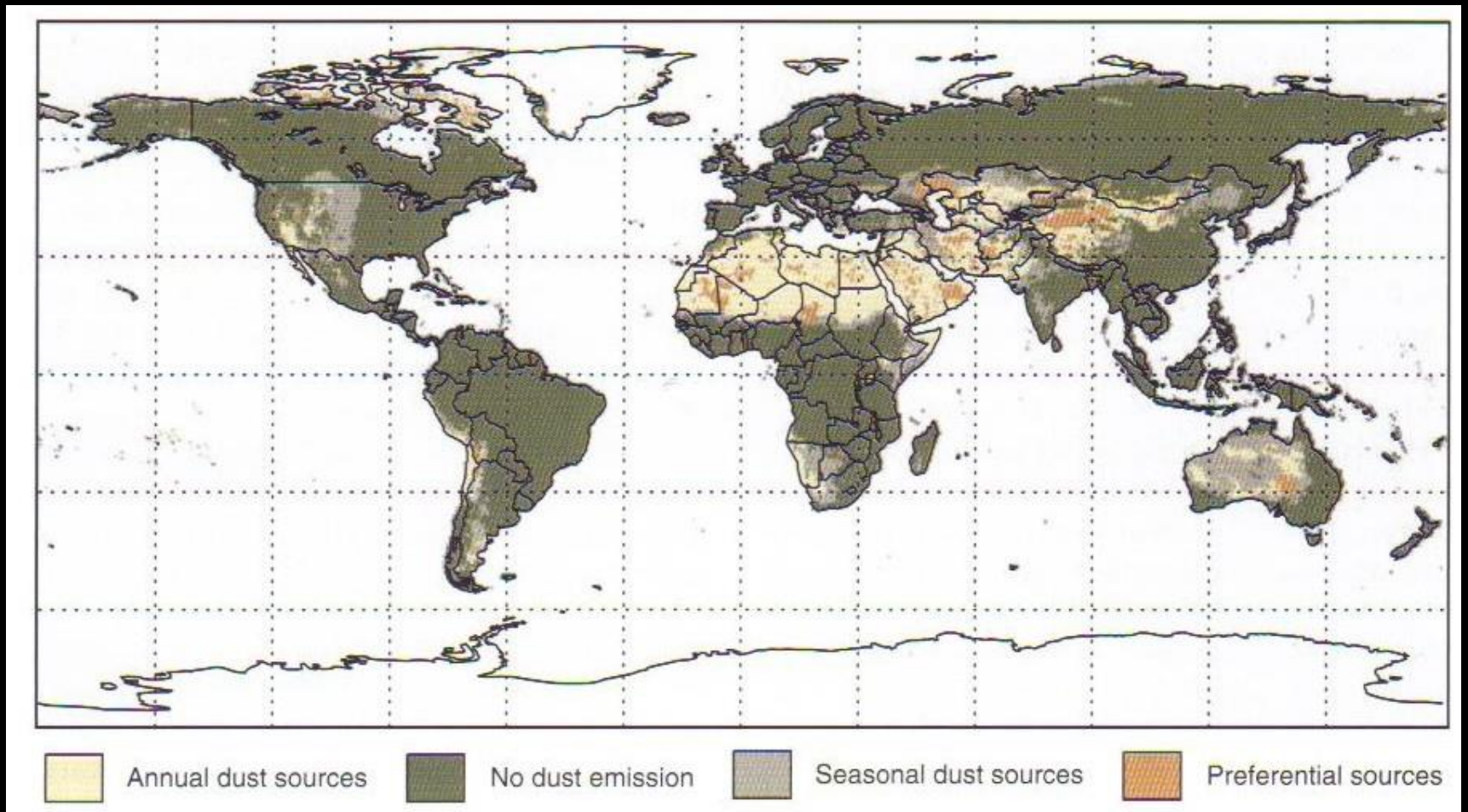
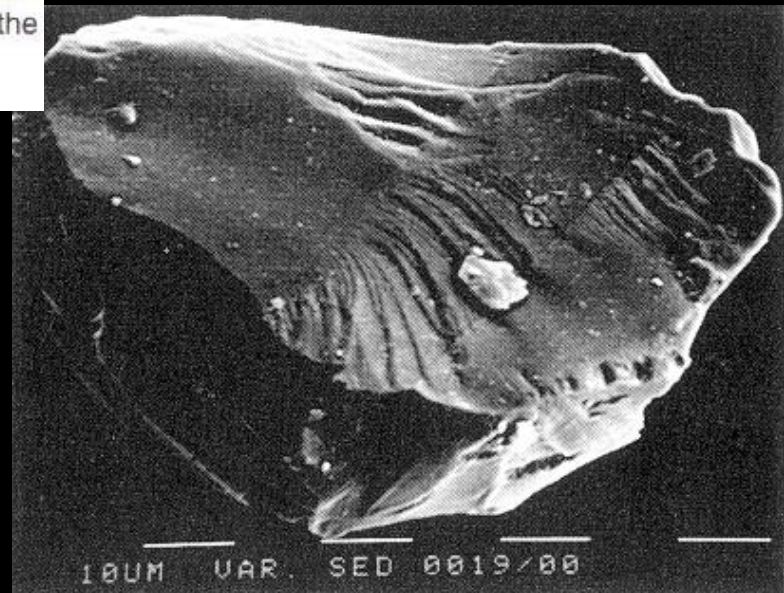
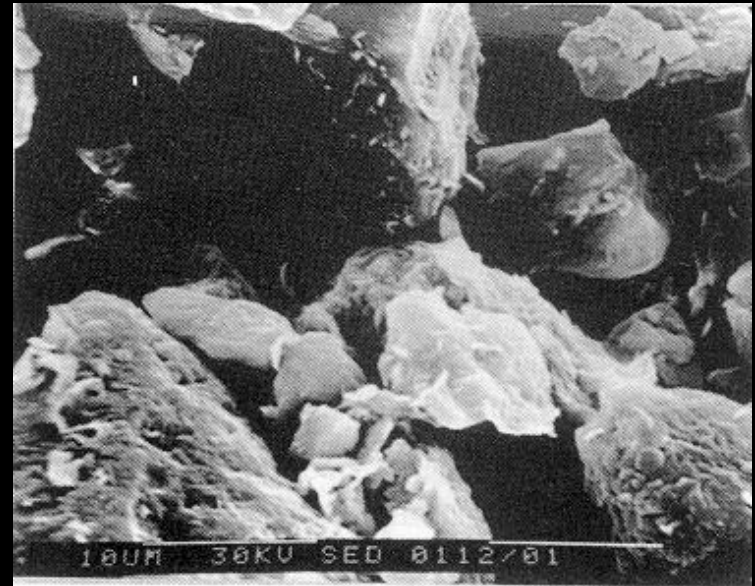




Figure 1 High mountain periglacial zone in the Eastern Pamirs where abundant moraine and glaciofluvial material serve as a source of clayey and silty sediments, which become a part of the system of fluvial runoff in mountain valleys.



Loess: granuli di quarzo
al microscopio

Asia centrale. Ambienti a sedimentazione eolica

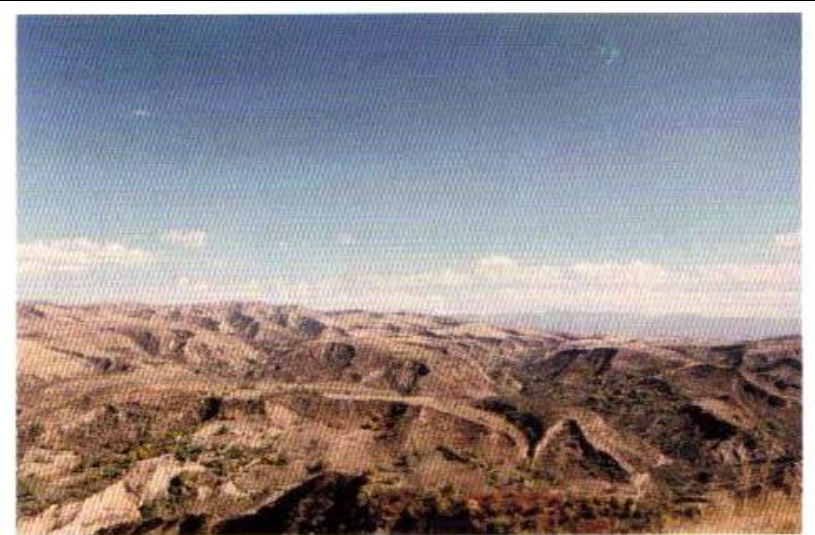


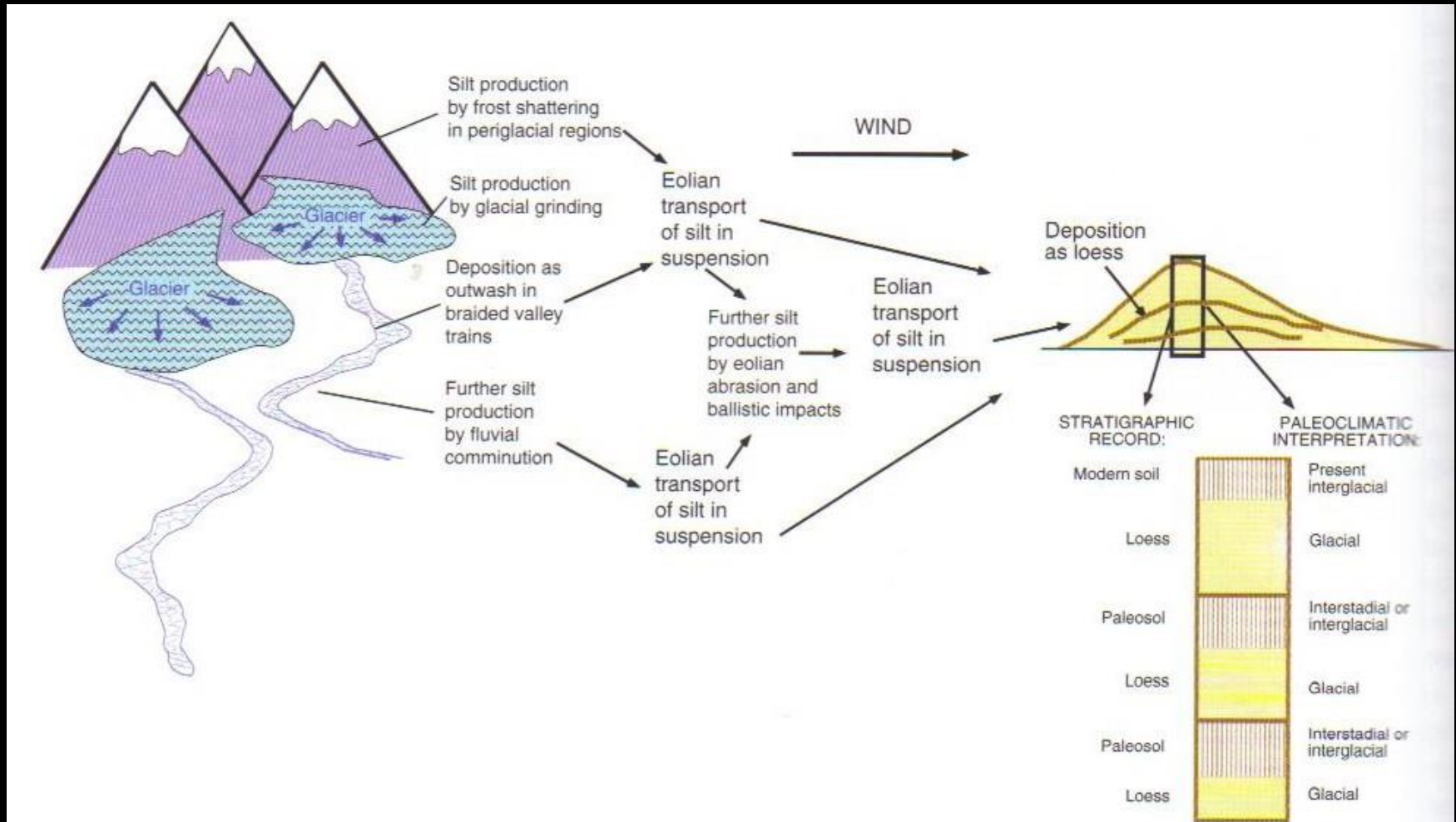
Figure 3 Loess plateau ca. 2,000m a.s.l. in the Western Pamirs piedmont.



← Suolo

← Loess

Condizioni favorevoli alla formazione del Loess.





Loess-paleosol series in the coastal outcrop of the Ob River

Campi di dune sabbiose in zona periglaciale.



Figure 6 Active transverse dunes of the Victoria Valley, Antarctica (N. Lancaster).

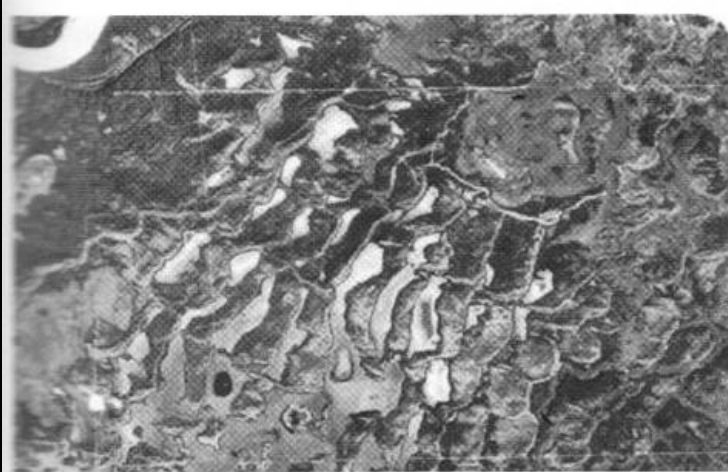
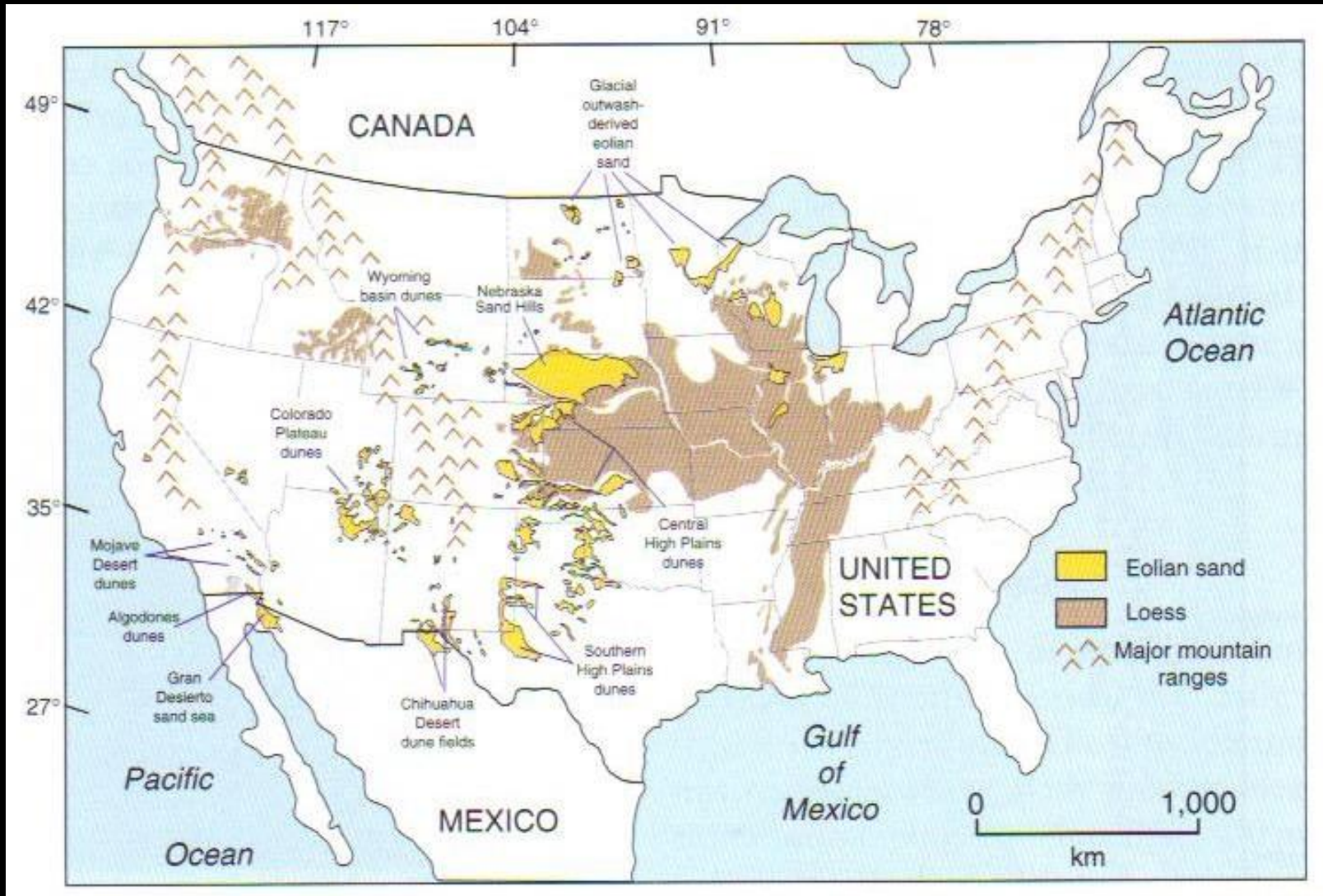


Figure 10 Stabilized transverse dunes, Holmes Crossing, central Alberta, Canada. Optical dating indicates these dunes were last active approximately 15,000 year ago. Transporting winds were from the northwest (upper left), and image view is 7 km wide



Distribuzione dei campi di dune sabbiose periglaciali del Pleistocene superiore in nordamerica.



Distribuzione mondiale del Loess



Loess del Pleistocene superiore in Italia

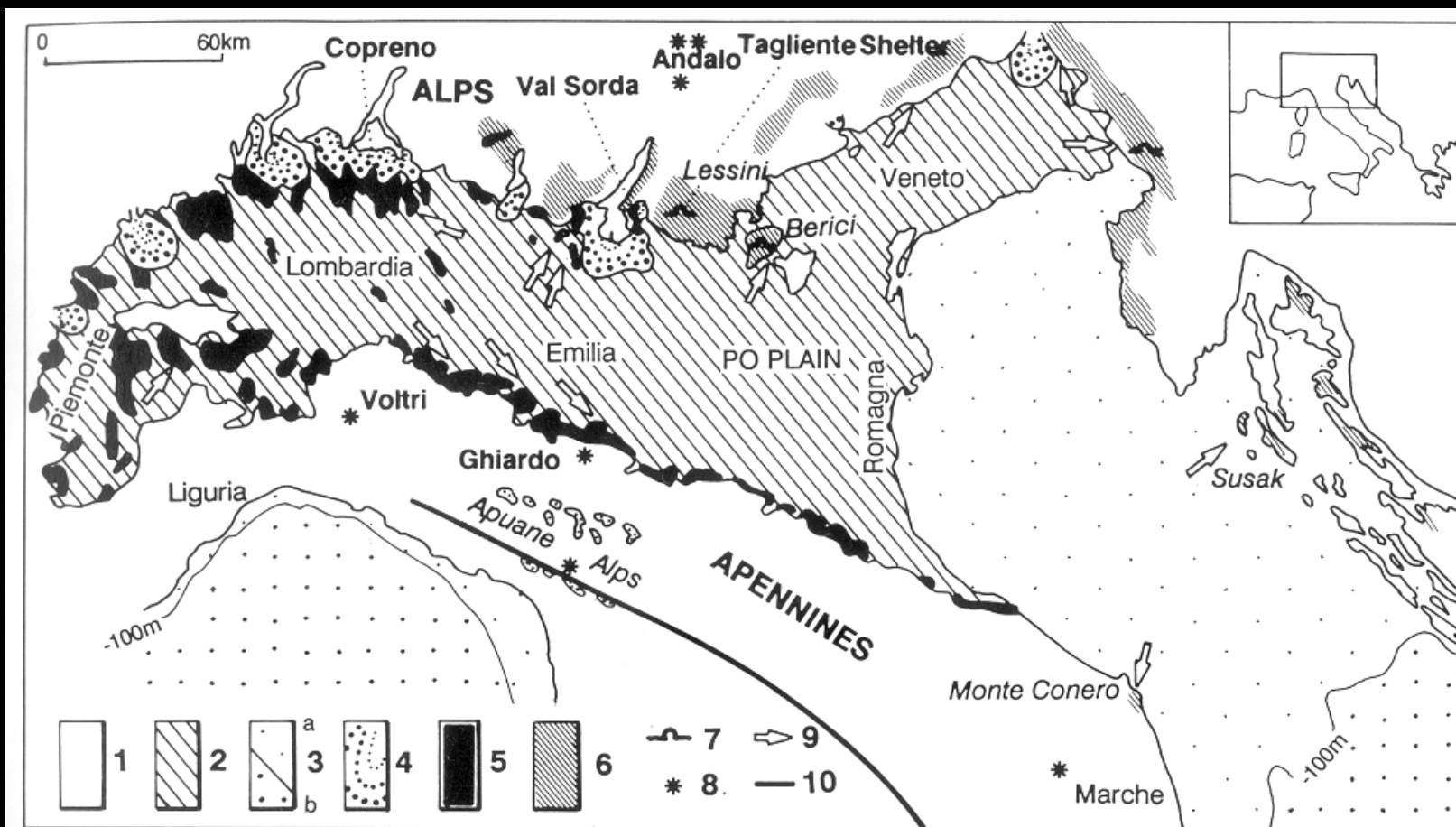
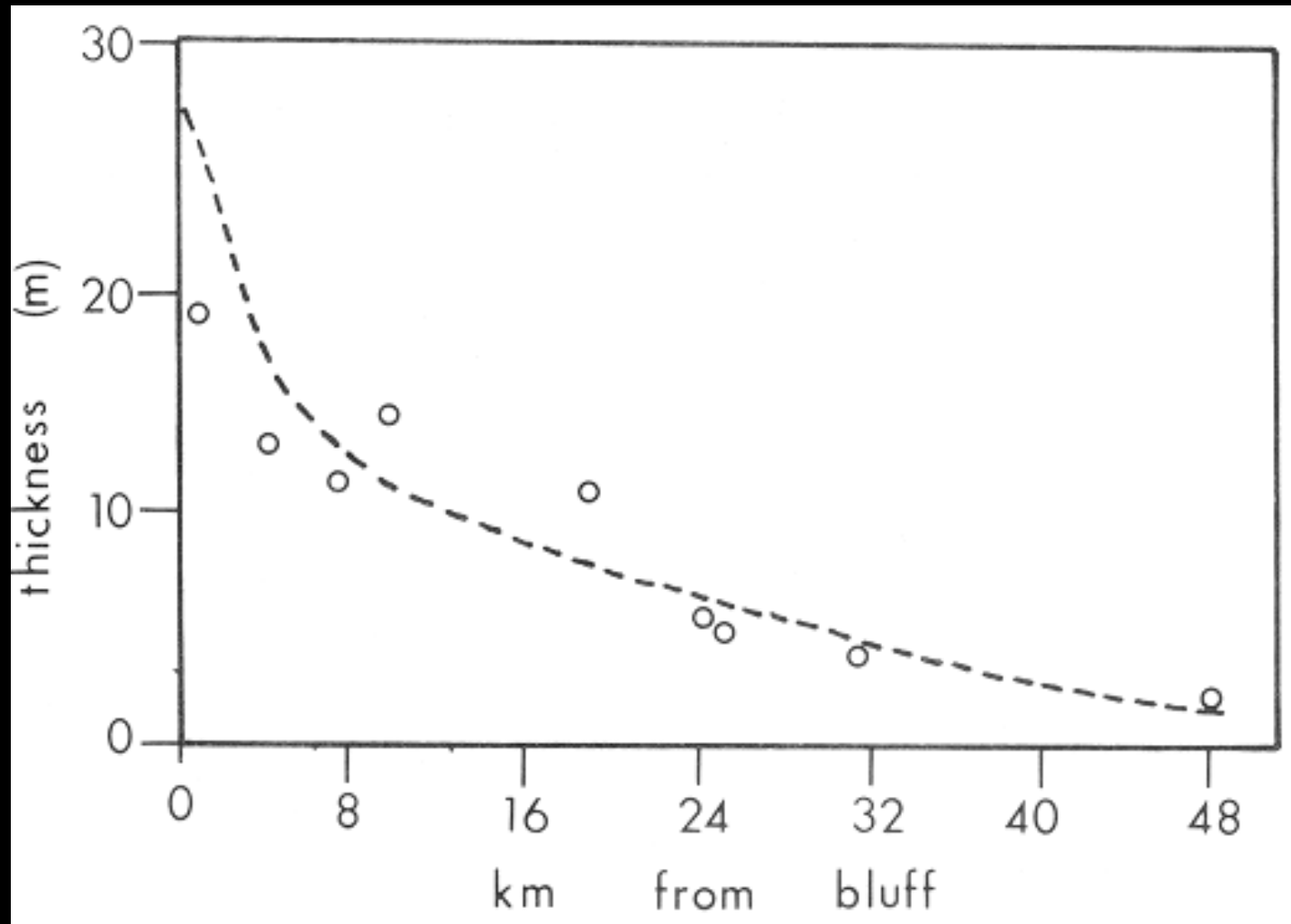


Fig. 3. Distribuzione dei depositi eolici nell'Italia settentrionale. 1) rocce pre-quadernarie; 2) piana alluvionale del tardopleistocenica ed olocenica; 3) l'attuale superficie marina; a - profondità inferiore a m 100; b - profondità superiore a m 100; 4) sistemi morenici prealpini ed appenninici; 5) depositi loessici su terrazzi fluviali, fluvioglaciali e su morene; 6) depositi loessici su plateau carsici; 7) loess contenuti in grotte o ripari; 8) loess su superfici di erosione; 9) direzione dei venti dominanti durante la sedimentazione del loess; 10) probabile limite sudoccidentale dell'area interessata a sedimentazione loessica.

Spessore depositi loess vs distanza da zona origine (area di deflazione eolica)

Nordamerica, bacino Mississippi)



Granulometria depositi loess vs distanza da zona origine (area di deflazione eolica)

Nordamerica, bacino Mississippi

