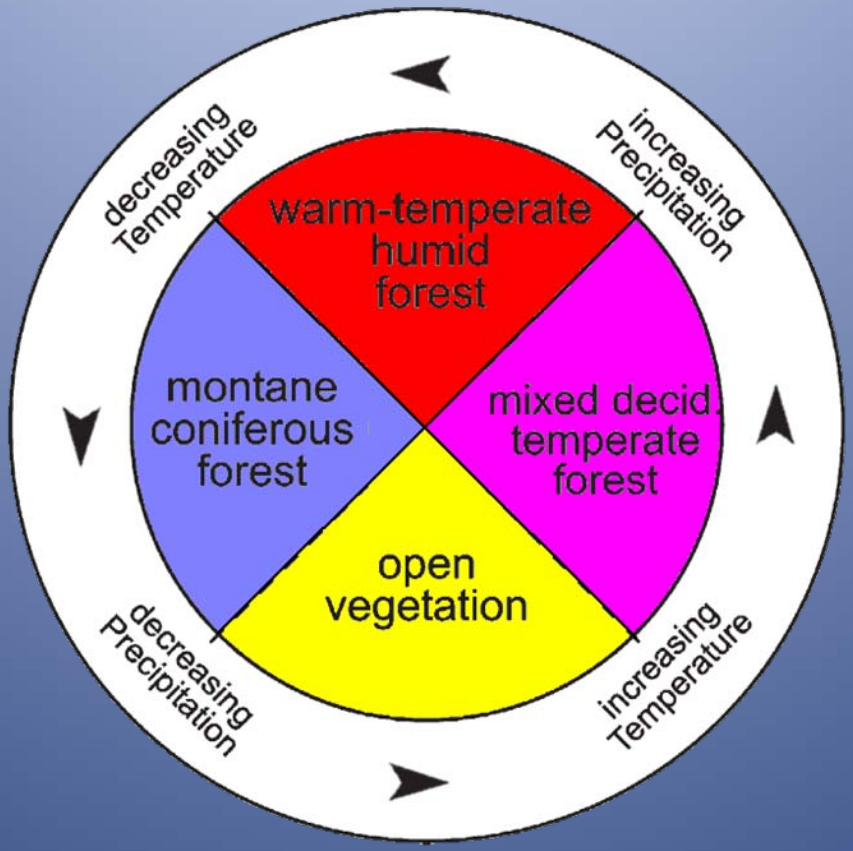
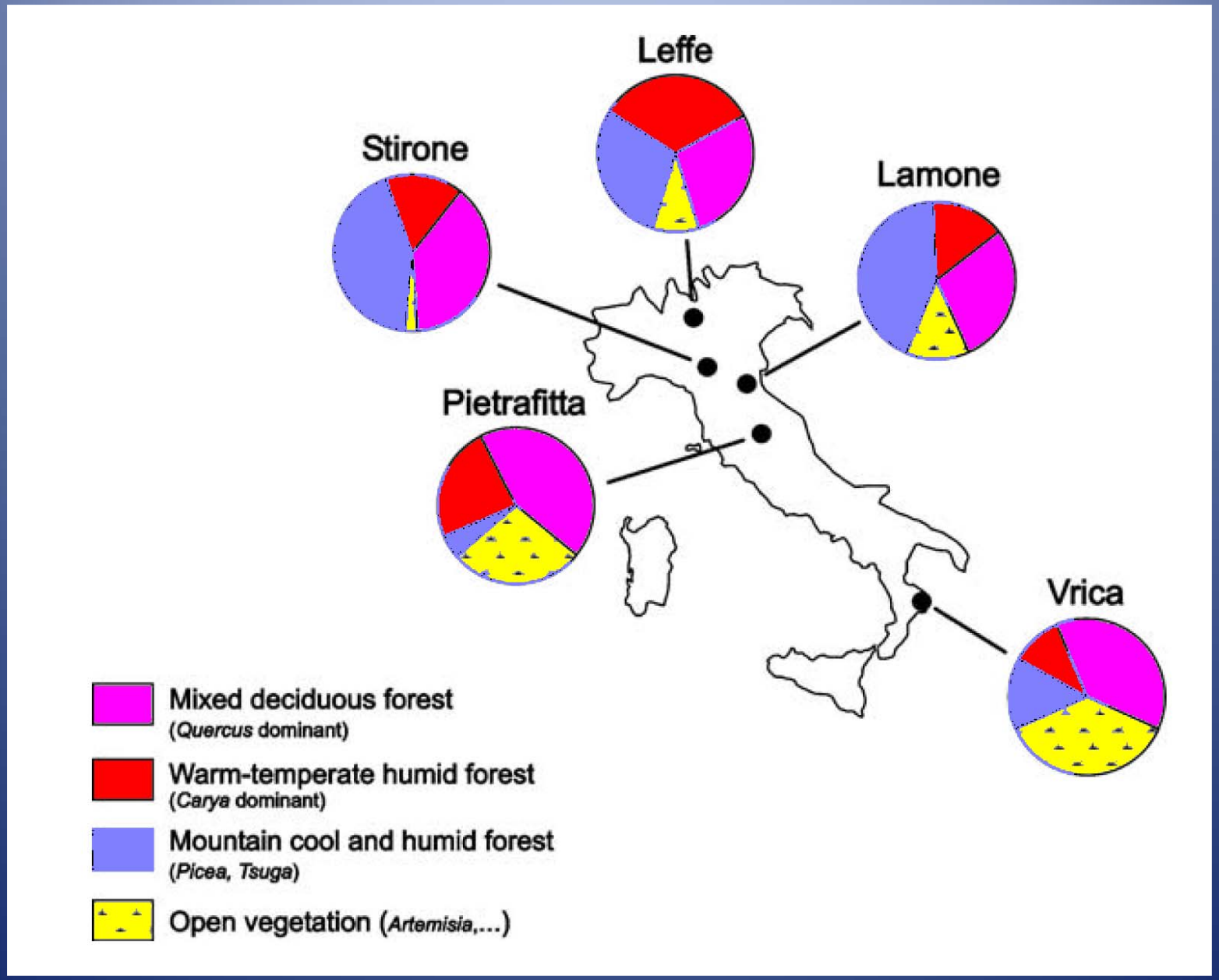


Ciclo glaciale/interglaciale

Fusco, 2007

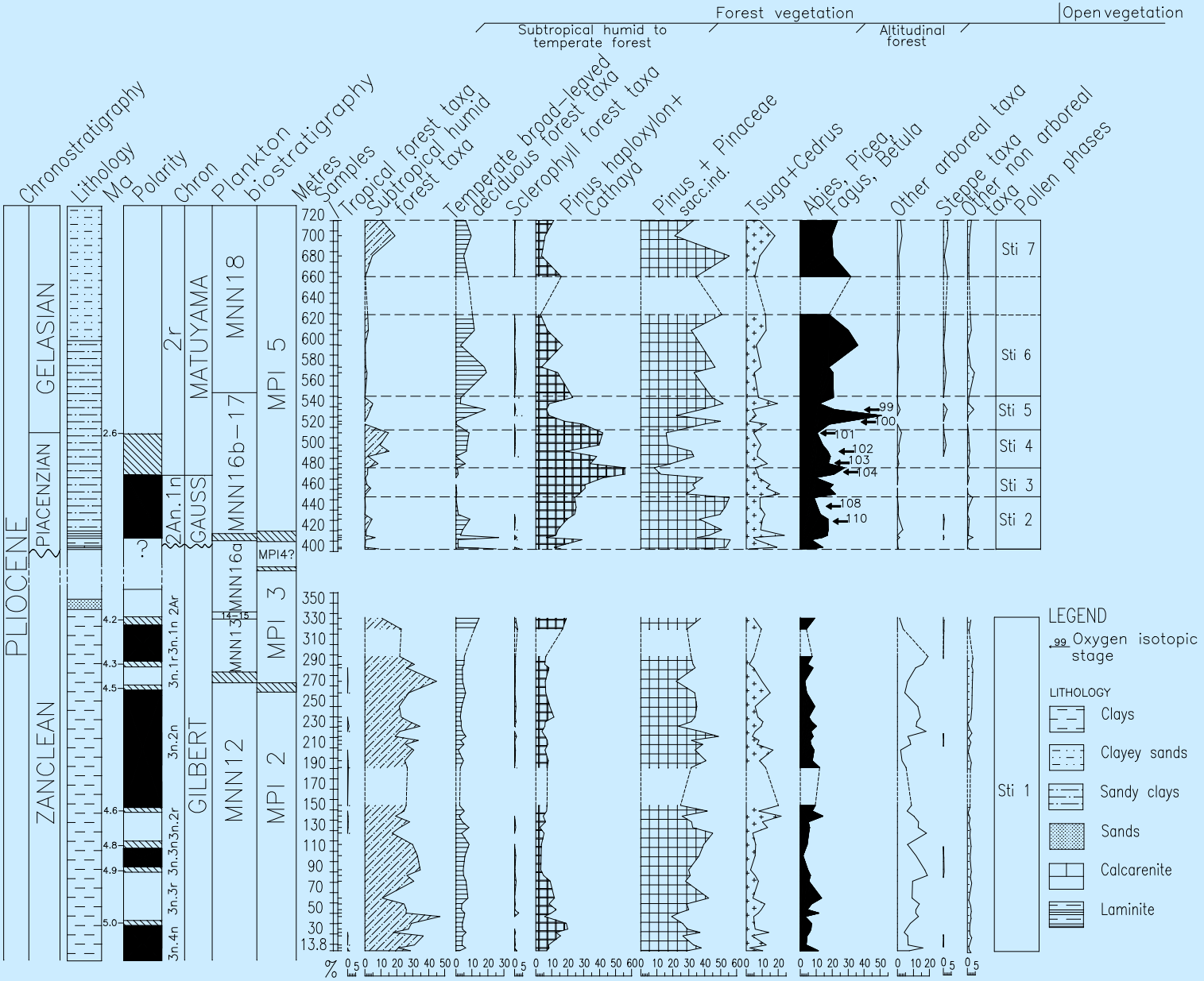
Distribuzione della vegetazione nel Pleistocene inferiore



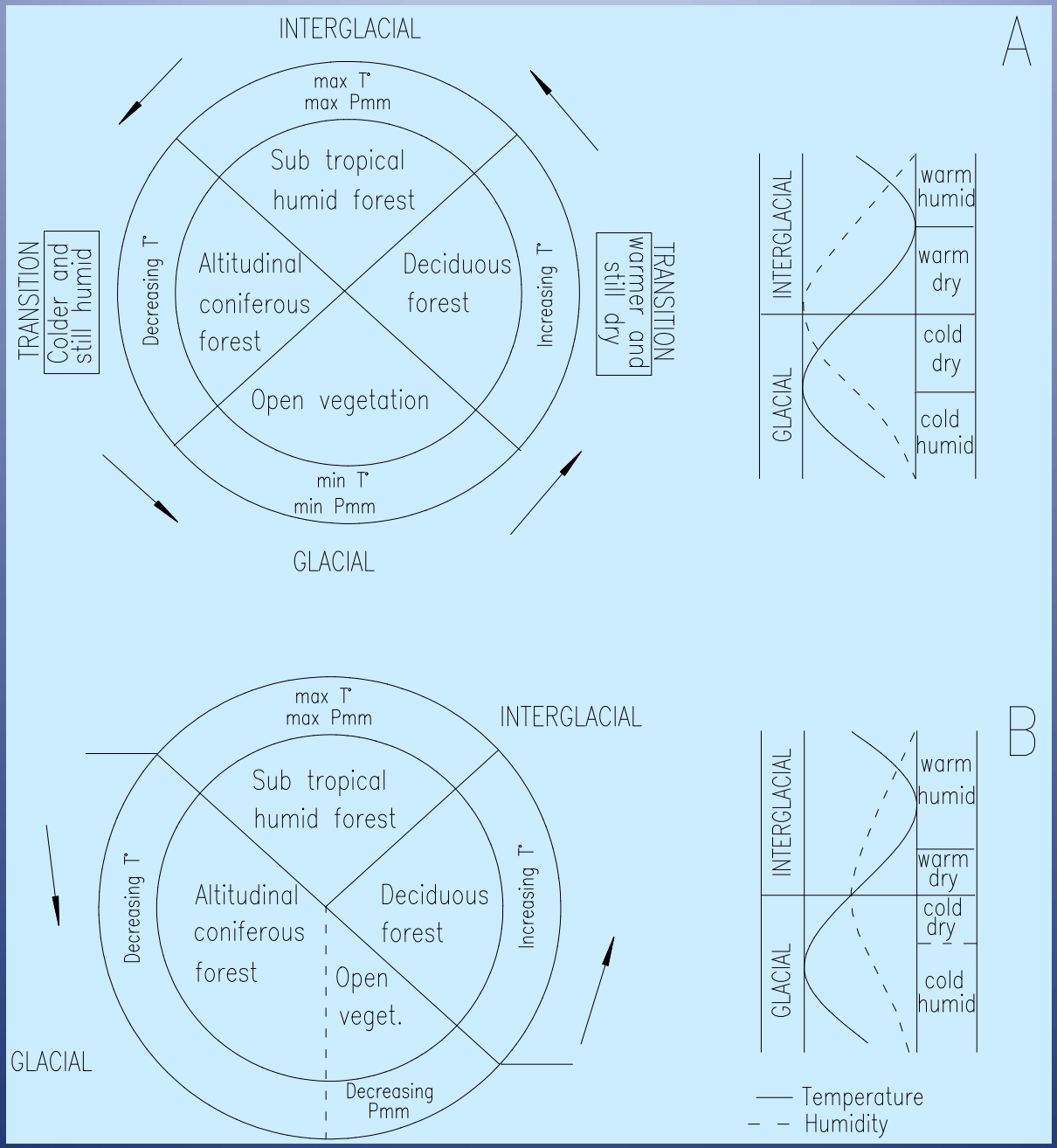
Fusco, 2007

Stirone (Italia settentrionale)

Stirone

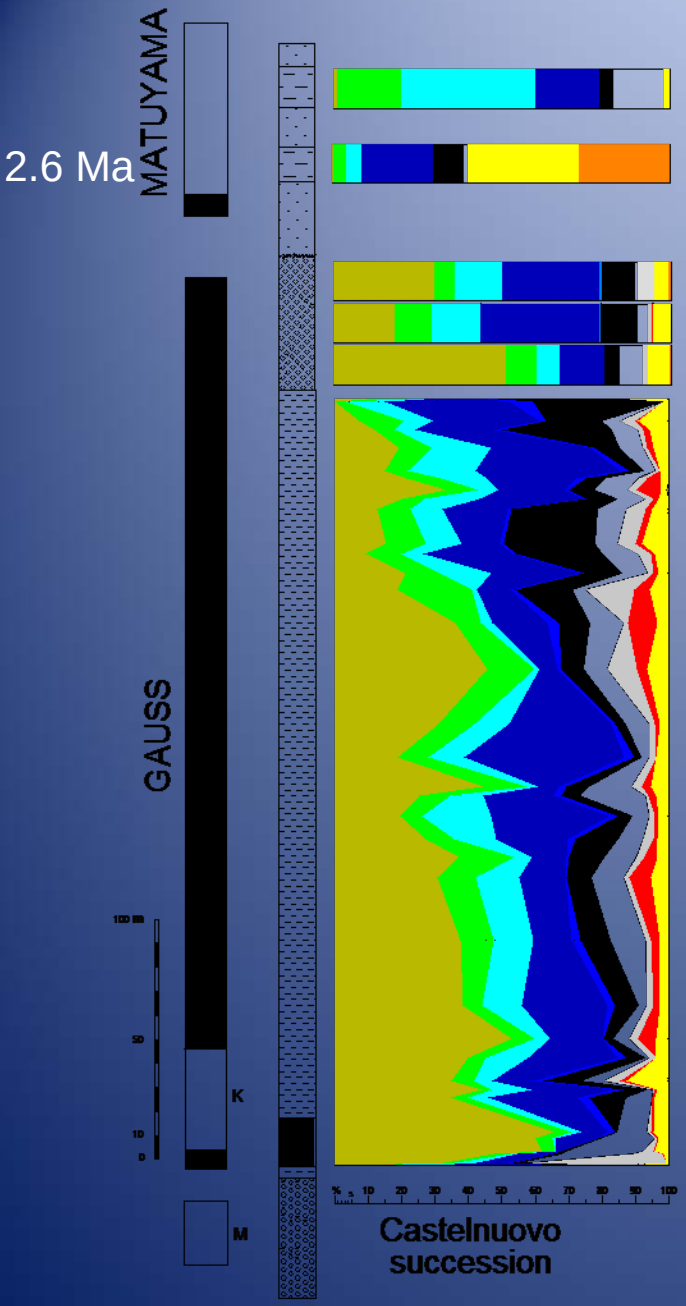


Da Bertini, 2001

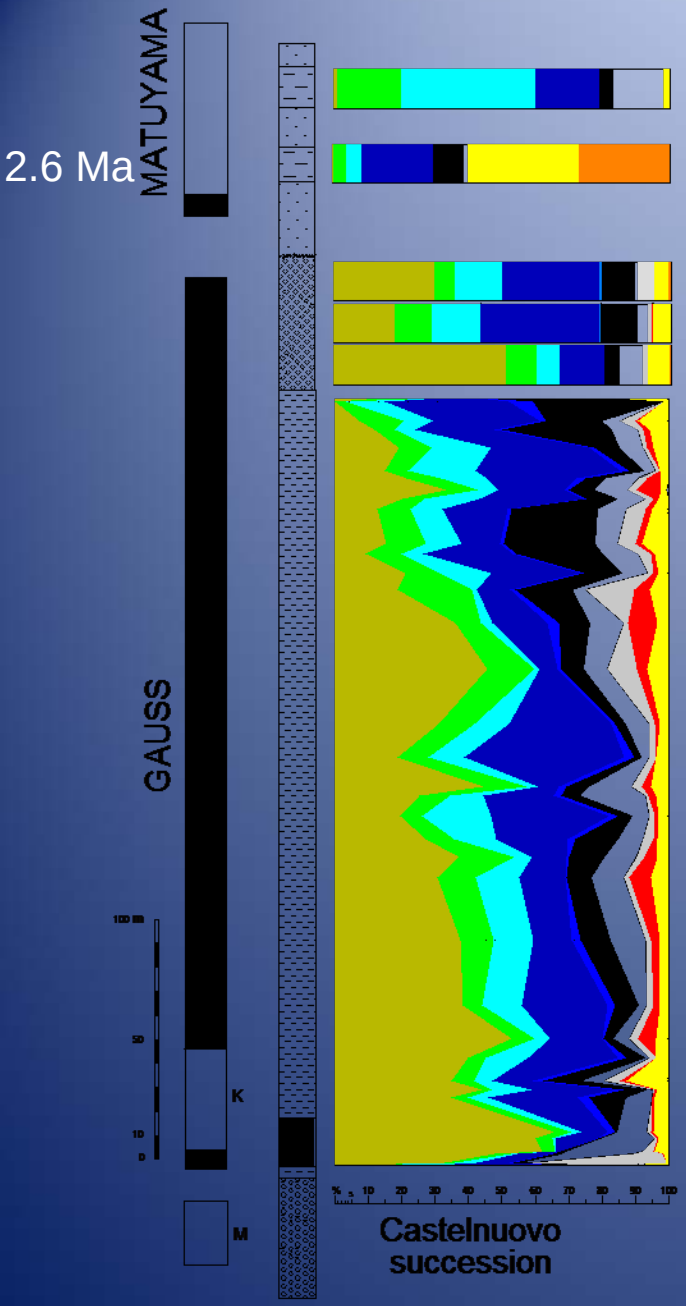


Da Bertini, 2001

Piacenziano– Valdarno superiore (Italia centrale)



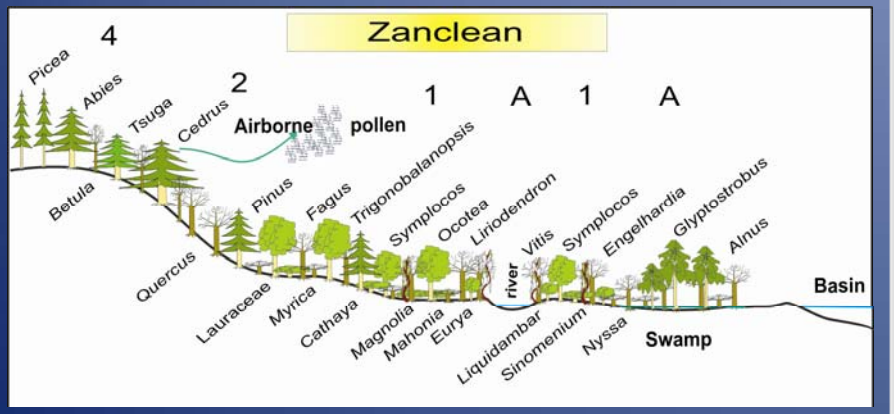
da Bertini 2010



da Bertini 2010

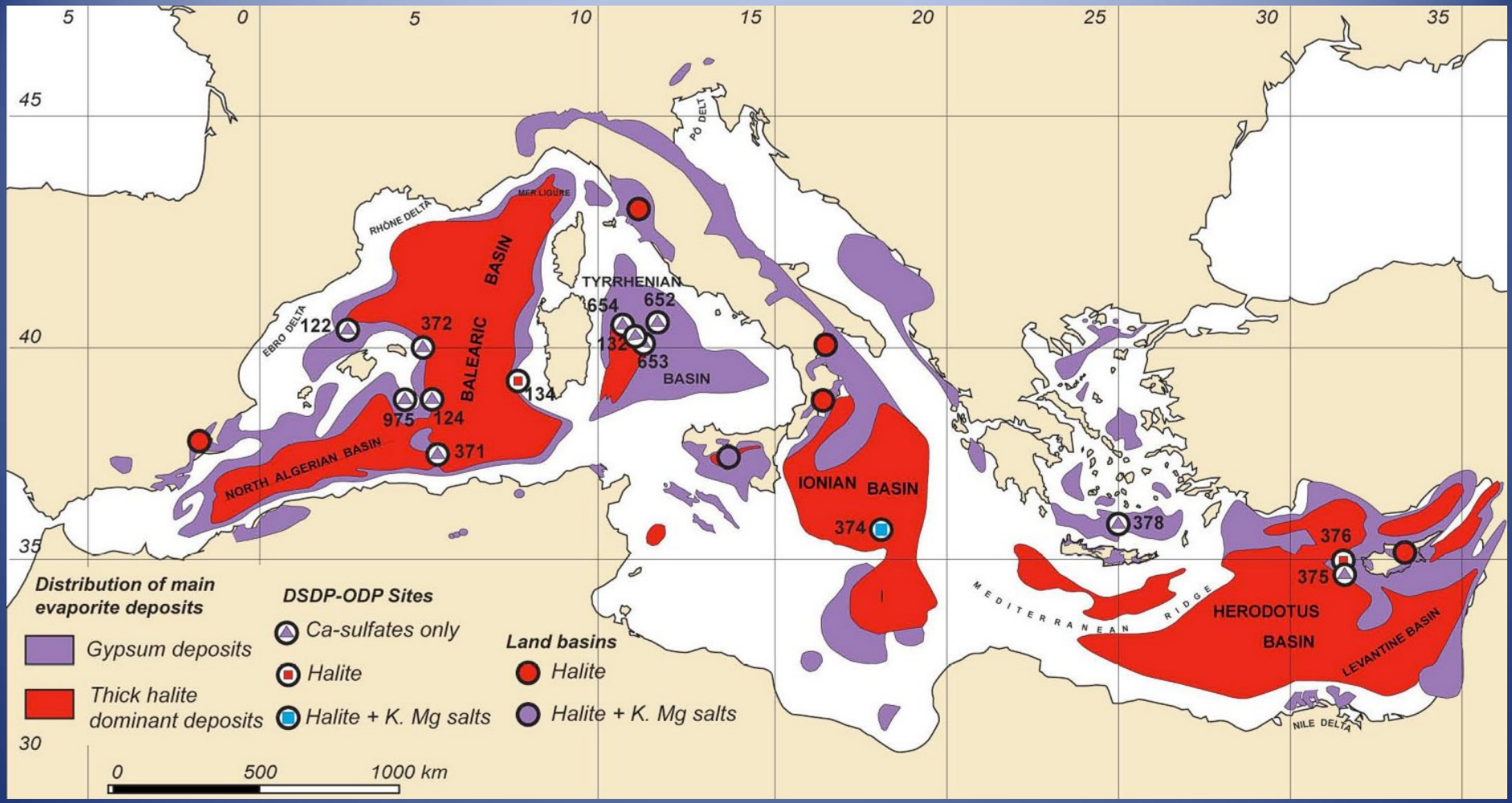
Santa Barbara, da Bertini 2000

bioma (C) " warm grassland/scrub"



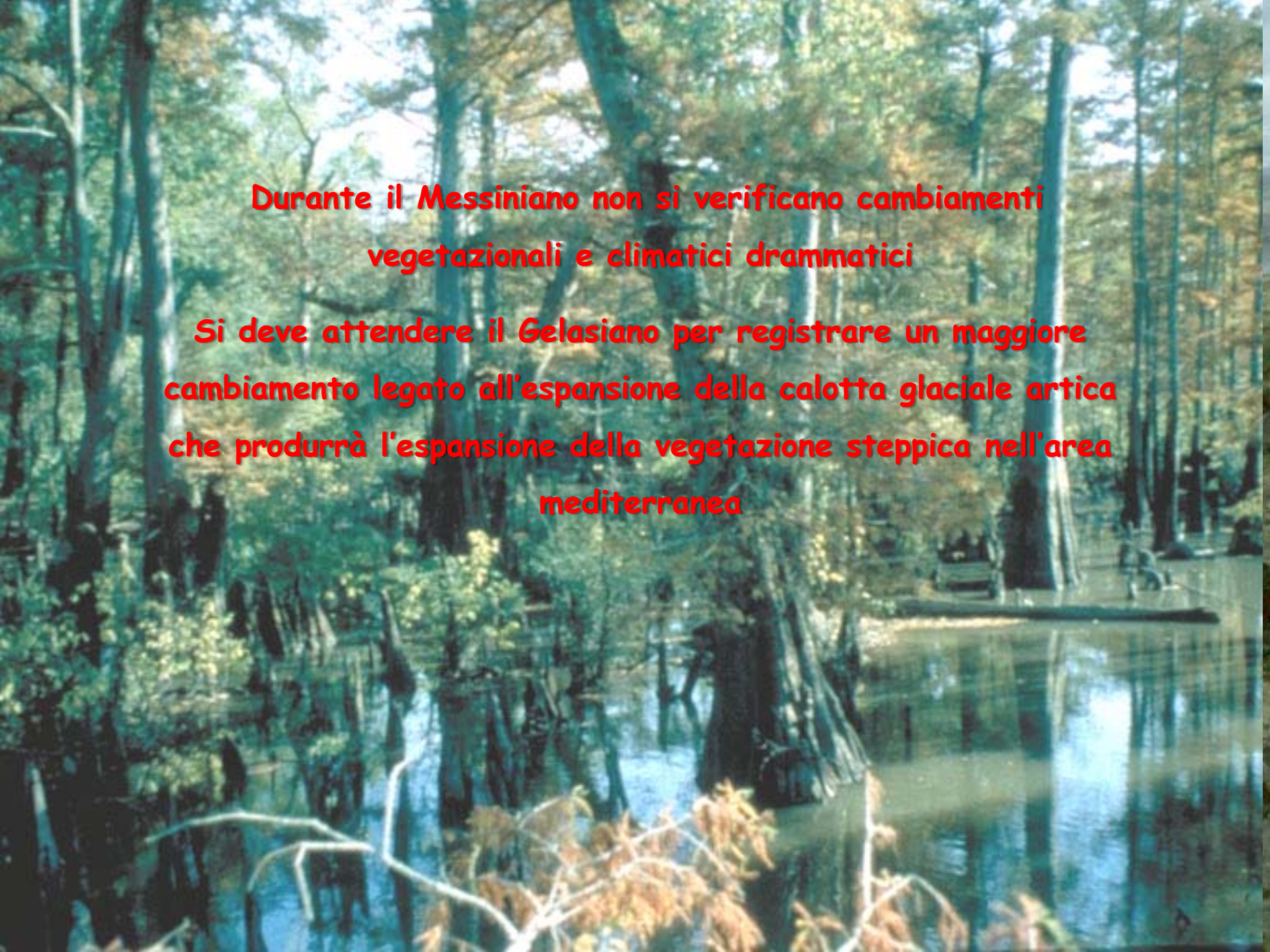
Bioma : "broadleaved evergreen/warm mixed forest"

Ricostruzione integrata macro- e microflorstica per i siti dell'Italia centro settentrionale(Bertini & Martinetto, 2008; Bertini & Martinetto, 2010)



Messiniano – 5.96 Ma

Da eventi globali a regionali



Durante il Messiniano non si verificano cambiamenti vegetazionali e climatici drammatici

Si deve attendere il Gelasiano per registrare un maggiore cambiamento legato all'espansione della calotta glaciale artica che produrrà l'espansione della vegetazione steppica nell'area mediterranea

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journal homepage: www.elsevier.com/locate/quaint

Impact of short-term climatic events on latest Pliocene land settings and communities in Central Italy (Upper Valdarno basin)

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ARTICLE INFO

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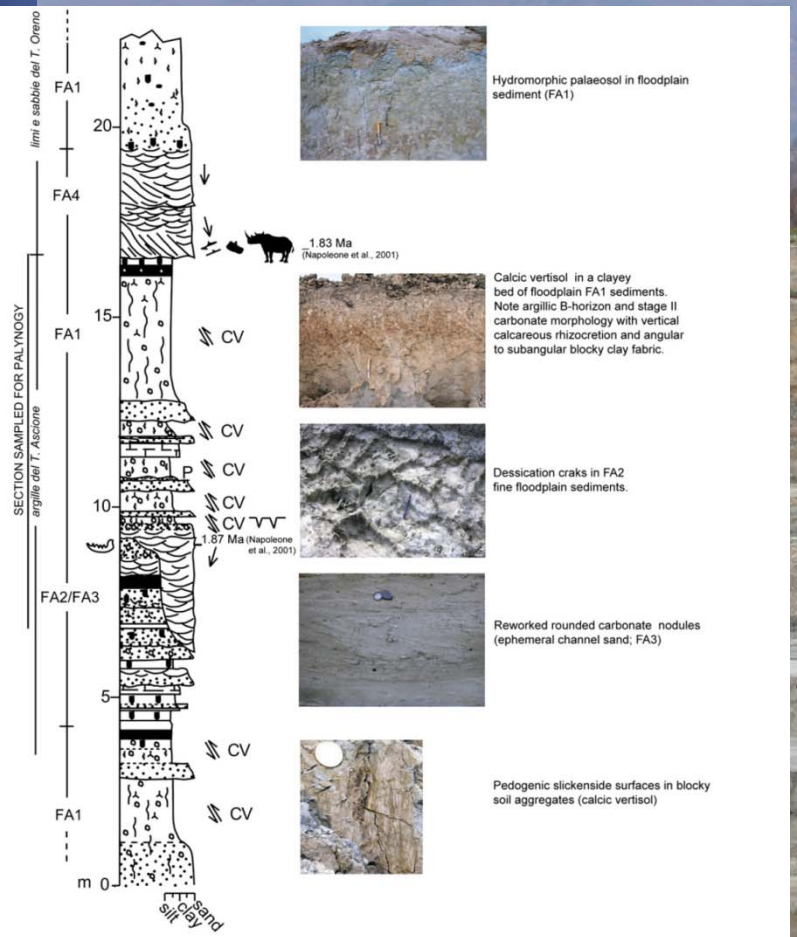
Available online 23 June 2009

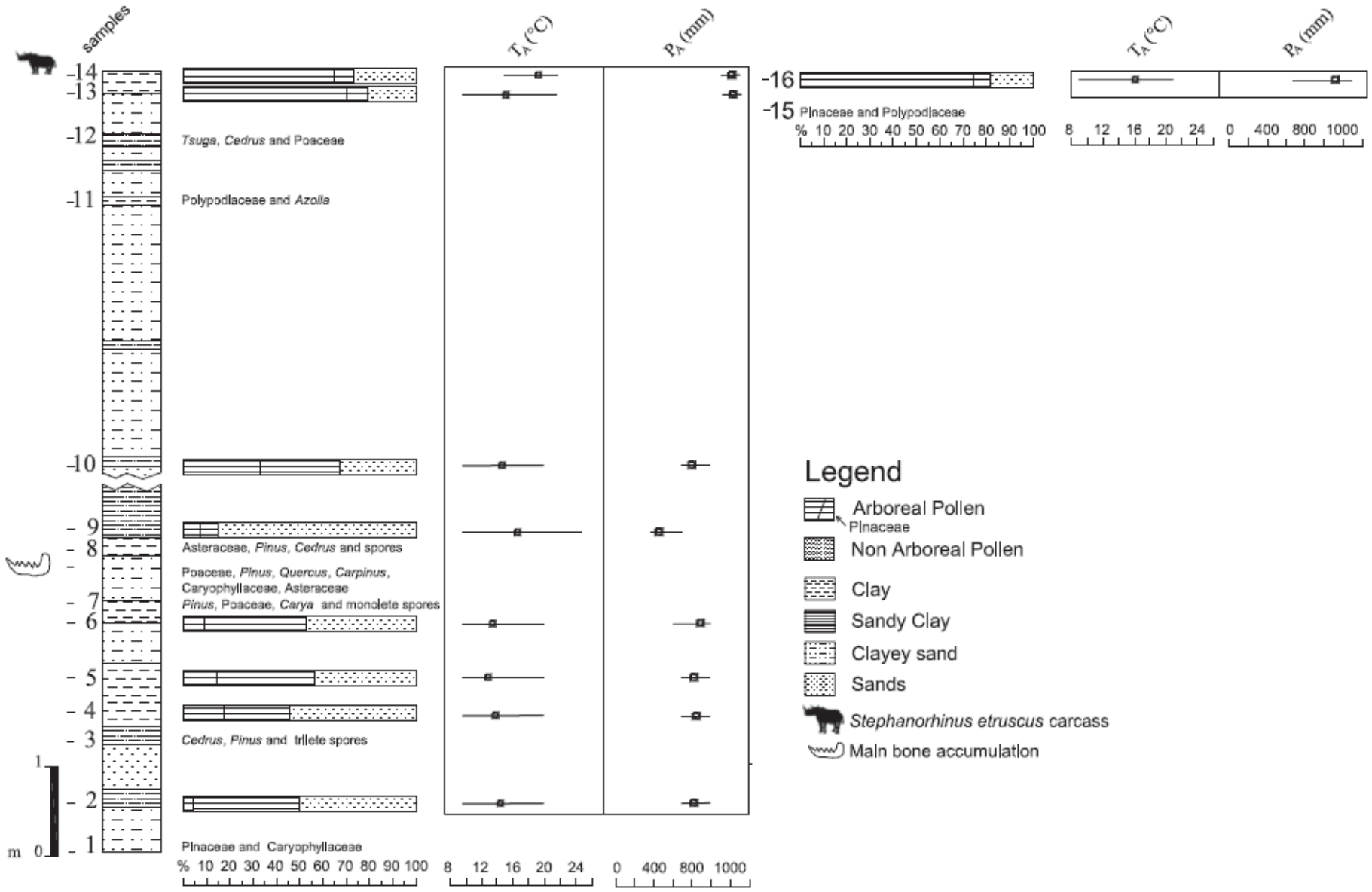
ABSTRACT

The Upper Valdarno (Italy) Plio-Pleistocene continental deposits record the latest uniform subtropical humid conditions and the successive climatic signature of glacial/interglacial cycling. The palynological and sedimentological analyses on the Poggio Rosso alluvial plain sediments reveal two major climatic fluctuations correlated to a glacial/interglacial cycle just before the Plio-Pleistocene boundary. The glacial phase, indicated by the expansion of herbs as well as by ephemeral streams associated with calcareous palaeosols, extends from the base of the succession and culminates close to an impressive mammalian bone accumulation dated at 1.87 Ma. The associated increasing aridity had severe consequences on the faunal communities, inducing the migration of open plain dwellers and the trapping of other residents around a few residual shrinking water bodies. A cooperative *Pachycrocuta brevirostris* clan acted as regulator of game populations debilitated by drought. Previous research indicates that hyenas were also the major bone accumulators. The following moister and warmer interglacial phase ca 1.83 Ma is documented by arboreal taxa and hydromorphic palaeosols in a floodplain crossed by migrating, perennial, sinuous streams. The Climatic Amplitude Method calculated mean annual temperatures around 12.5–14 °C and mean annual precipitation around 800 mm, with a minimum of 400 mm during the glacial phase and 15/16–19 °C and 750–1200 mm during the interglacial phase. The reconstruction reveals higher mean annual temperatures and precipitation during the interglacial as compared to the present-day climate. During the glacial, conditions were similar to today's in all but lower precipitation values were reached during the acme drought phase just above the fossiliferous bed. Poggio Rosso documents the ecological consequences the buildup of the Apennine chain had under the effects of the latest Pliocene global climatic changes. It therefore represents one of the first signals of the patchiness that, since then, gradually increased leading to the eventual habitat fragmentation typical of the late Pleistocene landscapes.

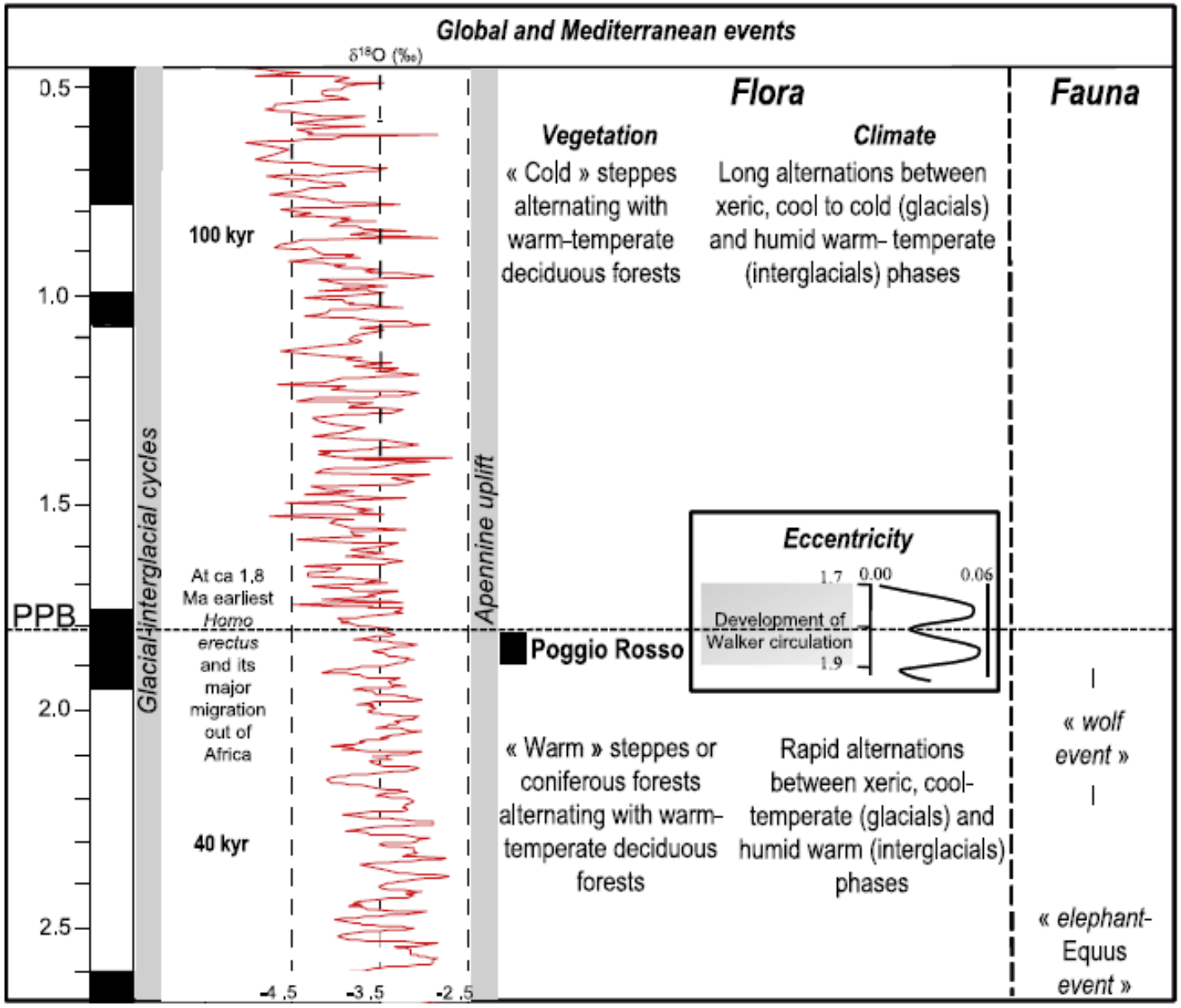
Poggio Rosso, Valdarno Sup.



Poggio Rosso, Valdarno Sup.

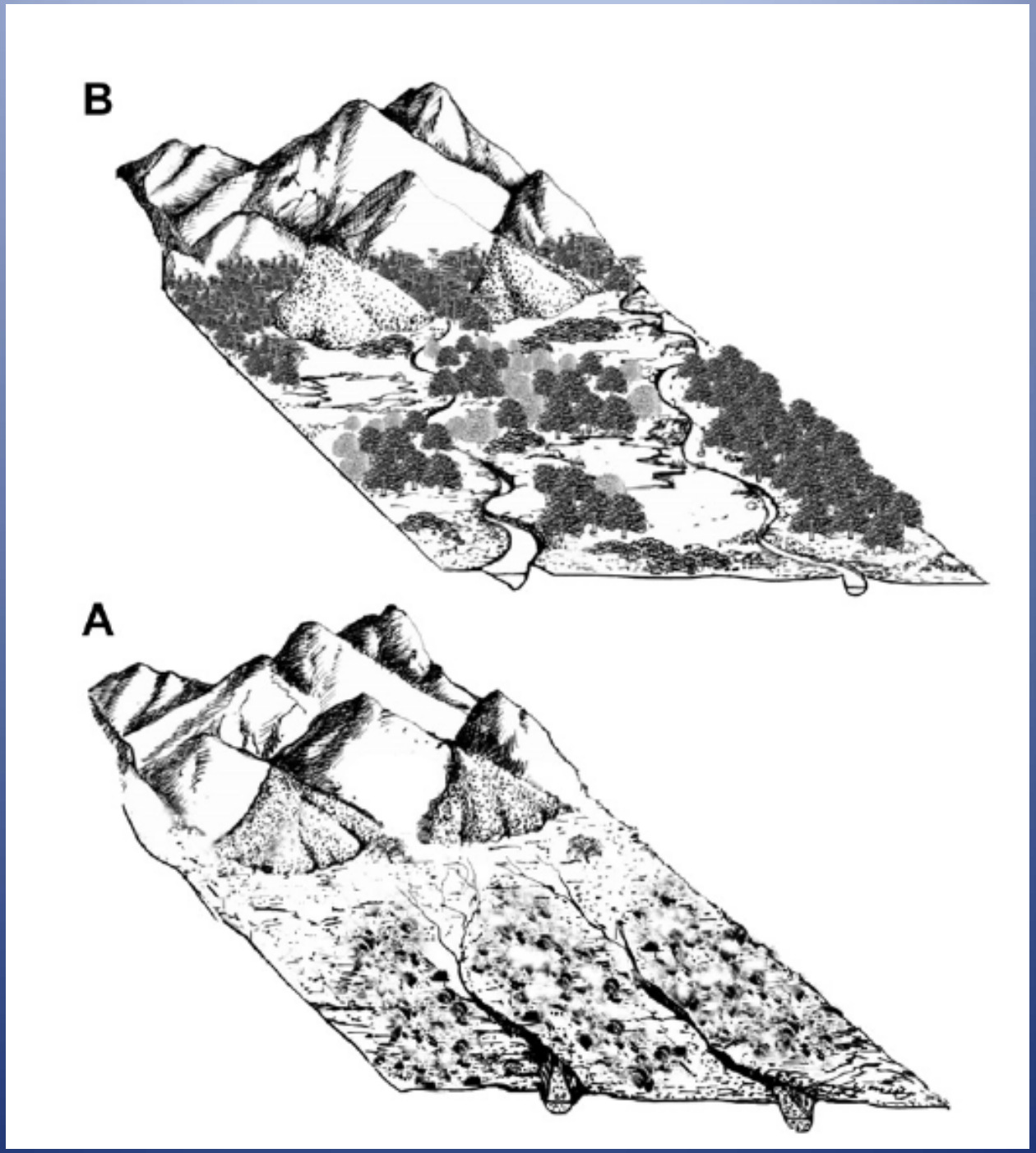


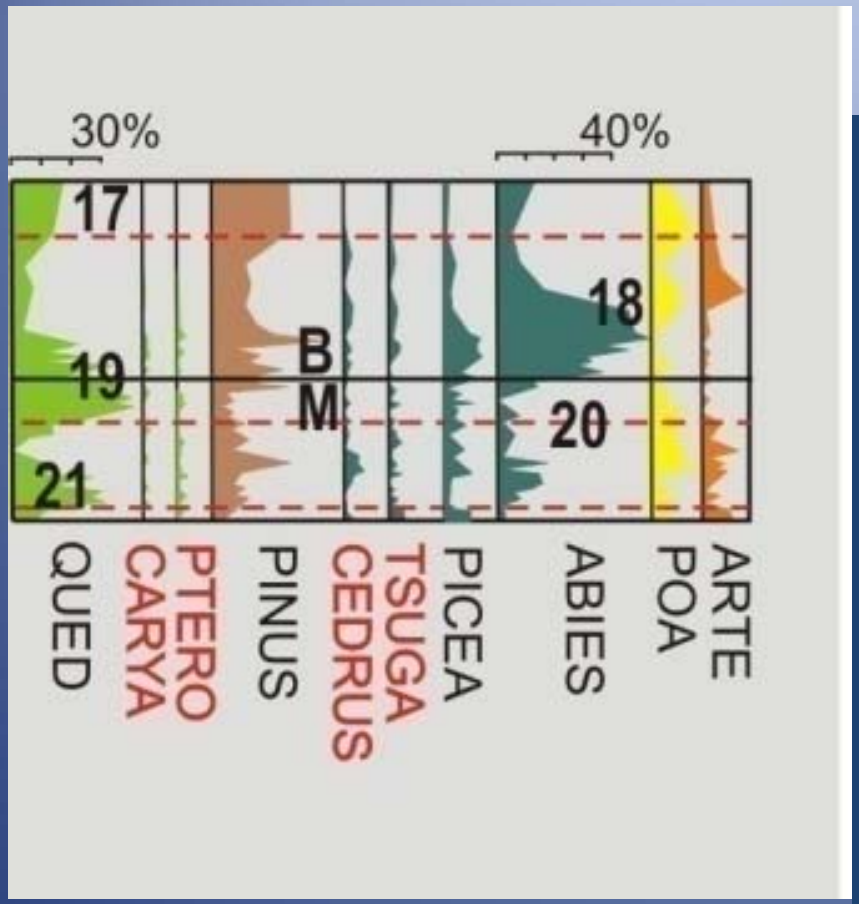
Poggio Rosso, Valdarno Sup. Da sinistra: colonna litologica, diagrammi pollinici sintetici e quantificazione climatica.


Global and Mediterranean events
δ18O (‰)
0.5
1.0
1.5
2.0
2.5
PPB
100 kyr
40 kyr
Glacial-interglacial cycles
At ca 1,8 Ma earliest Homo erectus and its major migration out of Africa
Apennine uplift
-4 ,5
-3 ,5
-2 ,5
Flora
Vegetation
Climate
« Cold » steppes alternating with warm-temperate deciduous forests
Long alternations between xeric, cool to cold (glacials) and humid warm- temperate (interglacials) phases
Eccentricity
1.7
0.00
0.06
1.9
Development of Walker circulation
Poggio Rosso
« Warm » steppes or coniferous forests alternating with warm-temperate deciduous forests
Rapid alternations between xeric, cool-temperate (glacials) and humid warm (interglacials) phases
Fauna
« wolf event »
« elephant-Equus event »

B. Scenario ricostruito per il sito di Poggio Rosso durante la fase interglaciale

A. Scenario ricostruito per il sito di Poggio Rosso durante la fase glaciale





Valle di Manche ; modificato da Capraro et al. (2005).

Complessi cicli vegetazionali:

Vegetazione alpina durante le fasi glaciali ma steppa arborata durante gli interglaciali

I diversi pattern potrebbero essere associati ai cicli glaciali/interglaciali guidati dall'obliquità ma sovrapposti ai cicli caldo/secchi–freddo/umidi precessionali.

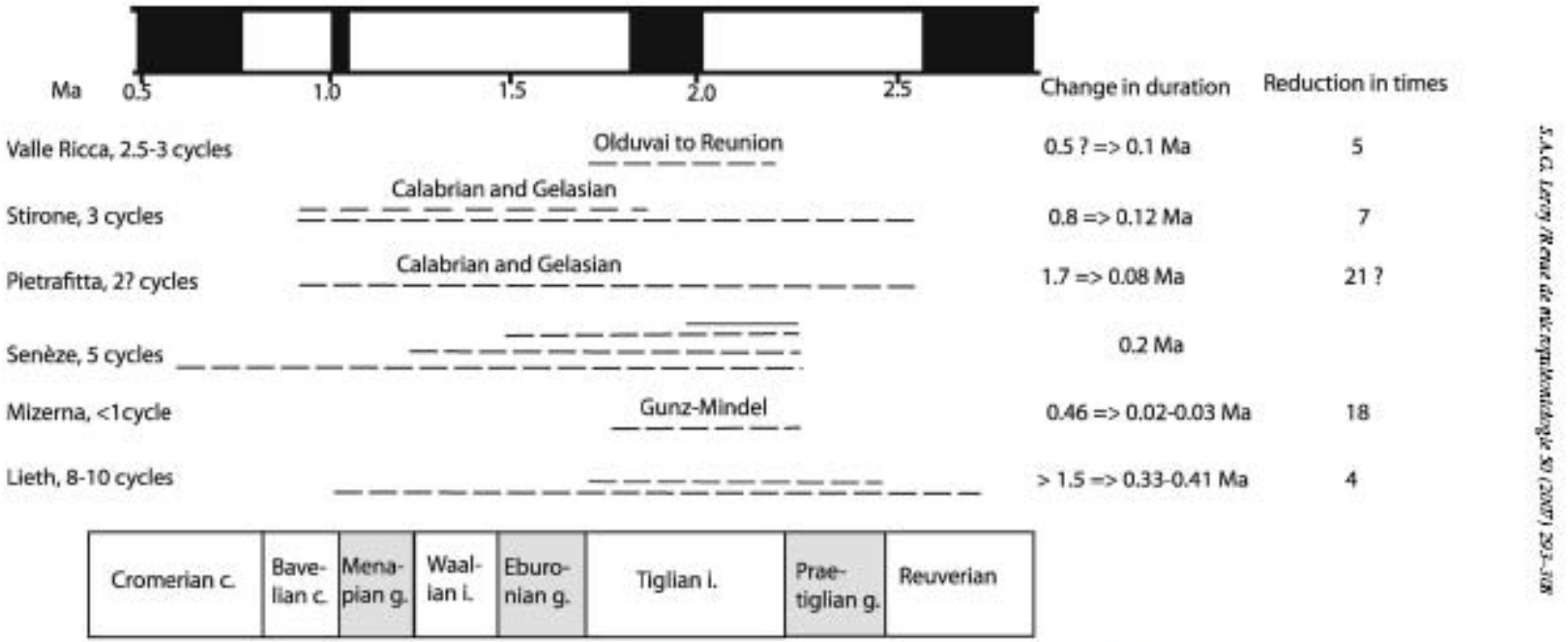
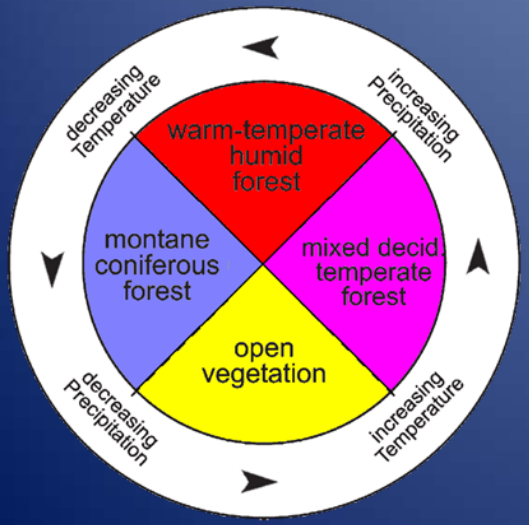
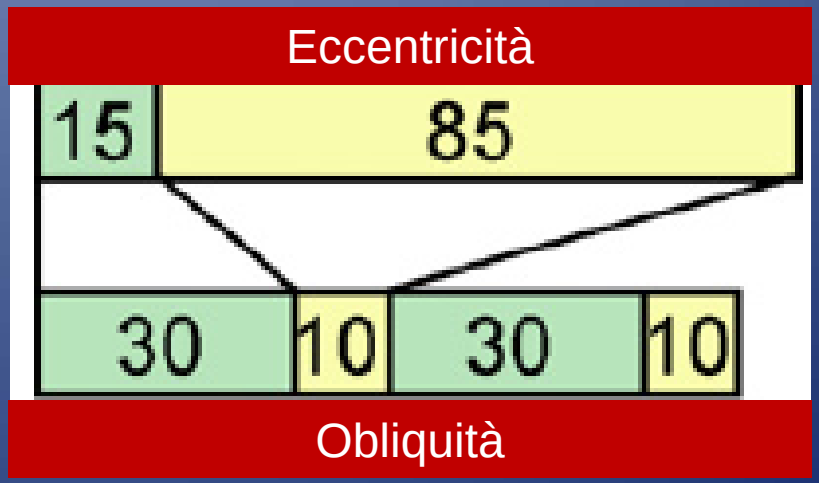
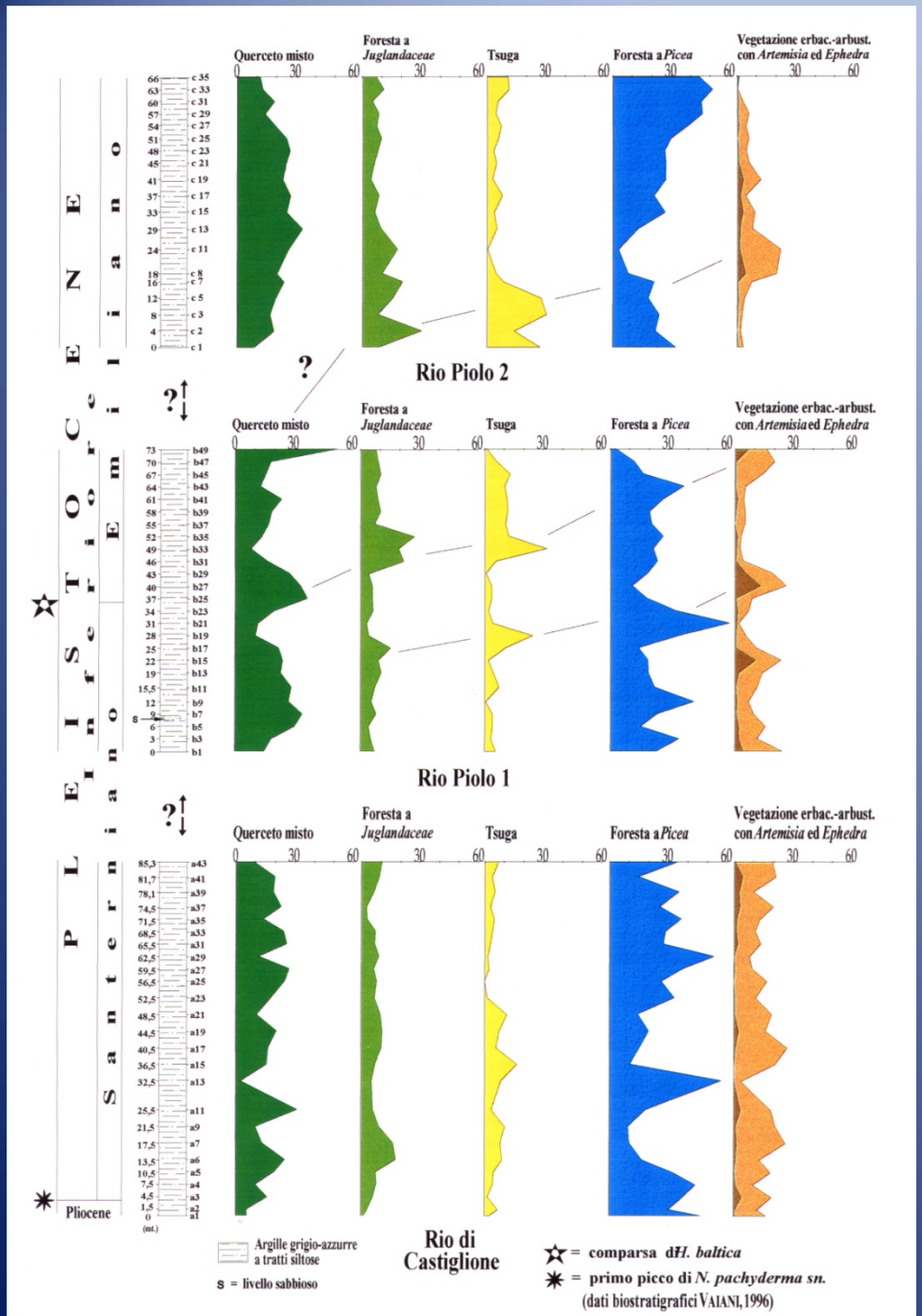
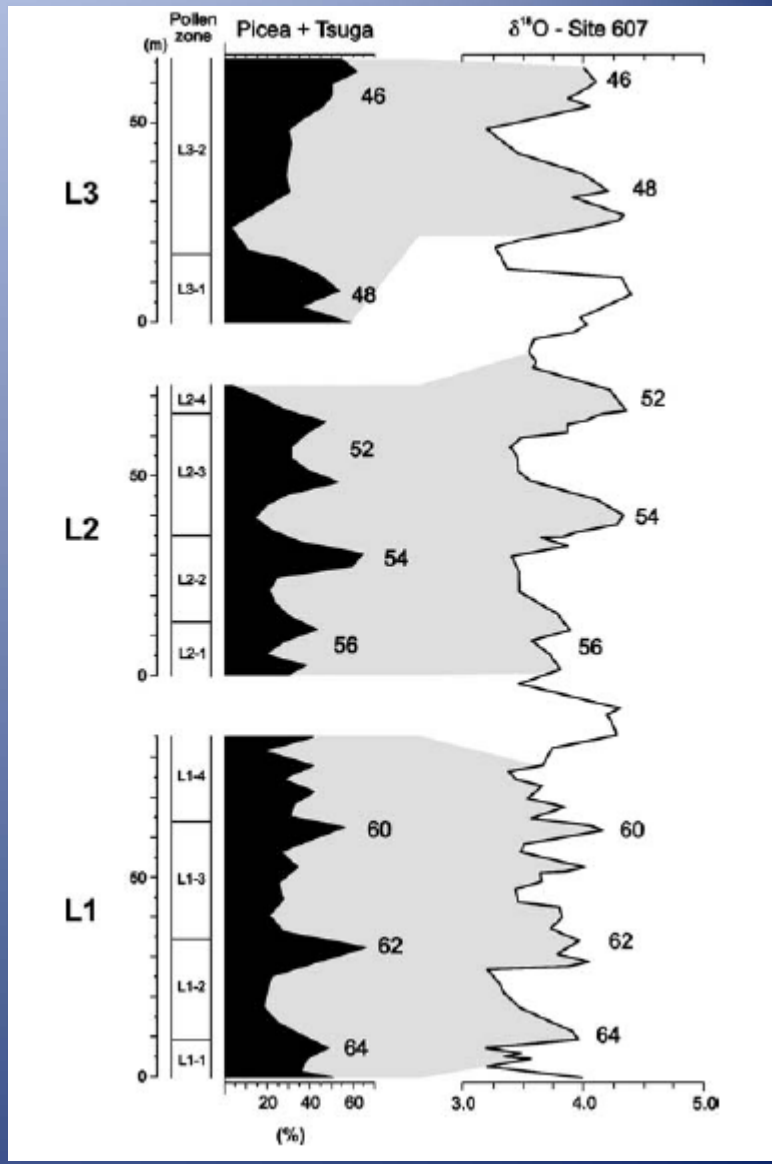


Fig. 9. Revision of the duration of a series of GCS sites. For Senèze according to Roger et al. (2000). Palynostratigraphy of the Netherlands according to Zagwijn (1996). g. = glacial, i. = interglacial, c. = complex.
Fig. 9. Révision de la durée d'une série de sites GCS. Pour Senèze selon Roger et al. (2000). Palynostratigraphie des Pays-Bas selon Zagwijn (1996). g. = glaciaire, i. = interglaciaire, c. = complexe.









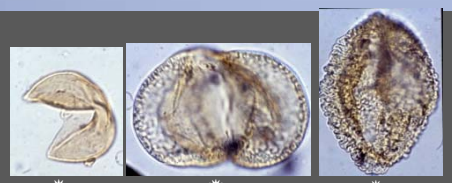
Da Fusco, 1996, 2010

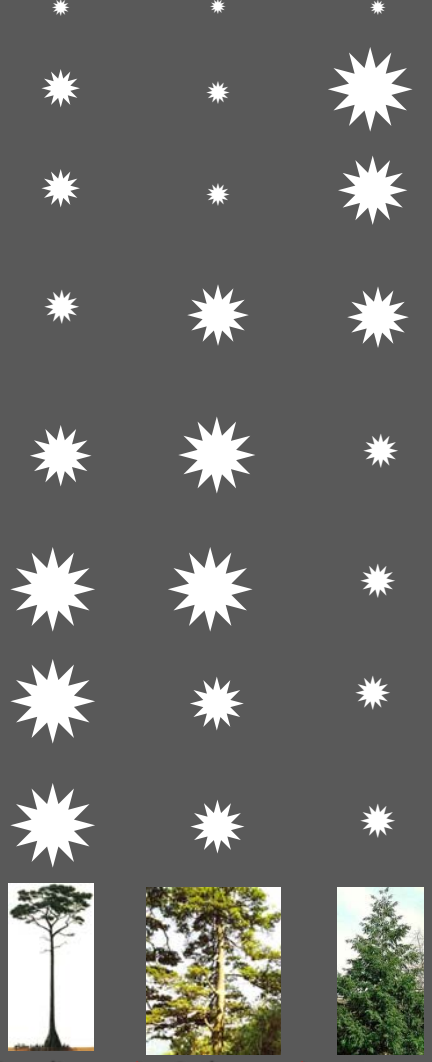
Period	Epoch	Age
QUATERNARY	PLEISTOCENE	IONIAN
		GELASIAN
		CALABRIAN
		Sicilian
		Emilian
		Santernian
NEOGENE	PLIOCENE	PIACENZIAN
		ZANCLEAN

100 ka

41 ka

Deciduous forest -steppe (or coniferous forest) alternations





Progressive floristic impoverishment

Strong cooling

Glacial/Interglacial cycles

« wolf event »

« elephant-Equus event »

2.6 Ma Arctic glaciation

3.0-3.2 Ma significant ^{18}O decrease

3.5-3.7 Ma ^{18}O increase

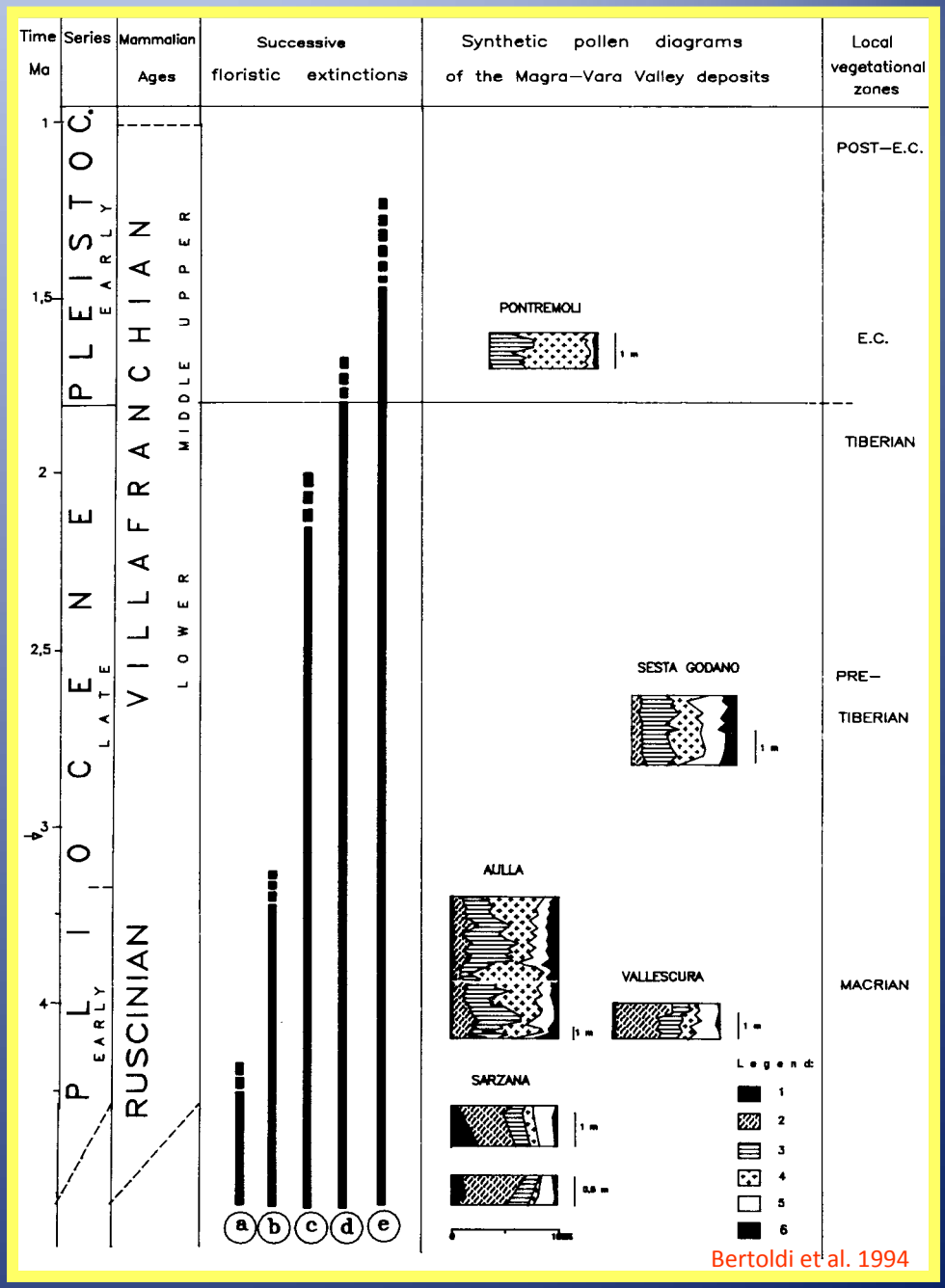
4.5 Ma cooling

5.3 Ma Zanclean transgression

Uso erroneo delle scomparse floristiche locali per ubicare stratigraficamente le diverse successioni

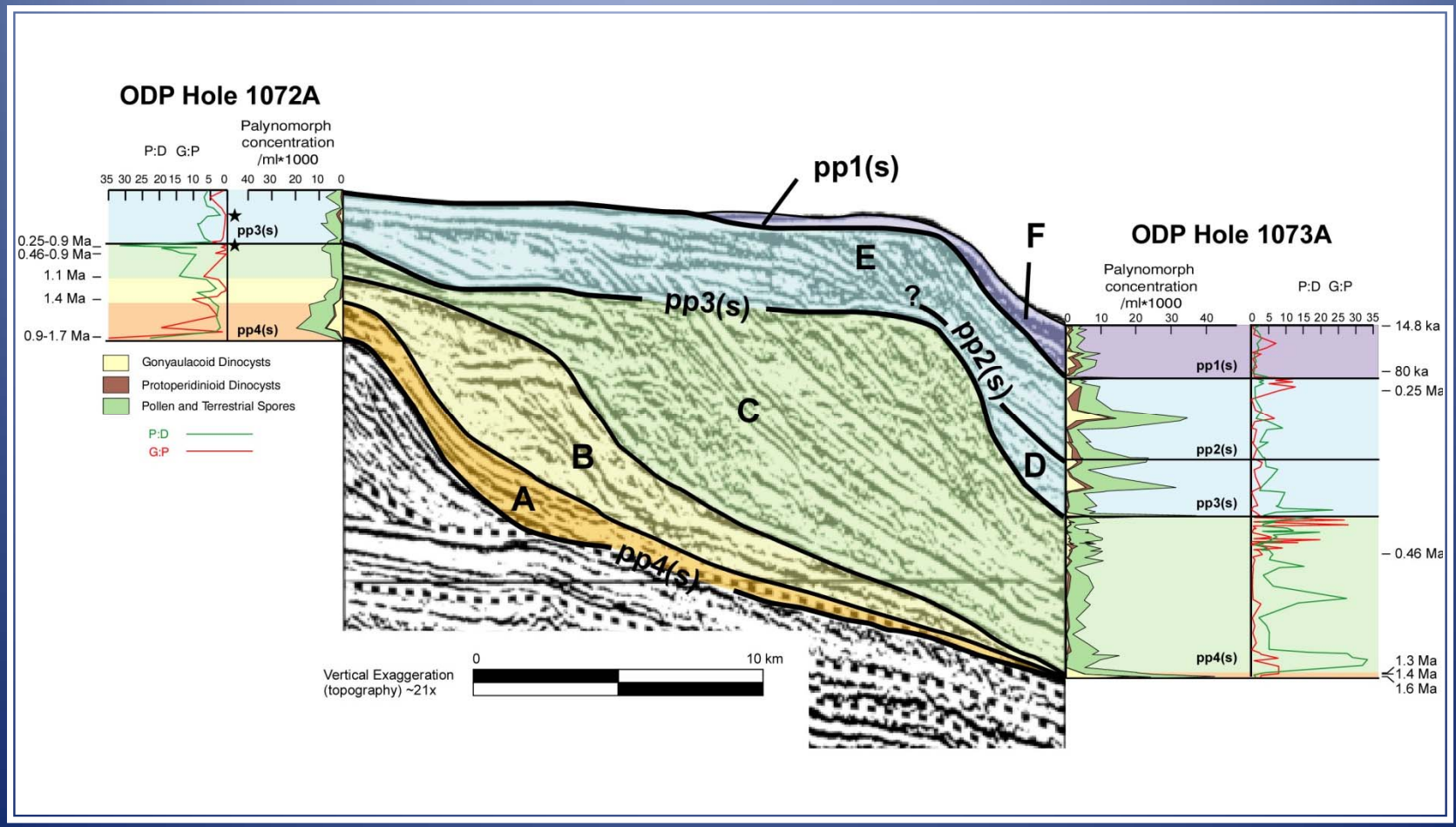
Zone di associazione

Ecobiostratigrafia

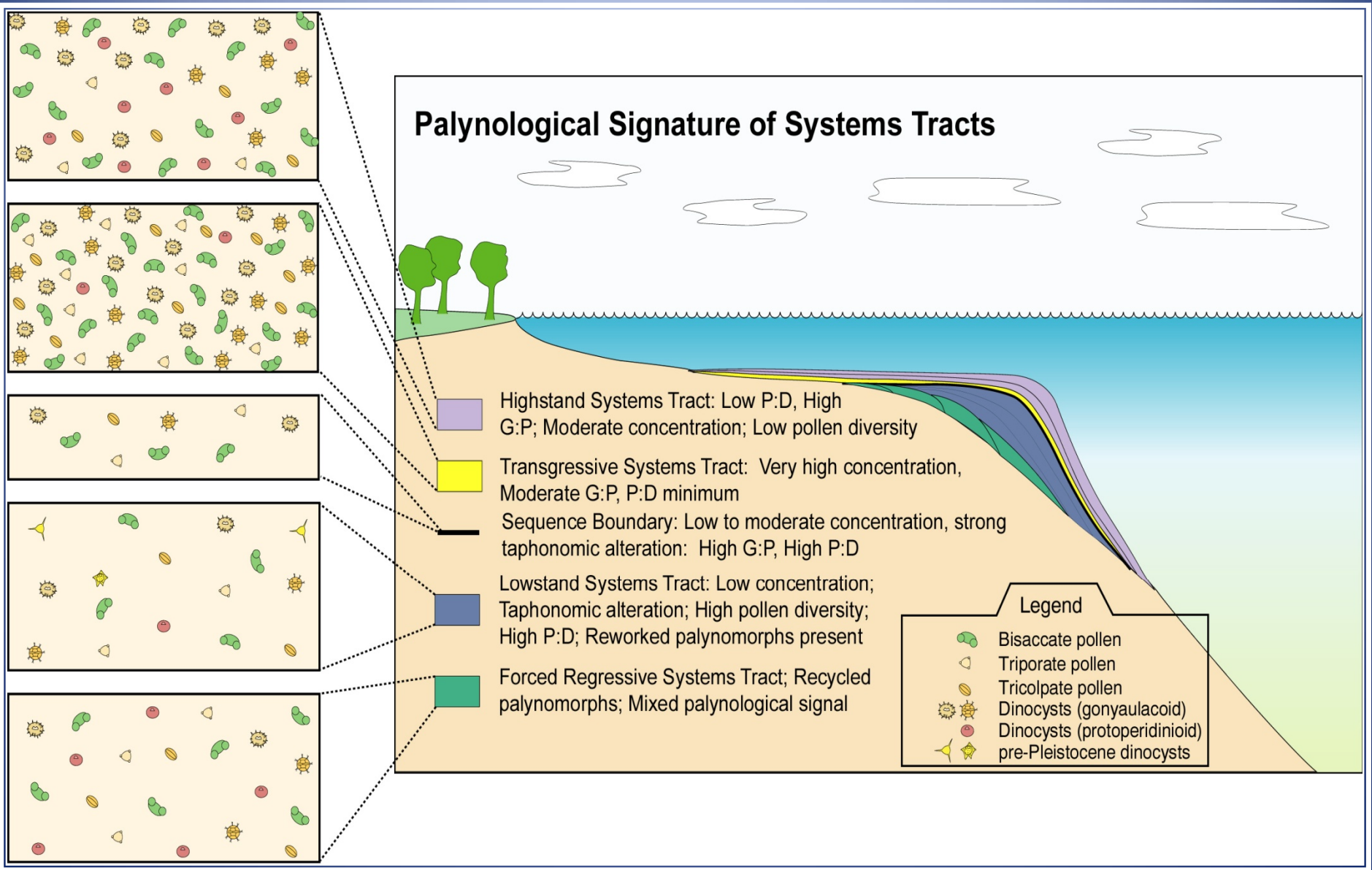


Bertoldi et al. 1994

Stratigrafia sequenziale



Da McCarthy et al., 2000



Da McCarthy et al., 2000

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Geobios 40 (2007) 143–158
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Original article

Integrated analyses of litho- and biofacies in a Pliocene cyclothemic, alluvial to shallow marine succession (Tuscany, Italy)

Découpage sequentiel d'une succession pliocène (Toscane, Italie) de milieu alluvial à marin peu profond d'après les analyses intégrées des litho- et biofaciès

Marco Benvenuti [a], Adele Bertini [a], Cristina Conti [b], Stefano Dominici [a,*]

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[b] *Agenzia Regionale Protezione Ambientale Toscana, Italia*

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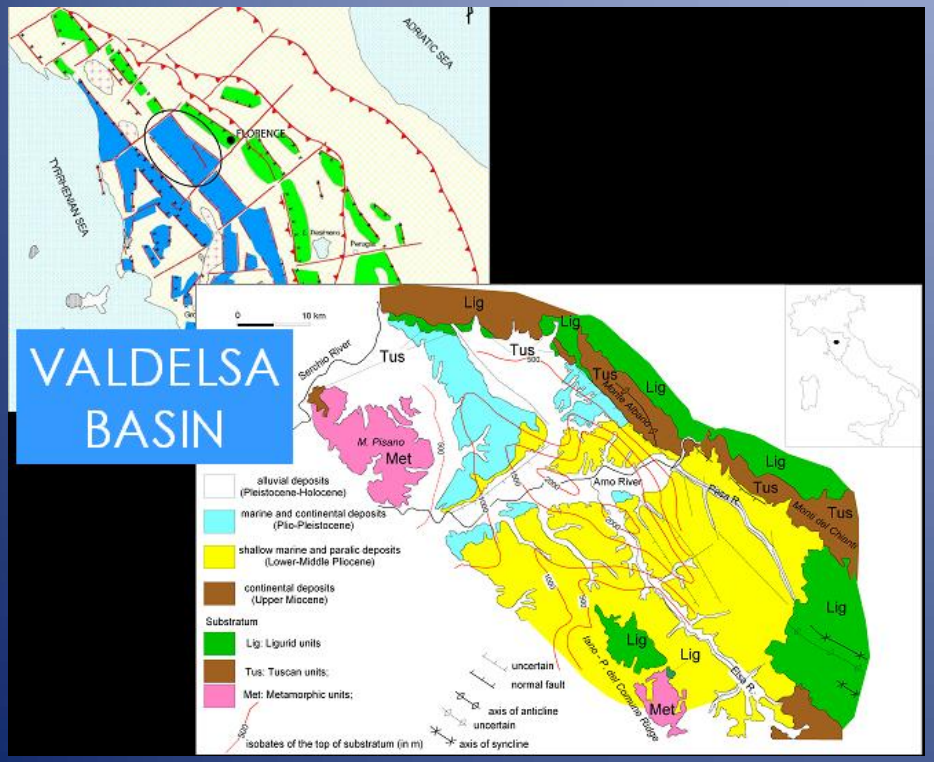
Abstract

Lithofacies analysis of the upper part of the Pliocene succession of the Valdelsa basin (central Italy) unravelled a number of depositional environments, ranging from alluvial plain to coastal, to marine. Strata are arranged in a hierarchy of elementary and composite unconformity-bounded units. A palaeoecological study of macro- (molluscs) and microfossils (pollen, dinocysts, foraminifera) allowed to finely reconstruct sub-environments within fine-grained terrestrial, coastal and marine deposits and thence to track the spatial and temporal change of physical conditions. The stacking pattern of sedimentary units highlights the lateral switching of onshore-offshore gradients and documents relative sea-level changes. These units are interpreted in a sequence stratigraphic framework. Elementary depositional sequences are arranged to form six composite depositional sequences, in turn encased within two major synthems. This hierarchy of unconformity-bounded sedimentary units suggests that sea-level variation has occurred at different time-frequencies. Glacio-eustasy and active tectonism are discussed as the main forcing factors regulating the different scales of sedimentary cyclicity.

Résumé

L'analyse des lithofaciès de la partie supérieure de la succession Pliocène du bassin de Valdesa (Italie centrale) a révélé un certain nombre d'environnements de dépôt, de la plaine alluviale à côtier, puis marin. Les dépôts sont arrangés selon une hiérarchie d'unités élémentaires et composées, délimitées par des inconformités. L'analyse paléoécologique des macro-(mollusques) et microfossiles (pollen, kystes de dinoflagellés, foraminiferes) a permis de reconstruire de manière détaillée les sous-environnements des dépôts terrestres à matériel fin, côtiers et marins, et ainsi de retracer les changements spatiaux-temporels des conditions physiques. En terme spatial, cette analyse multidisciplinaire permet de retracer de manière précise les gradients environnementaux ayant connecté les plaines alluviales aux milieux de plateforme. La variation temporelle de ces gradients, mise en évidence par la superposition des différentes rangées d'unités sédimentaires, documente les changements du niveau marin relatif ayant eu lieu à différentes fréquences de temps. Les cycles sédimentaires sont insérés dans un modèle de séquence stratigraphique et contiennent

The distribution of palynomorphs in Pliocene coastal lithofacies (TUSCANY, ITALY)



Marco Benvenuti, Adele Bertini, Cristina Conti, Stefano Dominici,

STRUTTURE SEDIMENTARIE

(macro) INVERTEBRATI

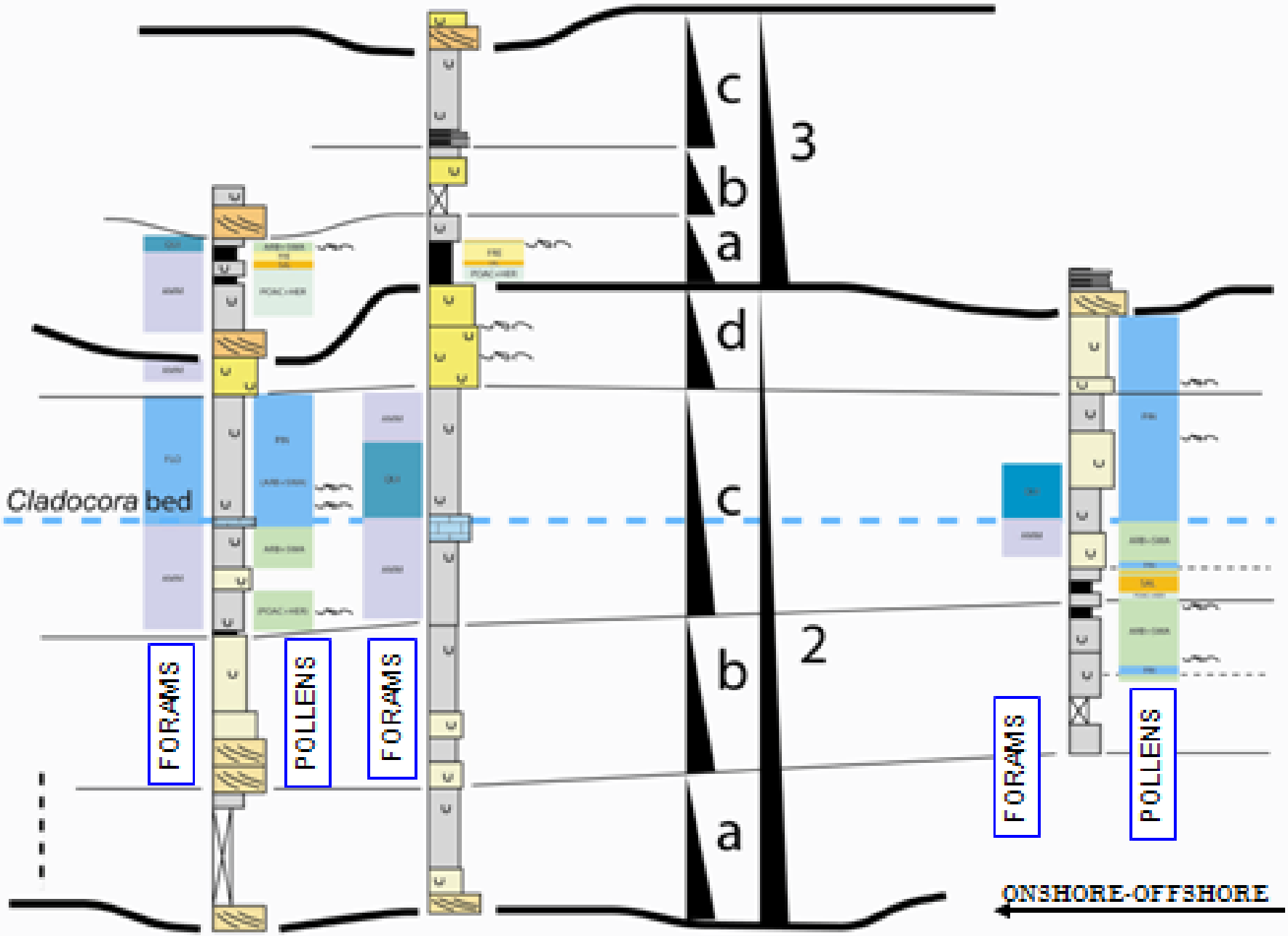
APPROCCIO INTEGRATO

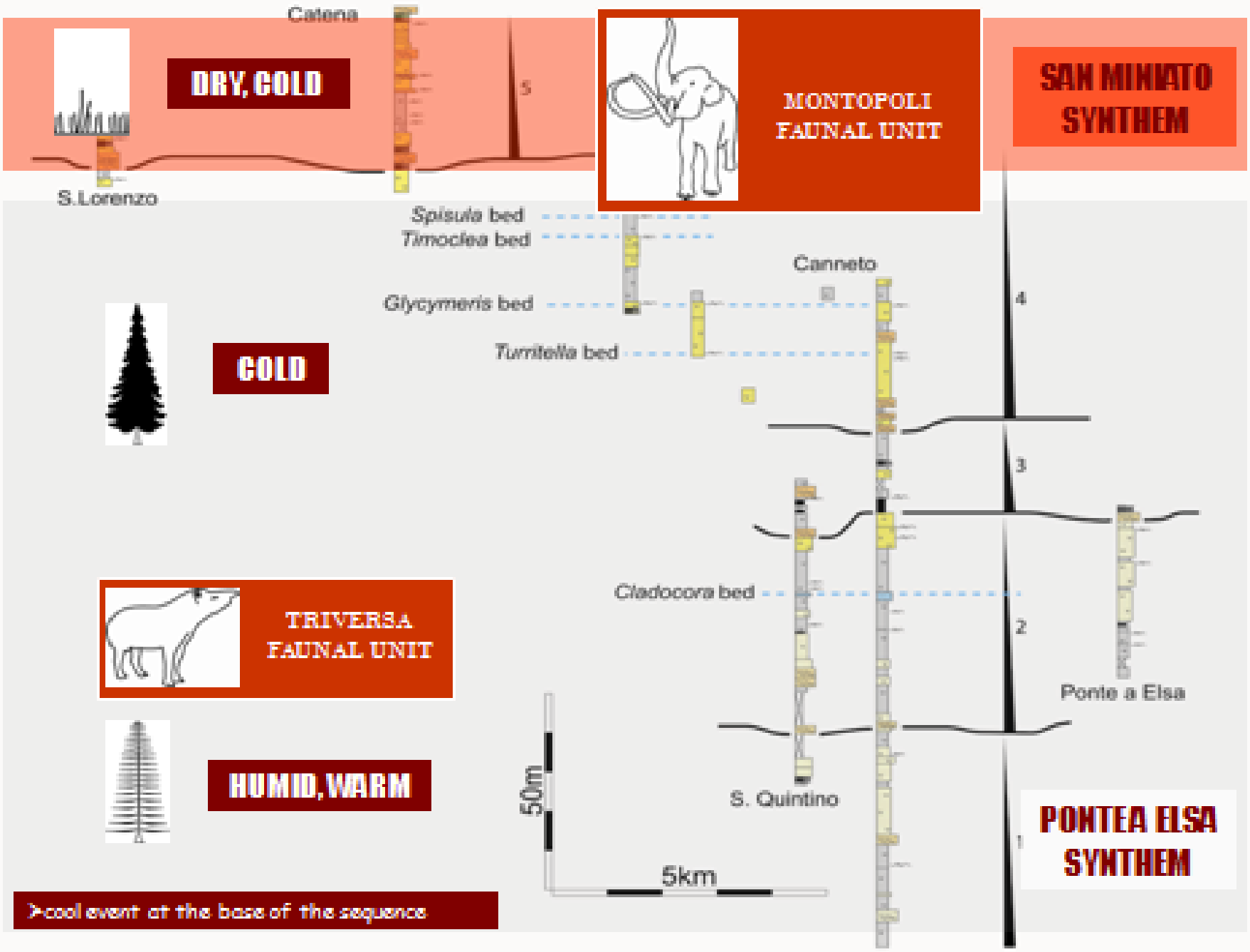
FORAMINIFERA

POLLINE

Valdarno Inferiore (Toscana) - Piacenziano

Ricostruzioni paleoambientali


c
b
a
3
d
c
b
2
a
Cladocora bed
FORAMS
POLLENS
FORAMS
FORAMS
POLLENS
ON3HORE-OFF3HORE


Catena
DRY, COLD
S.Lorenzo
5
MONTOPOLI
FAUNAL UNIT
SAN MINIATO
SYNTHEM
Spisula bed
Timoclea bed
Glycymeris bed
Turritella bed
Canneto
4
COLD
3
Cladocora bed
2
TRIVERSA
FAUNAL UNIT
Ponte a Elsa
50m
S. Quintino
PONTEA ELSA
SYNTHEM
1
5km
HUMID, WARM
>cool event at the base of the sequence

MULTIVARIATE ANALYSES

- Hyerarchical techniques (CLUSTER)
- Ordination techniques (DCA, MDS, ANOSIM)

Bertini et al. 2005

TAXONOMIC/ECOLOGIC GROUPS

COL
Fagus, *Picea*, *Tsuga* (877)

PIN
Pinus and
all other pinaceans (10,814)

POAC
Poaceae (5,066)

HER
All other herbs (36 taxa) (2,149)

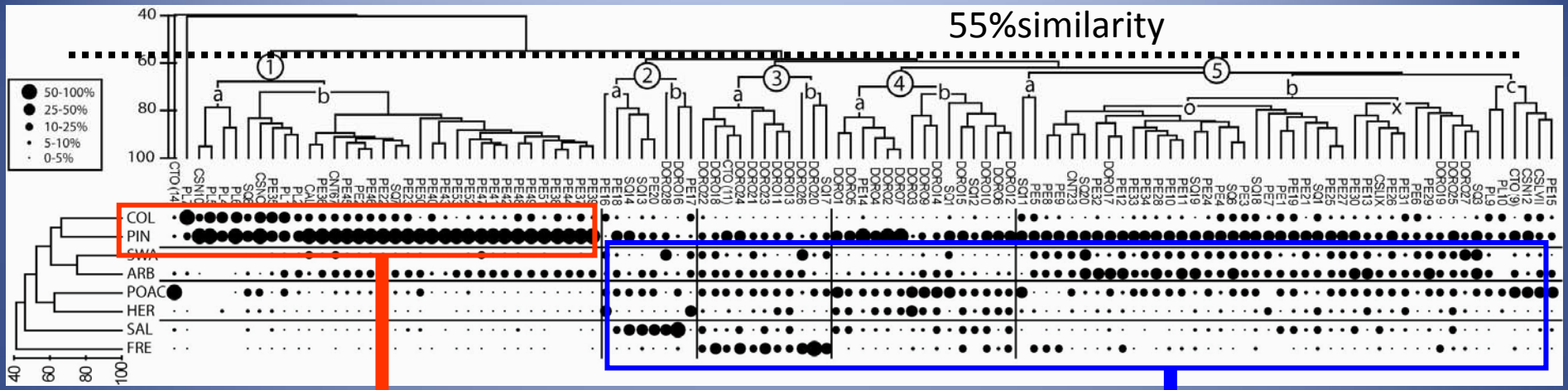
SWA
Taxodium, *Alnus*, *Myrica*, *Nyssa*, *Salix* (1,901)

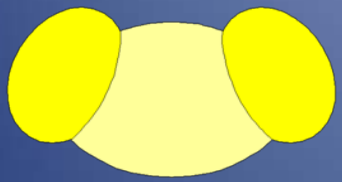
ARB
All other arboreal taxa (62) (4,393)

FRE
Sparganium, Cyperaceae, and other aquatic taxa (2,697)

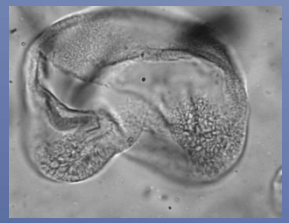
SAL
Chenopodiceae (2,975)

Bertini et al. 2005

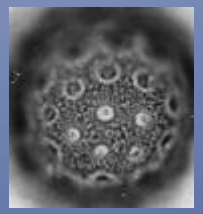




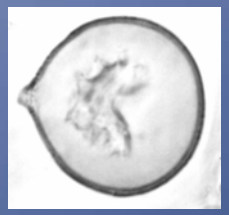
Bisaccate grains



Picea

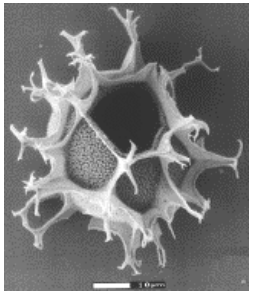


Chenopodiceae

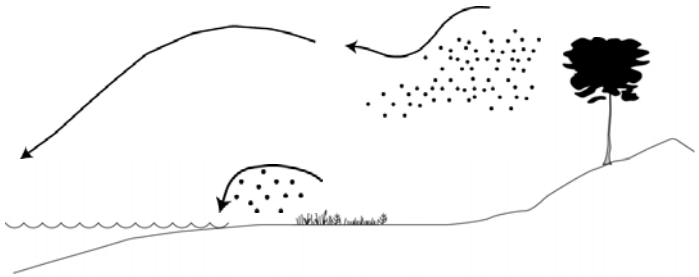


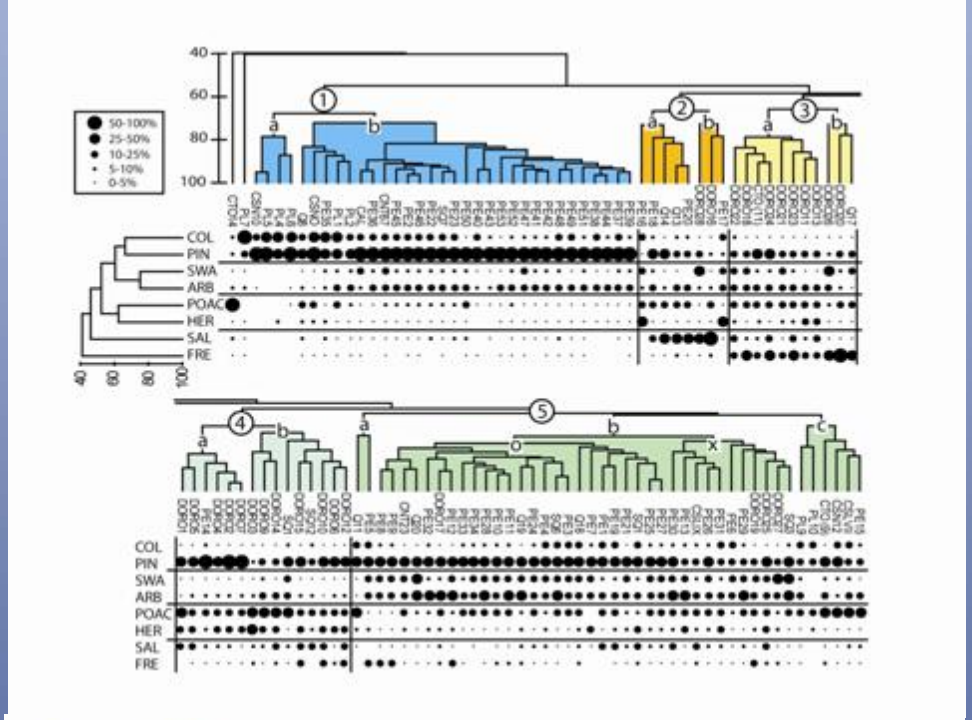
Taxodium

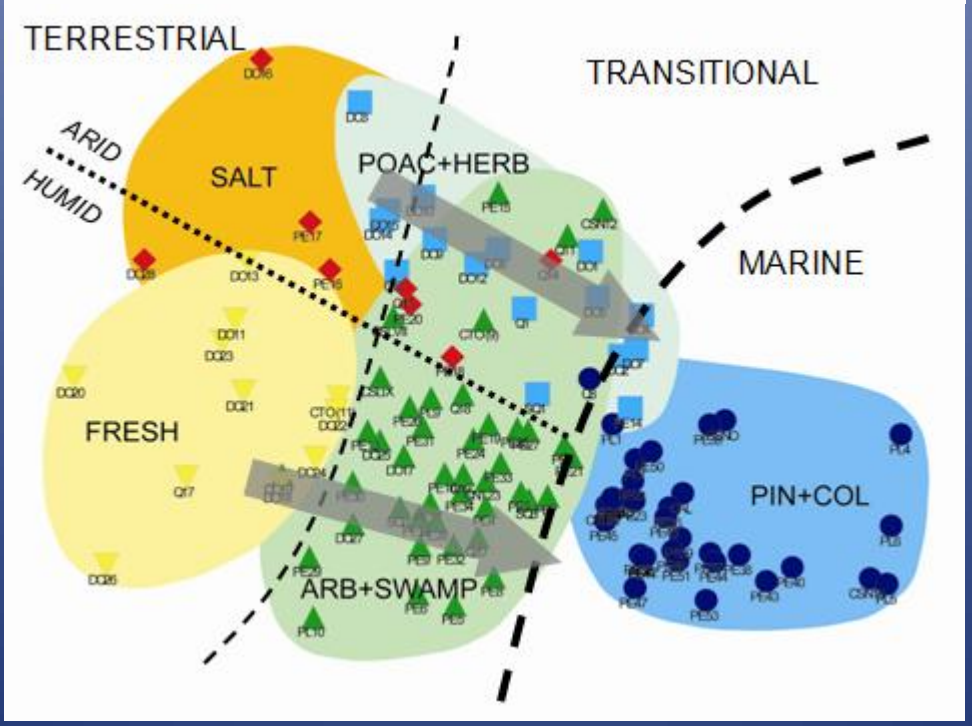
Cyperaceae



Dinocysts







Bertini et al. 2005

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Earth and Planetary Science Letters 170 (1999) 35–47

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A new approach for palaeoaltitude estimates based on pollen records: example of the Mercantour Massif (southeastern France) at the earliest Pliocene

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Abstract

The altitude of the Mercantour Massif (Southern Alps, France) during the earliest Pliocene has been estimated using a new quantification method. Instead of classical methods using geomorphologic criteria, our method uses biogeographic and climatologic criteria: composition of the modern vegetation belts in the European and peri-Mediterranean mountains, and Pliocene annual temperature estimates obtained from fossil pollen data. The climatic transfer function indicates for the coastal earliest Pliocene of the studied area a mean annual temperature of 16.5°C. Such a temperature today occurs at 38.5°N latitude in the Mediterranean region. The relation established by Ozenda between the present-day vertical and latitudinal vegetation assemblages evidences a shift of, on average in Western Europe, 110 m in altitude per degree in latitude. As a consequence, it is possible, taking into account that the Pliocene lapse rate was almost similar to the modern one, to estimate the minimum altitude of the massif at the earliest Pliocene. The so-obtained palaeoaltitude estimate is close to that obtained with the geomorphological method: the Mercantour Massif was almost 2000 meters high at the earliest Pliocene.

Keywords: altitude; Southern Alps; lower Pliocene; pollen; climate; geomorphology

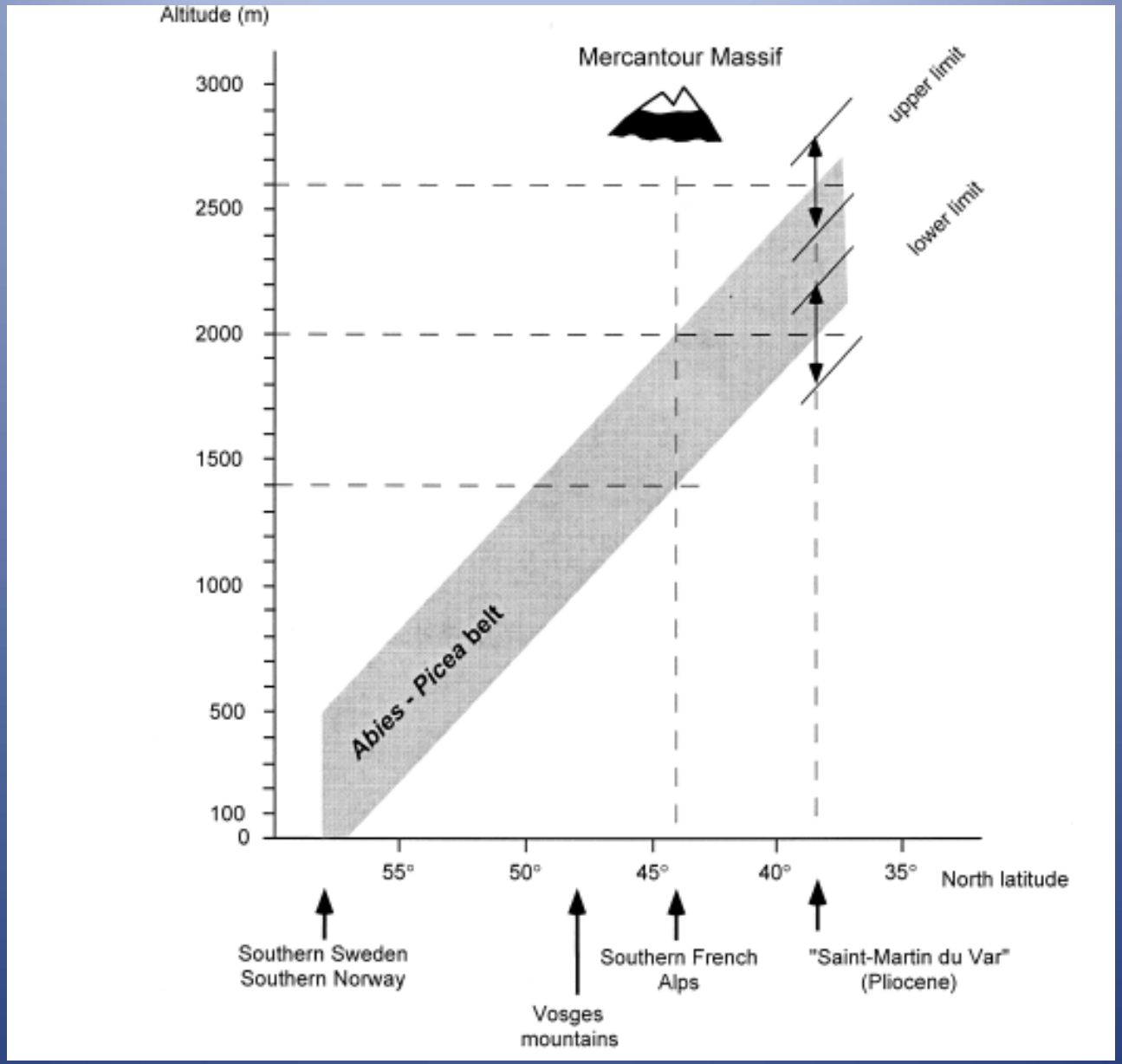

Fig. 6. Altitudinal variation of the *Abies–Picea* belt in relation to latitude, from North to South, and estimation of the palaeoaltitude of the Mercantour Massif, taking into account the Modern altitude of the *Abies–Picea* belt in the South French Alps and the higher temperature during the Pliocene.

Modellizzazioni

Disponible en ligne sur www.sciencedirect.com
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Original article

Messinian vegetation maps of the Mediterranean region using models and interpolated pollen data

Cartes de végétation de la région méditerranéenne au Messinien d'après les modèles et les données polliniques interpolées

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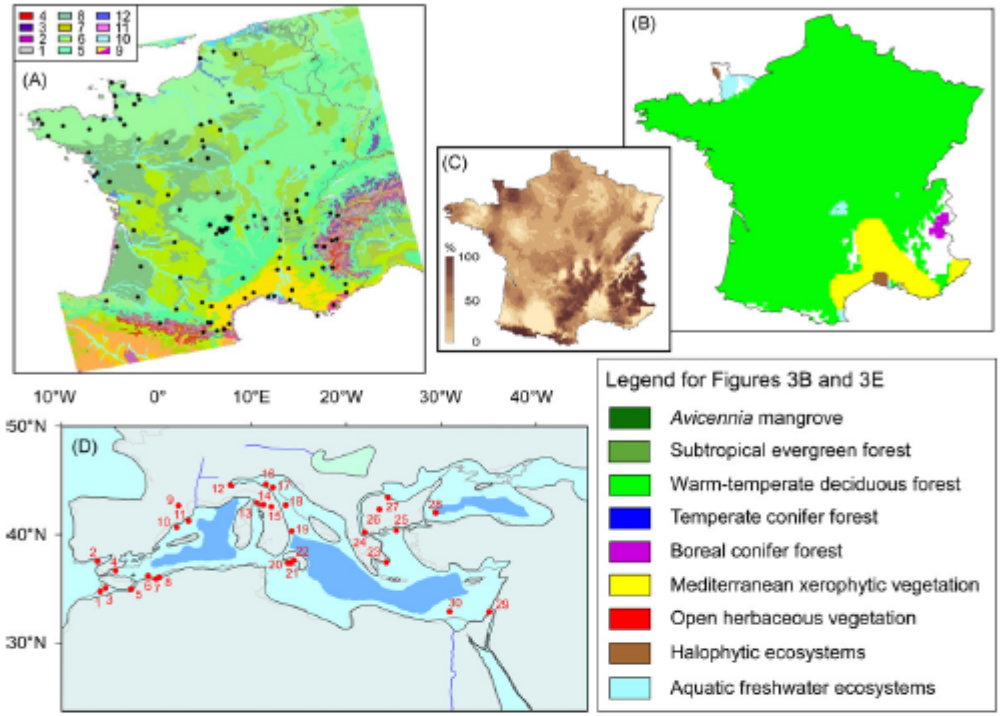
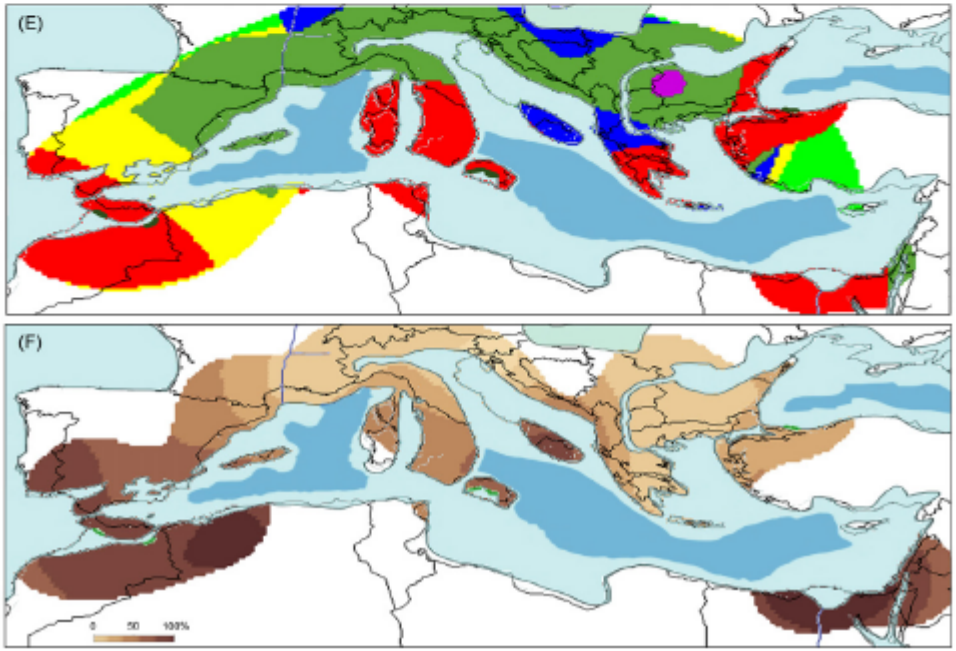
Abstract

This study proposes to compare the outputs from the CARAIB vegetation model forced by results from the LMD General Circulation Model with interpolated pollen data (Kriging method) from the Mediterranean region during the Messinian. The vegetation maps that have been obtained represent distinct phases of the salinity crisis: before the crisis and during the marginal evaporitic phase (interpolated map), and during the complete desiccation phase (simulated map). However, they are comparable in terms of vegetation density and agree on a strong contrast between the Northern (forest vegetation) and Southern (open vegetation) Mediterranean regions. Main differences concern the type of forests in the northern


(A)
(B)
(C)
%
100
50
0
10°W
0°
10°E
20°W
30°W
40°W
50°N
40°N
30°N
(D)
Legend for Figures 3B and 3E
Avicennia mangrove
Subtropical evergreen forest
Warm-temperate deciduous forest
Temperate conifer forest
Boreal conifer forest
Mediterranean xerophytic vegetation
Open herbaceous vegetation
Halophytic ecosystems
Aquatic freshwater ecosystems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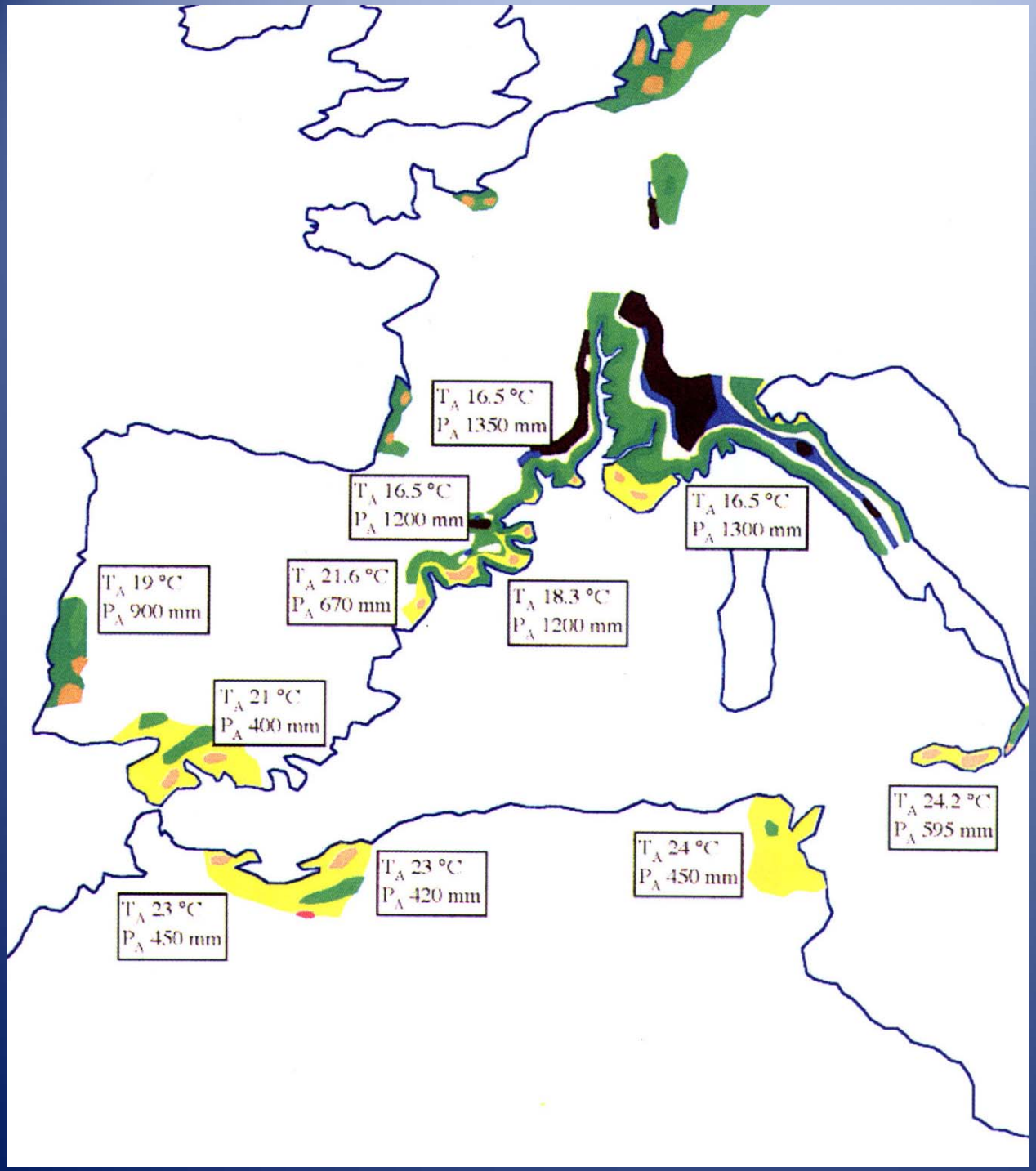
Pliocene



Da Suc et al., 1999

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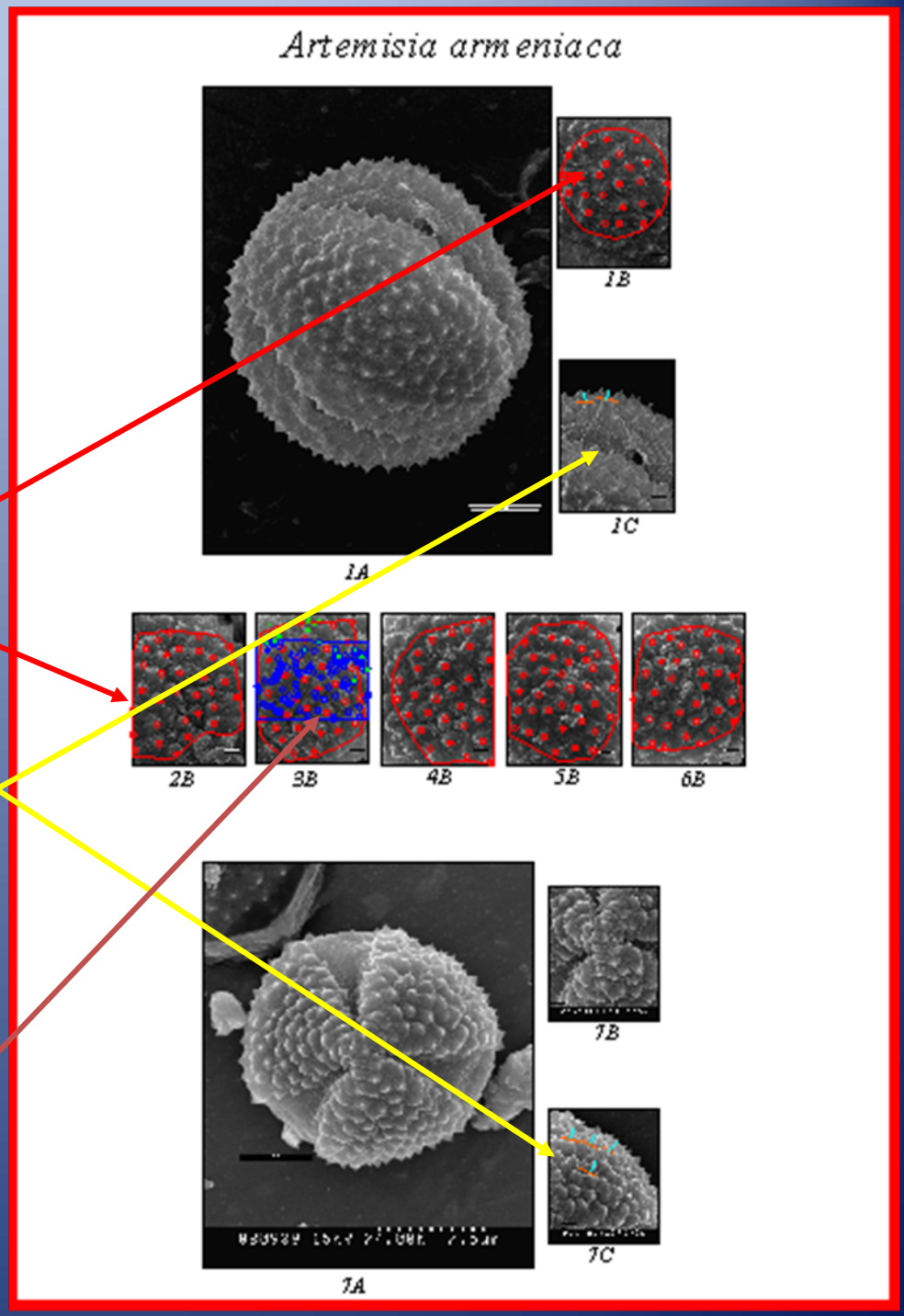
“ Dopo vent'anni, oggi, nel salotto rivivo con profumo d'artemisia e mentastro e di cotogna tutto ciò che fu. Mi specchio ancora nello specchio rotto rivedo i finti frutti d'alabastro... ”
Guido Gozzano

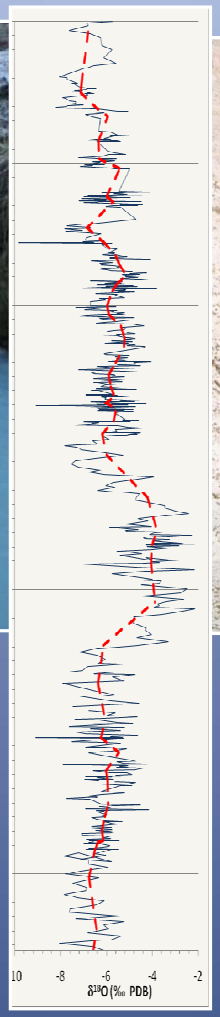
MAIN SELECTED PARAMETERS

1. Equatorial diameter
2. Polar axis
3. Exine
4. Spine density
5. Length of spines
6. Width of spine base
7. "*glomerules*" density
8. Diameter of "*glomerules*"



Rapolano

Travertini precipitano da acque termali ricche in bicarbonato: degassamento della CO_2 ed evaporazione dell'acqua



Bellucci, 2007

Gonfiantini et al. (1968):

degassamento della CO_2 ed evaporazione dell'acqua non avvengono in equilibrio isotopico

I valori isotopici sono legati al clima/ambiente???

Da Ricci, 2010

…i valori isotopici dei travertini devono essere confrontati con altri proxy paleoambientali/paleoclimatici come il **polline**

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