Storia geologica dei gessi emiliano-romagnoli

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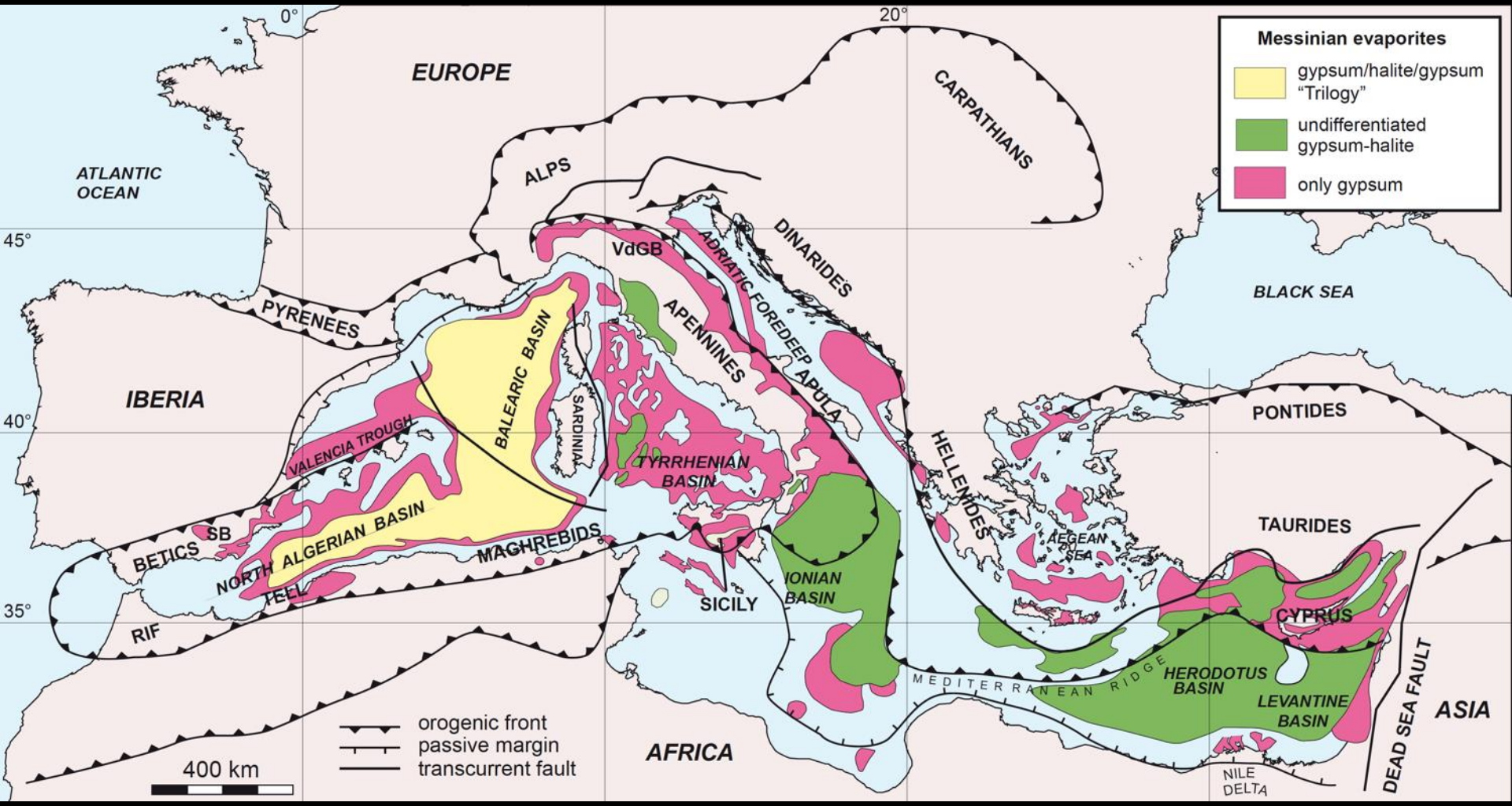
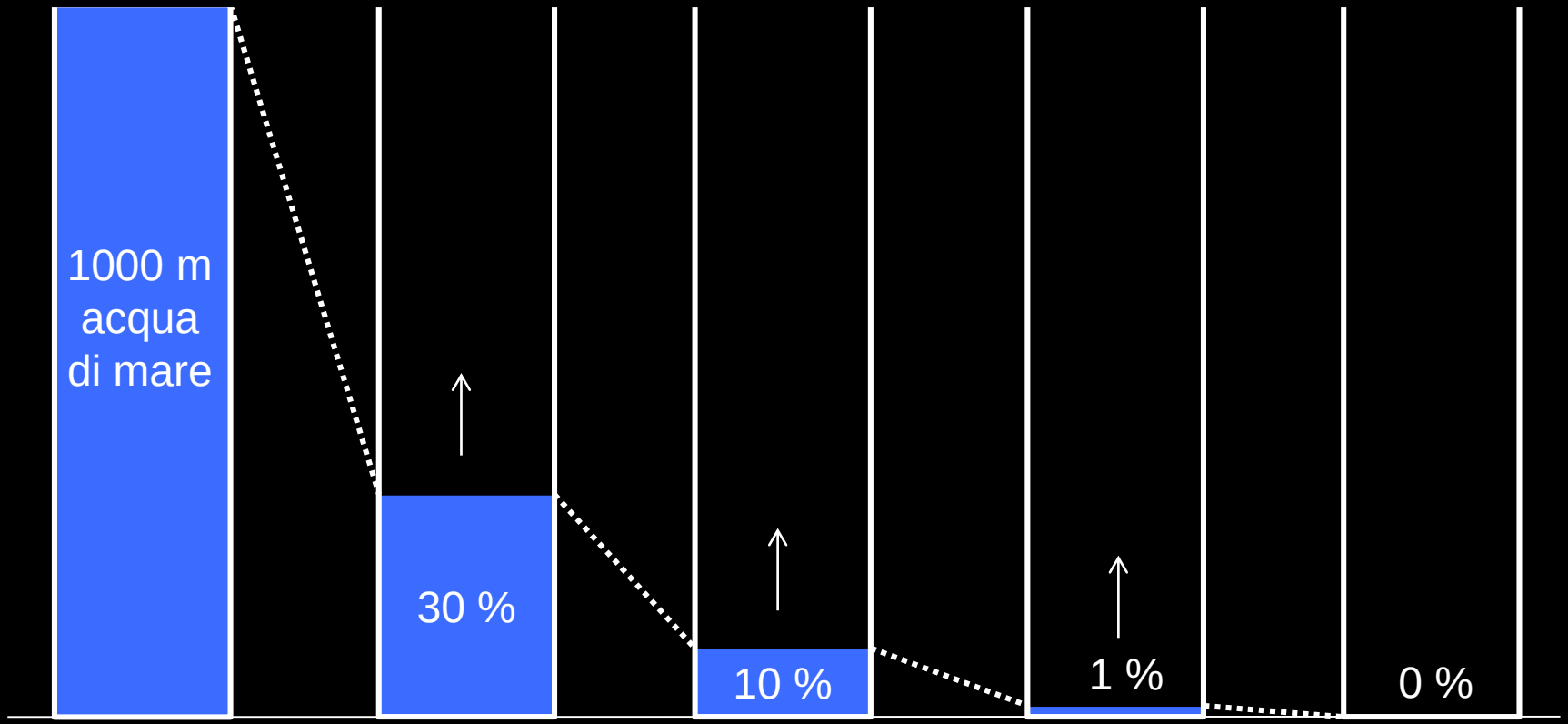
UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

Storia di una catastrofe!

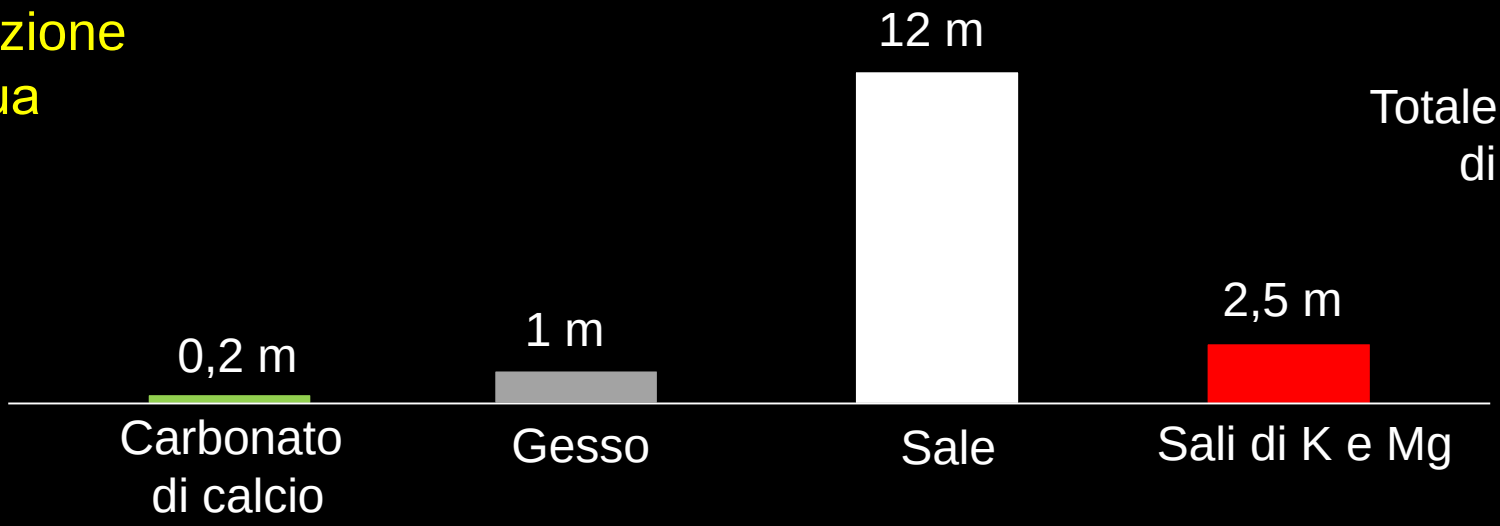
•*Manzi et al., 2012*



- Più di 2 km di spessore di gesso e sale in ~ 640.000 anni
- Tra 5.971.000 e 5.330.000 anni fa



Evaporazione dell'acqua marina



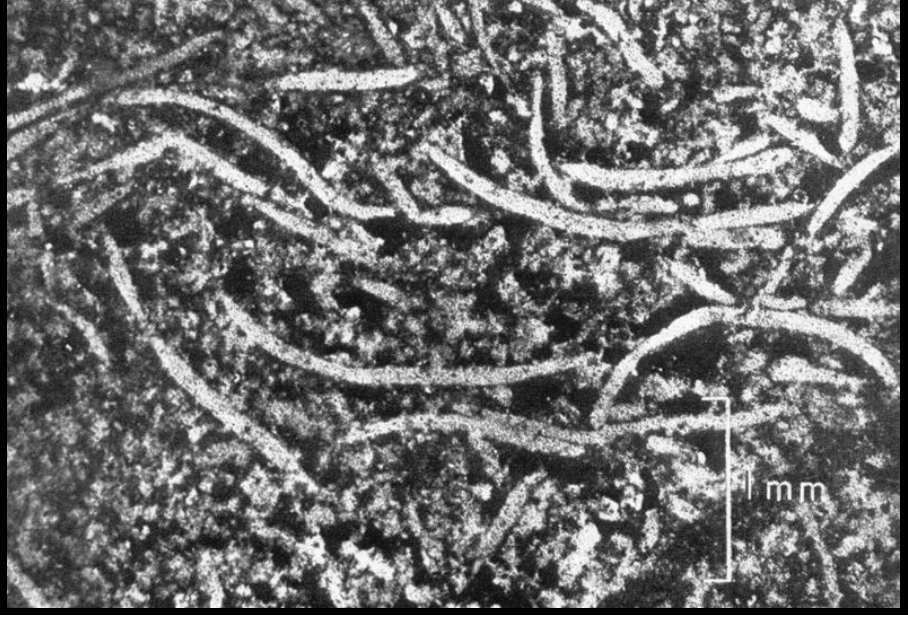
Totale: 15.7 m
di sali

Trapani

Cervia

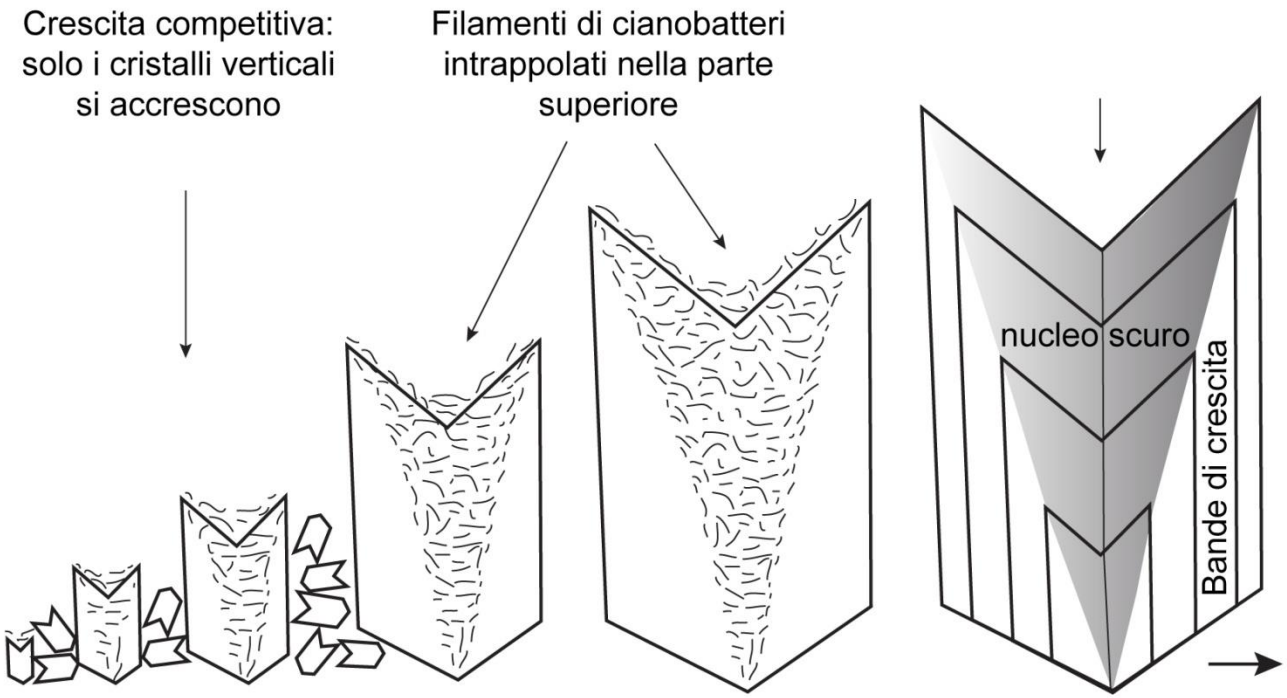
S. Antioco, Sardegna

Trapani – salina SoSalt



Cianobatteri

Regola di Mottura



Lugli et al., 2010

Geobiology

Geobiology (2010) DOI: 10.1111/j.1472-4669.2009.00230.x

Ribosomal RNA gene fragments from fossilized cyanobacteria identified in primary gypsum from the late Miocene, Italy

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[5]*Department of Earth and Space Sciences, University of Washington, Seattle, WA, USA*
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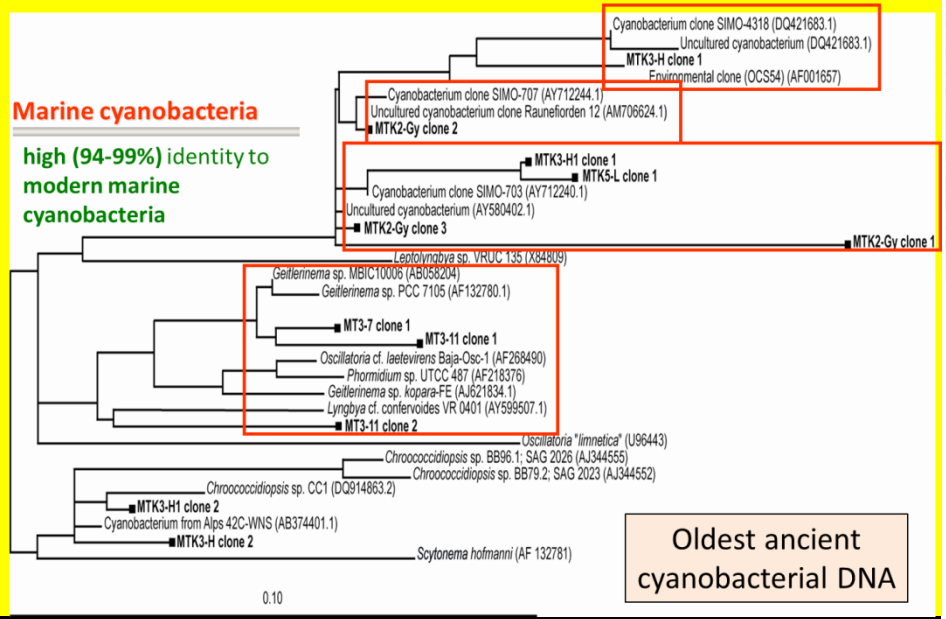
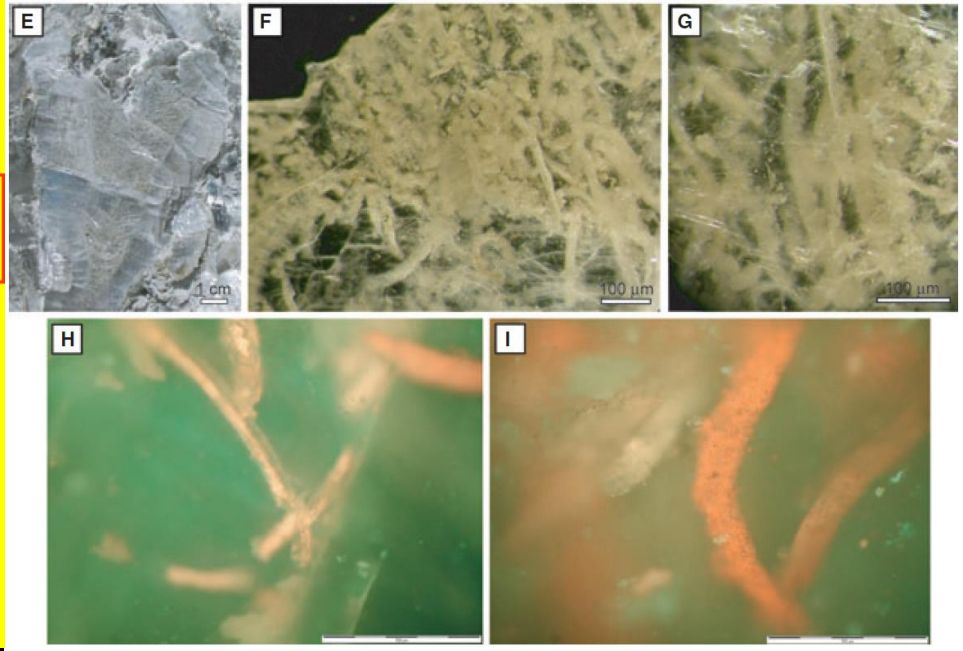
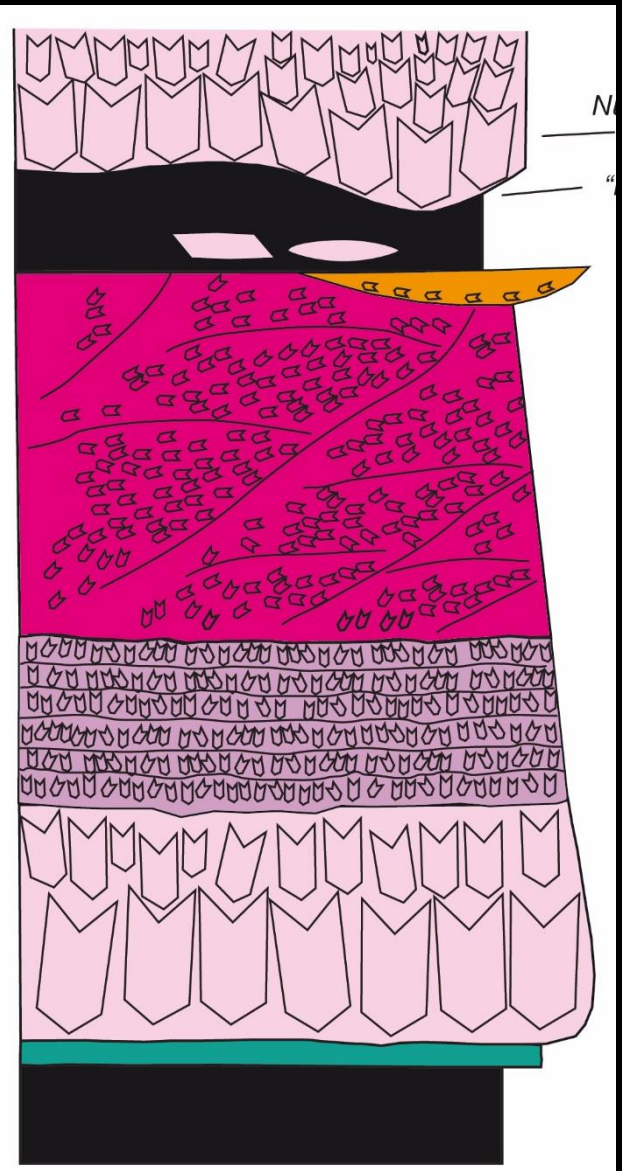
Phylogenetic analysis (16S rRNA)

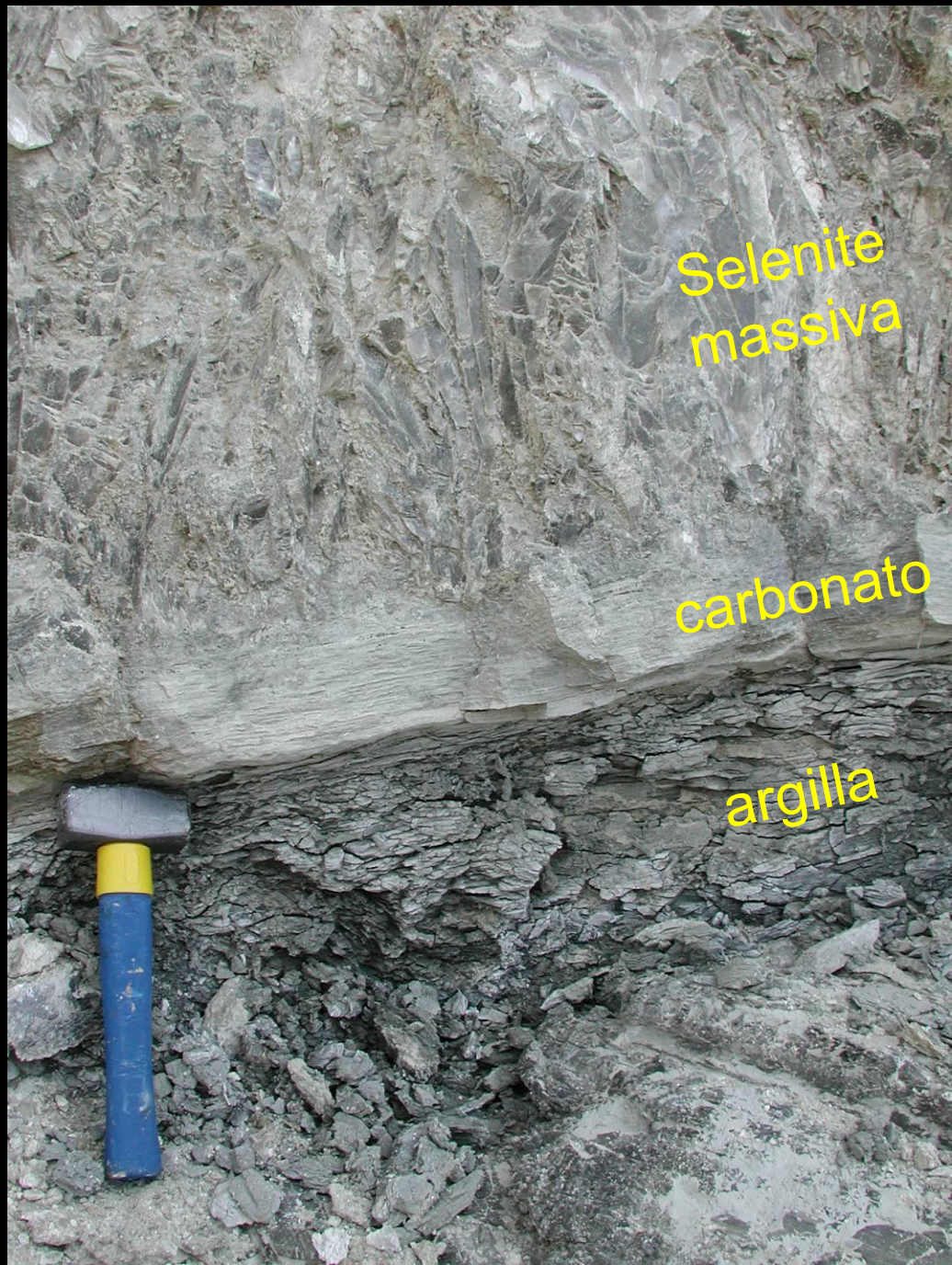




Gessi inferiori

Lugli et al., 2010



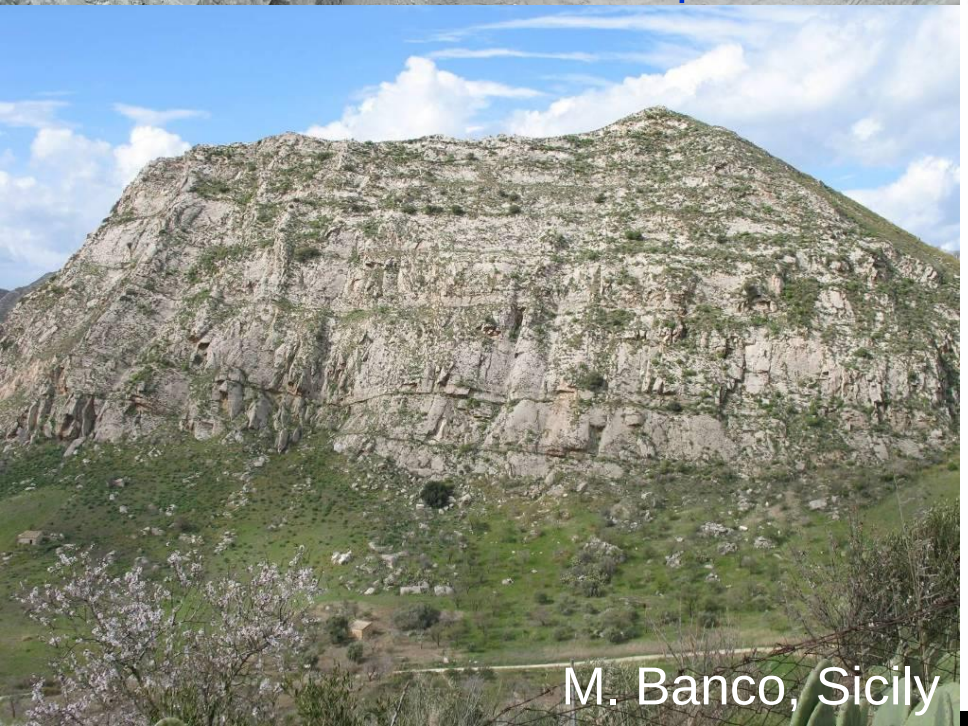


Lugli et al., 2010

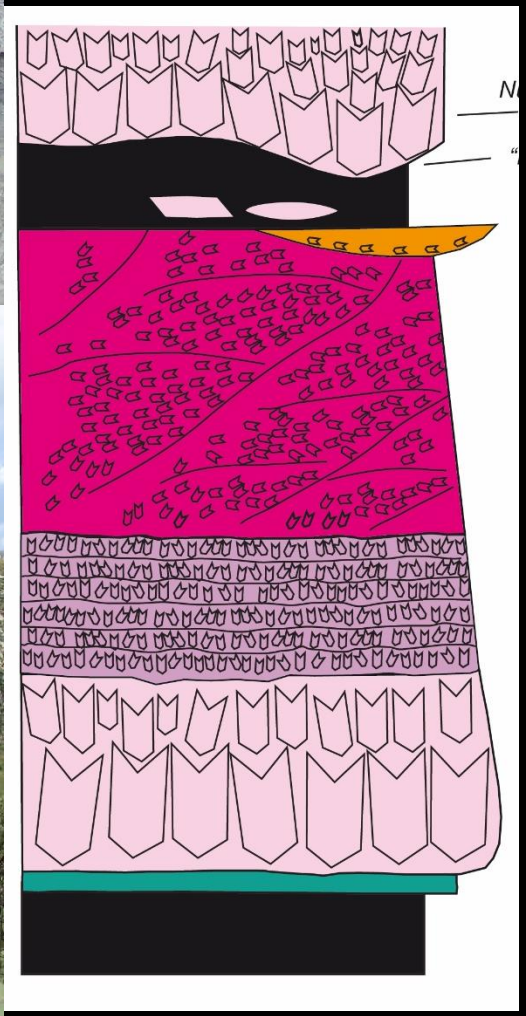
Gessi Inferiori
I fase crisi salinità
5.97–5.6 Ma

Fino a 16 strati di selenite

Monte Tondo, N Apennines



M. Banco, Sicily



gessarenite

branching selenite
selenite ramificata

Selenite bandata

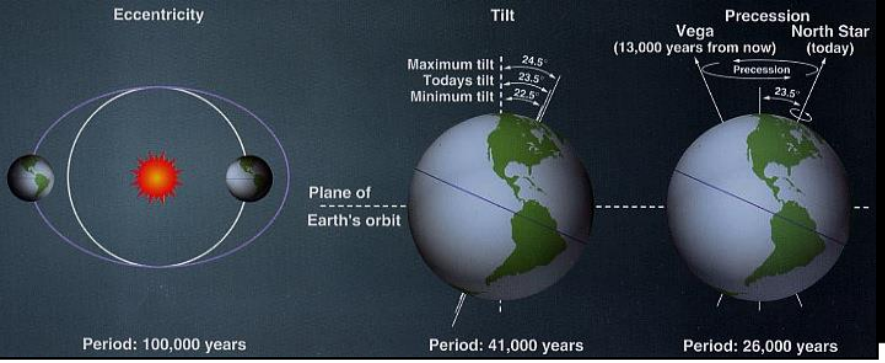
Selenite massiva

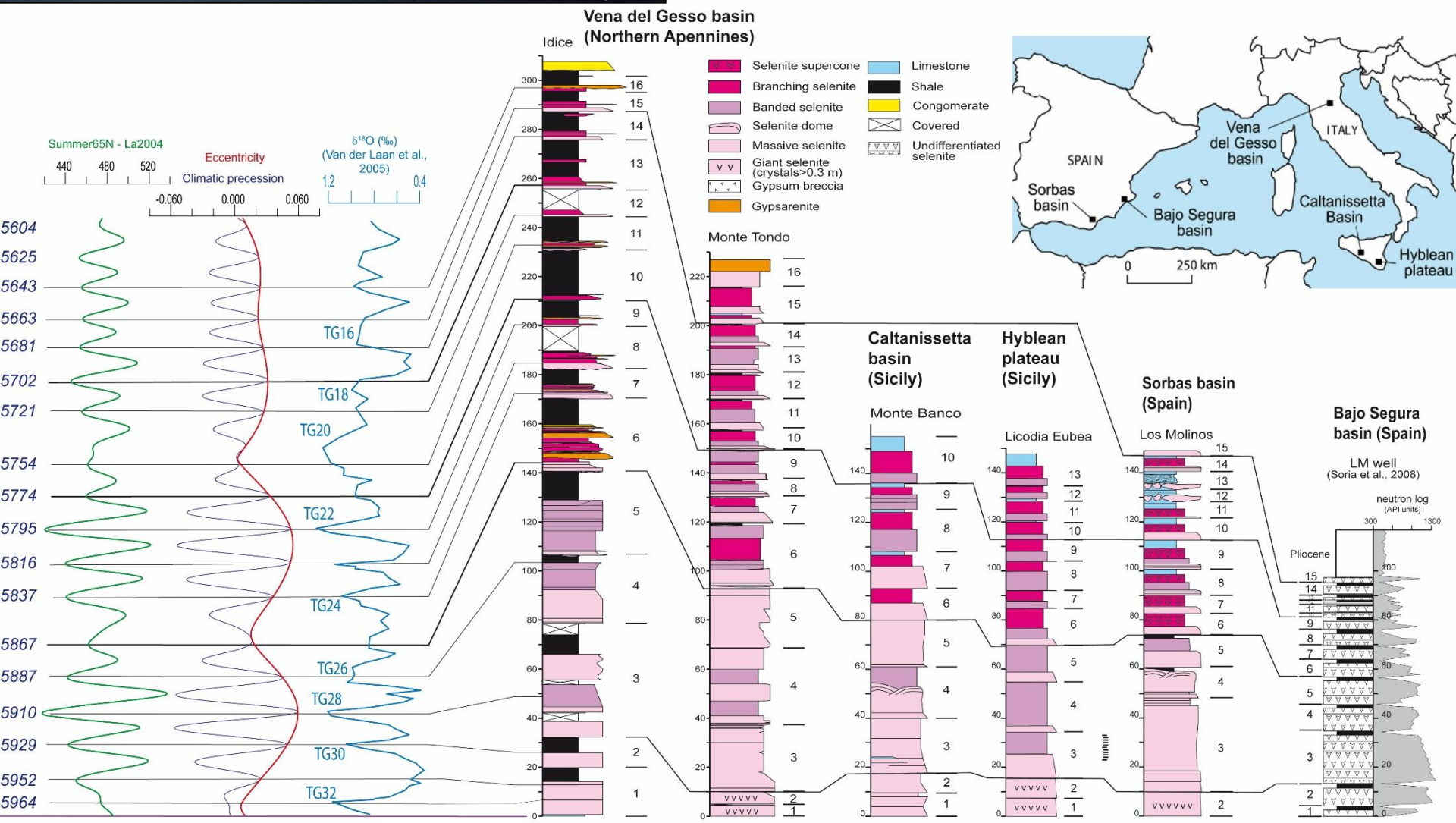
carbonato

argilla

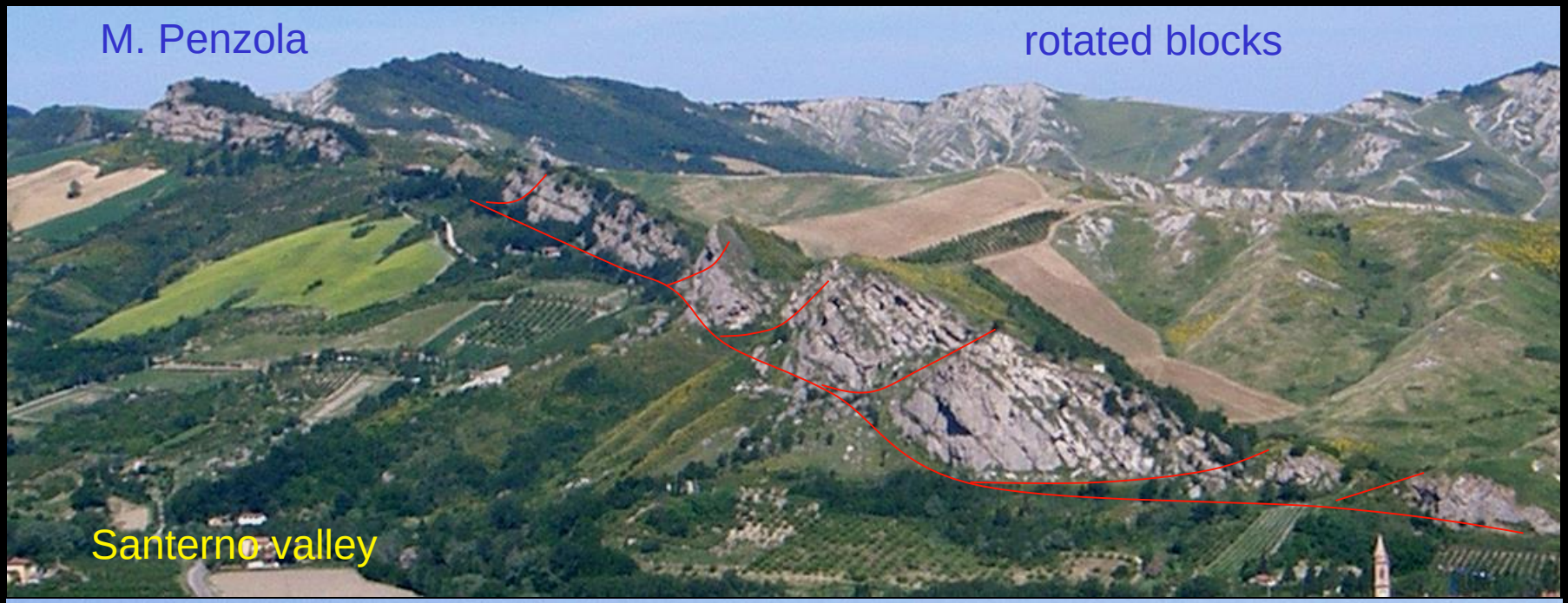
Astrocronologia dei Gessi Inferiori

Lugli et al., 2010





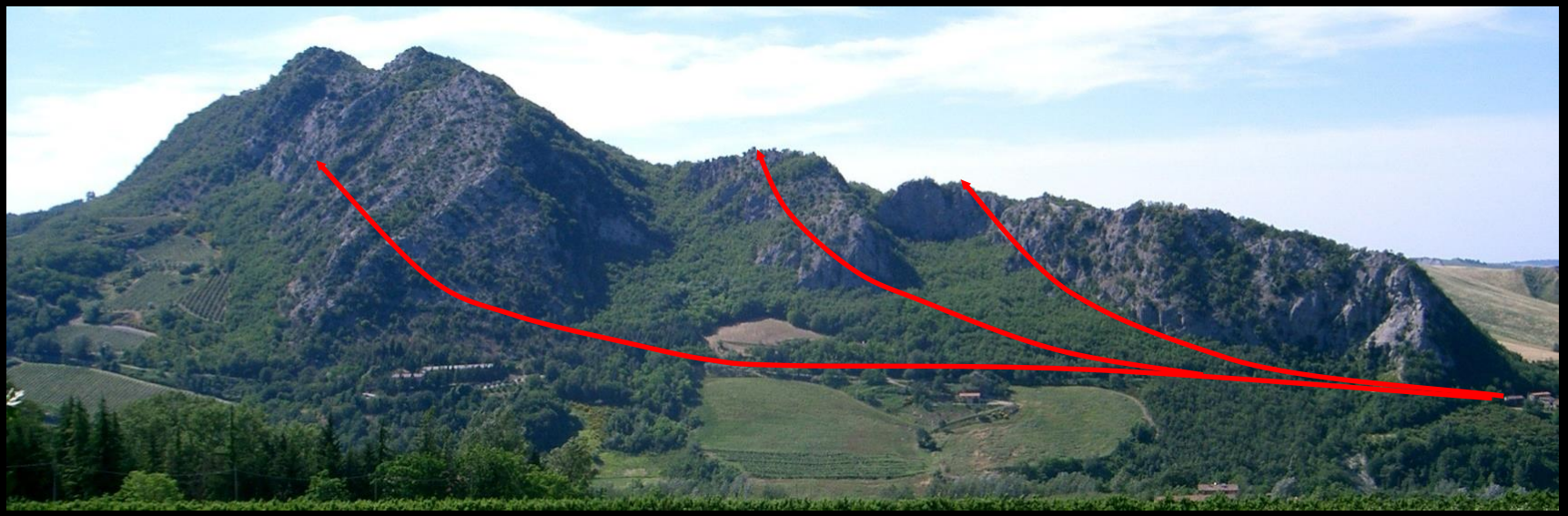
Collassi gravitativi a grande scala

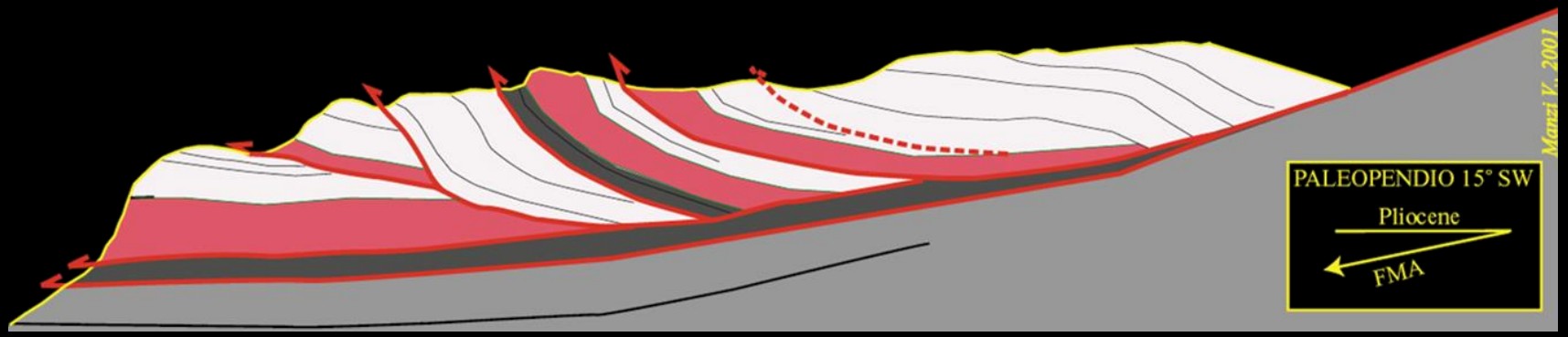


Strutture estensionali e compressive non dovute a tettonica

Roveri et al., 2006

Scivolamenti lungo paleopendii a basso gradiente

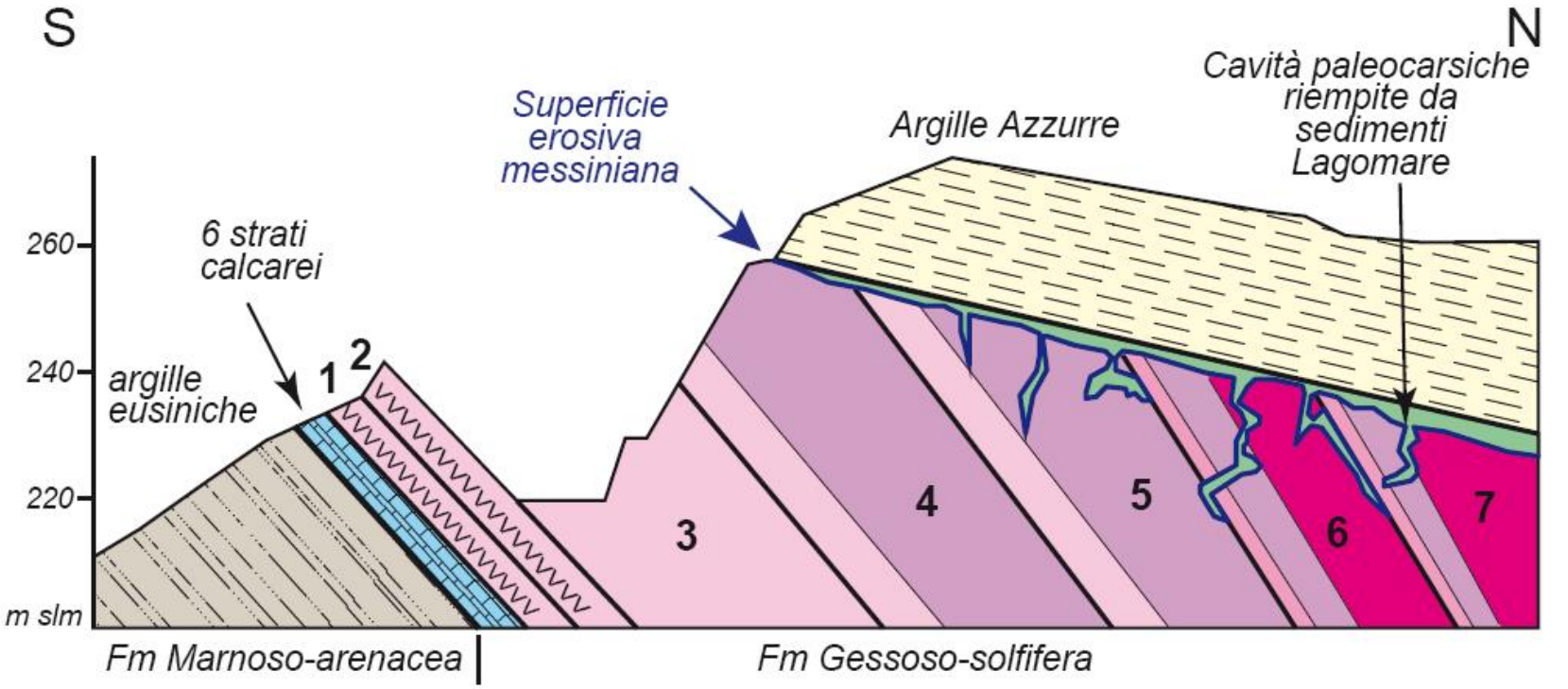


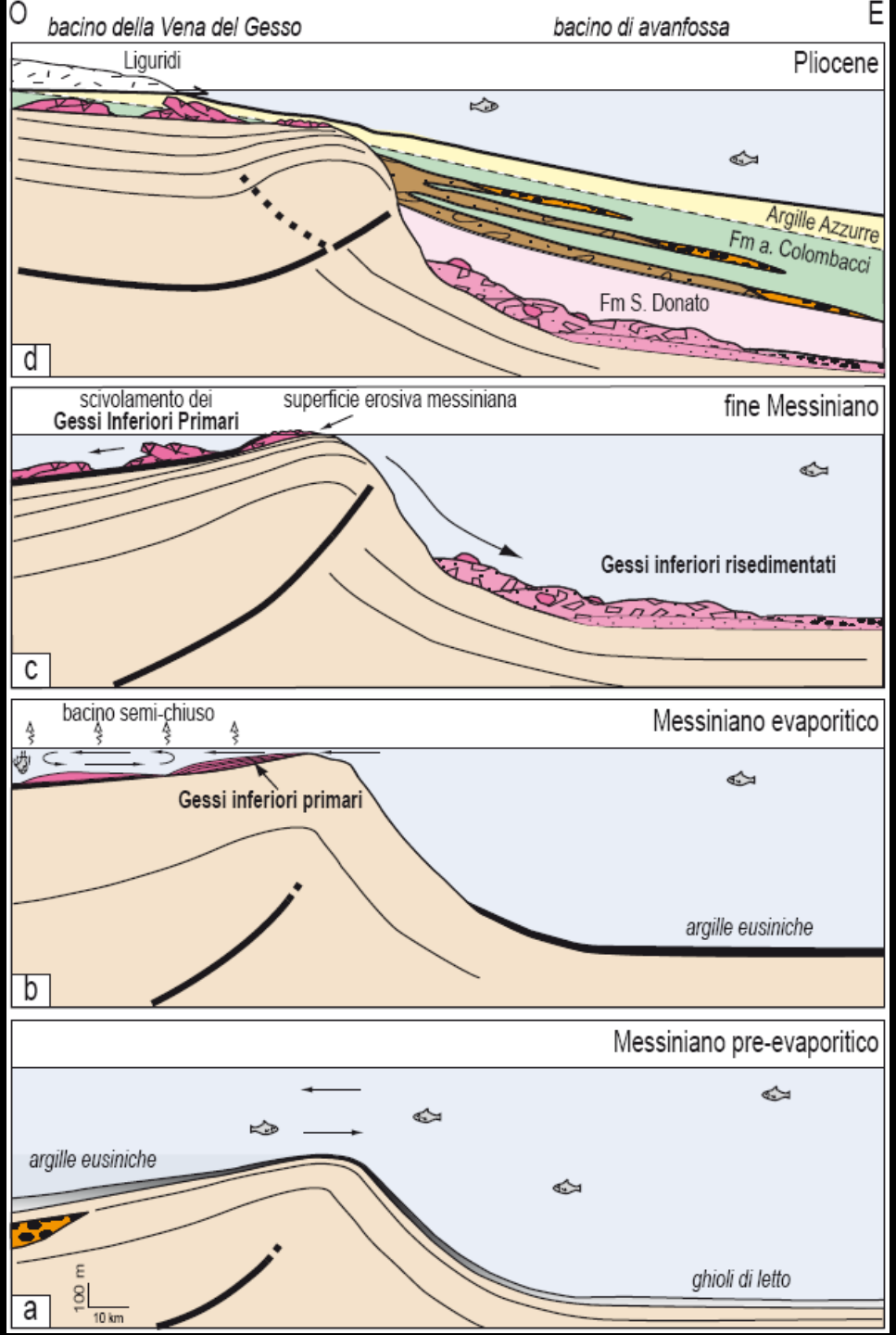


Piani di scivolamento: le argille organiche alla base

Roveri e Manzi, 2005

Parco Museo geologico cava Monticino




O
bacino della Vena del Gesso
bacino di avanfossa
E
Liguridi
Pliocene
Argille Azzurre
Fm a. Colombacci
Fm S. Donato
d
scivolamento dei
Gessi Inferiori Primari
superficie erosiva messiniana
fine Messiniano
Gessi inferiori risedimentati
c
bacino semi-chiuso
Messiniano evaporitico
Gessi inferiori primari
argille eusiniche
b
Messiniano pre-evaporitico
argille eusiniche
ghioli di letto
m
100
10 km
a


Manzi et al., 2005
Gessi Risedimentati
II fase
5.6–5.55 Ma
Torbiditi di gesso
T. Fanantello (Romagna)

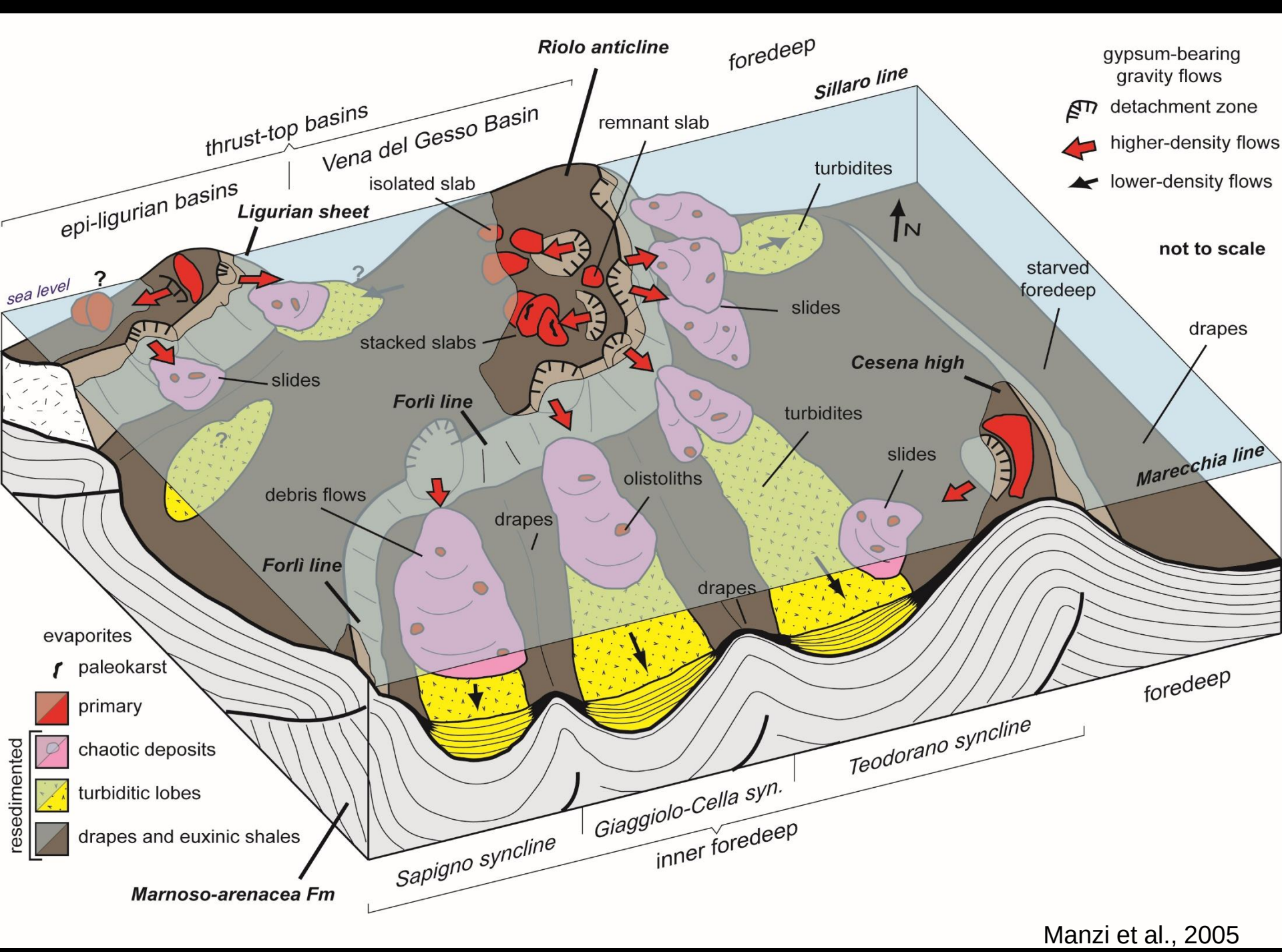
climbing ripples

Lobe deposits

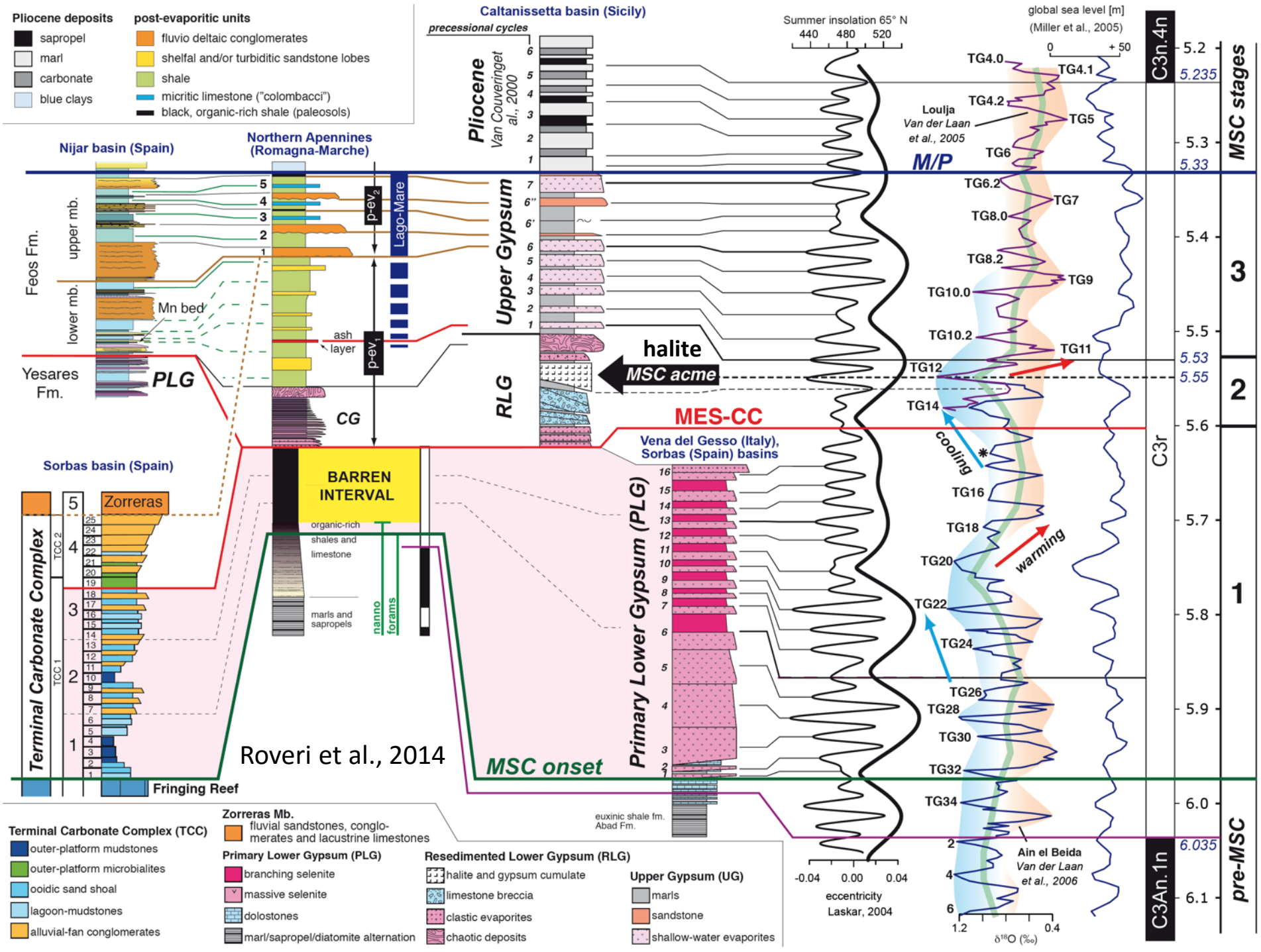
high to low density gravity flows
tabular and lenticular bodies
gypsarenite silt and shale

gypsum turbidites
N. Apennines

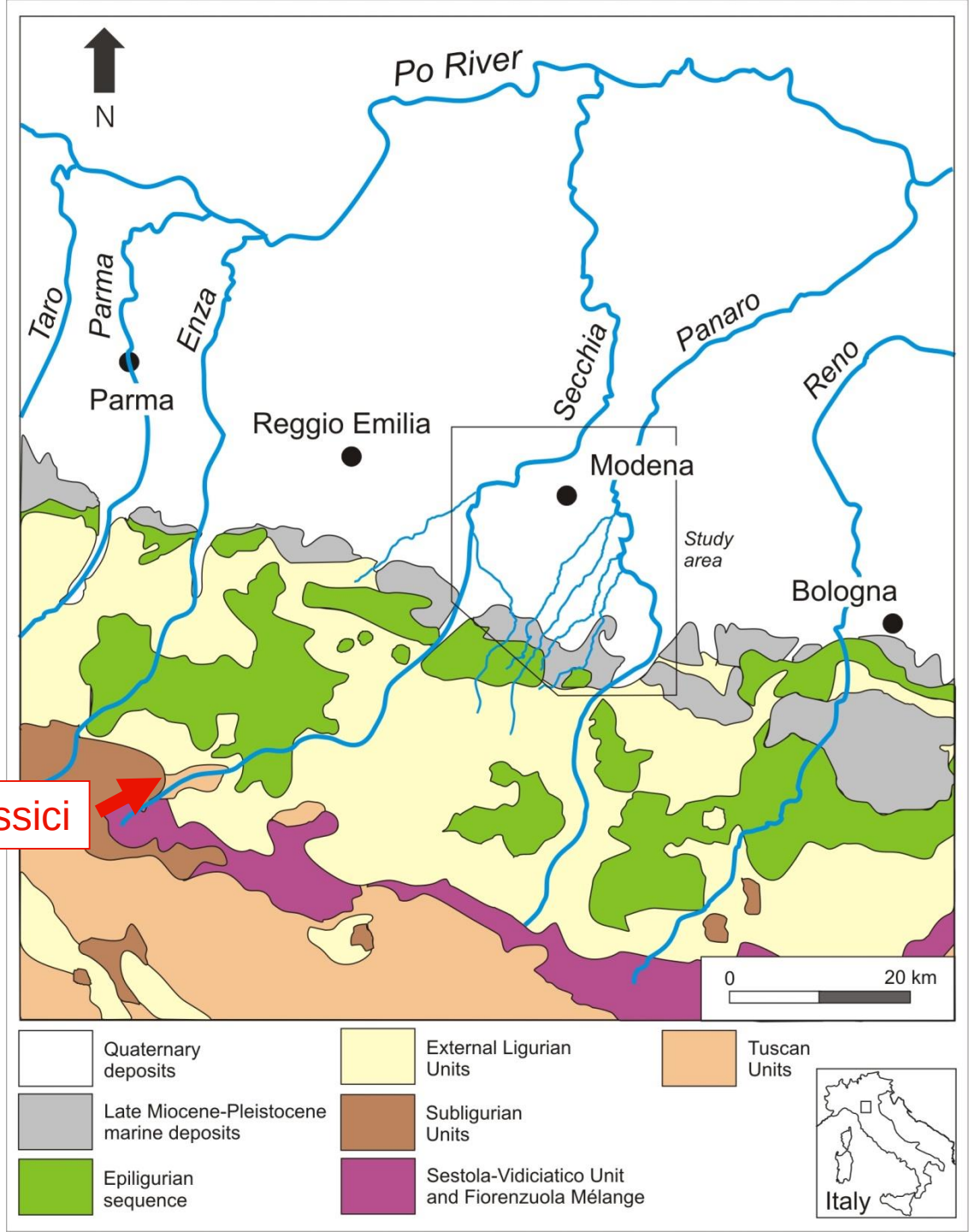
Manzi et al., 2005



Manzi et al., 2005

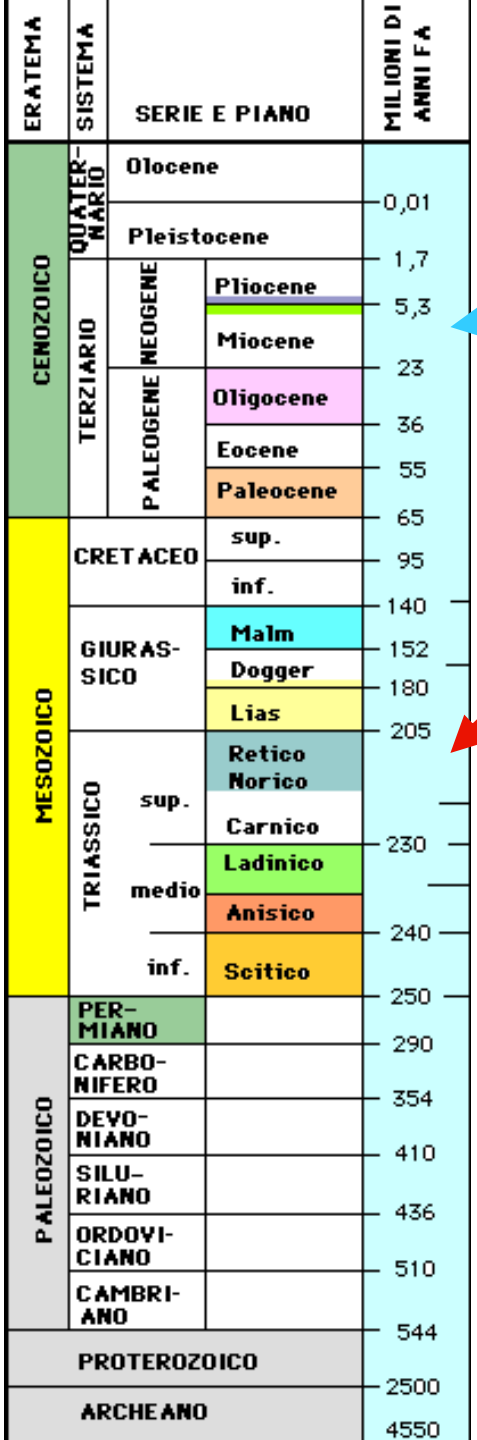

Pliocene deposits
sapropel
marl
carbonate
blue clays
post-evaporitic units
fluvio deltaic conglomerates
shelfal and/or turbiditic sandstone lobes
shale
micritic limestone ("colombacci")
black, organic-rich shale (paleosols)
Caltanissetta basin (Sicily)
precessional cycles
Pliocene
Van Couvering et al., 2000
Summer insolation 65° N
440 480 520
global sea level [m]
(Miller et al., 2005)
0 + 50
Nijar basin (Spain)
Northern Apennines (Romagna-Marche)
Feos Fm.
upper mb.
lower mb.
Mn bed
ash layer
p-ev2
p-ev1
Lago-Mare
Yesares Fm.
PLG
CG
Upper Gypsum
RLG
halite
MSC acme
MES-CC
Vena del Gesso (Italy), Sorbas (Spain) basins
Primary Lower Gypsum (PLG)
Sorbas basin (Spain)
Zorreras
Terminal Carbonate Complex
TCC 2
TCC 1
BARREN INTERVAL
organic-rich shales and limestone
marls and sapropels
nanno
forams
MSC onset
Fringing Reef
euxinic shale fm.
Abad Fm.
Roveri et al., 2014
Loulja
Van der Laan et al., 2005
M/P
TG4.0
TG4.1
TG4.2
TG5
TG6
TG6.2
TG7
TG8.0
TG8.2
TG9
TG10.0
TG10.2
TG11
TG12
TG14
cooling
TG16
TG18
warming
TG20
TG22
TG24
TG26
TG28
TG30
TG32
TG34
Ain el Beida
Van der Laan et al., 2006
-0.04 0.00 0.04
eccentricity
Laskar, 2004
1.2 0.4
δ18O (‰)
C3n.4n
C3r
C3An.1n
5.235
5.33
5.53
5.55
5.6
6.035
MSC stages
pre-MSC
Terminal Carbonate Complex (TCC)
outer-platform mudstones
outer-platform microbialites
ooidic sand shoal
lagoon-mudstones
alluvial-fan conglomerates
Zorreras Mb.
fluvial sandstones, conglomerates and lacustrine limestones
Primary Lower Gypsum (PLG)
branching selenite
massive selenite
dolostones
marl/sapropel/diatomite alternation
Resedimented Lower Gypsum (RLG)
halite and gypsum cumulate
limestone breccia
clastic evaporites
chaotic deposits
Upper Gypsum (UG)
marls
sandstone
shallow-water evaporites

Gessi Triassici



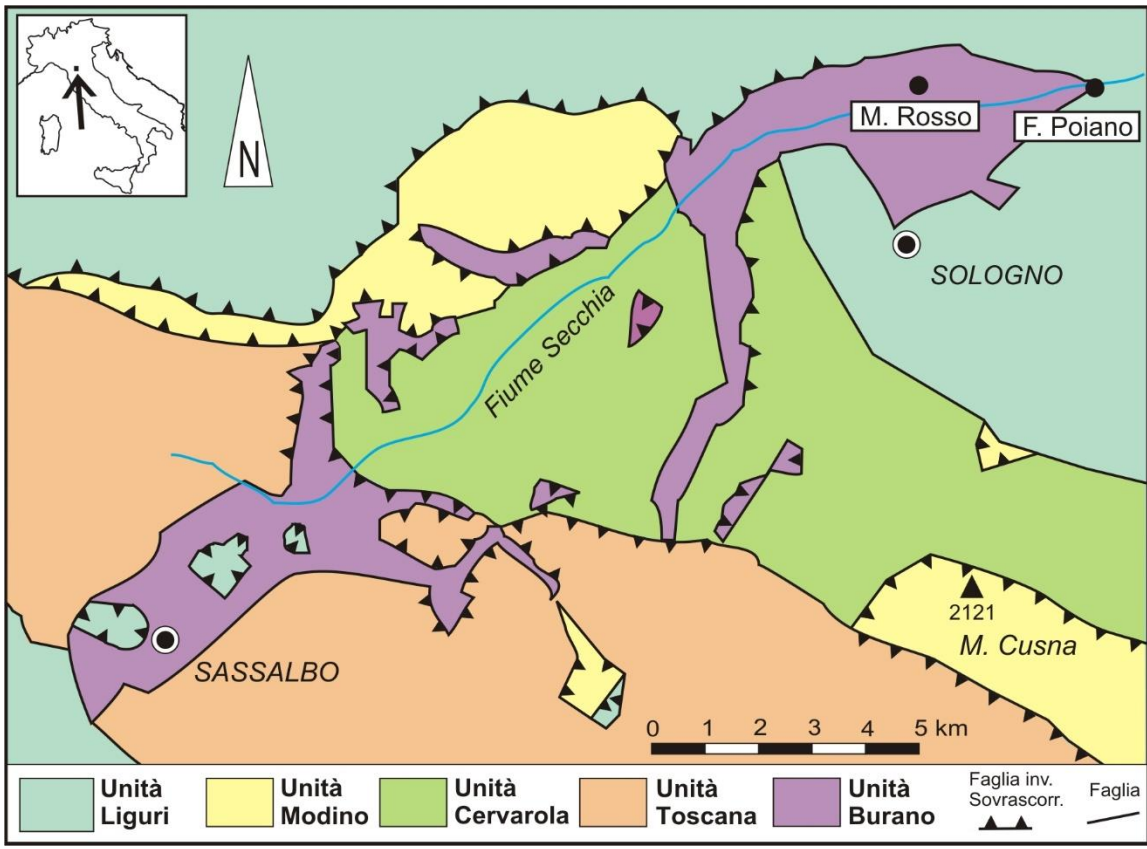
Gessi triassici

Da Bettelli e De Nardo, 2001 semplificato



Gessi messiniani

Gessi triassici



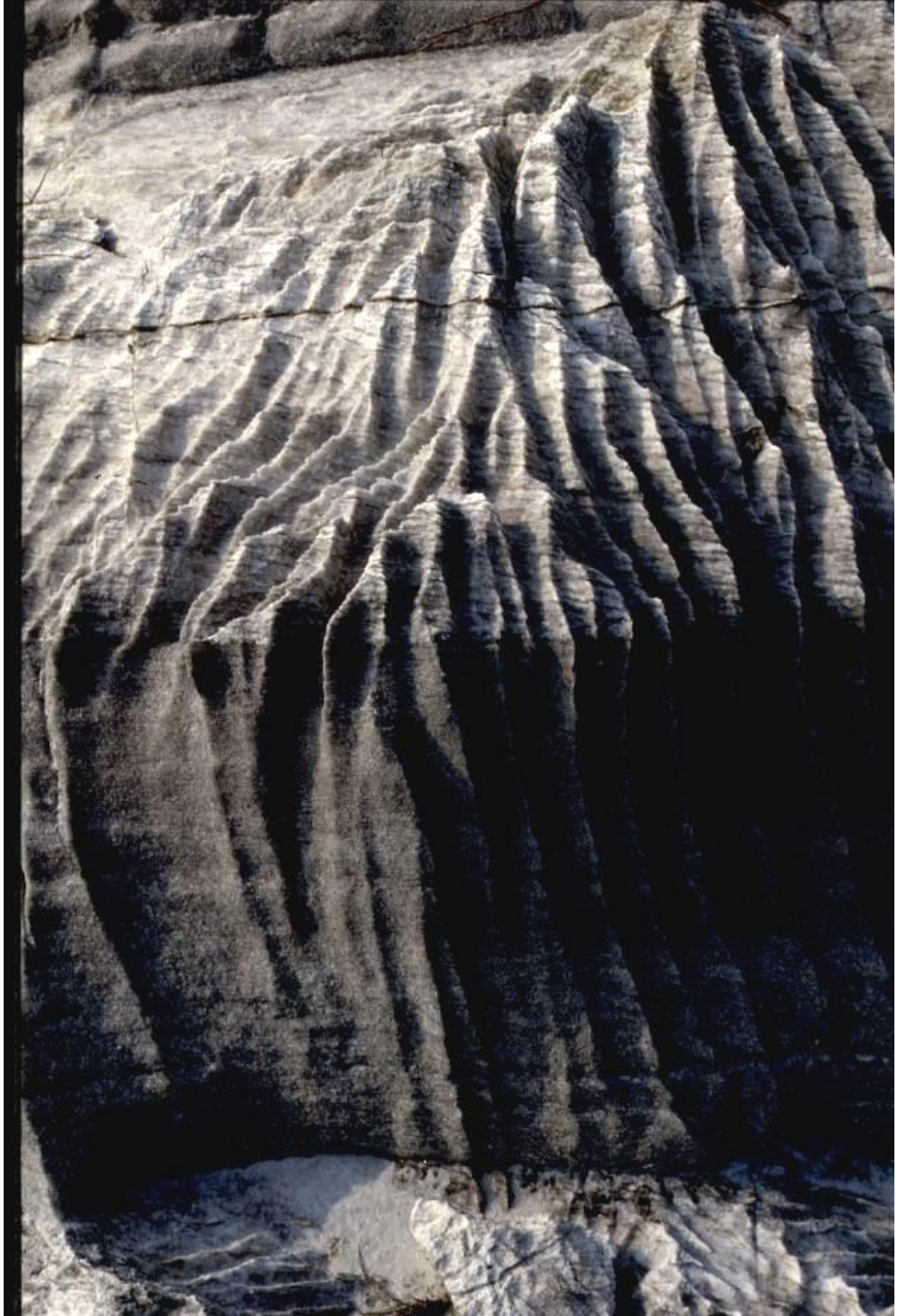
- Gessi triassici e pietra di Bismantova

Salina di Cervia

Sale

Gesso triassico

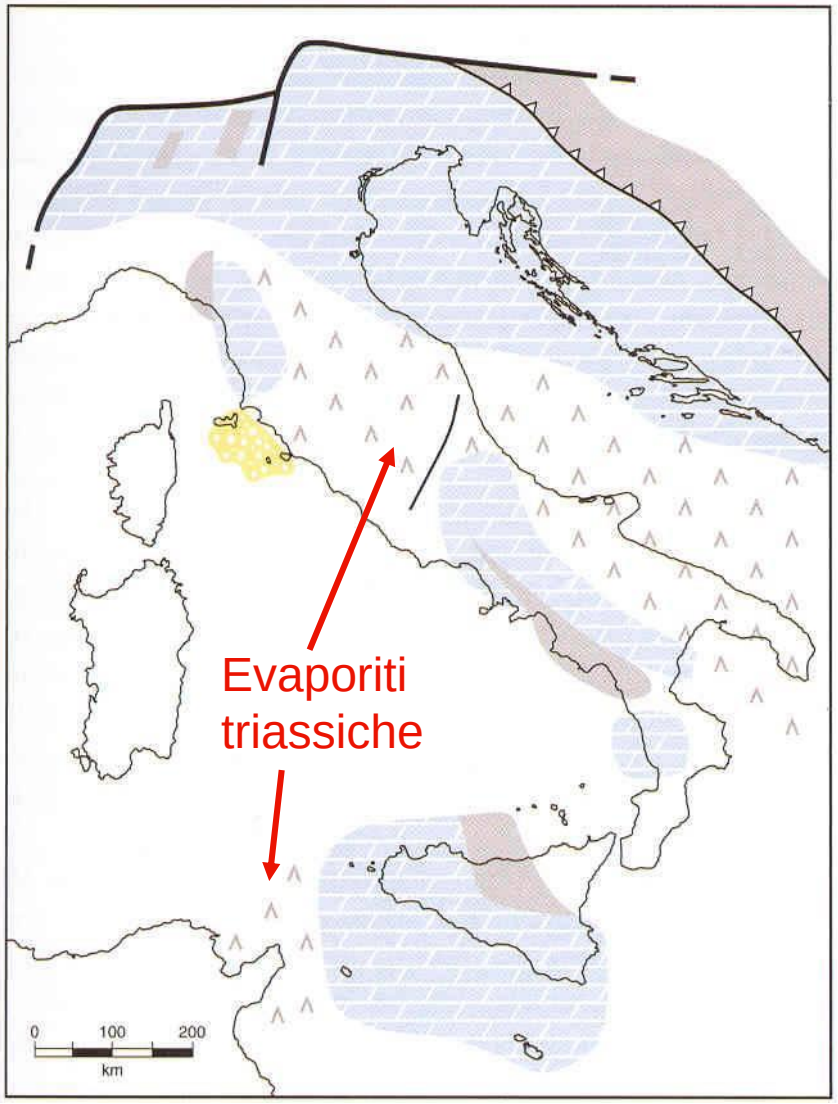
Gesso messiniano
(Vezzano)

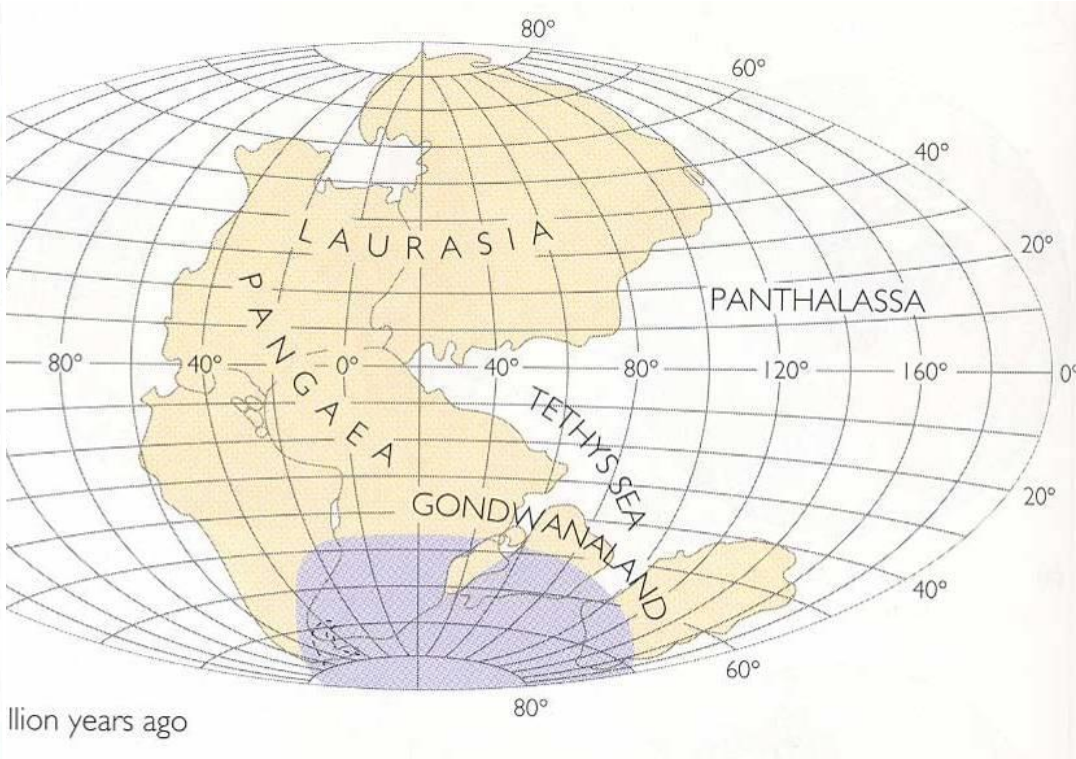


Gesso
$CaSO_4 \cdot 2H_2O$

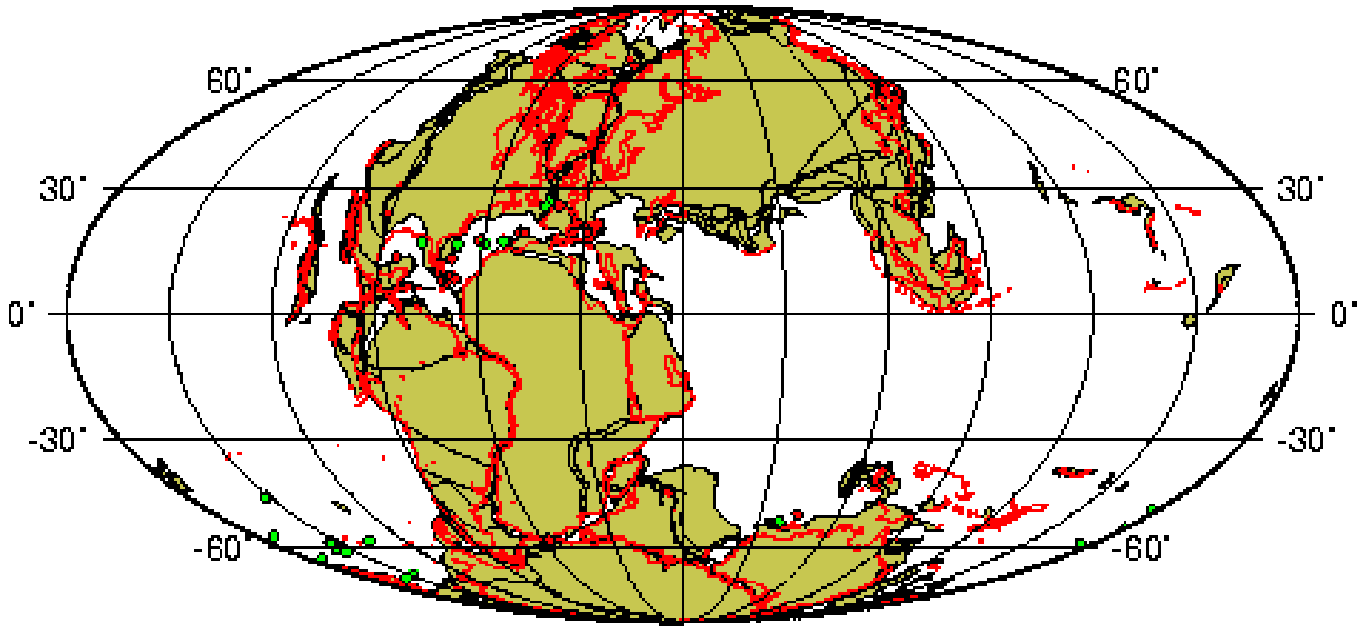
Anidrite
$CaSO_4$

Lugli, 2001

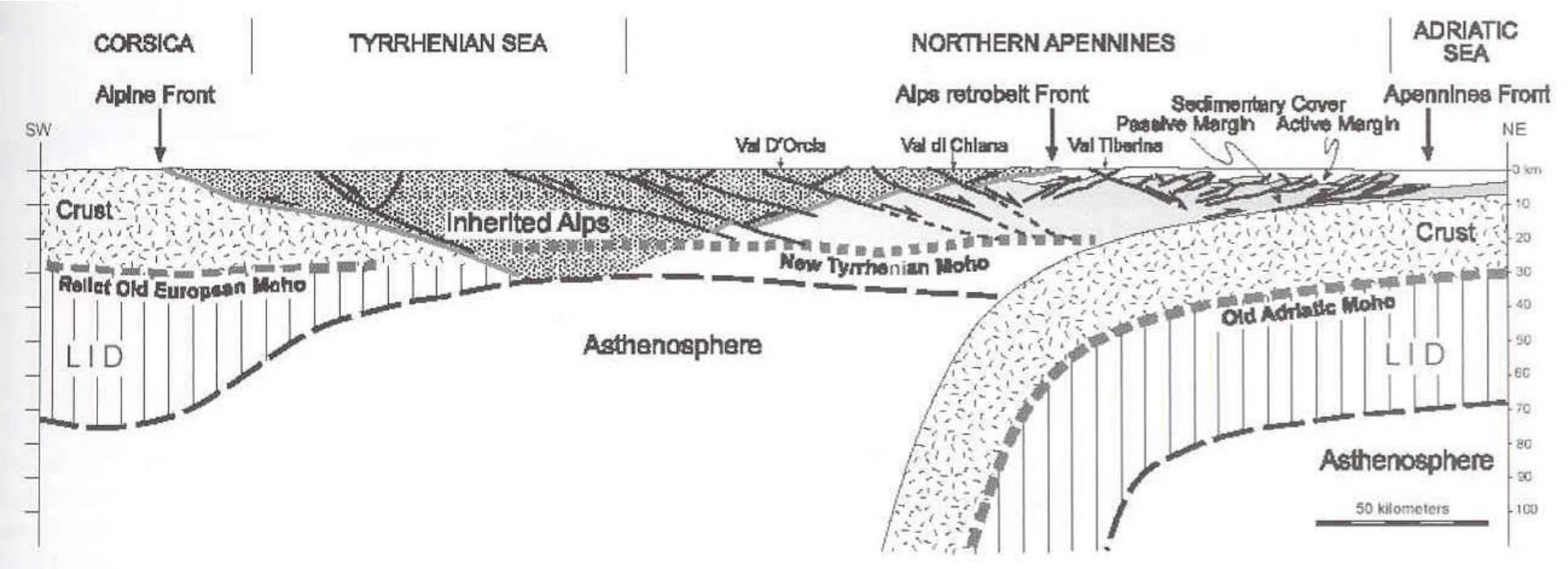




llion years ago

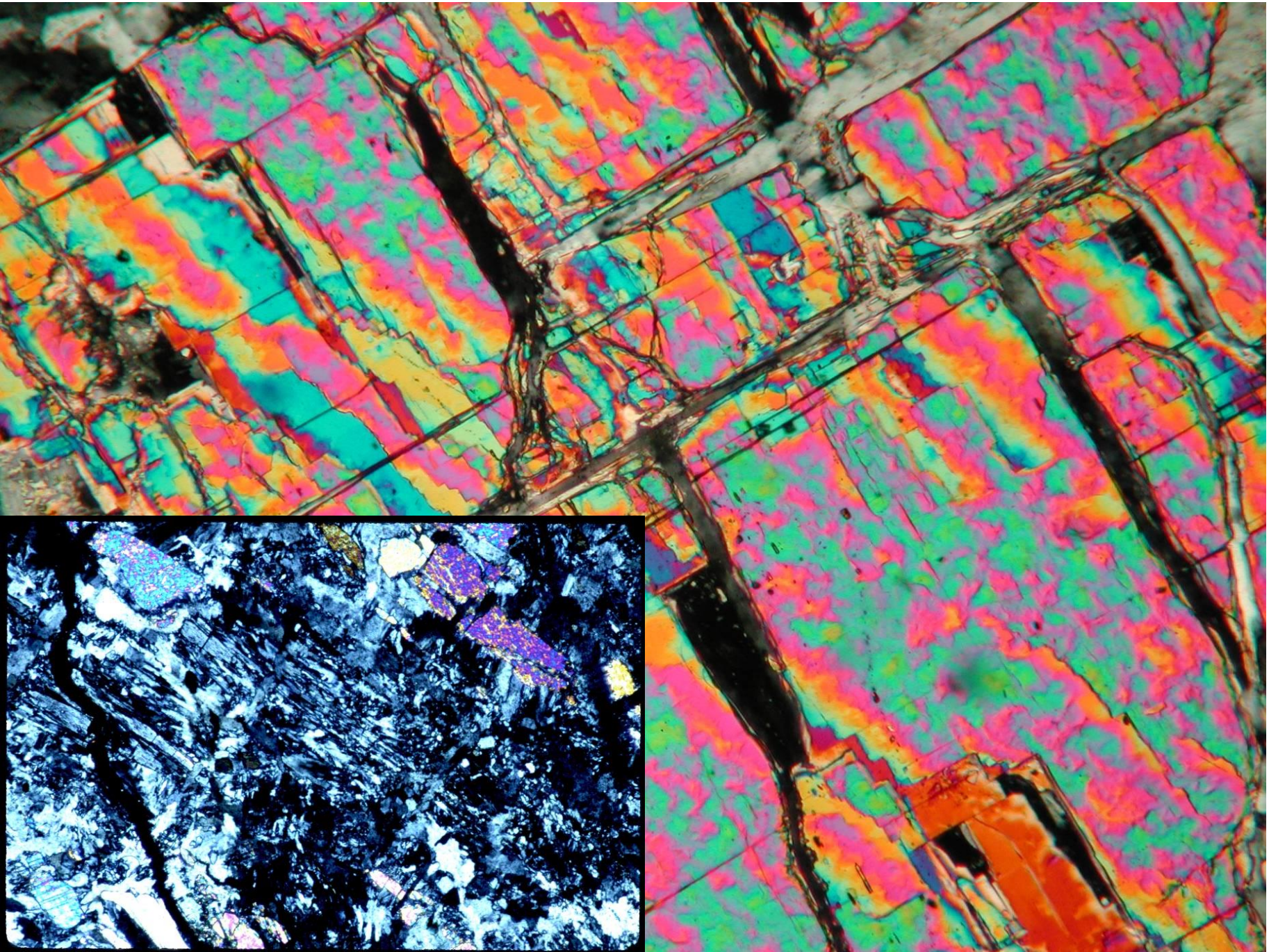


150 My Reconstruction


CORSICA
TYRRHENIAN SEA
NORTHERN APENNINES
ADRIATIC SEA
Alpine Front
Alps retrobelt Front
Apenninss Front
Sedimentary Cover
Passive Margin
Active Margin
SW
NE
Val D'Orcia
Val di Chiana
Val Tiberina
Crust
Inherited Alps
New Tyrrhenian Moho
Relict Old European Moho
LID
Asthenosphere
Crust
Old Adriatic Moho
LID
Asthenosphere
50 kilometers
0 km
10
20
30
40
50
60
70
80
90
100

Lugli, 2001

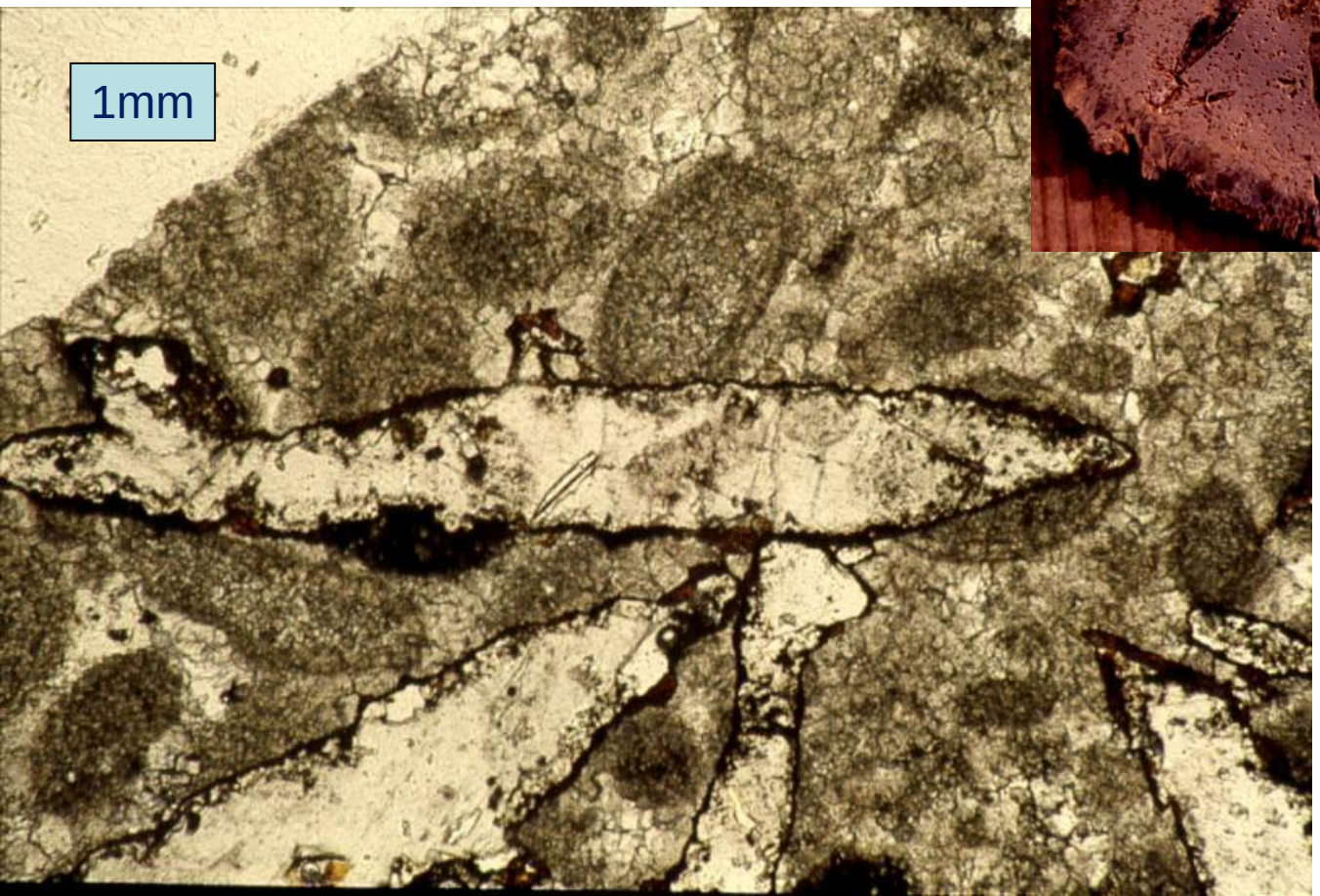
Lugli, 2001



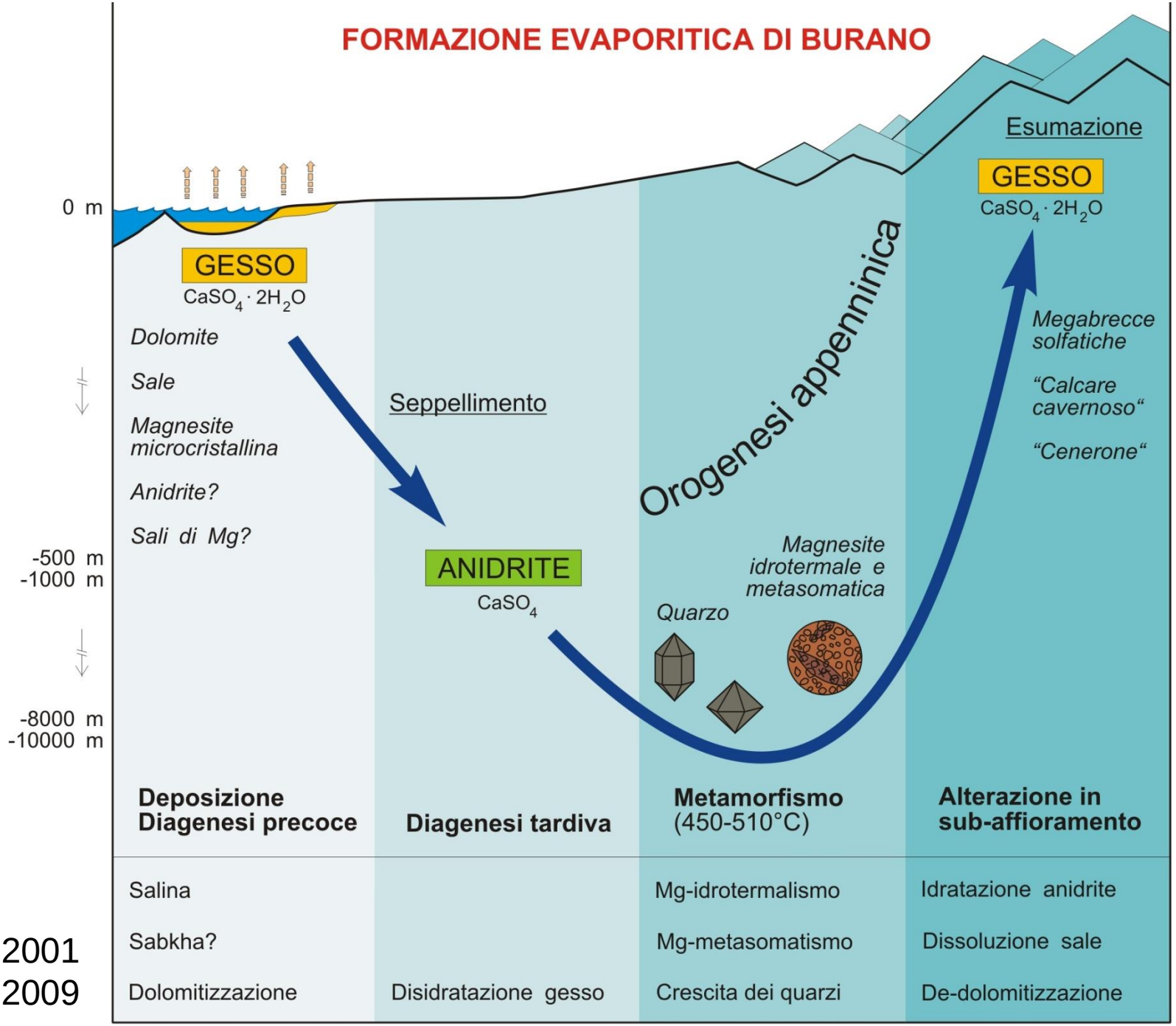
I quarzi neri

Foto: E. Borghi (*Società Reggiana di Scienze Naturali)*

Magnesite $MgCO_3$



Lugli et al., 2002



Lugli, 2001
Lugli, 2009