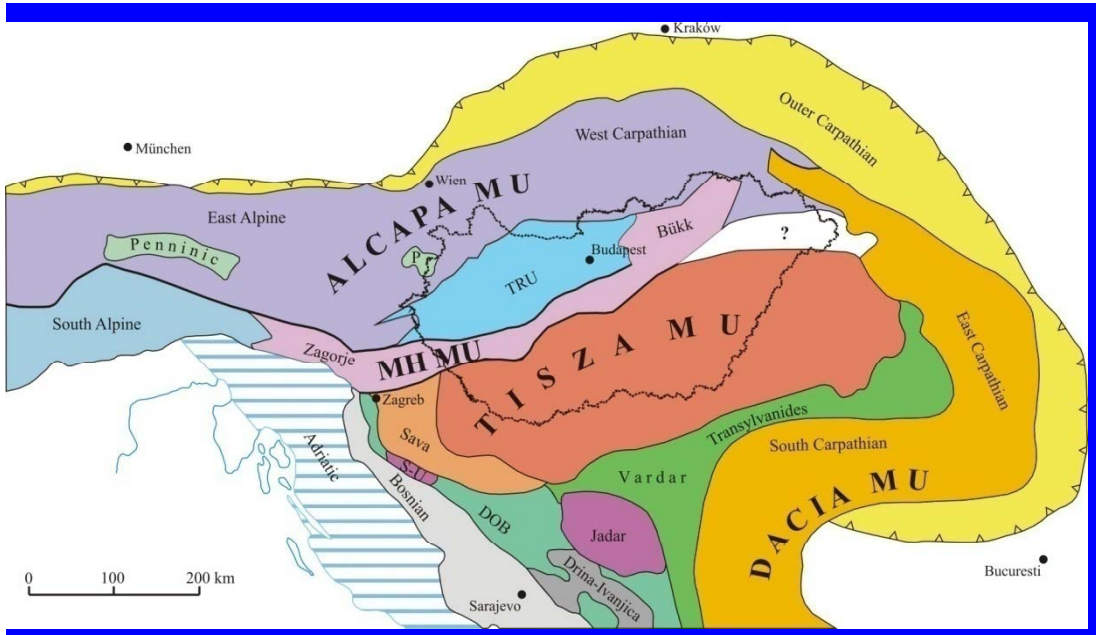
Tectonic, eustatic and climatic control on the Dachstein platform development in the Transdanubian Range, Hungary

János HAAS & Tamás BUDAI



Transdanubian Range U

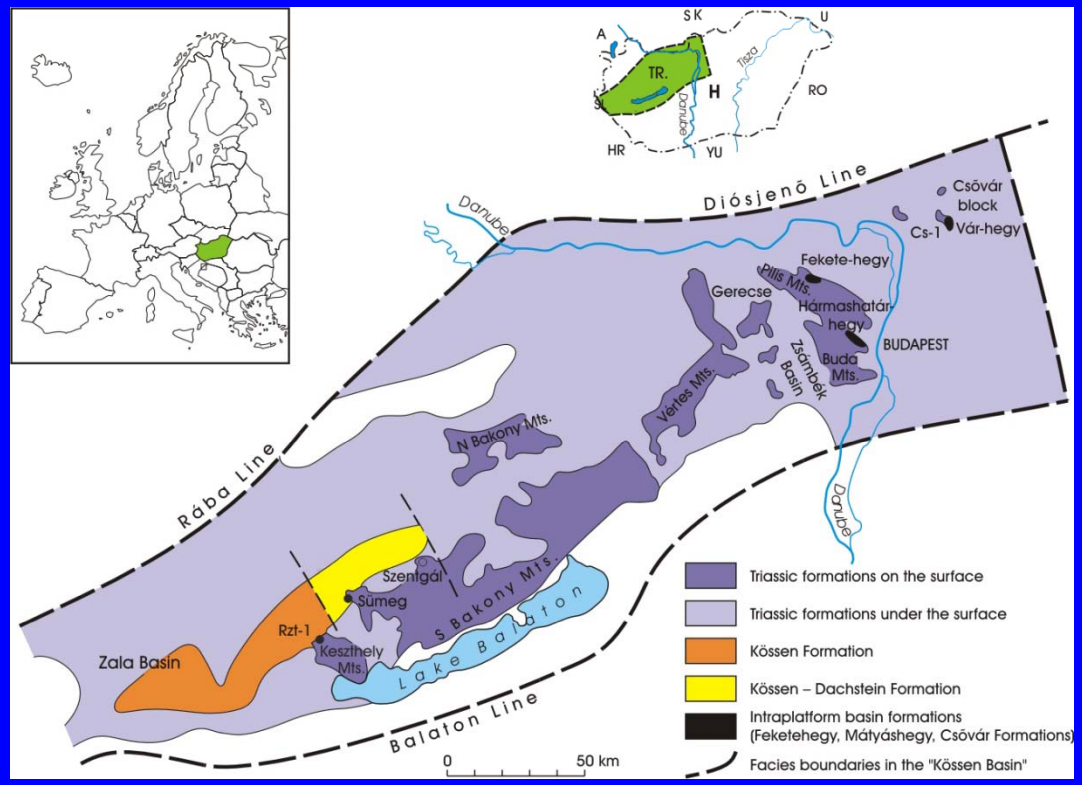
a part of ALCAPA

Upper Austroalpine

stuctural setting

was not affected by intense Alpine deformations

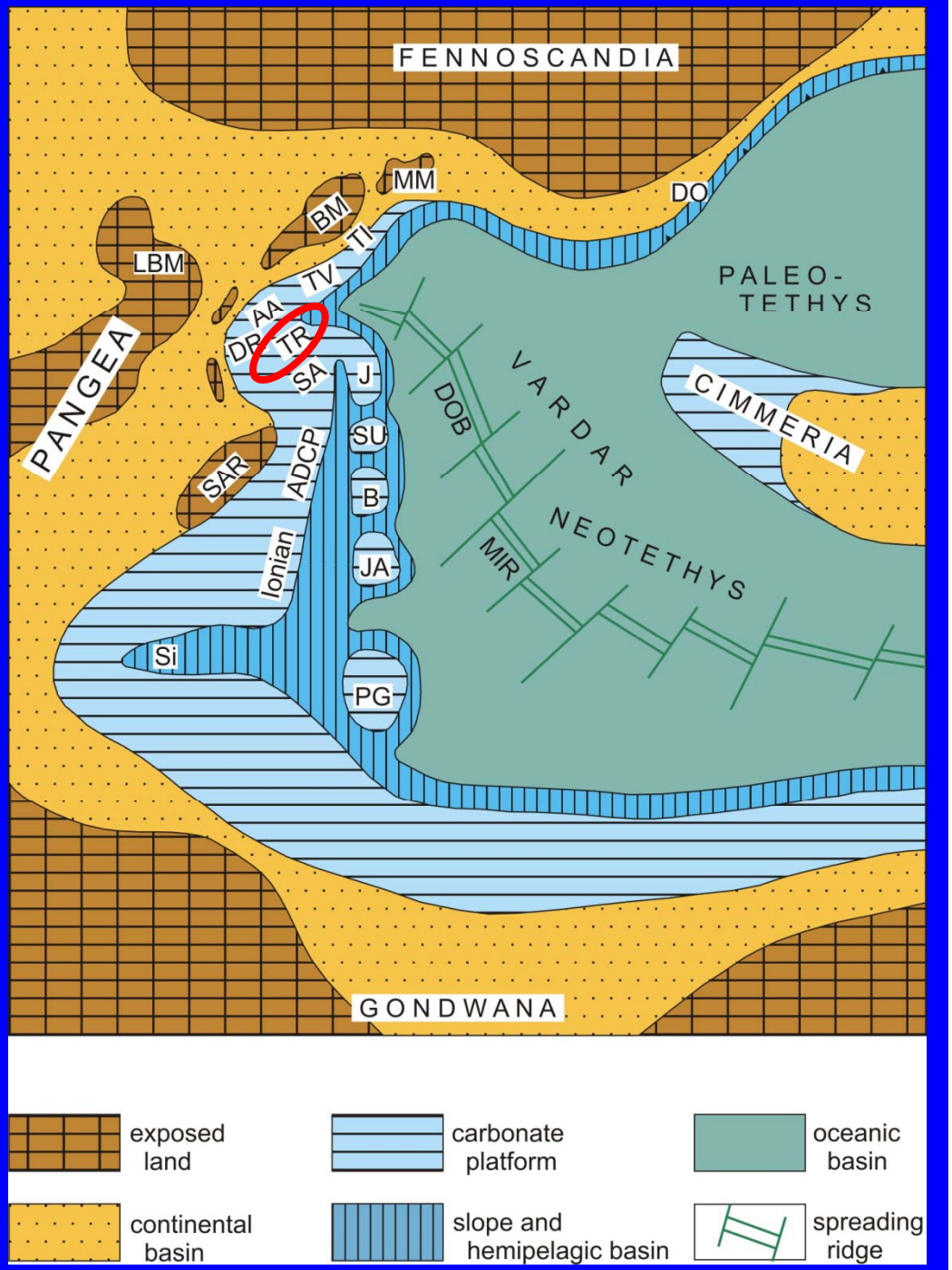
The facies relations reflect the original paleogeographic setting



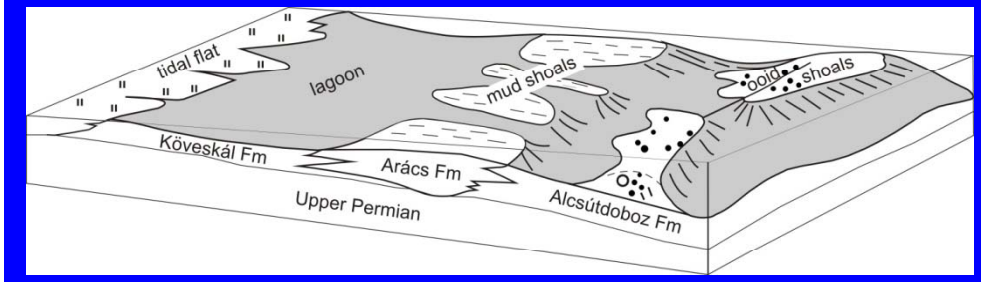
Good potential for analysis of the facies development

Paleogeographical setting

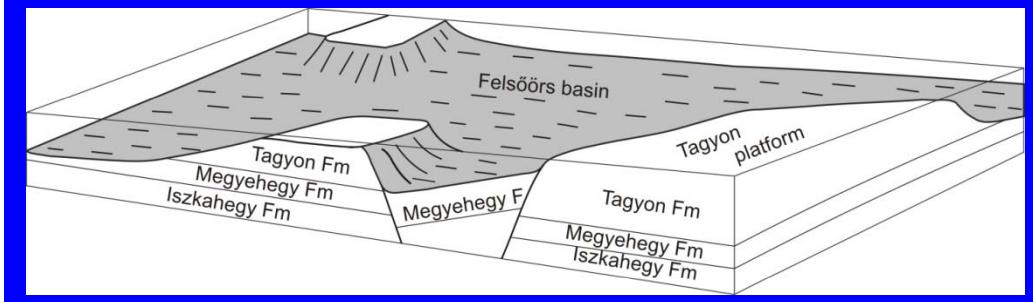
It was located between the Upper Austroalpine and South Alpine domain



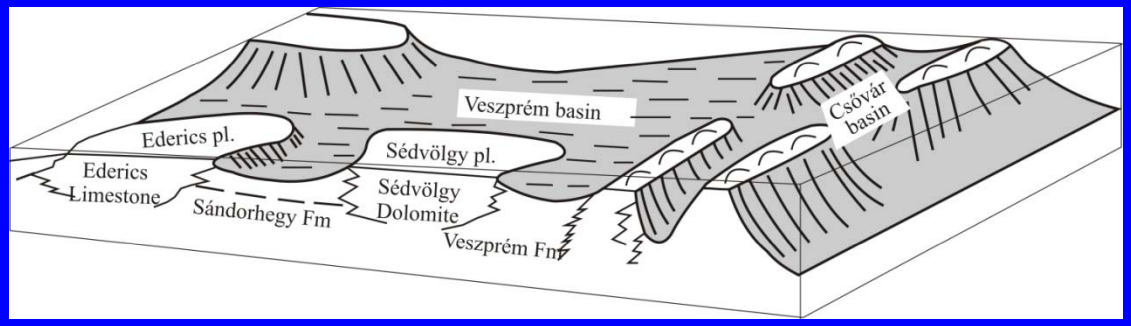
The main stages of the structure evolution during the Alpine plate-tectonic cycle prior to the onset of the Dachstein platform development



Earliest Triassic transgression
Early Triassic mixed ramp

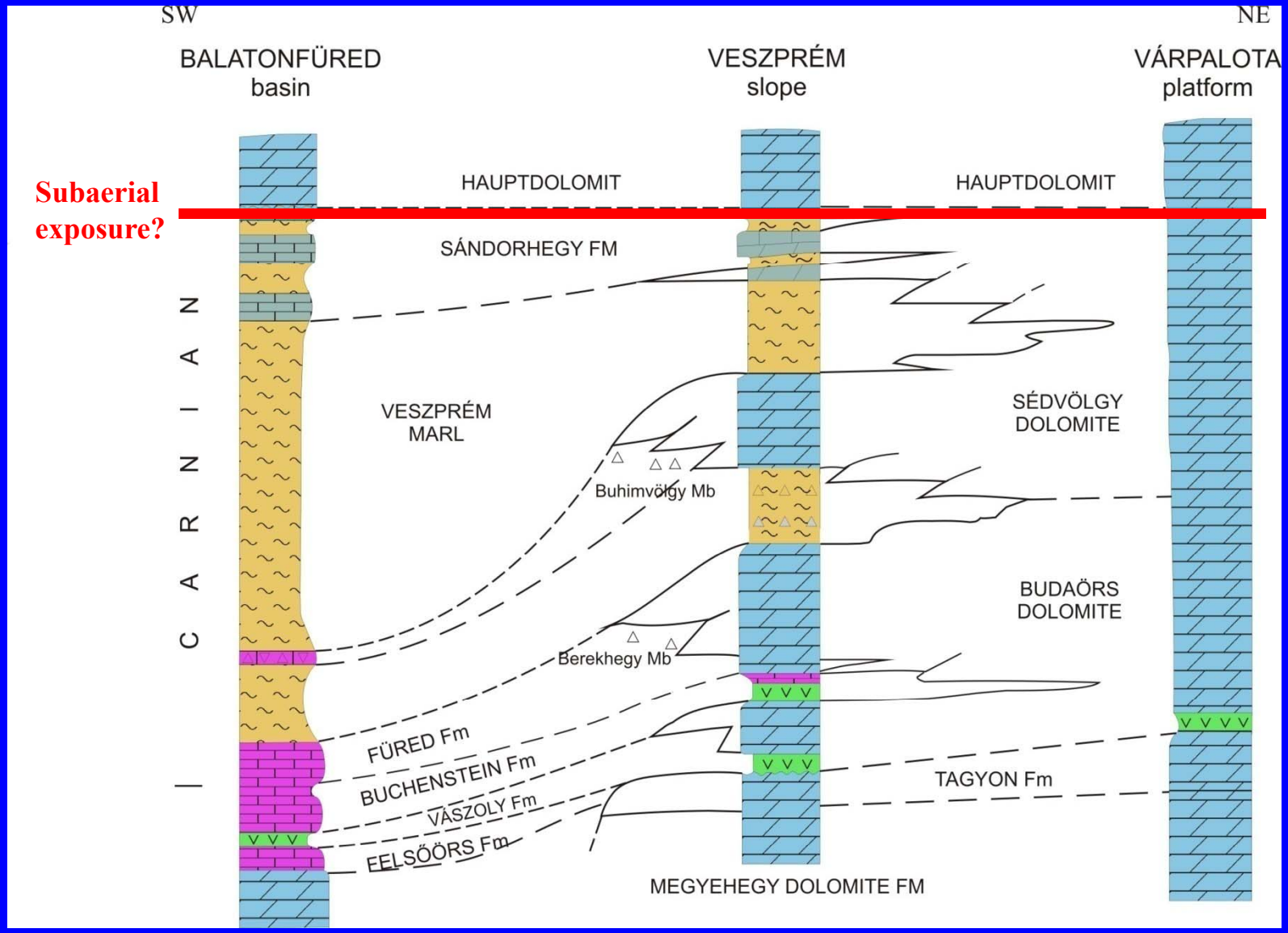


Early Anisian carbonate ramp
Middle to Late Anisian
rifting: platforms and basins

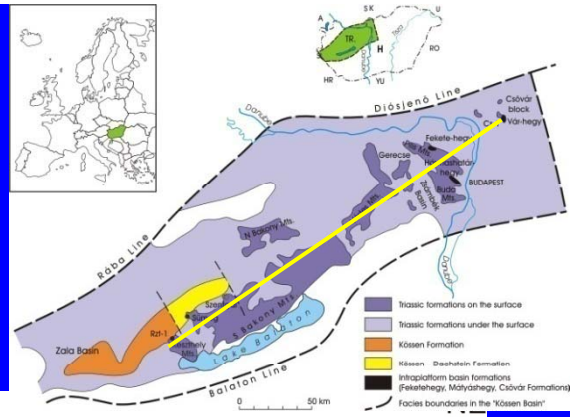


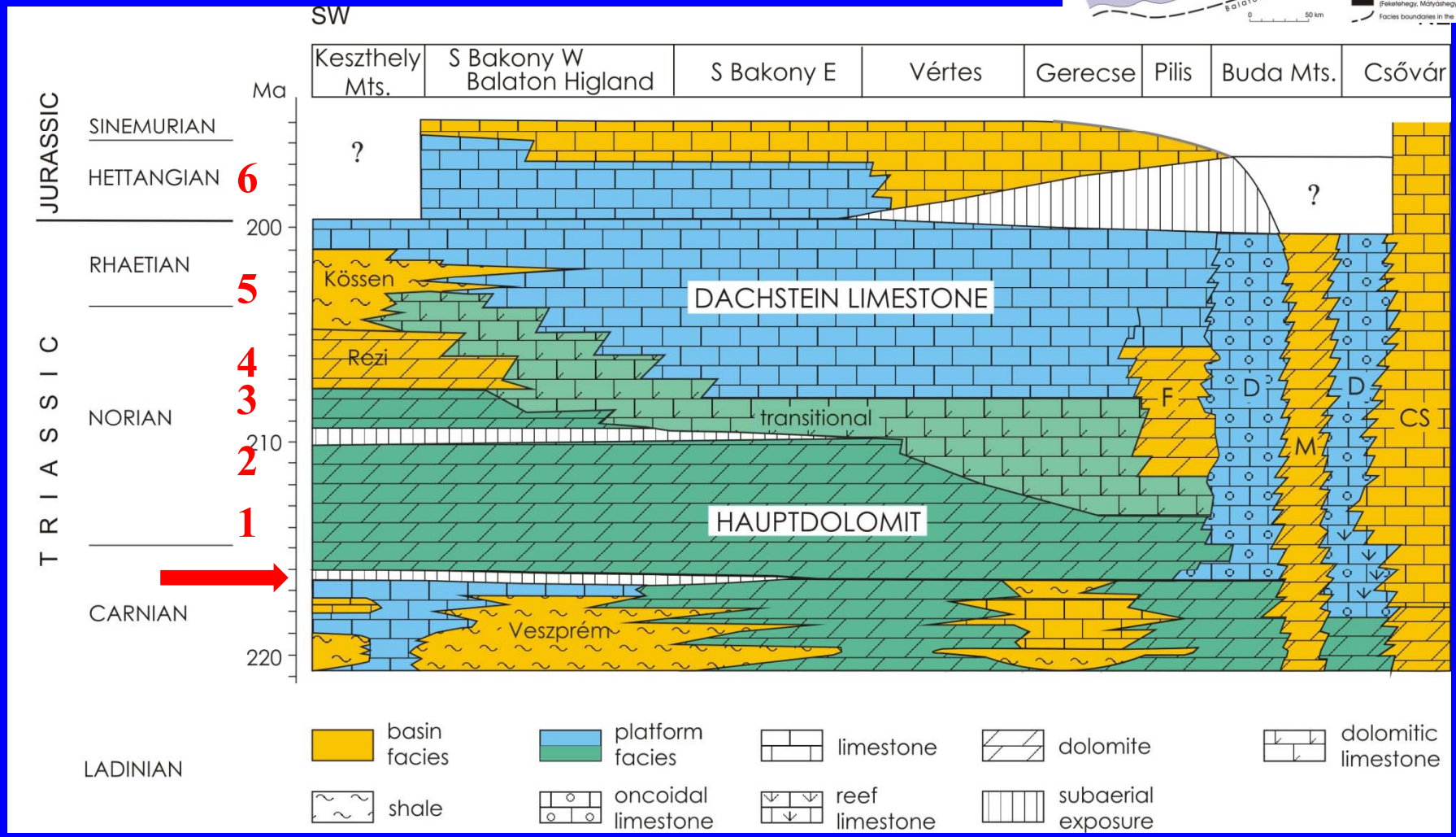
early Late Carnian
basin upfilling with
fine terrigenous sediments

The final stage of the basin upfiling, and onset of the Dachstein platform evolution in the latest Carnian

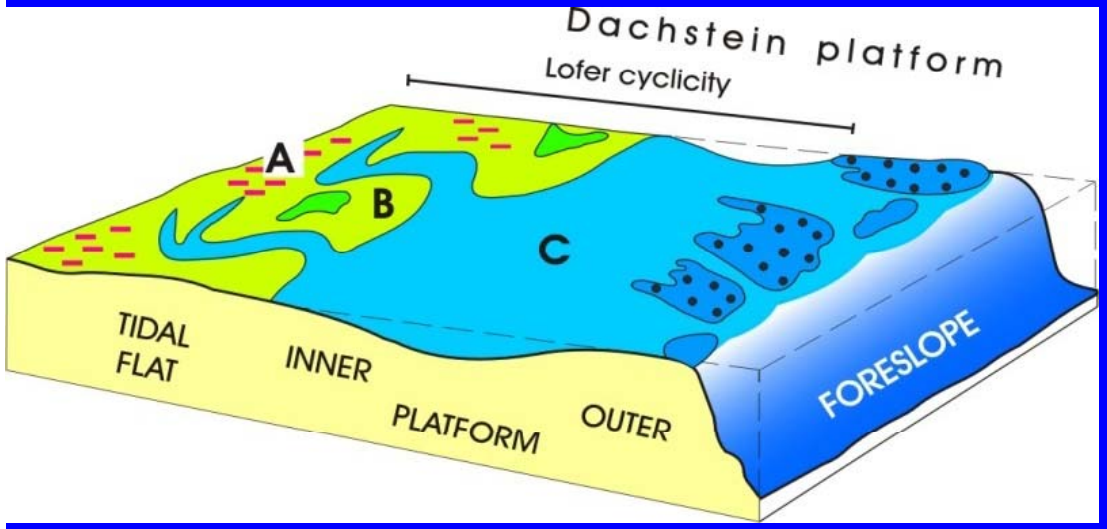


Anatomy of the
Dachstein Platform in the TR
and the main evolutionary stages



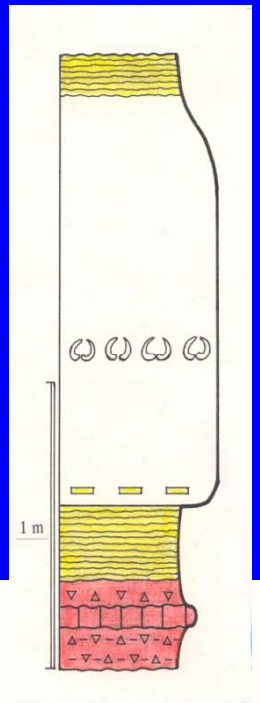


General facies pattern

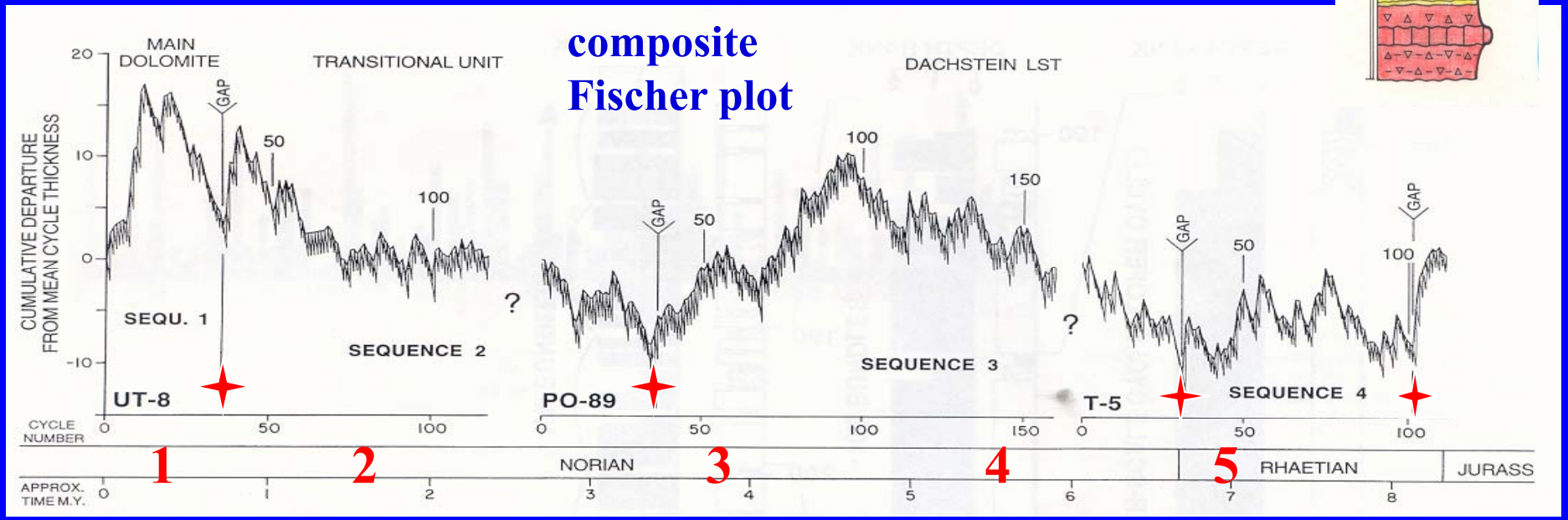


inner platform – tidal flat:
Lofer-cyclicity

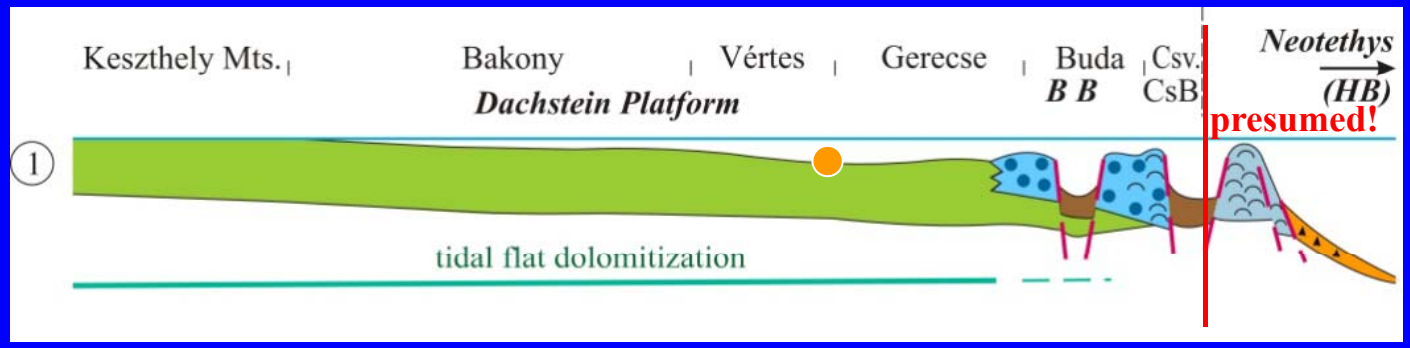
outer platform:
oncoidal facies with patch reefs



High-fequency cycles -- sequences

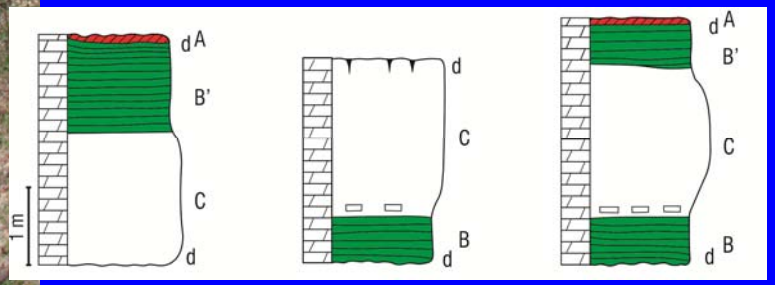


1. Latest Carnian to mid-Norian – Hauptdolomit stage

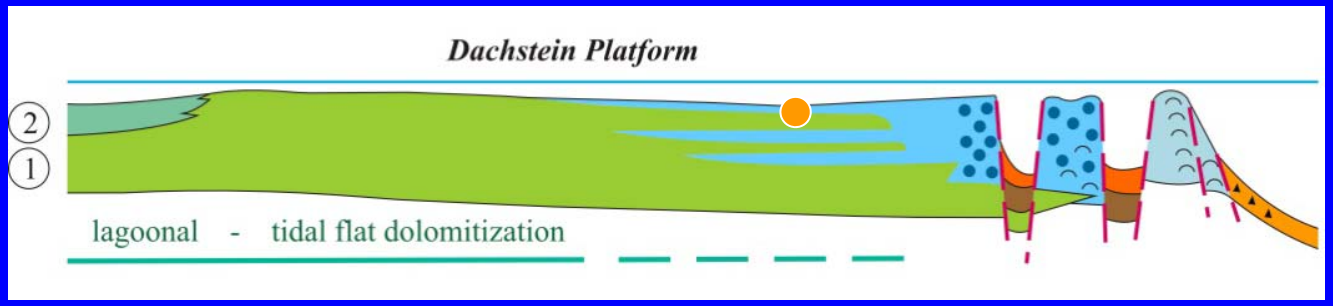


-levelled topography
-platform aggradation
-oncoidal packstone with patch reefs in the outer platform
-wide belt of optimal tidal flat dolomitization
semi-arid climate - dolocretes

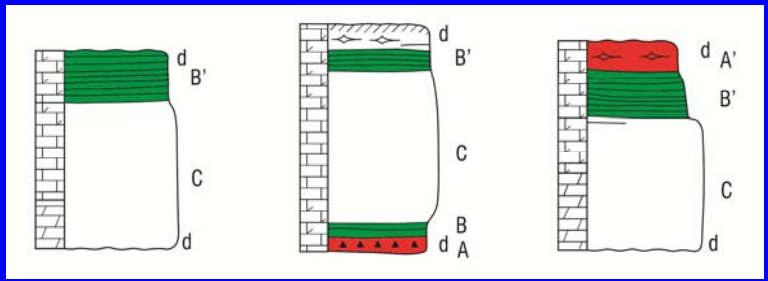
characteristic Lofer-cycles



2. mid-Norian Hauptdolomit - Dachstein Limestone transition stage

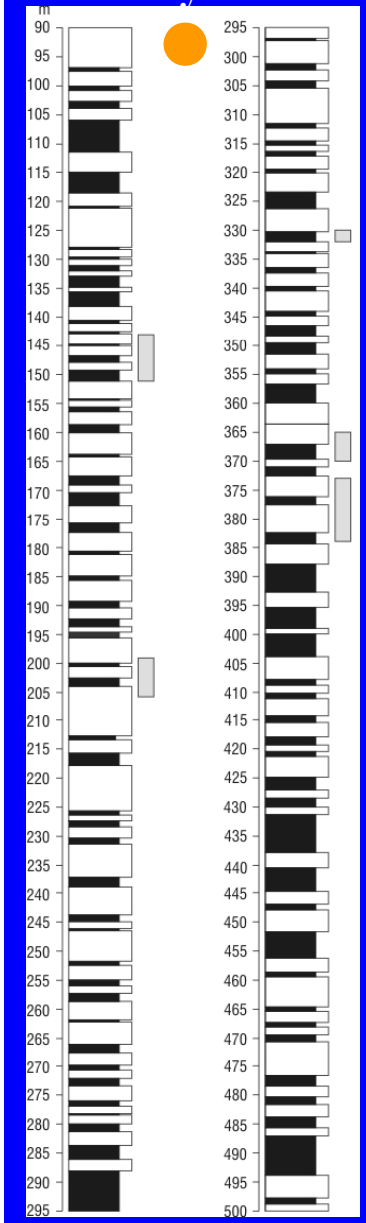


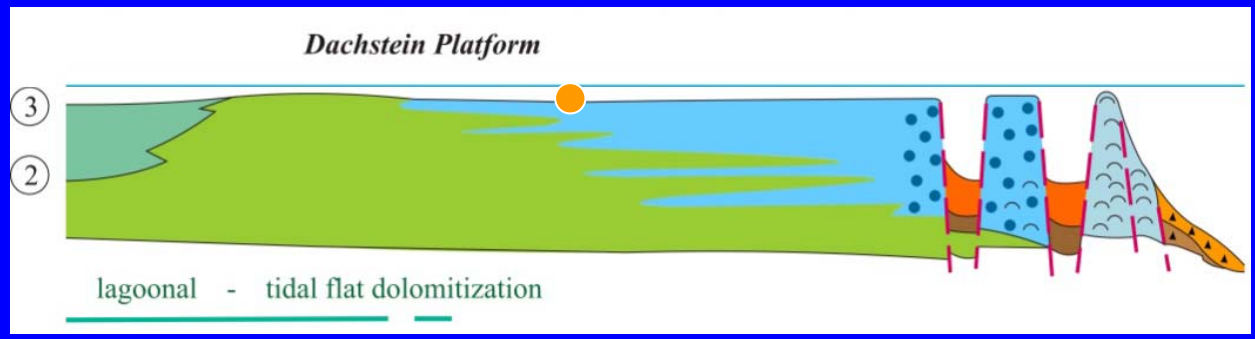
-reduction of the width of the optimal tidal flat dolomitization zone;
-wide belt of selective and partial dolomitization;
-dolocretes, calcretes, and clayey reworked paleosol beds with black pebbles
-more humid climate

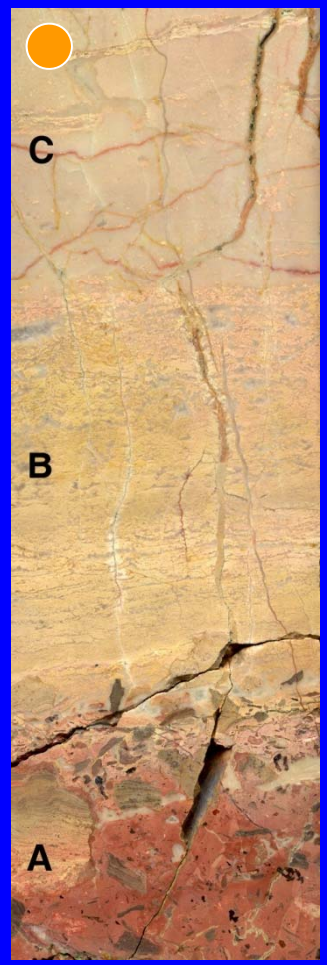


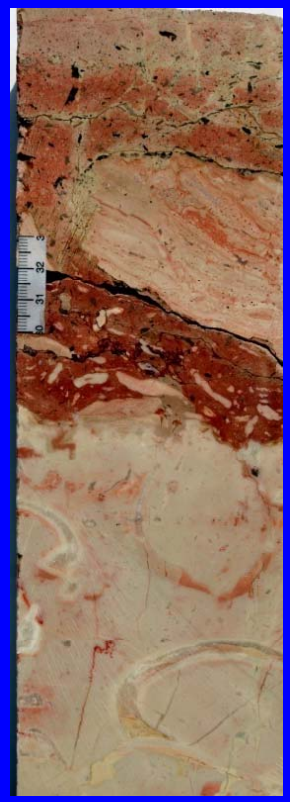
3. Mid-Norian the lower Dachstein Limestone stage

Core Po-89
Bakony



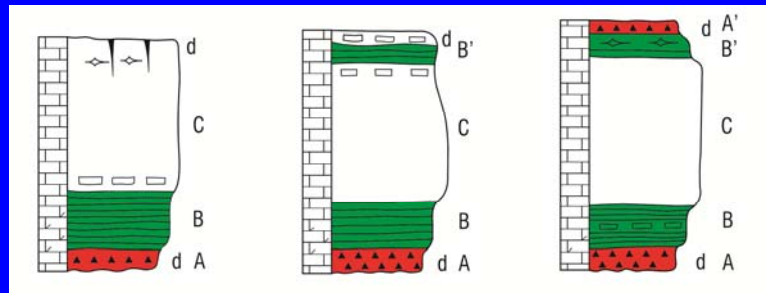




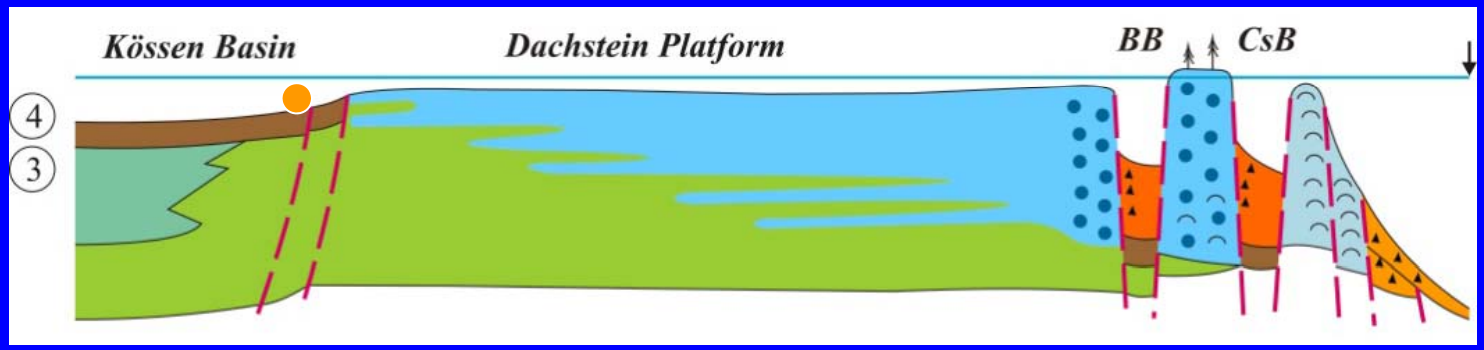


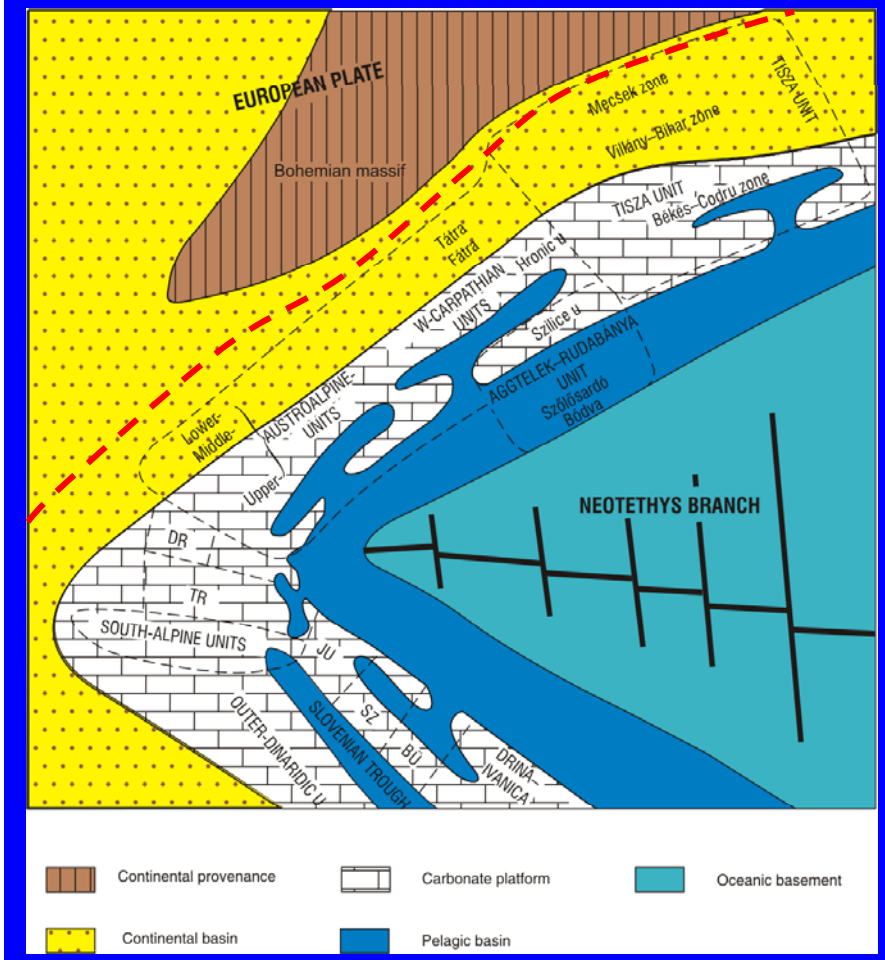
-non-dolomitized successions in the NE and central parts
-reworked clayey paleosol beds
-well developed peritidal members
-tidal flat and shallow lagoon dolomites in the SW part

symmetric cycles are common



4. Late Norian onset of the Kössen Basin development



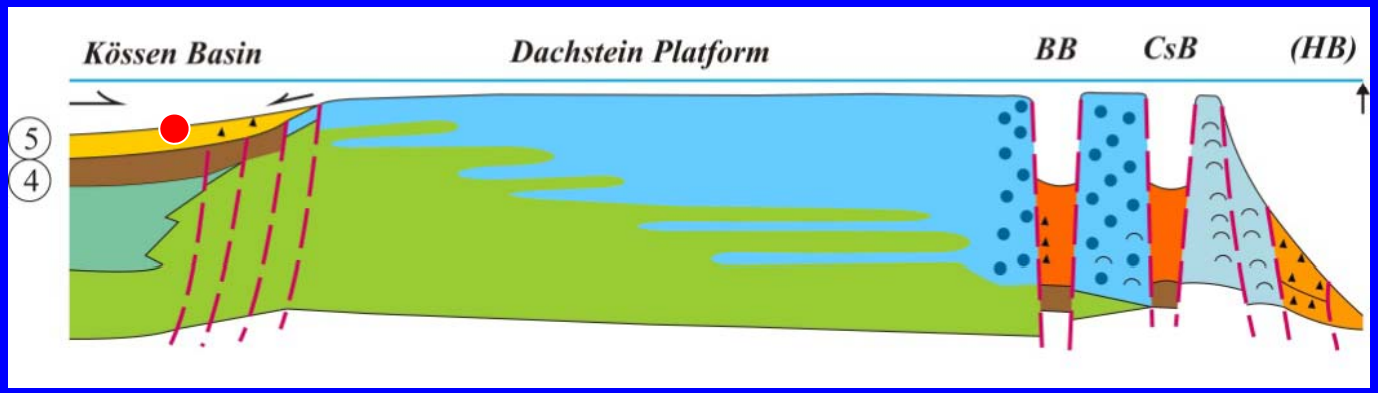


-incipient continental rifting of the Penninic Ocean led to development of a large extensional basin

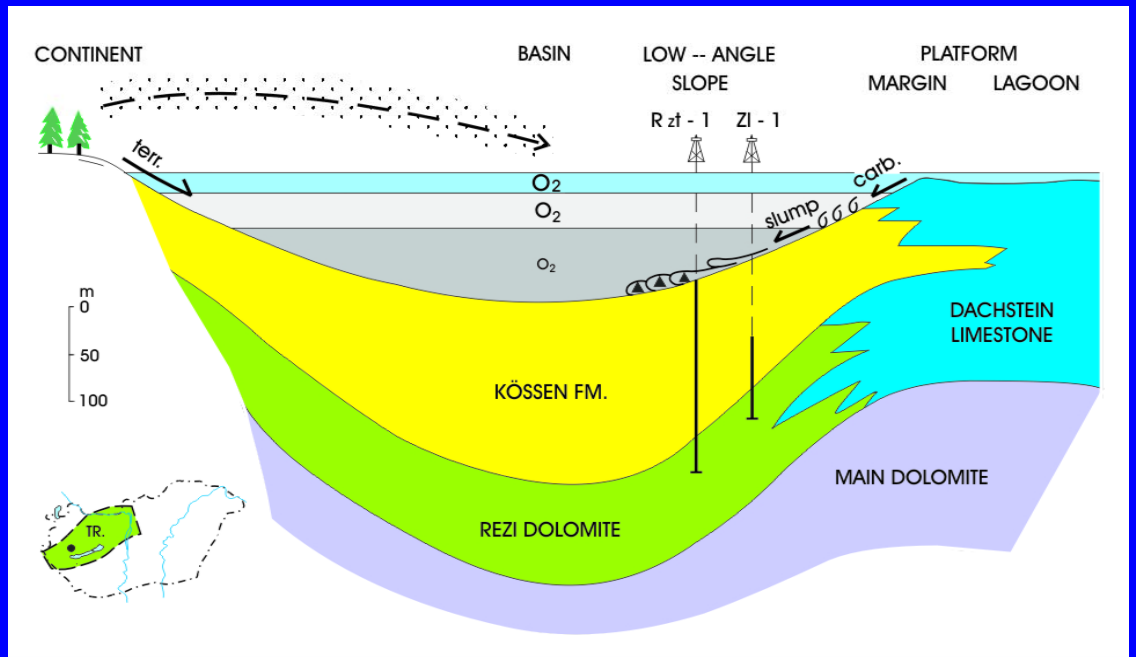
-formation of basinal dolomites

-isolation of the Dachstein Platform

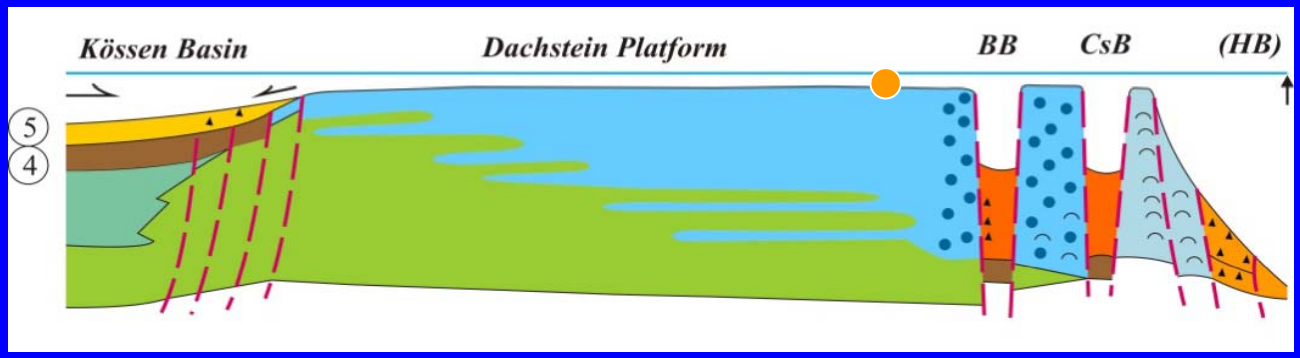
5a. Rhaetian the main stage of the Kössen Basin evolution…



-fine siliciclastic input from the continent suggesting humid climatic conditions
-carbonate imput from the platform



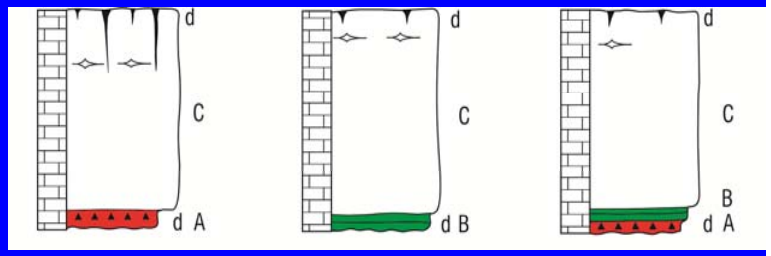
5b. Rhaetian …and the upper Dachstein Limestone stage



-continuation of the platform conditions on the isolated platform

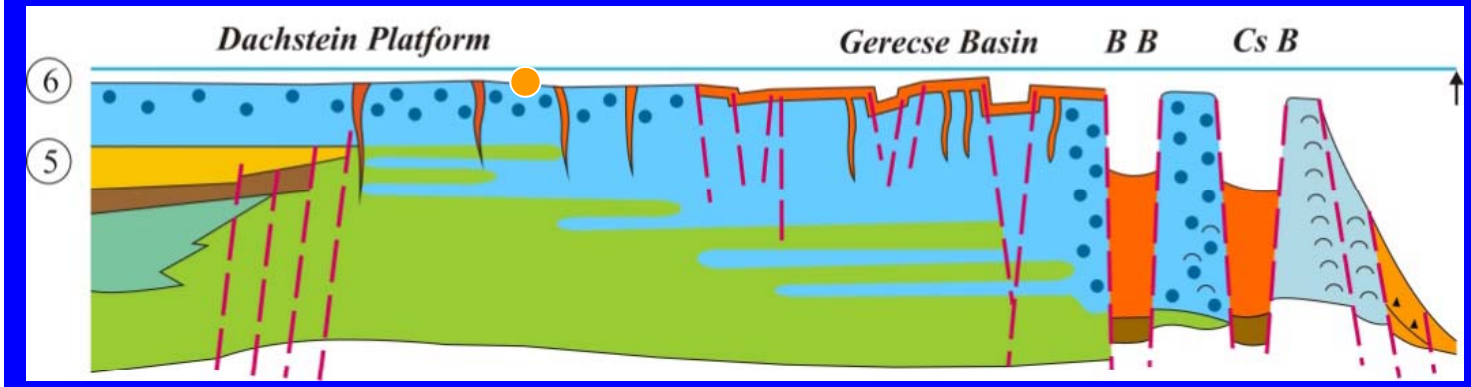
-significant platform progradation onto the Kössen Basin in the late Rhaetian

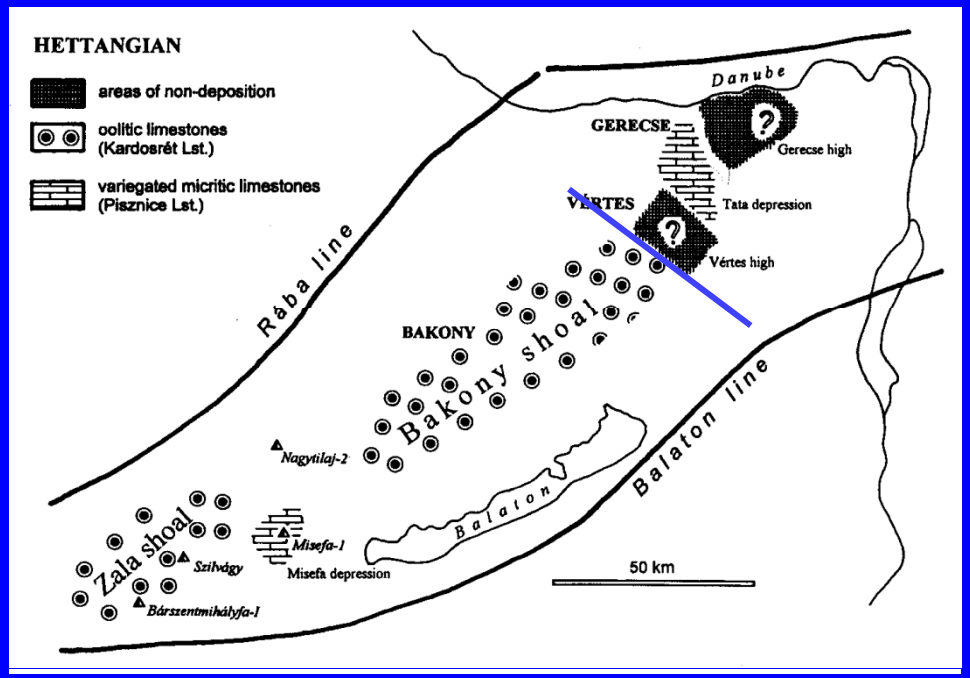
truncated cycles, the peritidal members are usually thin



6a. earliest Jurassic

survival of the Dachstein Platform in the SW part of the TR





Vörös & Galácz, 1998

-prolongation of the platform growing shallow subtidal oncoidal limestones

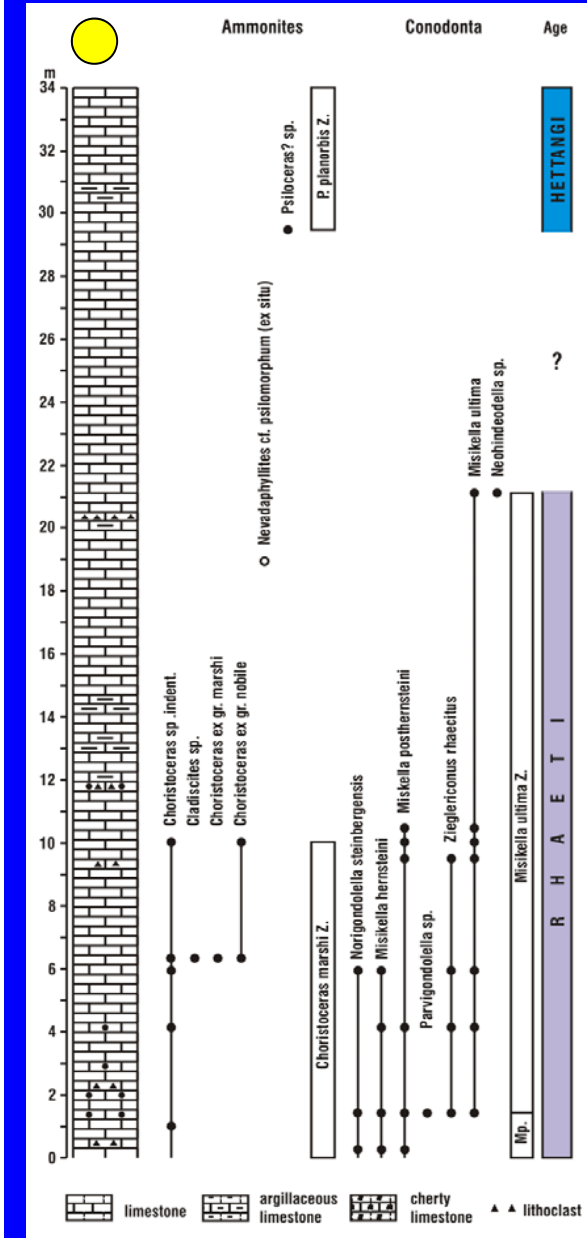
-the peritidal beds and signals of the subaerial exposure are missing

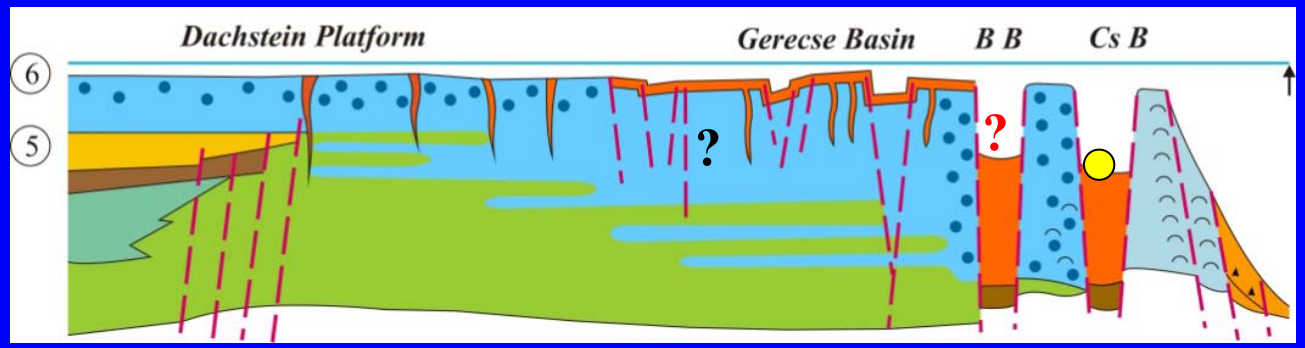
6b. Triassic/Jurassic boundary

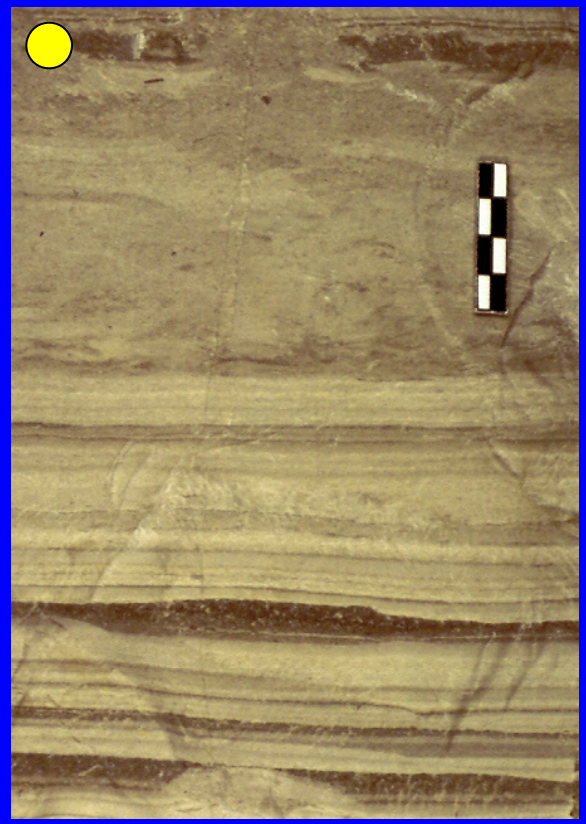
drowning of the Dachstein Platform in the NE part of the TR

Early Hettangian gap

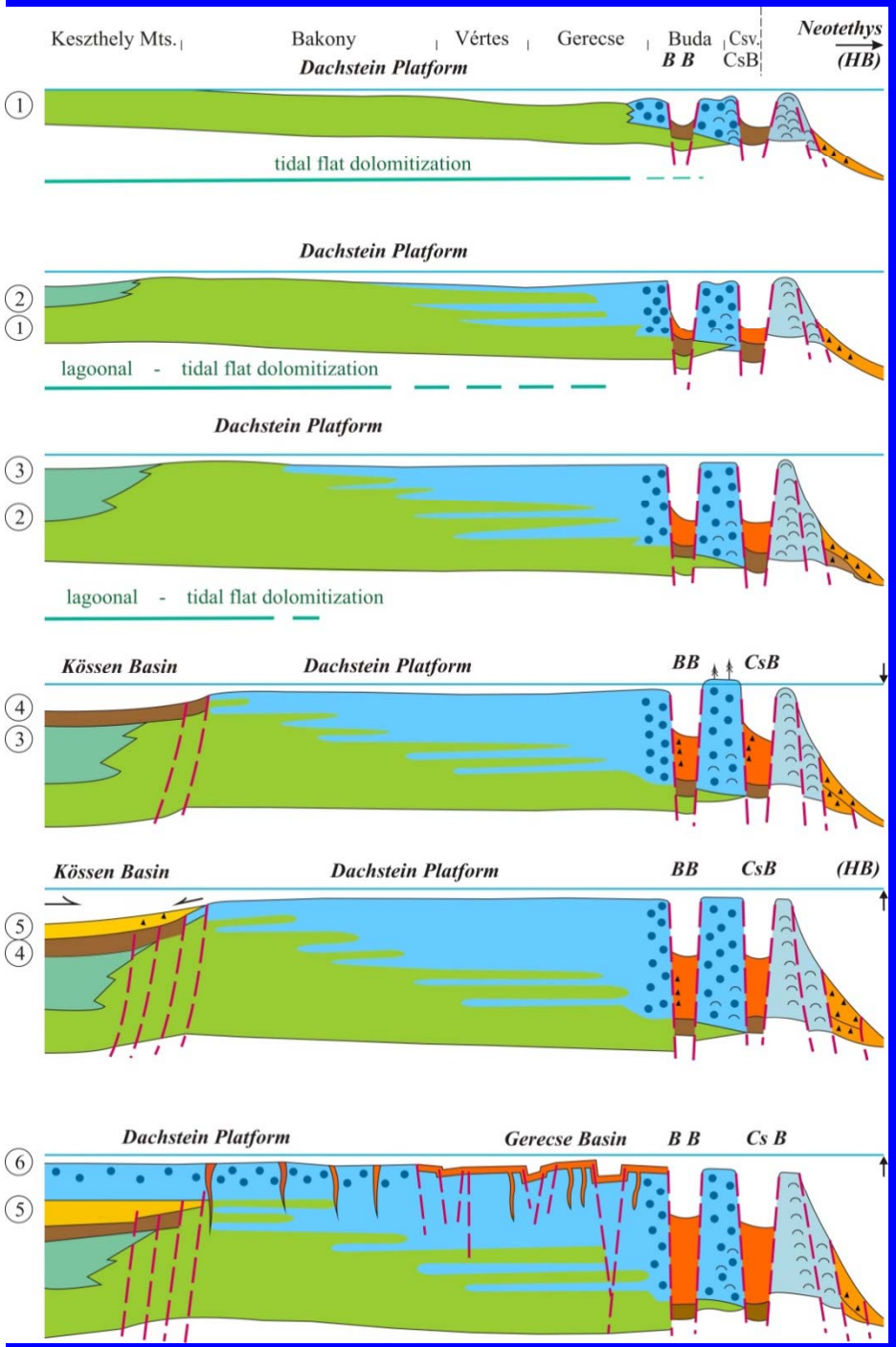
6c. Late Triassic – earliest Jurassic
prolongation of the basin conditions in the Csővár Basin







cherty limestones
carbonate turbidites
radiolarian pelagites



The main controlling factors

Geodynamic – tectonic

- -development of extensional basins at the Neotethys margin since the Late Carnian
- -development of the Kössen Basin at the Penninic margin during the latest Norian-Rhaetian

Climatic

- -determiation of the width of the zone of optimal dolomitization in the internal palatform – decreasing aridity
- -siliciclastic event in the Kössen Basin in the Rhaetian -- humid episode

Eustatic

- -high-frequency sea-level oscillation reflects in the Lofer-cyclicity
- -higher order sea-level changes: transgression in the latest Carnian sea-level drop in the latest Norian transgression since the Rhaetian