ge chemische Unterschiede zwischen den zwei Polymorphen erkennbar. Innerhalb des Calcits ist mittels Kathodolumineszenz in manchen Proben Lagenbau nachweisbar, der durch jahreszeitliche Änderungen in der Zusammensetzung der Paläowässer, besonders deren Redox-Potentials, bedingt sein dürfte.
Der Aragonit tritt in zwei Typen auf. Der häufigere Typ (Aragonit I) weist eine deutliche Bänderung auf und zeigt unter dem Mikroskop eine dunkelbraune Färbung. Der strahlige Aragonit II verdrängt lokal Aragonit I. Der Calcit tritt zumeist als Fasercalcit auf und verdrängt häufig Aragonit I.
Anhand der Existenz der beiden $CaCO_3$ Polymorphe können Rückschlüsse auf die Paläowässer gezogen werden, die zur Bildung dieser Phasen geführt haben. Welches Polymorph sich bei $CaCO_3$-Übersättigung bildet, hängt in erster Linie von zwei Faktoren ab, vom Ca/Mg Verhältnis und der Konzentration der Lösung. Ein hohes Mg/Ca Verhältnis in der Lösung behindert die Nukleation von Calcit und ermöglicht so metastabile Aragonitbildung. Hohe Fließraten des Wassers und hiermit zusammenhängend geringere Konzentration begünstigen hingegen die Calcitbildung. Aragonit ist generell ein typisches Karbonatmineral für warme Höhlen und seine Präsenz kann somit als Indikator für eine ehemals höhere Evaporation der Bergwässer gewertet werden. In erster Annäherung kann somit eine Wechselfolge bestehend aus Calcit und Aragonit als qualitativer Hinweis auf länger andauernde Schwankungen in der Konzentration und/oder Temperatur dieser Kluftwässer im Inneren des Sonnenberges interpretiert werden. Da diese Schwankungen primär Ausdruck des Wasserangebotes bzw. der Konzentration des Bergwassers darstellen, kann der interne Aufbau der langsam wachsenden Kluftsinter als kontinuierliche Aufzeichnung klimatischer Schwankungen gesehen werden.
Auch heute bilden sich calcitische Sinter lokal eindeutig noch weiter. Hydrochemische Analysen belegen, daß die am Sonnenberg austretenden Wässer sowohl an Calcit als auch zumeist auch an Aragonit übersättigt sind. Allerdings erfolgt die Sinterbildung heute mit Sicherheit nicht mehr in dem Ausmaß wie im Spätglazial und frühen Holozän.

Sequence Stratigraphy of the Muschelkalk and Lower Keuper in the southwestern Germanic Basin: importance of lateral variations in relative sea-level

VECSEI, A.* & DURINGER, P.**

*Geologisches Institut der Universität, Albertstr. 23B, 79104 Freiburg i. Br., Germany, **Université Louis Pasteur (Strasbourg I), E.O.S.T., Institut de Géologie, 1 rue Blessig, 67084 Strasbourg Cédex, France

The Muschelkalk and Lower Keuper strata in the intracratonic Germanic Basin were deposited on mixed carbonate and siliciclastic ramps (Lower and Upper Muschelkalk) and on mixed siliciclastic-evaporitic marginal-marine plains (Middle Muschelkalk and Lower Keuper) during Middle Triassic time. We have analyzed this succession along a 200 km long transect from the southwestern paleo-basin margin (in Luxembourg and western Germany) to the basin center (the Alsace-Lorraine Trough in eastern France).
The sequence stratigraphy in this epicontinental basins shows important differences to the sequences at passive margins commonly used in stratigraphic models. The lower Middle Muschelkalk is a continental redbed series. These redbeds can not be interpreted with the existing sequence concepts based on sea-level control. The upper Middle Muschelkalk and the Upper Muschelkalk are interpreted as one sequence. Its lower boundary is at an imprecisely known interval within the Middle Muschelkalk. The transgressive systems tract (TST) starts at the first marine flooding surface (below the first areally extensive evaporites) within the transgressive upper Middle Muschelkalk, and ends at the maximum flooding and maximum depth levels within the Upper Muschelkalk. The Middle/Upper Muschelkalk boundary, which marks a turn from predominantly siliciclastic and evaporitic to open-marine carbonate sedimentation, is probably a series of diachronous flooding surfaces within the TST.

In the basin center, we recognize a maximum water depth interval that contains the unrecognized maximum depth surface, based on the most distal tempestites in the thickest clay interval (DURINGER & VECSEI 1998). There is no flooding record in the basin center. The maximum depth interval is probably one ceratite zone or more younger than the maximum flooding surface at the basin margin. The diachroneity of the maximum flooding surface and the maximum depth interval suggest different tectonic components of the relative sea-level at the basin margin and center. Such lateral differences in relatively sea-level are likely to be common in epicontinental basins. The greatest subsidence rates were not attained in the geographical basin center, but in the Nancy-Sarreguemines Trough (southern Saarland and adjacent area in France). In a three-dimensional view, we suggest that distinct maximum flooding areas and maximum depth areas occur within this basin and tectonically similar intracratonic basins.
The upper part of the Upper Muschelkalk is the highstand systems tract (HST). A coastal bar retrograded in the TST and then prograded in the HST (VECSEI et al. 1999). During the final stage of the regression in the HST, a tidal flat prograded along the basin margin (VECSEI 1997). The Muschelkalk/Keuper boundary is a Type 1 sequence boundary, characterized by paleosol formation at the basin margin, and by submarine erosion in the lagoon and part of the shelf. In the basin center, the Muschelkalk/Keuper boundary is contained within a regressive (subtidal to intertidal) succession that records a forced transgression (early lowstand systems tract, ELST).

The Lower Keuper contains fine-grained siliciclastic deposits, evaporites. and dolostones of an intermittently flooded marginal-marine plain. The Lower Keuper strata contain an additional sequence boundary of undetermined type. On this marginal-marine plain, a low-amplitude relative sea-level fall resulted in this high-frequency sequence. In contrast, on the deeper-water ramp of the Upper Muschelkalk, several sea-level falls of similar low amplitude resulted in higher- order flooding surfaces between parasequences.

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Shell preservation of *Globigerina bulloides* (planctic foraminifera) and *Limacina inflata* (Pteropoda): new proxies for carbonate corrosiveness of water masses

VOLBERS, A., GERHARDT, S. & HENRICH, R

Dept. of Geoscience, University of Bremen, Germany, avolbers@mail.sedpal.uni-bremen.de

New proxies from carbonate preservation of planctic foraminifera (calcite) and pteropods (aragonite) have been established in Atlantic surface sediments and calibrated to the carbonate corrosiveness of surface, intermediate, and deep water masses. SEM-investigation of the ultrastructure of *G. bulloides* clearly reflects alteration of

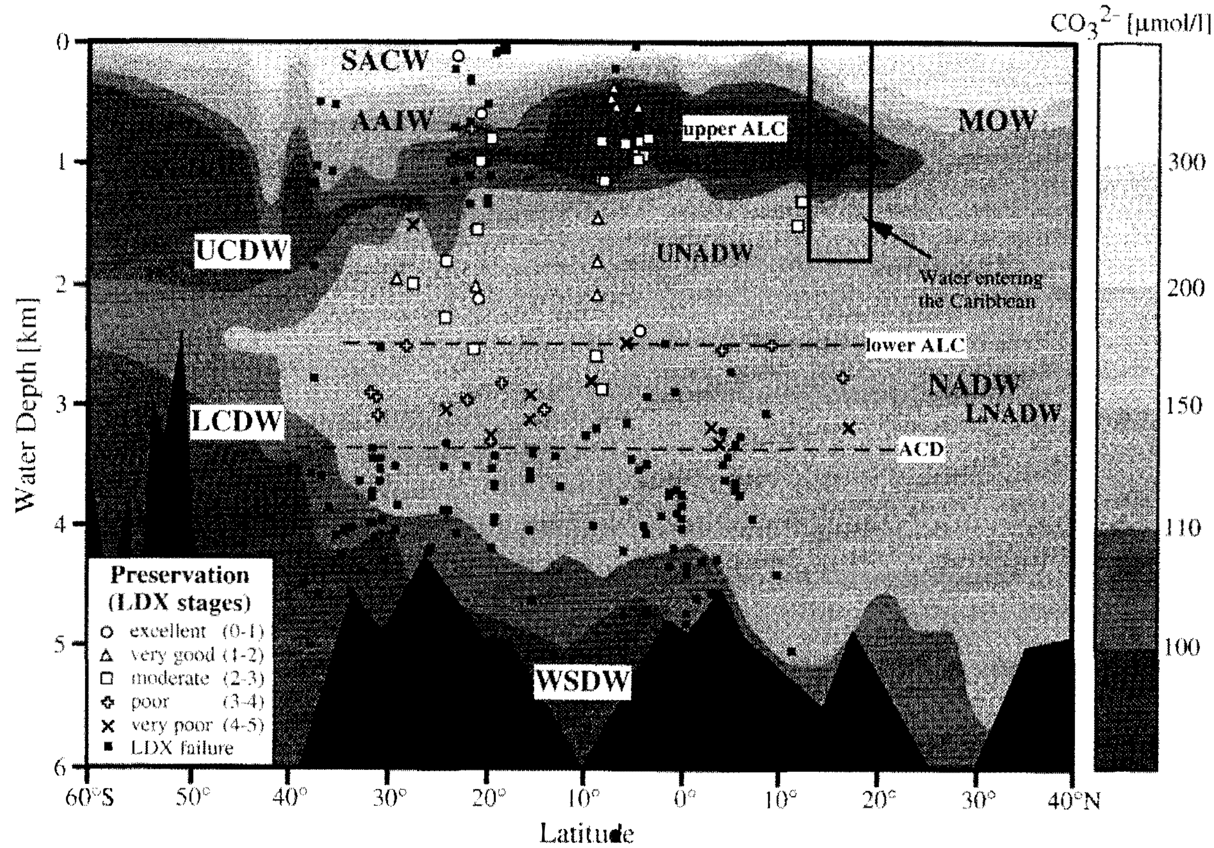

Fig. 1: LDX results in the western Atlantic Ocean compared with the present water mass distribution. SACW= South Atlantic Central Water, AAIW = Antarctic Intermediate Water, MOW= Mediterranean Outflow Water, UCDW = Upper Circumpolar Deep Water, LCDW = Lower Circumpolar Deep Water, UNADW = Upper North Atlantic Deep Water, LNADW= Lower North Atlantic Deep Water, WSDW = Weddell Sea Deep Water, ACD = Aragonite Compensation Depth, ALC = aragonite lysocline.

spine bases, ridges, pores, and interpore areas during progressive dissolution (*Bulloides* Dissolution Index, BDX'). Test preservation generally worsens with increasing water depth towards the top of the calcite lysocline, which is marked by increasing dissolution around 4100 m water depth in the Brazil Basin. The calcite lysocline coincides with the NADW and AABW boundary, whereas the CCD is reconstructed below 5000 m within AABW.

The state of preservation of *L. inflata*, determined by light-microscopy, yielded the *Limacina* Dissolution Index (LDX). The LDX indicates strong correspondence between preservation states and saturation states in the overlying waters. Worse preservation is found within intermediate water masses (AAIW and UCDW) and good preservation is found within the surface water and UNADW (see Fig. 1 and GERHARDT & HENRICH, subm.). The resulting S-shaped curve trend indicates the presence of two aragonite lysoclines at about 750 and 2500 m depth in the Brazil Basin. In the eastern Atlantic, the LDX fails in most cases mainly due to extensive dissolution at the sediment-sea water interface. The BDX' and LDX show much promise as reliable proxies for the reconstruction of deep and intermediate water masses.

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Inversion tectonics in Upper Triassic sediments on the western margin of the Yangtze-Platform, Yunnan Province, P. R. of China

WAGNER, B.*, ZHANG, G.**, BANNERT, D.***, HELMCKE, D.* & ZHANG, Y.**

*Institute for Geology and Dynamics of the Lithosphere Goettingen (Germany), **Yunnan Bureau of Geology and Mineral Resources Kunming (P. R. of China), ***Federal Institute of Geosciences and Natural Resources Hannover (Germany)

Strong contractional deformation of Upper Triassic age (Indosinian orogeny) is widely considered to be characteristic of regions on the western margin of the Yangtze-Platform. However, recent field work in the area between Lijiang and Heqing revealed evidence for synsedimentary extension in Middle to Upper Triassic sediments. This extensional phase was followed during Uppermost Triassic to Lower Jurassic by rather weak transpressional deformation, creating typical inversion structures.
An outcrop proving this exemplary is situated 18 km south of Heqing along the road between Lijiang and Dali (Yunnan Province). This outcrop exposes Upper Triassic clastics of the Songgui-Formation. The exposed part of the middle Songgui-Formation consists of alternating dark mudstones and brownish silt- to sandstone beds. Within some layers graded bedding and convolute lamination occurs. At the base of some beds groove casts, sometimes overprinted by load casts can be observed. According to YBGMR