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er levels that increased only modestly throughout the rest of the Cenozoic. We use both a new, as yet unpublished catalog of diatom species, and a new version of the Neptune database (NSB, based at the MfN in Berlin) to calculate new diversity estimates for Cenozoic diatoms. Unlike the earlier studies with Neptune, in our analyses of NSB occurrence data we combine subsampling with additional analyses to compensate for biases in subsampled estimates due to changing patterns of dominance, and the development of largely endemic polar floras during the Cenozoic.

Our results from analysing both the catalog data and from NSB are similar. They show a small temporary Eocene diversity peak, followed by strong further diversity increase beginning in the mid Miocene, resulting in much higher late Neogene diversity than in the earlier Cenozoic. While a simple compilation of diversity (SC99) is indeed biased towards over-estimatation of increase due to sample size bias, failure to consider changing dominance and biogeography when using subsampling methods (RS09) leads to equally severe underestimation of diversity increase. Our own results are still underestimates of the extent of diatom diversification, in that we have not included the effects of systematic changes in preservation and style of data recording over the Cenozoic, both of which have probably biased the data against detecting diversity increase over time.

S5 – Building a global infrastructure for 21st Century marine micropaleontology

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Marine micropaleontologic research addresses problems that are global in scope and increasingly needs tools to access and synthesise data on a global scale. Current data systems are inadequate: ocean drilling program databases contain only a subset of raw primary data; archives e.g. Pangea hold fragmentary, non-standardised literature results. The MfN Berlin leads development of two databases that address this need -the most recent version (NSB) of the Neptune database of microfossil occurrences, and the IODP supported master Taxonomic Name Lists of marine microfossil species (TNLs). The MfN also is lead curator for the Micropaleontology Reference Centers – a global network of nearly 200,000 marine microfossil slides/samples, and develops the MRC database.

Neptune originated at the ETH, Zürich in the 1990s (Lazarus, 1994); was improved by porting to standard internet capable database software, and with additional data records, by the NSF supported Chronos project in the 2000's. NSB, with financial support from CEES, Oslo, was created by Lazarus (MfN) and P. Diver, chief programmer for Chronos after the end of the Chronos project. NSB holds > 500,000 occurrence records for several thousand marine microfossil species; age models for sections; and taxonomy with synonyms. Neptune has been used/cited in > 40 publications, primarily in evolution studies, or as a source of global age information; including several in Science, Nature and PNAS. Improved community access to NSB is planned for the coming year.

The TNL database of IODP has recently been created by members of IODP's Paleontology Coordination Group (PCG) to allow integration and exchange of paleontology data throughout the multi-agency IODP effort. It contains over 18,000 evaluated species names for planktonic foraminifera, radiolaria, coccolithophores, diatoms and dinoflagellates. The TNL is based on IODP's own databases, the Neptune taxonomy tables and several large community databases. It will be hosted at IODP and maintained under supervision of the PCG, and is expected to provide a standard source of taxonomic names for use by both IODP and the general science community.

The MRC database is sample, not taxon oriented, but shares a common format for sample names with the other databases. Future development is planned to cross-correlate to the NSB age-model library, thus allowing rapid searching for slides/samples by age that in turn are linked to the results of other NSB searches.

With convergence of data content, data technologies (all these databases use Postgres) and growth of internet data exchange standards, the NSB, TNL and MRC databases are becoming more closely linked to each other, forming a global federated structure for use in 21st century marine micropaleontologic research.

S13 – Early Triassic microbialites and carbonate factory changes across the Permian-Triassic boundary near Julfa (NW Iran) and Abadeh (Central Iran)

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Permian-Triassic boundary sections in the regions of Julfa (NW Iran) and Abadeh (Central Iran) display three characteristic rock units: (1) the *Paratirolites* Limestone (4-5 m thick) with the mass extinction horizon (P-Tr extinction event) at the top surface (2) the 'Boundary Clay', and (3) the Elikah Formation with the conodont P-Tr boundary near the base.

The *Paratirolites* Limestone is the uppermost of the Permian carbonate formations. It is a pelagic red nodular marly limestone and represents a skeletal-dominated benthic carbonate factory. Microfacies studes show a decline in carbonate accumulation towards the top of this unit, where increasing numbers of reworked hardground clasts, bored and encrusted bioclasts and lithoclasts, ferruginous crusts, and dissolved cephalopod shells occur. The reduction in the carbonate accumulation culminates at the transition from the *Paratirolites* Limestone into the 'Boundary Clay', where red claystone and shales with only few marly nodules replace the carbonate factory. At this transition occurs also a significant reduction of biogenic components. In Central Iran, in the transition from the 'Boundary Clay' to the overlying grey platy limestone beds of the Elikah Formation occur one or more enigmatic 'calcite fan' layers of probably abiotic origin. The skeletal carbonate factory of the Late Permian was restorted with the deposition of micritic limestone with stromatolitic and thrombolitic fabric at the base of the Elikah Formation. Densely laminated bindstone, aggregate grain grapestone, wackestone with calcite spar-filled voids, and oncoid floatstone represent a microbial-dominated carbonate factory.

Microbial carbonates deposited in the Early Triassic Elikah Formation are represented by different types of microbialite and stromatolite. In the sections near Julfa the organosedimentary deposits are controlled by benthic microbial communities; they can be classified based only on their microstructure. They comprise fine-grained agglutinated stromatolite, poorly structured thrombolite, and cryptic microbialite. In the sections near Abadeh, in contrast to the sections near Julfa, the occurrence of the microbialite and stromatolite is more diverse and large-scale features with conspicuous morphology and internal structure occur. They comprise heart-shaped, flower-shaped, isolated and amalgamated forms. Thrombolite mounds with clotted mesofabric, planar and domal stromatolites with laminated mesofabric predominate.

The P-Tr boundary sections in Julfa area and Central Iran were deposited on a carbonate shelf (platform) in equatorial latitudes. Skeletal, biotically controlled benthic carbonate factory of the Late Permian has been replaced by the biotically induced carbonate factory of the Early Triassic, with periods of abiotic precipitates within the 'Boundary Clay' and in the Elikah Formation. Microbialites deposited in the aftermath of the P-Tr mass extinction are considered to be anomalous are mentioned as biotic responses to periods of unusual ocean chemistry.

S14 – The early evolution of terrestrial tetrapod communities

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The general pattern observed within the trophic structure of modern terrestrial tetrapod communities is a predominance of herbivores over carnivores, specifically with respect to their relative abundance (number of individuals). However, early tetrapod communities were dominated by carnivorous taxa. Herbivorous tetrapods only became a major component of terrestrial ecosystems later during the Paleozoic and long after their first appearance in the late Pennsylvanian. Here we address the question of the exact timing and modalities of this shift between carnivore and herbivore proportions in terrestrial ecosystems. Based on the number of specimens, we study the variation in the trophic structure, the body size distribution and the taxonomic composition of tetrapod assemblages from the Late Carboniferous to the Late Permian. We compiled a dataset of 151 terrestrial and sub-aquatic genera, derived from 175 fossil assemblages from North America and Eastern Europe. Preliminary results show that herbivores become a major component of terrestrial ecosystems by the late Early Permian (Leonardian). From the early Middle Permian (Roadian), this structure is well established, both in North America and Eastern Europe. This shift seems to represent a global signal as contemporaneous faunas from the Karoo Basin (South Africa) also show a high dominance of herbivorous taxa. In Eastern Europe and in North America, this shift is accompanied by a modification in the body size distribution within carnivores. Indeed, carnivore-dominated communities are mainly composed of small species during the Pennsylvanian and of large species from the end of the Carboniferous. However, when herbivores become dominant in communities, carnivores tend to decrease in size, showing more medium-sized individuals. Finally, North American faunas (Early to Middle Permian) and Eastern European faunas (Middle to Late Permian) are taxonomically distinct, the former being dominated by "pelycosaurs", the latter by therapsids. However, beyond the traditional view of a temporal transition between these faunas, the Roadian assemblages from both continents suggest that their taxonomic structure is further imprinted by a strong geographic heritage, while showing the same ecological structure.

S25 - Integrated palaeontology of the Early Aptian at the southern margin of the Lower Saxony Basin: An unusual near-shore bay deposit including OAE 1a

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