

in doing so convert it primarily to N_2 gas. Denitrification strongly fractionates nitrogen isotopes, leaving the remaining NO_3^- enriched in $\delta^{15}N$. A paleoceanographic record for denitrification intensity is created when $\delta^{15}N$ -enriched NO_3^- is transported to surface waters, consumed by phytoplankton, transported downward with organic matter and preserved in the sediments. When there is good to excellent preservation of organic matter at the sea floor due to either suboxic bottom water and/or high sediment accumulation rates, sediment $\delta^{15}N$ faithfully records the $\delta^{15}N$ of sinking organic matter. Marine water-column denitrification is principally concentrated in three areas: the Arabian Sea, the Eastern Tropical North Pacific and Eastern Tropical South Pacific. The advent of well-dated, high-resolution records of sedimentary $\delta^{15}N$ generated by us from each of these regions now facilitates comparison of the relative timing of their large changes in denitrification since the last glacial maximum (~25 Ka). By assigning a hypothetical equal contribution to global marine denitrification from well-constrained records from each region, we have calculated a marine denitrification composite (MDC) record which strongly resembles the Taylor Dome ice core Antarctic CO_2 record. Such early and coincidental changes in $\delta^{15}N$ and CO_2 prompt us to hypothesize that changes in the inventory of marine nitrate caused by increased denitrification subsequently altered global marine carbon sequestration, especially in the vast oligotrophic regions of the oceans, at a time of concurrent reductions in atmospheric dust inventory. Since the process of denitrification is accelerated by low oxygen conditions, it is sensitive to both remote ventilation rates at the source of intermediate water and in situ respiration rates during the sinking of organic matter. We note that the timing of increased denitrification during deglaciation is earliest in the ETSP, followed by a peak in the ETNP, with maximum $\delta^{15}N$ recorded in the Arabian Sea approximately 2.9 Kyr later. The ventilation of intermediate water originates in the Southern Ocean and is advected simultaneously to the denitrification regions. Therefore, regional processes such as export production must primarily determine denitrification rates, modulated by preconditioning of intermediate water masses. We conclude that although the initial trigger for deglaciation may lie with SST and ice cover changes in the Southern Ocean, its progress to interglacial conditions was determined by regional effects such as rates of upwelling driven by low-latitude Walker/Hadley Circulation and the monsoon at each location.

URL: <http://www.smast.umassd.edu/cmastweb/biohigginson.html>

PP41A-08 0945h

Abrupt Climate Change During the Last Glacial Cycle Based on Gulf of Mexico Sediments

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Evidence is emerging that the tropical climate system played a major role in past global climate change during the last glacial cycle. However, existing studies indicate asynchronous temperature variability in the western equatorial Atlantic, complicating the identification of causal mechanisms. Because the Gulf of Mexico (GOM) is linked to the equatorial Atlantic, sea-surface temperature (SST) records from the GOM help assess the phasing between low- and high-latitude Atlantic climate. High sedimentation rates of >40 cm/k.y. and laminated sediments in Orca Basin allow sub-centennial-scale resolution. Paired $\delta^{18}O$ and Mg/Ca data on the planktic foraminifer *Globigerinoides ruber* from core EN32-PC6 are used to separate deglacial changes in SST and $\delta^{18}O$ seawater due to low-salinity meltwater from the Laurentide Ice Sheet (LIS). Mg-SST increases by >3.0°C between 17.2 and 15.2 ka (calendar years) encompassing Heinrich Event 1 in the North Atlantic. Comparison to polar ice core records indicates GOM SST was not in phase with Greenland air temperature, consistent with thermohaline circulation modulation of Atlantic climate. This warming represents the bulk of the 4.2±/−0.9°C increase from the last glacial maximum (24.0±/−0.8°C) to early Holocene (29.0±/−0.4°C). Subtracting temperature and ice-volume effects from *Gs. ruber* $\delta^{18}O$ reveals two episodes of LIS meltwater input, one of >1.5‰ from ca. 16.2–15.7 ka and a second major spike of >2‰ from ca. 15.2–13.0 ka that encompassed meltwater pulse 1A (mwp-1A) and peaked at ca. 13.4 ka. These results suggest that (1) subtropical Atlantic SST

warming preceded peak LIS decay and mwp-1A by >2 k.y., (2) thermohaline circulation may have modulated Atlantic climate on the millennial scale during the last deglaciation, and (3) major LIS meltwater input to the GOM ended before North Atlantic Deep Water suppression during the Younger Dryas. A new 31.79 m Calypso piston core collected in July 2002 on the R/V Marion Dufresne (MD02-2551) documents GOM climate variability associated with Dansgaard-Oeschger (D-O) cycles known from Greenland ice records. *Gs. ruber* $\delta^{18}O$ data from the 40–30 ka interval (30 year resolution) reveal cycles of >1‰ amplitude that closely match D-O cycles 8–5, although the relative phasing is complex. Paired $\delta^{18}O$ and Mg/Ca data indicate that these oscillations reflect significant changes in $\delta^{18}O$ seawater that result from changes in evaporation/precipitation balance and LIS meltwater input. Overall, significant sub-centennial- to millennial climate variability persists throughout the last glacial cycle in the GOM.

PP41B MCC: Level 2 Thursday 0830h

Mesozoic Black Shales: Fresh Looks at an Old Problem I Posters (joint with OS)

Presiding: K G MacLeod, University of Missouri; P A Meyers, University of Michigan

PP41B-0835 0830h POSTER

The Mid-Barremian Event (MBE): the Prelude to the OAE1a

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Detailed litho-, bio- and chemostratigraphic investigations of the Hauterivian-lowermost Aptian Maiolica pelagic limestones in the Umbria-Marche sequence, allowed to identify that the Selli Level, which is the regional sedimentary expression of the OAE 1a, represents the climax of a ca. 5 myr-long cycle of black shale deposition starting at the lower/upper Barremian boundary within polarity Chronozone M3 and H. similis-H. kutznetsovae planktonic foraminiferal Zone, that is in the lowermost part of the calcareous nanofossil Zone NC 5D. This long-term cycle starts with a prominent short-term event, here named mid-Barremian Event (MBE), which is associated with several changes in the biotic and abiotic records. In particular, a comparison of the available chemo- litho- and biostratigraphic data from the Umbria-Marche Basin, allows to recognise that the MBE is defined by: 1) a 0.5 per mil positive shift in the carbon isotope values (Hadji, 1993; unpublished data); 2) a major step in the initial evolutionary radiation of planktonic foraminifera (unpublished data); 3) a major turnover in the radiolarian assemblages (Jud, 1994; O'Dogherty, 1994). The above mentioned change in carbon isotope values can be confidently correlated over the Mediterranean Tethys which is the sole area where a detailed isotopic record is available for the entire Barremian (Erba et al., 1999; Wissler et al., 2002). These lines of evidence concur to define the MBE as an outstanding event associated with large scale changes in the ocean-climate system likely related to the rapid oceanic Ontong-Java Plateau formation, which eventually led to OAE1a. Remarkably, the MBE largely predates the well known series of biotic and geochemical events occurring prior to the OAE1a and may be considered as the real turning point in the Barremian-Aptian long-term cycle of black-shale deposition and evolutionary turnovers in several fossil groups. References Erba, E., Channell, J.E.T., Claps, M., Jones, C., Larson, R., Opdyke, B., Premoli Silva, I., Riva, A., Salvini, G., and Torricelli, S., 1999, Integrated stratigraphy of the Cisono Apticore (Southern Alps, Italy): a "reference section" for the Barremian-Aptian interval at low latitudes. *Journal of Foraminiferal Research*, v. 29, pp. 371–391. Hadji, S., 1993, Stratigraphie isotopique des carbonates pélagiques (Jurassique supérieur-Crétacé inférieur) du bassin d'Ombrie-Marches (Italie). PhD Thesis, Univ. Pierre et Marie Curie, Paris, 118 pp. O'Dogherty, L., 1994, Biochronology and Paleontology of Mid-Cretaceous Radiolarians from Northern Apennines (Italy) and Betic Cordillera (Spain): *Mémoires de Géologie (Lausanne)*, v. 21,

413 pp. Rud, J., 1994, *Biochronology and Systematics of Early Cretaceous Radiolaria of the Western Tethys: Mémoires de Géologie (Lausanne)*, v. 21, 147 pp. Wissler, L., Weissert, H., Masse, J.P., and Bulot, L., 2002, Chemostratigraphic correlation of Barremian and lower Aptian ammonite zones and magnetic reversal: *Int. J. Earth Sci. (Geol. Rundsch.)*, v. 91, pp. 272–279.

PP41B-0836 0830h POSTER

Timing and Paleoceanography of Early Cretaceous Oceanic Anoxic Events in the Pacific Ocean as Determined From Wireline Logs

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DSDP and ODP core recovery of Early Cretaceous pelagic sediments in the Pacific Ocean has been limited by the widespread occurrence of chert. Remarkably, Leg 198 of the Ocean Drilling Program (Shatsky Rise, north west Pacific) was very successful in recovering shales rich in organic-carbon, dated as being equivalent to the Early Aptian "Selli Level", thus confirming the truly global nature of Oceanic Anoxic Event 1a. However, recovery of contiguous deposits of late Aptian and Albian age was generally poor. Two of three sites at which OAE1a was recovered (1207 and 1213) were logged using standard downhole geophysical tools, which provide us with an alternative method for investigating the sedimentary and paleoceanographic history of these sites. Using the downhole logs we present an interpretation of the Aptian-Albian sedimentary history of Shatsky Rise and discuss the paleoceanographic implications of changing abundances of clay, carbonate and bioliteous sediments. Plotting the geophysical logging data against time yields interesting information about the onset, duration and termination of organic-carbon burial. Comparison with logging and biostratigraphic data from other sites in the Pacific and Tethys allows us to assess whether OAE1a was truly synchronous and to evaluate differences in paleoceanography in different ocean basins during OAE1a.

PP41B-0837 0830h POSTER

Correlation, Fauna And Sedimentary Environments Of The Mid-Cretaceous Oceanic Anoxic Event Horizons In North-west Pacific Margin.

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The Cretaceous Yezo Group exposed in northern Japan consists mainly of mudstone and turbiditic sandstone deposited in the continental slope to shelf off the eastern margin of Asian continent. The 10000-m-thick sequence provides a synthesis concerning paleontological, sedimentological and paleoenvironmental histories during early Aptian to Maastrichtian in the mid-latitude North-west Pacific margin. Based on an integration of bio- and chemo-stratigraphic results of the Yezo Group using macrofossils (ammonoids and inoceramids), microfossils (planktic foraminifers and calcareous nanofossils) and carbon isotope of wood fragments, we can recognize five chemo-stratigraphic events corresponding to the Oceanic Anoxic Events (OAE 1a, 1c, 1d, MCE, 2) that are accompanied with prominent negative or positive $\delta^{13}C_{worg}$ excursion. No black shales or marine-organic rich sediments were consequently detected at these horizons in the Yezo Group because voluminous siliciclastic influx from the Asian Continent diluted organic matter content in the sediments. The characteristics of faunal turnover and

chemo-stratigraphic changes during the OAEs are summarized as follows.

The OAE 1a horizon of the Yezo Group is recognized by the presence of a pair of negative-and-positive $\delta^{13}C_{wood}$ excursions during the Early Aptian. Mudstone at the horizon is characterized by finely laminated with rare or barren benthic macro- and microfossils. The OAE 1b may be missing by a significant hiatus between late Aptian and early Albian. The OAE 1c represents a distinct negative $\delta^{13}C_{wood}$ excursion of 1 ‰ with an explosion of radiolarians and moderate bioturbations during the *Biticinella bryggenensis* Zone. Calcareous foraminifers disappear at the horizon. The rocks at the OAE 1d level consists of weakly laminated pyrite-rich mudstones with a broad positive excursion of $\delta^{13}C_{wood}$. Planktic and calcareous benthic foraminifers are lacking, while radiolarians are abundant at the horizon as well as the OAE 1c. A 1.2 ‰ positive excursion of $\delta^{13}C_{wood}$ within the *Rotalipora cushmani* Zone can be correlated with the horizon of the mid Cenomanian Event (MCE). Step-wise extinction of calcareous benthic foraminifers and a noted decrease in radiolarian abundance begin above the horizon. The OAE 2 horizon is marked by laminated pyrite-rich mudstone with a prominent $\delta^{13}C_{wood}$ positive excursion of 2.5 ‰. Investigation of benthic foraminifer assemblages demonstrates that the two lowest oxygen conditions developed during 0.15 m.y. before the C/T boundary and 1.5 m.y. after. Significant radiolarian explosion also occur just above the boundary. These characteristics of major faunal turnover and paleoenvironmental changes at the OAE horizons of the Yezo Group are very similar to those of the Tethyan and Atlantic regions.

PP41B-0838 0830h POSTER

Aptian-Albian Carbon Burial Episodes At The Apulian Platform Margin (Gargano Promontory, Southern Italy): Regional Versus Global Driven-Mechanisms

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The Gargano Promontory (Southern Italy), located at the eastern margin of the Apulia Platform, is a peculiar area of the Tethys where the transition between platform and adjacent basins is exposed on land. Microfossil distribution patterns and high-resolution carbon- and oxygen-isotope curves, calibrated against planktonic foraminifer and calcareous nannofossil biostratigraphy, are provided for the Aptian-Albian pelagic succession (Marne a Fucoidi). The Gargano Promontory sequence shows similarities with that of the nearby Umbria-Marche Basin, though some lithological differences exist probably due to the platform proximity. In the Marne a Fucoidi of the Gargano area, four carbon burial episodes were documented. The biostratigraphic data assign the older black shale to the Selli Level equivalent (Lower Aptian); this carbon-rich interval is immediately followed by another black shale early Late Aptian in age. In the Albian portion of the succession two anoxic episodes occur and correlate the Urbino Level' (OAE1b, Lower Albian) and Amadeus segment' (OAE1c, Upper Albian) of the Umbria-Marche Basin. The carbon- and oxygen-isotope record is in line of evidence with the curves documented elsewhere. Nevertheless, regional controlling factors influenced the record of the global anoxic events producing sedimentary expressions and biotic responses which may differ from those of the type-locality. The Selli Event (OAE1a), characterized by a pronounced abrupt negative carbon-isotope excursion, is generally interpreted as a high productivity episode followed by a global cooling trend. In the Gargano Promontory, albeit the carbon- and oxygen-isotope curves support the same evolution, the micropaleontological data do not give evidence of particularly high fertility of the surface waters. The lower Upper Aptian black shale appears as a local event and correlates the main Aptian carbon-isotope positive excursion. For this episode, the micropaleontological data indicate an increase in surface-water fertility. In the Lower and Upper Albian stratigraphic interval, the carbon-isotope curve records two pronounced negative shifts followed by marked increases of the values. The oxygen-isotope curve shows negative shifts in the same stratigraphic position, which may be interpreted as, essentially primary, records of warming events. The synchronous negative shifts in carbon and oxygen isotope curves may be the documentation of dissociation of gas hydrates somewhere in the world ocean and the near-instantaneous

oxidation of the released methane to another greenhouse gas, carbon dioxide and consequent rapid global warming. The two Albian episodes of organic carbon burial, the Urbino' and Amadeus' level equivalents, correlate the carbon and oxygen shifts. Microfossil distribution patterns give evidence of high productivity for these episodes. Global versus regional features of Albian anoxic episodes are still largely debated. A reliable correlation exists between the Lower Albian successions of the Gargano Promontory, the Vocontian Basin (Southeastern France) and the Magazan Plateau (Northwest Africa). Similar isotopic signatures for the Albian events may record phenomena that were similar in kind.

PP41B-0839 0830h POSTER

Negative spikes of isotopic composition of organic matter in Cretaceous OAE-2 black shales

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To demonstrate paleoecological changes during the mid-Cretaceous Oceanic Anoxic Event-2 (OAE-2, 93 Ma), we determined isotopic ratios of total organic carbon ($\delta^{13}C_{org}$) for samples collected across the "Livello Bonarelli" black shale enriched in organic carbon (up to 25%). About 500 samples were measured in a 1 m sequence of the Bonarelli black shale to reconstruct ultra-high-resolution $\delta^{13}C_{org}$ record during the OAE-2. The $\delta^{13}C_{org}$ profile shows fine-scale fluctuations as well as an upward increasing trend (up to -22 ‰) due to an enhanced organic carbon burial during the OAE-2. We found several narrow ^{13}C -depleted intervals down to -35 ‰. This value is substantially lighter than the adjacent samples (-22 to -27 ‰) as well as those previously reported both from the Bonarelli and other Cretaceous black shales. Such large, rapid negative spikes of $\delta^{13}C_{org}$ could not simply be ascribed to the variability of isotopic fractionations by primary producers during the event, but it may reflect the contribution of organisms metabolizing isotopically light carbon like methane. In order to examine this, we measured carbon isotope ratios of lipid biomarkers extracted from several intervals including the isotopically light intervals. Unexpectedly, the results show that the extractable lipid compounds such as alkanes, hopanoids, isoprenoids, alkanols and fatty acids indicate relatively constant $\delta^{13}C_{org}$ values mostly ranging from -25 to -30 ‰, even in the ^{13}C -depleted intervals. It suggests that the ^{13}C -depleted compounds exist as non-extractable form of organic matter (kerogen) in the black shale. In the presentation, we will report carbon isotopic compositions of kerogen-bound compounds in the ^{13}C -depleted intervals.

PP41B-0840 0830h POSTER

The Global Significance of a Deep-sea Isotopic Event During the Toarcian Oceanic Anoxic Event Recorded in Japan

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The record of the Toarcian oceanic anoxic event (OAE) is considered global in nature due to the occurrence of organic carbon-rich sediments worldwide, although its expression in the carbon isotopic record (marine carbonate and organic matter and terrestrial plants) has only been recorded in European localities. We have investigated the carbon-isotope record

of marine organic matter in deep-sea cherts of the Inuyama area in Japan. This stratigraphic chert sequence records the Toarcian OAE through a transition from red to black to red-green cherts and radiolarian biostratigraphy indicates a Pliensbachian-Toarcian age range. A major negative carbon-isotope excursion (~ 6 ‰) is recorded just after the Pliensbachian/Toarcian boundary based on radiolarian biostratigraphy, where $\delta^{13}C_{org}$ fluctuate and peak at a value of ~ 32 ‰ that is concurrent with the highest TOC values (~ 3.5 wt %). $\delta^{13}C_{org}$ values gradually return to pre-excursion values but continue to rise to more positive values of ~ 21 ‰ just prior to the Toarcian Radiolarian Event. After this point carbon-isotope values return to pre-Toarcian values of ~ 25 ‰. This dataset confirms that the Toarcian OAE did affect the entire global carbon reservoir and was not isotopically expressed only in Europe, shallow seas or continental margin settings. The nature and cause of the excursion has been proposed to be caused by the upwelling of oxidized organic matter, a massive dissociation of continental margin CH_4 -gas hydrates and/or increased volcanism all leading to a surface-water productivity event. Based on sedimentation rates the onset of the negative $\delta^{13}C_{org}$ excursion occurs in less than ~ 100 kyr, which is certainly within the realm of a CH_4 -gas hydrate event, and the total duration of the negative excursion is ~ 500 kyr. The duration of the negative and positive $\delta^{13}C_{org}$ excursion inclusive is ~ 2 Myr. Although a definitive answer as to the driving mechanism for the negative and positive excursion and high rates of carbon burial in the deep-sea is still a matter of debate, a model of the carbon-isotope curve suggests that both CH_4 -gas hydrate and volcanism are involved in driving the global Toarcian carbon burial event. Due to the apparent synchronicity of biostratigraphy between shallow and deep-water sequences, upwelling of ^{12}C -rich organic matter could not explain the negative carbon-isotope event on a global scale.

PP41B-0841 0830h POSTER

Organic matter diagenesis and nitrogen isotopes in Cretaceous black shales ODP Leg 207, Demarara Rise.

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Excellent recovery of Cretaceous black shales on Ocean Drilling Program Leg 207, Demarara Rise has provided a unique opportunity to study organic matter diagenesis. Interpretation of paleoceanographic signals requires a sound understanding and assessment of changes to sediment chemistry and proxies. The 90m thick sequence of black shales recovered show evidence of continuing microbial activity and it is highly likely that these reactions have imparted chemical change on paleoceanographic proxies. Nitrogen isotopes are good tracers of such changes due such microbially mediated reactions as denitrification and deamination of organic nitrogen, and its subsequent conversion to N_2 and ammonia respectively. Nitrogen isotope data are reported for a 1.8 m high resolution, 18 sample section from Site 1260B (426.2-428 meters composite depth). Carbonate free and exchangeable ammonia-extracted (2M KCl) $\delta^{15}N$ pairs were run for each sample. Additionally, $\delta^{13}C_{org}$, $\delta^{13}C_{carb}$, $\delta^{18}O_{carb}$, ethylene glycol monoethylether surface area (EGME SA), and C and N elemental data have been obtained. The samples have very high TOC % (10-15 wt.%) and average C/N ratios of 25. Values average -1.13 ‰ for $\delta^{15}N_{bulk}$, and -0.97 ‰ for $\delta^{15}N_{KCl}$. The high C/N ratios and depleted $\delta^{15}N$, are typical for black shales but are significantly different from modern marine OM. The +0.16 per mil average difference between $\delta^{15}N_{bulk}$ and $\delta^{15}N_{KCl}$ indicates sub-sediment microbial degradation and $\delta^{15}N$, depleted ammonia production. Samples characterized by significant differences between $\delta^{15}N_{bulk}$ and $\delta^{15}N_{KCl}$ also have elevated C/N ratios, supporting a loss of nitrogen as ammonia. EGME SA show a positive correlation with $\delta^{15}N$ ($r^2 = .73$) with $\delta^{15}N_{bulk}$ that may be the result of a preferential sorption of relatively ^{15}N enriched ammonia on mineral surfaces. EGME SA values range between 3-3.5 m²/g. These values are relatively low despite the very high TOC% implying a nominal role of sorbative protective processes in OM preservation in this depositional setting.

PP41B-0842 0830h POSTER

Nitrogen Fixation Enhanced Organic Matter Production in Demerara Rise Black Shales

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The high concentrations of organic carbon that are common to Cretaceous black shales imply levels of sustained primary production that are unknown in the modern ocean. How organic matter productivity could be maintained for many millennia remains an open question. Cenomanian to Santonian black shale sequences in the five sites drilled by Leg 207 on the Demerara Rise range in thickness from 56m to 93m. The finely laminated sequences contain between 1 and 28 percent organic carbon, and their organic geochemical properties reveal aspects of the exceptional conditions of organic matter production and preservation involved in their formation. The results of Rock-Eval pyrolysis show that the bulk of the organic matter originates from marine primary production. Improved preservation of the organic matter is implied by C/N ratios that increase to 40 as organic carbon concentrations increase; land-plant organic matter appears to be important only in the lower Cenomanian black shales from Site 1260 in which C/N ratios sometimes reach 60. Nitrogen isotope compositions that become lighter as organic carbon concentrations increase indicate that organic matter production was enhanced by a consortium of primary producers that included nitrogen fixing bacteria. Expansion of an intensified oxygen minimum zone into the photic zone probably permitted coexistence of algae and the photosynthetic microbes that function best under dysaerobic and anaerobic conditions and that are not limited by nitrate availability.

PP41B-0843 0830h POSTER

Cretaceous Oceanic Anoxic Events and Radially Elongated Chambered Planktonic Foraminifera: Palaeoecological and Palaeoceanographic Implications

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Planktonic foraminifera with radially elongated chambers became a consistent component (up to 80%) of foraminiferal assemblages in coincidence with the deposition of the main prominent Cretaceous organic carbon-rich horizons. However, the exact ecological meaning of elongated chambered forms and related palaeoceanographic scenario are not definitively established. All this above moved us to investigate in greater detail on the elongated chambered planktonic foraminifera across the latest Hauterivian Faraoni Event, the late Early Aptian Selli Event (OAE1a) and the latest Cenomanian Bonarelli Event (OAE2) in different areas from the Mediterranean Tethys (Umbria-Marche Apennines as type area, Southern Alps, Gargano Promontory, Sicily, SE Spain, SE France). Our analysis, conducted both on washed residues and thin sections confirms that the radially elongated chambered forms preferred oxygen-depleted waters and provides the following main evidences: a) each event has its own peculiarities; b) there is not relationship between Corg accumulation and relative abundance of this foraminiferal group; c) the first radiation of elongated chambered morphotypes (i.e., *P. eocretacea*) remarkably just predates the Faraoni Event with the percentage of these forms not exceeding the 7%; d) the relative abundance of these forms across the Cretaceous anoxic events varies in the different studied areas, probably also controlled by the water depth. In particular, the development of radially elongated chambered forms across the Selli Event seems to be favoured in shallower settings; e) the three morphological categories established for the Early Cretaceous radially elongated chambered forms (sublavate to clavate chambers, pointed at the end chambers, bulbous terminations-bearing chambers) are present in the

investigated areas in variable percentages. This evidence suggests that local environmental parameters influenced their distribution. Remarkably, the particularly elongated sublavate to clavate morphotypes (i.e., *P. robesae*) appear almost restricted to the western Mediterranean Tethys; f) a possible competition between radiolaria and leupoldinids across the Selli Event is reflected by their distribution patterns showing evidence that the latter group became more abundant (up to 10%) when the former decrease in abundance or are absent. Conversely, the other sublavate to clavate forms do not seem to suffer the relative high abundance of radiolaria. All this above allow us to speculate that leupoldinids are the less eutrophic forms among the radially elongated chambered morphotypes proliferating under moderate degree of fertility; g) higher numbers of radially elongated chambered forms together with a more consistent distribution are recognized just after the Selli Event suggesting that this event played a fundamental role in the radiation of this planktonic foraminiferal group; h) the onset and end of the Bonarelli Event in deep-water settings is characterized by schackoinid assemblage-dominated (up to 80%). According to their morphological features, schackoinids appear more competitive than other radially elongated chambered forms in low-oxygen, eutrophic conditions; i) the remarkably higher percentages of radially elongate chambered forms across the Bonarelli Event may provide evidence that the intensity of the environmental perturbation related to the Cretaceous anoxic event was much stronger during this event and weaker during the Faraoni Event.

PP41B-0844 0830h POSTER

Calcification Changes of Mesozoic Calcareous Nannofossils

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Studies on plankton samples and cultures revealed a variety factors which presumably control calcification and the size of coccoliths. Among others temperature, nutrients and seawater pH are thought to influence nannoplankton calcification. Whereas these studies only provide information of very short time intervals from hours to years, global climatic and oceanographic changes occur, however, on geological timescales. Thus their impact on nannofossil calcification and carbonate production can only be studied from the fossil record. We investigated DSDP sites from the western Atlantic of late Jurassic to early Cretaceous age in order to better understand long-term variations of the size of common nannofossil taxa and the resulting carbonate accumulation. The studied interval is characterized by two events in the pelagic carbonate record: (1) the onset of pelagic carbonate accumulation in the Tithonian, and (2) the Valanginian 'nannoconid crisis'. The Tithonian event went along with high abundances of strongly calcified nannofossils which presumably have an affinity to more oligotrophic surface water conditions. The mid Valanginian is marked by a positive carbon isotope excursion (CIE). This coincides with a sea level rise, volcanic activity and elevated atmospheric pCO₂ levels. Greenhouse climate and an accelerated hydrological cycle presumably intensified weathering processes causing enhanced nutrient transfer from the continents into the oceans. Increasing surface water fertility is indicated by high abundances of nannofossils which possibly indicate more eutrophic conditions. In the western Tethys the CIE is predated by a sharp decrease in the abundance of rockforming nannoconids. This event is less pronounced in the western Atlantic due to a general scarcity of nannoconids. Low nannofossil carbonate accumulation rates and a dominance of less calcified taxa were observed and may reflect a general marine biocalcification crisis. Possible factors, which may have caused changes in calcification and carbonate accumulation are (1) the trophic system and (2) seawater pH. Low nutrient conditions coincide with high abundances of strongly calcified taxa in the Tithonian, whilst high nutrient levels are presumed for the Valanginian. In addition, low pH levels induced by high atmospheric pCO₂ is believed to reduce the calcification rates of modern coccolithophores.

PP41C MCC: Level 2 Thursday 0830h

Nature and Causes of Cyclicity in Triassic Through Miocene Paleoclimate Records I Posters (joint with OS)

Presiding: K L Bice, Woods Hole Oceanographic Institution; T Wagner, University Bremen

PP41C-0845 0830h POSTER

Seasonal Wildfires as a Mechanism for Long-distance Transportation of Leaf Waxes and Pyrolytic Hydrocarbons in the Aptian-Albian Scisti a Fucoidi, Italian Apennines

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The Scisti a Fucoidi is a heterogeneous pelagic deposit including thinly laminated black shales deposited under poorly to moderately oxygenated conditions. Black shale deposition was coupled to Milankovitch climatic cyclicity with individual black shales occurring at ~20,000 year intervals. Scisti black shales are characterized by relatively low organic carbon contents (0.41 - 5.69 wt. %) and low T_{max} values (411 - 432°C). These strata are at a remarkably low level of thermal maturity as evidenced by the presence of β,β-hopanes. Despite a scarcity of woody or structured terrestrial organic matter, hydrogen indices are low and long-chain n-alkanes show a strong odd/even carbon preference. Consequently, terrestrial organic matter is inferred to derive from input of leaf waxes associated with eolian dust, strong winds and an arid climate on the up-wind landmass. It is notable that Scisti black shales contain greater relative abundances of aromatic hydrocarbons than saturated hydrocarbons. Aromatic hydrocarbons are characterized by a complex mixture of diagenetic and pyrolytic polycyclic aromatic hydrocarbons (PAH). Diagenetic PAH include methylphenanthrenes and chrysenes; pyrolytic PAH include phenanthrene, anthracene, fluoranthene, pyrene, benzo[ghi]perylene, and coronene. These PAH are inferred to be products of wildfires associated with dry continental conditions, enhancing long-distance transport of pyrolytic PAH. An abundance of pyrolytic PAH in ancient pelagic marine sediments substantiates the linkage between natural burning, atmospheric input and transport of terrestrial organic matter to distal marine basin/s. Winds associated with arid conditions and/or wildfires provide an ideal mechanism for air transport of leaf waxes and pyrolytic PAH to marine sediments. The relative abundance of leaf wax aerosols suggests that there was enough vegetation to generate these waxes and to act as fuel for fires. If landscape denudation occurred following wildfires then nutrient loads to coastal marine settings may have increased resulting in enhanced marine productivity in localized areas.

PP41C-0846 0830h POSTER

Late Cretaceous Layered Cherts in the Pacific Analyzed Using Downhole FMS Logs

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ODP and DSDP drilling of sediments that contain chert has yielded only limited core recovery. The low core recovery results from the contrast in hardness between the chert and the host sediment (often ooze or chalk), because coring is optimized for either hard or soft sediments. During ODP Leg 198 to Shatsky Rise, Hole 1207B was logged using downhole geophysical tools, including the Formation Micro-Scanner (FMS), providing an alternative method of investigating such sequences. The FMS gives a resistivity image of the