distinct variations in their signal shape and frequency content depending on sediment type and composition.

The transmission seismograms are first analyzed to derive the commonly used logging parameters: An evaluation of the first arrivals yields P-wave velocity logs, and a determination of the maximum amplitudes provides information on the attenuation characteristics.

In addition, the complete transmission seismogram section is processed with respect to its frequency content and instantaneous seismic attributes to enhance the contrast between uniform and stratified parts of sediment sequences. Instead of using conventional wiggle traces for the seismogram display variable density or pixel plots combined with an appropriate color-encoding allow to present the condensed full waveform information on a handy scale.

As an example, results of a gravity core from the equatorial Mid-Atlantic Ridge, which is characterized by several turbidite layers, are presented. A comparison of the transmission seismograms and their amplitude spectra with X-ray and core photographs illustrates the transition of the spectral energy from high- to low-frequency bands within the graded turbidite layers. The relative amount of high- and low-frequency components is obviously controlled by the average sediment grain size, as is evident from a sand content log.

The computation of instantaneous seismic attributes, originally developed for seismic stratigraphy purposes, here provides valuable lithological information. Instantaneous amplitudes reveal a weak attenuation for fine-grained clayey horizons and a strong attenuation for coarse-grained sandy intervals. Plots of the instantaneous phase clearly illustrate the continuity of homogeneous sediment sequences and mark lithological changes by abrupt phase jumps. Instantaneous frequency displays emphasize the turbidite layers as low-frequency depth intervals.

IMPROVED BIOSTRATIGRAPHIC DATING USING PROGRESSIVE GRAPHIC AGE-DEPTH CORRELATIONS OF DSDP/ODP SITES IN THE ATLANTIC OCEAN

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The development of age-depth models is a common method for summarizing stratigraphic data for a geological record in order to achieve a more detailed and accurate time-scale which can then be used to express the sedimentation history of a geological section. Biostratigraphy has an important place in many areas of historical geology, and in the past decade biostratigraphic methods using computation to calculate enormous data sets from different species has evolved so far that geologists are able to produce stratigraphic frameworks in which a single species data point has the potential for reconstructing age estimates for the geological record.

The intent of this paper is to focus on the development of a continuous age-depth model including data for bolboforma, coccoliths, diatoms, dinoflagellates, planktic foraminifers, radiolaria, silicoflagellates and magnetostratigraphic data from 18 DSDP/ODP sites in the North Atlantic. This information gives us an indication of the relationship between the depth of a section and its chronological age as a method of absolute age calibration on a joint stratigraphic basis.

This data set was processed using Shaw's graphic correlation method as well as the probability of a direct age/depth correlation graphics method. In spite of the various procedures used, both methods, which in the case of the Shaw

plot, is based on interpolations of an ideal correlation line and, in the case of the probability age/depth correlation graphic, is based on a minimalization or maximization of the absolute ranges of individual taxa, only slight variations (relative error < 4%) were able to be determined by comparing bioevent ages of the most common taxa. Larger deviations in taxa described only in one or two drill holes are due to the fact that these taxa tend to represent local, that is, smaller distribution ranges in Shaw's method.

THE EARLY DIAGENETIC FORMATION OF "BARITE FRONTS"

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Sediments that are deposited in areas of high biological productivity are often enriched in specific major and minor elements. In case of diatomites, e.g., biogenic silica and Ba are accumulating at the sea floor. Since biogenic silica is dissolving in the corrosive deep waters, only the enhanced levels of Ba seem to document productivity events in the geological record. Here some data are presented that demonstrate, that these Ba enrichments are not necessarily related to productivity spikes alone. Instead, the Ba depth distribution seems to be much more influenced by microbial activity in the sedimentary column than previously thought.

The Ba concentration in marine pore waters is governed by the solubility of barite. As long as sulphate is present in significant amounts, biogenic barites will not dissolve. But in rapidly accumulating sediments that contain organic matter, rather steep sulphate gradients will be established in the interstitial waters and barites will start to dissolve at near-zero sulphate concentrations. In this case, the Ba levels in the pore waters may be more than a factor of 1000 higher than in sea water. Examples from the Gulf of California (Mexico) and the Japan Sea are shown, where Ba concentrations in pore waters are very high below the zone of sulphate reduction.

During stops in sedimentation or drastic changes in sedimentation rate, barites may diagenetically precipitate as concretions in the depth range where sulphate levels are near zero and dissolved Ba increases. Sulphate will be provided by diffusion from the sediment/seawater interface, whereas Ba originates from dissolved biogenic barites below the sulphate reduction zone.

Sulphur isotopes provide a useful tool to distinguish barites formed diagenetically under conditions of sulphate depletion due to microbial activity from those which are precipitated when Barich solutions from cold seeps or hydrothermal activity enter sea water. In the latter case the sulphur isotopic composition of seawater sulphate should be reflected ($\delta^{34}S$ around +2 ‰ rel. CDT), whereas diagenetical barites should mirror the "heavy" ($\delta^{34}S$ between +30 and +80‰ rel. CDT) sulphur isotopic composition of the residual pore water sulphate pool. Diagenetic "barite fronts," therefore, are characterized by a "heavy" sulphur isotopic composition. Examples from Quaternary and Cretaceous sediments are shown.