

THE INTEGRATED PALEONTOLOGICAL SYSTEM: A SOFTWARE APPLICATION FOR THE ANALYSIS, INTERPRETATION, AND INTEGRATION OF BIOSTRATIGRAPHIC DATA

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The Integrated Paleontological System (IPS) is a user-friendly, interactive software application for the display and analysis of digitally stored biostratigraphic data. Operating in both DOS and UNIX environments, IPS readily integrates E-log and other geologic data and gives the geoscientist a powerful new tool for interpreting paleoenvironments, sequence stratigraphic architecture, and stratigraphic correlations. A hierarchical menu and point-and-click function selection allows the user to quickly extract and display information in the following ways:

Fossil distribution or "range" chart. Using the mouse pointer, the IPS user can quickly investigate information within the chart such as sample depths, taxa names, and color-coded abundance values; subsets of the range chart can also be easily selected based on depth range, genera, minimum abundance values, and bathymetric zones.

Biostratigraphic "curves" summarizing sample information. Default curves include Shannon-Wiener diversity index, total count, percent planktonics, and sample similarity coefficients; a number of operations exist for creating user-defined curves and additional display options allow modification of the curves for enhanced visual presentation; E-logs can be easily presented with the biostratigraphy curves.

Specialized paleobathymetry curve. Estimated paleobathymetry based on benthic foraminifera can be displayed, along with other parameters that allow the user to assess the reliability of the estimate; the paleobathymetric estimate is calculated by comparing the faunal content of each sample to a referenced look-up table containing species' water depth distributions from the basin of interest.

Graphical pre-processing of data for input to RASC/CASC. Extinction events and up to six additional events for each taxon can be added, deleted, or modified graphically from a digital display of the range chart; this information can be written to a file accepted by the RASC/CASC probabilistic stratigraphy software.

Biostratigraphic cross-plots of well sections vs. standard sequence of events. Individual wells can be graphically compared to the ranked or scaled optimum sequence of stratigraphic events produced by RASC/CASC.

Testing and validation of IPS has involved mainly Oligocene to Pleistocene foraminiferal and calcareous nannoplankton data obtained from dozens of wells in the Gulf of Mexico. This effort has resulted in a model that characterizes the key stratal surfaces which underpin the interpretation of sequence stratigraphic architecture. Flooding surfaces, major condensed sections, sequence boundaries, and the stacking pattern of higher-order sequences all have characteristic IPS signatures.