

Developing tools to compile and visualize nannofossil occurrence data

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The Neptune database is an invaluable compilation of planktonic microfossil occurrence data. Adding data from Neptune into Nannotax has provided effective visual summaries of the abundance and stratigraphic distribution of taxa. However, the data in Neptune are mostly >20 years old, are exclusively from ocean drilling cores, and coverage of the Mesozoic is rather sparse. Recently, we have been working on an extended Cretaceous nannofossil occurrence database. This is intended both for research, to allow investigation of the autecology of nannofossils and their response to environmental change, and for documentation of their stratigraphic occurrence on Nannotax.

We have developed the database so that all data uploading, editing, and displaying are done via webpages as part of the Nannotax system. The workflow is based on the upload of distribution tables (samples versus species) from a single drill site or outcrop. First, metadata (location, analyst, source publication, etc.) for the table are entered via a form, and then the table of data is uploaded as a tab-delimited file or spreadsheet. Next, a data-cleansing step ensures sample data are consistently labeled and that the recorded taxa are correctly linked to entries in Nannotax. The data upload script then populates the sample and occurrence tables. An optional step allows calculation of sample depths and entry of zonal assignments. The uploaded data are then displayed, and age-diagnostic data are summarized in an age-depth plot that allows a line of correlation to be drawn and ages assigned to the samples. Finally, paleolatitudes and paleolongitudes are added using g-plates (this step requires use of an external script but can be done in large batches).

Data visualization primarily uses systems previously developed for use with the Neptune database, and this allows plotting of range charts, distribution maps, and plots of occurrence frequency against time and paleolatitude. An extra system has been developed to allow examination of all occurrence data from a single time-latitude defined interval. Access to this database is currently restricted prior to publication, but it should be available by the end of 2024. An age-depth plotting tool is already directly accessible from Nannotax (tools menu), and the database development tools will be available for future projects.