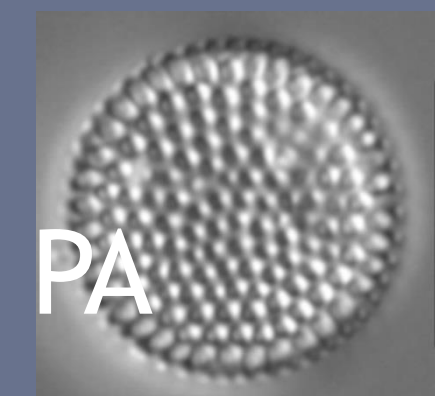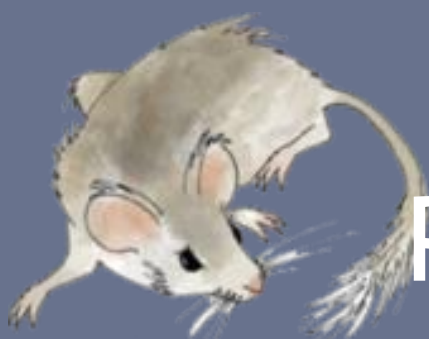# NEOTOMA PALEOECOLOGY DATABASE: DIATOMS

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What is Neotoma?

The Neotoma Paleoecology Database (www.neotomadb.org) is a community-curated data resource that supports global change research. It enables broad-scale studies of taxon and community distributions, diversity and dynamics during large environmental changes of the past. In addition to diatoms, it includes data on pollen, ostracods, insects, plant macrofossils, vertebrates, geochronology and other sediment characteristics. By consolidating many kinds of paleoecological data into a common repository, Neotoma lowers costs of paleodata management, makes paleoecological data openly available, and offers paleoecologists a high-quality, curated data resource. Neotoma also supports different platforms and software to allows users to access and manipulate data once it is uploaded.

What Diatom Data are Available?

Neotoma contains diatom data for over 350 sediment cores and over 600 surface samples. Collectively, they represent over 1000 datasets.

Stratigraphic Diatom Sites

Surface Sample Diatom Sites
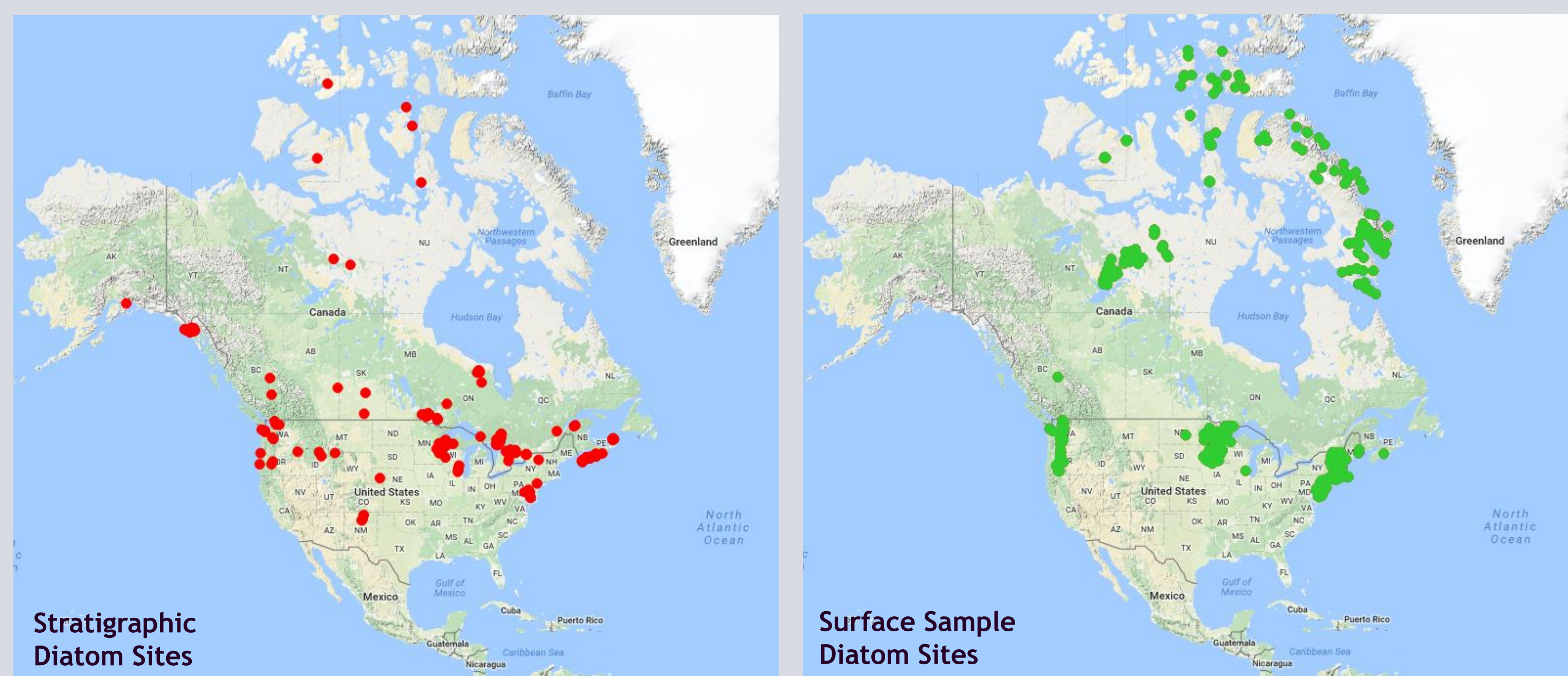
Stratigraphic and calibration data sets that can be downloaded from the website, Tilia, or using R include:

- Diatom counts
- Water chemistry
- Lake characteristics
- Chronologies and Geochronologies

More diatom data are accessible through DPDC (Diatom Paleolimnology Data Cooperative), which includes over 600 calibration sites and almost 400 stratigraphic sites, with over 5000 collective samples. (diatom.ansp.org/dpdc/)

How Can I Access the Data?

You can access Neotoma data using the Neotoma Explorer application, the Tilia software, and the neotoma R package.

Use the Explorer application on the Neotoma website to show locations of study sites in a map view. Use its advanced search tools to find data sets based on specific parameters. Search for locations of sites with specific diatom taxa; show stratigraphic diagrams of the common taxa in a core.

Use the neotoma R Package, downloadable from GitHub, to access data directly from the Neotoma database and work with the datasets using this and various other R packages (e.g., analogue and rioja). The neotoma R package allows users to download and manipulate data from many Neotoma datasets simultaneously. With R users can compare multiple lakes and the different datasets present, as well as turn out stratigraphic diagrams and maps using different search parameters.

Use the Tilia program to access individual datasets. Link Tilia to the Neotoma database and use Explorer to locate data for a specific site. Download the data directly into Tilia. Then manipulate data using the Tilia software. For example, make detailed stratigraphic plots or run a program to create stratigraphic zones.

How Can I Use the Data?

You can use Neotoma tools to download individual or combinations of datasets and to help address site-specific or large-scale ecological issues.

- What sites have been studied in a particular region?
- What is the geographic distribution of individual taxa or groups of taxa?
- What are their ecological characteristics?
- What can diatom stratigraphies tell me about climate change, eutrophication, acidification?
  Can look at individual taxa/ groups of taxa / lakes.
- How have ecological conditions changed in large regions since pre-disturbance times?
- Which surface samples would be good to include in a new regional calibration dataset?

Figures on this poster provide examples.
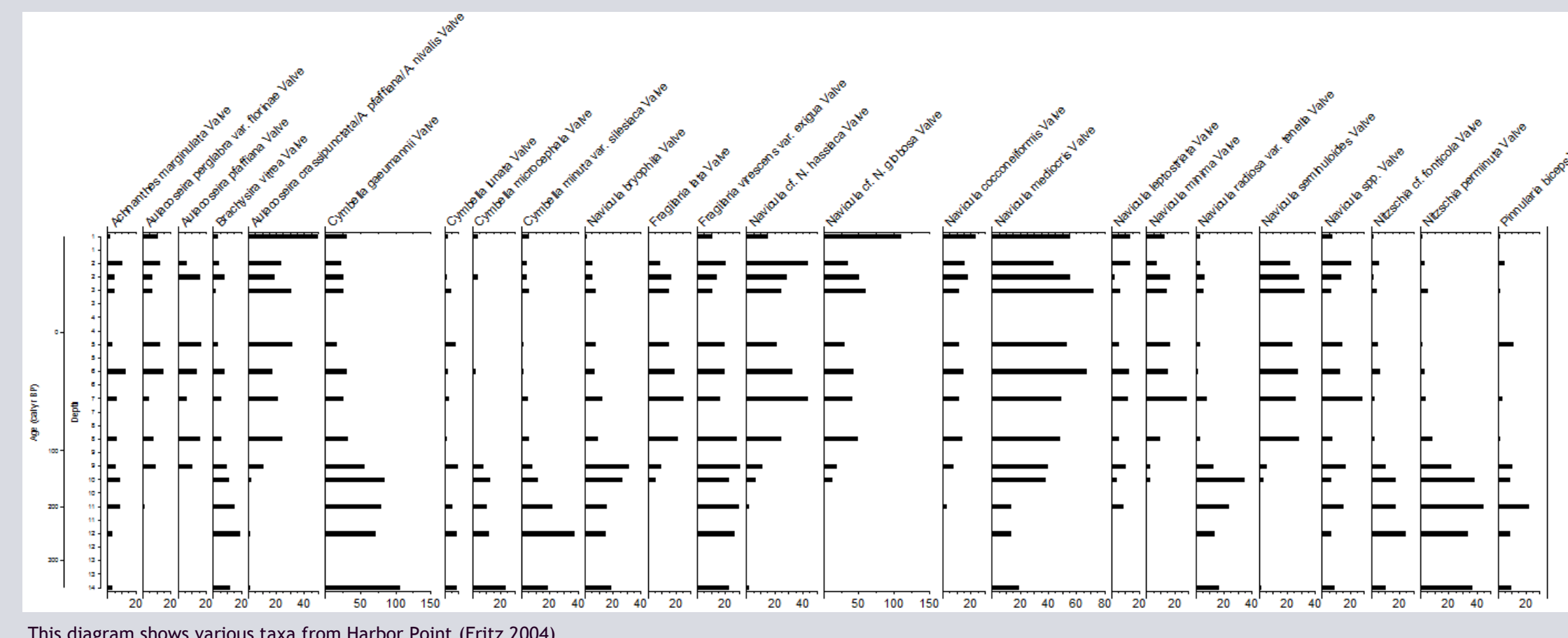
This diagram shows various taxa from Harbor Point (Fritz 2004)

Tilia software can be used to create stratigraphic diagrams of diatom taxa. The easy user interface allows for alteration of graphics, axes, and exploration.
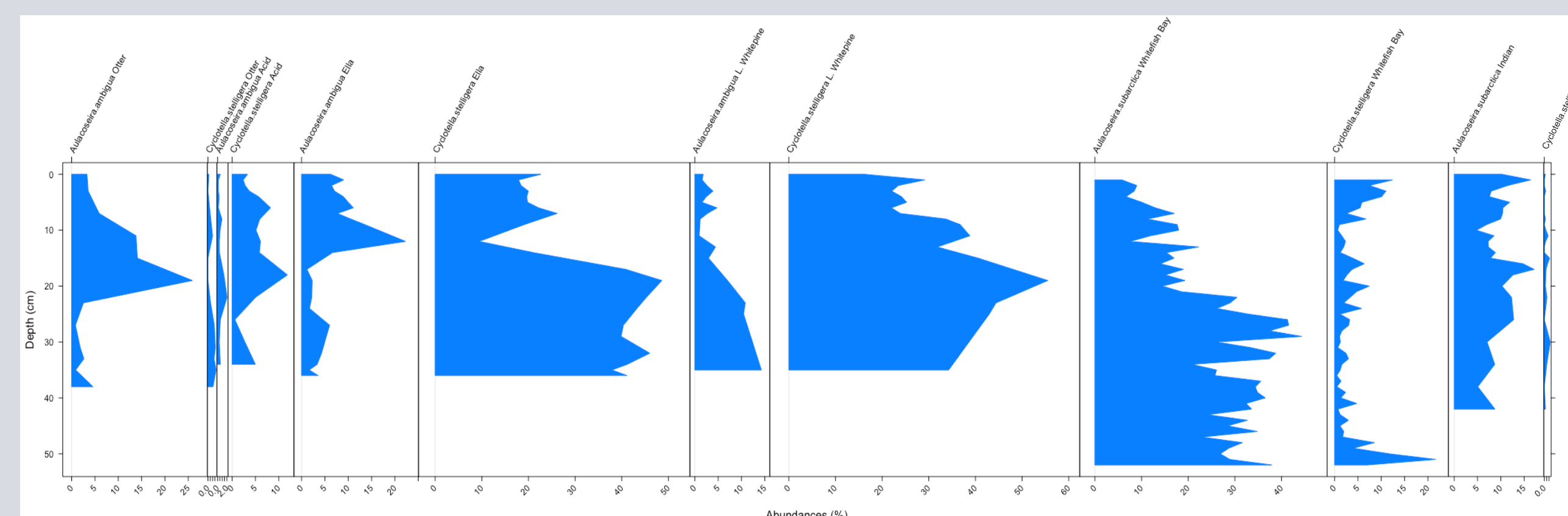
This diagram compares Otter Lake (Forrest 2001), Acid Lake (Dixit et al 1992), Ella Lake (Dixit et al 2002), Little Whitepine Lake (Dixit et al 1996), Whitefish Bay (Rühland et al 2010), and Indian Lake (Forrest 2001).

The neotoma R package can be used to compare diatom stratigraphies of the same or closely related taxa from multiple lakes. The R software allows more options for comparisons between lakes than Tilia or Explorer.

How Can I Contribute Data?

Neotoma depends on voluntary submissions from the diatom paleoecology community. We encourage you to contribute to Neotoma so your data will be accessible and can be used for further research by the scientific community.

Data of most interest are:

- Diatom counts
- Diatom inferred values
- Geochronology, chronology, LOI, lithology
- Water chemistry
- Site Metadata
- Contributor names

You can contribute data tables in spreadsheet (e.g., Excel, Tilia) or database format. Taxa names and other data will be uploaded in the same form in which you published them. Data uploads to Neotoma are handled via the Tilia software program; its automated systems check data conformity and completeness, and match taxon names with those in the master list. Data are usually uploaded by data stewards, but you can enter data into Tilia yourself before submitting them (though this is not necessary). We try to make the process as easy and efficient as possible.

Acknowledgements

Education and Student Activities

ANSP is producing a standards-based lesson plan using diatom data from Neotoma to allow students to investigate earth systems changes, develop an understanding of past biotic responses to climate change, and apply knowledge gained to current rates of environmental change. They will pilot the lessons with its Women in Natural Sciences program (WINS), a free after-school summer science enrichment program for high-school girls.

The Academy of Natural Sciences of DREXEL UNIVERSITY

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