PALEODATA



Figure 2: The PANGAEA network uses client/ server technology through the Intranet/ Internet to communicate and distribute data between institutes.

The retrieval tool for finding and extracting data from the system is uniformly designed for all levels and allows the use of complex combinable search criteria. Data can be exported as tables or plotted with one of the visualization tools. Tables can be sorted and configured individually. Multiple data sets can either be displayed with identical parameters and locations in one column, or the data can be split by locations and/or different versions of data sets into separate columns, thus allowing the direct comparison of data sets from different investigations or locations.

When dealing with the archiving and publication of data, copyright has to be considered. If an information system also stores unpublished data, it is crucial for the acceptance and the trust of the database that the data can be protected. In PANGAEA the owner of a specific data set is able to define access rights for individual users or groups.

Technical setup

PANGAEA uses client/server technology through the Internet with a main server (SUN E10000, 8 processors, 8GB internal memory, 100GB hard disk capacity) running SYBASE as the database management software. The client soft-

ware for import/export, written in 4th Dimension (4D), runs on the operating systems MacOS and Windows. The 4D clients are used by the data curators for project data management (http:// www.pangaea.de/projects/) and for the import of data from different institutions participating in the network. The client software to be used on the World Wide Web is written as a Java applet and allows read only access on published data for anyone. Registered users can also share unpublished data. The applet includes a draft map and plot functionality for quick overviews. Due to the use of Java applets, users of the web client should use recent browser software versions. Non-Java interfaces are in preparation.

External tools

For the geographical presentation of data the PANGAEA tool PanMap was developed as a stand-alone mapping application for vector data (http:// www.pangaea.de/software/). PanMap can be used to draw sampling sites with meta-data or analytical data in a geographical context. Maps can be configured with different projections, the styles of map elements can be changed, additional vector data or site information can be imported and managed in different layers, and graphics can be exported. The General Bathymetric Chart of the Oceans (GEBCO) is provided as a bathymetric data source.

The PANGAEA tool PanPlot enables the user to plot data versus depth/altitude or time. Scales and graphic features can be modified by the user and distinct parameters can be selected from a data matrix. PanPlot and PanMap can be directly accessed by the 4D clients. When using the Java web client, data have to be downloaded to the PC first and the visualization software then has to be started by the user. PanMap and PanPlot are freeware.

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In Memory of Hans Oeschger

Hans Oeschger, one of the founding fathers of PAGES died on December 25, 1998. His role in the establishment and promotion of PAGES drew on both his distinction as a scientist and his commitment as a person. His passing has evoked many tributes in both national and international media. His distinguished career, culminating in the award of both the Tyler and the Revelle prizes, is described more fully and with great insight and affection in these accounts and they reinforce the immensely high standing he had among his peers. Here, we have tried to bring a specifically PAGES dimension to our commemoration by inviting two of his close associates during the development of the project to give their personal recollections. The first of these is Jack Eddy, who worked alongside Hans in the early planning stages:

Hans was one of several proponents for a paleostudies component in the initial architecture of ICSU's International Geosphere-Biosphere Program, and with that goal in mind he accepted membership on the first Scientific Committee for the IGBP in 1985/86. Based on his own early work, and that of his colleagues at the Physical Institute that he directed in Bern, he recognized the valuable role paleoclimate information could play in clarifying some of the main issues that then clouded conjectures regarding the enhanced greenhouse effect. He was also concerned that projects of the WCRP had put so little emphasis, or trust, in paleoclimate data. Hans helped identify candidates who might serve on the initial steering committee for what came to be known as the IGBP Past Global Changes (PAGES) project. He hosted the early meetings in Bern and served as its co-chairman.

Members of the IGBP Working Group on Global Changes of the Past, and later of the PAGES Steering Committee, favored expanding the concept beyond Hans' initial thoughts regarding greenhouse warming and isotope chemistry. With these other insights the PAGES concept was broadened to embrace many different disciplines; to include Holocene as well the somewhat longer time scales of the last glaciations; to utilize PAGES as a vehicle to coordinate the efforts of disparate (and sometimes competing) factions in paleoscience; and to open up and centralize paleo data sources around the world as a way of achieving this kind of needed organization and synthesis.

OBITUARY

Once these and other goals were defined and agreed upon, there were months and years of writing and convincing to be done, funds to be raised, meetings to be run, and battles to be won before PAGES was accepted as a workable core project of the IGBP. In these early labors, however, as in the initial work of project concept and definition, Hans was involved only peripherally, for by nature and personal inclination his principal interests and contributions were on quite another scientific plane.

The period of the initial conception and definition of the PAGES project – the early Spring of an effort that is now mature – found Hans in the late Autumn of his own career at the University of Bern, and at a stage when the long shadow of his earlier years of work in isotope chemistry was well recognized around the world. The lustre of his early work in ice-core studies was of undeniable help in launching the PAGES project. Indeed, it was his heart and name, more than his time or the work of his hands, that Hans principally contributed, first to the IGBP and then to the PAGES project.

Hans readily accepted the suggestion of a joint Swiss/US-sponsored PAGES Core Project Office in Bern, which was a gift he gave of yet another kind, made invaluable by the eminence of Swiss studies of tree-rings and varves and ice cores, as well as the reputation of the laboratory that he had directed in Bern. His name and reputation were also a help in the efforts needed to secure the initial commitments from the US and the Swiss National Science Foundations to support the work of the new project office, and on his retirement from the faculty of the University of Bern, Hans devoted much of his time to its endeavors.

Once the PAGES project was established, its further progress owed a great deal to the fruitful interaction between Hans and Herman Zimmerman, whose recollections of him thus form a natural sequel to the above:

My first contact with PAGES came at the second meeting of the PAGES Scientific Steering Committee in Bern (April, 1992). Prior to this, Hans and I had some minor interaction concerning the initiation of the GRIP and GISP2 projects in Greenland, but now we had committed to working closely together in developing the framework of the PAGES Project and in establishing the project office in Bern. Hans and Jack Eddy co-chaired that meeting of the PAGES SSC and much of the future structure of the project was outlined there. By that time, Hans and Jack had already completed the organizational spadework for the PAGES office. PAGES had been accepted as a core project of the IGBP and proposals to the Swiss and US National Science Foundations were already submitted. Discussions were well underway about the funding arrangements and other details for the establishment of the PAGES office.

When Jack Eddy found that he could not actually participate as co-director in Bern, my role crystallized as "the organizational person" to help develop the office's operational procedures, and organize the international paleoscience community's linkage to the global change effort. Hans and I often mused over lunch as to how our personalities meshed and were well suited to our separate roles within the PAGES world and how surprisingly well we worked together. Hans was the tireless PAGES' safety net. When help was needed with the funding agencies, the research community, or the international planning groups, Hans was there on an airplane, or writing letters and articles. He was the great ambassador for global climate research, for the paleosciences, for the application of isotopic techniques - his special love. After retiring from his professoral positions at the University of Bern, he devoted his full energies to promoting climate studies in general, and PAGES in particular.

Hans and I were closest when there was an editing chore to be done. He wrote with a Swiss accent, but his work also had a distinctive style and flare. We spent long hours editing out the accent, but keeping the flare. The term "climate surprise" came from Hans' not being able to find quite the correct phrase in English, but we left it, because it actually described just the right thought – the abrupt, short-lived, climate changes of the glacial stages that had been unexpectedly found in the ice core records from Greenland.

Hans delighted in a fine meal at a favorite Bernese restaurant, and there were many of these. He delighted in explaining the 'typische' Bernese cuisine – even when, having to translate for me, the correct word in English eluded him. One can imagine the topics of discussion: from isotopes in precipitation, to the climate record teased from tree-rings and ice cores, and to his displeasure – indeed anger, with the few "scientists" who nay-sayed the importance of the greenhouse gas problem or his exas-



peration with those who denied the evidence of the paleoclimate record. But his remembrances about his professor, the late Fritz Houtermans, who inspired Hans to undertake the study of isotopic geochemistry, were always the high point of lunch. It was Houtermans who first asked Hans to set up a radiocarbon laboratory.

In Hans' case, it is difficult to separate the scientist from the man. He was genuinely and personally concerned about how the change in our planetary environment would impact people and his beloved Swiss Alps. Mankind's great experiment with the Earth's atmosphere was his personal concern. He was a strong advocate for science in the service of society, and he considered it his personal responsibility to point out the climate risk to future generations by loading the atmosphere with greenhouse gases. As Hans would say: "in the frame of PAGES, we need to learn from the experiments that nature has conducted in the past and that are recorded as trace constituent concentrations and isotopic signatures in earth system components in natural archives".

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