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Developing community data sets for calibration of the time scale: International collaboration for the latest Carboniferous-Cisuralian from the southern Urals, Russia

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The Late Paleozoic assembly and early evolution of Pangaea is marked by major tectonic events that varied in timing and style in different parts of the supercontinent, by major eustatic changes in sea level, global climate change from the Pennsylvanian “ice house” to the Permian “hot house”, and major faunal changes. The understanding of these and other processes and events relies on international collaboration in conducting the research, pooling the data derived from that research into geoinformatics databases, and, importantly, the development of a high-resolution radiometric calibration of this part of the time scale. In the southern Urals and elsewhere, our international team is striving to bring together high quality data sets that are tied to detailed measured sections, such that radiometirc ages can be "calibrated" with precise and detailed data on lithostratigraphy, biostratigraphy, taxonomy, stratigraphic range, litho- and biofacies, chrono-, sequence, chemo-, magneto- and cyclo-stratigraphy, and geochronology. This suite of data, which is being compiled in the PaleoStrat data system (www.paleostrat.org), will be available for use by the larger international community, and form an important building block for better understanding of Pangaea.

The southern Urals is an excellent field laboratory to begin the process of the

Pennsylvanian-Cisuralian time scale calibration and global correlation. There, numerous interstratified volcanic ash layers occur within well characterized and biostratigraphically constrained sequences. To date, we have obtained high precision ages for Moscovian, Kasimovian, Gzhelian, Asselian and Sakmarian. Globally, in contrast, the situation is quite different, and the task of global calibration and correlation is immense. With duration of the Pennsylvanian-Cisuralian Epochs close to 50 m.y. the regional biozones on average give a resolution better than 1.5-1.0 m.y., whereas on average there is less than one radiometric date per 10 m.y. Worse, there are no dates for most of the Bashkirian, Sakmarian, Artinskian and Kungurian and single dates (Ar/Ar, SHRIMP and U/Pb from calish calcite) only in the Moscovian, Kasimovian, Gzhelian and Asselian most of which neither precise or reliable. The biostratigraphic calibration is also compromised in that the dates for the Upper Pennsylvanian and the rest of Cisuralian come from continental sequences of Western Europe that only poorly correlate with marine sequences in the type regions. Ar/Ar dates assigned to biostratigraphically well-constrained western European regional stages within the Namurian and Westphalian are needed to revaluate against the modern spikes and to correlate with the well-calibrated standard biozonal scales and international stages. Similar issues compromise the few available radiometric constraints on the Cisuralian from Australia. Although Permian biostratigraphy of Australia is reasonably established, it is based on local cold-water foraminifers, palynomorphs, and brachiopods and cannot provide reliable global correlation. We, as a community, are challenged to carefully compile the available global data into universally accessible geoinformatics databases, assess these data, and thus construct the basis for continued research. The project is supported by the NSF grants EAR 0106796, EAR-ITR 0218799 and EAR 0418703.