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From Ions to Bits - Developing the IT infrastructure around the CAMECA IMS 1280-HR SIMS lab at GFZ Potsdam

A. Galkin (1), J. Klump (1), and M. Wiedenbeck (2)

(1) German Research Centre for Geosciences, CeGIT, Potsdam, Germany (jens.klump@gfz-potsdam.de), (2) German Research Centre for Geosciences, Sec. 4.2, Potsdam, Germany (michael.wiedenbeck@gfz-potsdam.de)

Secondary Ion Mass Spectrometers (SIMS) is an highly sensitive technique for analyzing the surfaces of solids and thin film samples, but has the major drawback that such instruments are both rare and expensive. The Virtual SIMS project aims to design, develop and operate the IT infrastructure around the CAMECA IMS 1280-HR SIMS at GFZ Potsdam. The system will cover the whole spectrum of the procedures in the lab – from the online application for measurement time, to the remote access to the instrument and finally the maintenance of the data for publishing and future re-use. A virtual lab infrastructure around the IMS 1280 will enable remote access to the instrument and make measurement time available to the broadest possible user community.

Envisioned is that the IT infrastructure would consist of the following: web portal, data repository, sample repository, project management software, communication arrangements between the lab staff and distant researcher and remote access to the instruments. The web portal will handle online applications for the measurement time. The data from the experiments, the monitoring sensor logs and the lab logbook entries are to be stored and archived. Researchers will be able to access their data remotely in real time, thus imposing a user rights management strucuture. Also planned is that all samples and the standards will be assigned a unique International GeoSample Number (IGSN) and that the images of the samples will be stored and made accessible in addition to any additional documents which might be uploaded by the researcher. The project management application will schedule the application process, the measurements times, notifications and alerts. A video conference capability is forseen for communication between the Potsdam staff and the remote researcher.

The remote access to the instruments requires a sophisticated client-server solution. This highly sensitive instrument has to be controlled in real-time with latencies diminished to a minimum. Also, failures and shortages of the internet connection, as well as possible outages on the client side, have to be considered and safe fallbacks for such events must be provided. The level of skills of the researcher remotely operating the instrument will define the scope of control given during an operating session.

An important aspect of the project is the design of the virtual lab system in collaboration with the laboratory operators and the researchers who will use the instrument and its peripherals. Different approaches for the IT solutions will be tested and evaluated, so imporved guidelines can evolve from obsperved operating performance.