

## **A Concept for Worldwide Gas Hydrate Data Dissemination - the Gas Hydrate Markup Language (GHML) and Network Applications**

**Ralf Löwner<sup>1</sup>, Willa Wang<sup>2</sup>, Tom Smith<sup>3</sup>, and Dendy Sloan<sup>4</sup>**

<sup>1</sup> GeoForschungsZentrum Potsdam, Telegrafenberg, 14473 Potsdam, D-14473, Germany

<sup>2</sup> Computer Network Information Center, Chinese Academy of Science, 4, 4th South Street Zhong guan cun, POBox 349, Beijing 10080 China

<sup>3</sup> MIT Systems, 565 Plandome Road #294 , Flushing, NY 11367-1597, USA

<sup>4</sup> Center for Hydrate Research, Colorado School of Mines, Golden, Colorado 80401 USA

Data and information exchange is crucial for any kind of scientific research activities and is becoming more and more important. The comparison between different data sets and different disciplines creates new data, adds value and finally accumulates knowledge.

Furthermore, natural gas hydrates may contain more energy than the combined other fossil fuels, causing hydrates to be a potentially vital aspect of both energy and climate change. Hence, knowledge in this field of research is expanding exponentially.

Through its multi-disciplinary worldwide network, the CODATA Gas Hydrate Data Task Group (<http://www.codata.org/taskgroups/TGgashydrates/index.html>) recognized the need for Information Technology and is implementing a virtual data infrastructure for gas hydrate research.

Because of the worldwide dispersion of the gas hydrate research community, a first step to achieve this goal is the creation of a technical communication language, the Gas Hydrate Markup Language (GHML). GHML is a standard based on the Extensible Markup Language (XML) to enable the transport, modeling and storage of all manner of objects related to gas hydrate research. The result of these investigations is a custom-designed application schema, which describes the features, elements and their properties, defining all aspects of Gas Hydrates.

In the near future, distributed heterogeneous databases will be connected by specific adapters to the data infrastructure. These adapters create XML files valid to GHML and translate them in proprietary formats used by the local data provider and vice versa. Services, which are accessible via web-based interfaces (Portal), permit all desired data transactions and functionalities (e.g., data exchange, data storage, data visualization and data mining).

Keywords: service-oriented data infrastructure, GHML, Gas Hydrates, exchange formats