



Mallik 2002 Gas Hydrate Production Research Well Program

Northwest Territories, Canada



Goal & Scientific Objective

The Mallik 2002 Gas Hydrate Production Research Well Program aimed to study and sample gas hydrate bearing sediments in a permafrost setting and to produce hydrocarbons by different stimulation tests. Three holes were drilled to penetrate a section with extensive gas hydrate accumulations in a depth interval from ~900 m - 1100 m below approx. 620 m of permafrost.

Operational Achievements

Three holes were drilled at 40 m distance, reaching a final depth of 1179 m (Mallik 3L-38), 1184 m (Mallik 4L-38) and 1165 m (Mallik 5L-38).

An extensive downhole measurement program including the full suit of open hole logs, porosity measurements, NMR and crosshole seismic experiments was executed by service companies

Hydrate-bearing core has been retrieved from Mallik 5L-38 between 891 and 1150 m

In all wells, DTS (Distributed Temperature Sensor) cables were installed behind casing

Several depressurization tests and a five-days thermal stimulation test were performed in the gas hydrate interval

Data & Sample Access

Data holdings can be accessed on the ICDP website.

Web & Media Resources

<http://mallik.icdp-online.org/>

https://en.wikipedia.org/wiki/Mallik_gas_hydrate_site

www.youtube.com/watch?v=7OaQeeWxf0Y

Timeline

2001 ICDP proposal submission and approval

2001 - 2002 drilling/coring operations including production tests

Principal Investigators

Scott R. Dallimore, Geological Survey of Canada

Timothy S. Collett, U.S. Geological Survey

Takashi Uchida, Japan National Oil Corporation

Jörn Lauterjung, German Research Centre for Geosciences

Avinash Chandra, Indian Ministry of Petroleum and Natural Gas

Michael H. Weber, German Research Centre for Geosciences

Tetsuo Yonezawa, Japan National Oil Corporation



Scientific Findings

Investigations on drill core from Mallik 5L-38 have demonstrate that gas hydrate occurs within the pore space of medium grained sands with gas hydrate saturations between 50% and 90%

Isotope and chemical studies revealed that hydrocarbons trapped in gas hydrates at Mallik are not formed in-situ, but from thermal degradation of organic material at depths >4000 m. The precursor organic material of hydrocarbons is composed of a variety of higher land plants with a terrestrial origin

Gas hydrates probably formed from formerly free-gas reservoirs during the last ice age when ground temperatures dropped. Intrapermafrost hydrocarbons of microbial origin underline a complex thermal history of the area.

The cumulative production of gas from the gas hydrate interval during a five day thermal production test was 468 m³.



Gas flaring during thermal production test at Mallik 5L-38

Key Publications

Dallimore, S.R.; Collett, T.S.; Taylor, A.E.; Uchida, T.; Weber, M.; Chandra, A.; Mroz, T.H.; Caddel, E.M.; Inoue, T. (2005). "Scientific Results from JAPEX/JNOC/GSC et al. Mallik 5L-38 Gas Hydrate Production Research Well, Mackenzie Delta, Northwest Territories, Canada". Geological Survey of Canada, Bulletin 585

Dallimore, S. R. and Collett, T. S., 2005: Summary and implications of the JAPEX/JNOC/GSC et al. Mallik 5L-38 gas hydrate production research well, in Scientific Results from the Mallik 2002 Gas Hydrate Production Research Well Program, Mackenzie Delta, Northwest Territories, Canada, (ed.) S. R. Dallimore and T. S. Collett; Geological Survey of Canada, Bulletin 585, 1-36 p.

Haberer, R.M.; Mangelsdorf, K.; Wilkes, H.; Horsfield, B. (2006): Occurrence and palaeoenvironmental significance of aromatic hydrocarbon biomarkers in Oligocene sediments from the Mallik 5L-38 Gas Hydrate Production Research Well (Canada). *Organic Geochemistry* 37 519-538, doi:10.1016/j.orggeochem.2006.01.004

Hancock, S.H., Collett, T.S., Dallimore, S.R., Satoh, T., Inoue, T., Huenges, E., Hennings, J., and Weatherill, B., 2005: Overview of thermal-stimulation production-test results for the JAPEX/JNOC/GSC et al. Mallik 5L-38 gas hydrate production research well; in Scientific Results from the Mallik 2002 Gas Hydrate Production Research Well Program, Mackenzie Delta, Northwest Territories, Canada, (ed.) S.R. Dallimore and T.S. Collett; Geological Survey of Canada, Bulletin 585, 15 p

Bauer, K., R. G. Pratt, C. Haberland, and M. Weber (2008), Neural network analysis of crosshole tomographic images: The seismic signature of gas hydrate bearing sediments in the Mackenzie Delta (NW Canada), *Geophys. Res. Lett.*, 35, L19306, doi:10.1029/2008GL035263