



Formation and evolution of pipe structures in sedimentary basins: Implications for fluid migration, seeps, and the global climate

Henrik Svensen (1), Ingrid Aarnes (1), Stephane Polteau (2), Alexander Polozov (1,3), Øyvind Hammer (1), Filip Nicolaisen (1), Anders Neramoen (1), Espen Jettestuen (1), Sverre Planke (1,2)

(1) University of Oslo, Physics of Geological Processes, Oslo, Norway (hensven@fys.uio.no), (2) Volcanic Basin Petroleum Research (VBPR), Oslo Research Park, 0349 Oslo, Norway, (3) Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry (IGEM), Russian Academy of Sciences, 119017 Moscow, Russia

Vertical pipe structures such as breccia pipes, phreatomagmatic pipes, and hydrothermal vent complexes, are common in many sedimentary basins affected by LIP-related volcanism. These basins include the Vøring and Møre basins offshore Norway, the Karoo Basin in South Africa, and the Tunguska Basin in East Siberia. The common denominator is the abundance of igneous sills and dikes in organic-rich and evaporite-rich sedimentary strata. Here we present the geological setting of these pipes, the nature of the pipe fill, and data demonstrating that a main pressure-buildup mechanism is maturation of organic matter in the pipe source region. This has important implications for the types of gases that be generated and for the fluid flow history of the pipes. Moreover, we have investigated the processes responsible for pipe formation by numerical modeling of overpressure generation and statistical analyses of pipe spacing. Finally we present a new classification scheme for pipe structures that can be used to estimate gas fluxes from individual pipes.