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Methane release from Pockmarks in the Witch Ground Basin, North Sea

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The fine-grained sediment of the Witch Ground Basin is cratered by pockmark depressions that may be formed by a rapid expulsion of fluid. Although the pockmarks are typically 50 - 100 m in diameter and 1 - 2 m deep, some larger ones, up to 750 m diameter and 22 m deep, occur. We have studied an area, in U.K. Block 15/25, containing four of these large pockmarks and estimate a methane flux, based on some direct gas-release measurements and a survey of gas outlets, of 46 tonnes of methane per year. Since most of the methane flux to the seabed is probably focused through these pockmarks, this equates to an annual flux of 0.15 tonnes per square kilometer for the survey area. Periodic eruptive release of gas is also believed to occur, based on sediment sorting in the base of one of the pockmarks. The resulting pockmark topography is complex, as shown on videos. Isotopic evidence shows substantial anaerobic oxidation of methane and stimulation of sulphate reduction. The sediment geochemistry within the sediments of the pockmarks was highly variable, leading to a patchy distribution of infauna, with chemosynthetic biota being highly localized to patches in the pockmark base.