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Fluid migration and pockmarcks related to polygonal faults, hydrate layers and landslides near the Storegga slide, Norwegian margin.

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Since the 1970's pockmarks have been widely reported during offshore hydrocarbon exploration and scientific surveys at water depths ranging from 30 m to over 3000 m (see Gay *et al.* 2003, for a detailed review). They have been identified along straight or circular lines correlated with glaciomarine tills (Whiticar & Werner 1981 and Kelley *et al.* 1994) or suggesting a structural control for fluid flow (Eichhubl *et al.* 2000). In particular, structural surfaces along bedrock (Shaw *et al*. 1997), salt diapirs (Taylor *et al.* 2000), faults and faulted anticlines (Boe *et al.* 1998 and Eichhubl *et al.* 2000) and polygonal faults (Gay *et al.* 2004) create pathways for deeper fluid migration. The pockmarks are commonly related to an overpressured buried reservoir of biogenic gases, thermogenic gases or oil, interstitial water, or a combination of the three.

This study investigates the slope of the Norwegian Margin across part of the Storegga slide which is one of the world largest exposed submarine slides. In the area, gas hydrates are suspected from the presence of a bottom-simulating reflector (BSR) on reflection seismic data (Bünz *et al.* 2003; Berndt *et al.* 2004 and Nouzé *et al.* 2004). Pockmarks and fluid pipes are not randomly distributed, but always associated with polygonal faults (Berndt *et al.* 2003), the gas hydrates interval and landslides. Detailed analysis of high-quality 3D-seismic data provided by BP permits mapping of the distribution of pipes and pockmarks in the sedimentary column. We show in this study that 1) the polygonal faults represent a preferential pathways for fluid migration; 2) the Holocene and pre-Holocene submarine landslides may be overconsolidated and act as a seal for deeper fluid migration. Under migration, the fluids are blocked beneath seals, such as hydrate layer and overconsolidated landslides and they are progressively re-distributed on the top of a large anticline, creating pockmarks on the seafloor. There

is evidence that fluid migration in the area is continuous on a large scale. However, some pathways seem to be active intermittently.

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