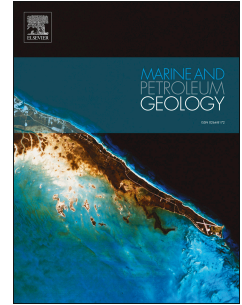


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Gas migration pathways and slope failures in the Danube Fan, Black Sea

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1 Gas migration pathways and slope failures in the Danube Fan, Black Sea

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9 **Abstract**

10 A large geophysical dataset, including bathymetry, and 2D and 3D P-cable seismic data, revealed
11 evidence of numerous gas flares near the S2 Canyon in the Danube Fan, northwestern Black Sea. This
12 dataset allows us to investigate potential relationships between gas migration pathways, gas vents
13 observed at the seafloor and submarine slope failures. Vertical gas migration structures as revealed in
14 the seismics appear to be concentrated near submarine slope failure structures. Where these
15 seismically defined features extend upwards to the seafloor, they correlate with the location of gas
16 flares. However, not all these structures reach the seafloor, in some cases because they are capped by
17 overlying sediments. A strong correlation is inferred between gas migration pathways, heterogeneous
18 mass transport deposits and contacts between adjacent units of contrasting lithology. Although
19 missing age constrains prevent a final judgement, we discuss the potential relationship between
20 submarine slope failures and gas migration in order to determine if gas migration is a precursor to
21 failure, or if the presence of slope failures and associated mass transport deposits facilitates the
22 migration of gas. Our observations indicate that lithological heterogeneity, mass transport deposits
23 and minor sediment deformation control gas migration pathways and the formation of gas chimney-
24 like features. Gas migration is focused and gradual, resulting in gas flares where the chimney-like
25 features extend to the seafloor, with no evidence of erosive features such as pockmarks.

26 **Keywords**

27 Gas migration, chimneys, gas hydrate, Danube Fan, slope failure, Black Sea

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