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Seismic triggering of fluid flow in the North Alex mud volcano on the western Nile deep-sea fan

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Submarine mud volcanoes are generally characterized by fluid formation and fluidization occuring at depths of several kilometers below the seafloor driving a complex system of interacting geochemical, geological and microbial processes. As mud volcanoes are natural leakages of oil and gas reservoirs, near-surface observations can be used for monitoring of these phenomena occurring at great depth.
North Alex Mud Volcano (NAMV), located on the upper slope of the western Nile deep-sea fan is the focus of an RWE Dea funded research project using existing and newly developed observatory technologies to better understand and quantify the internal dynamics and its long-term variability in relation to underlying gas reservoirs. As it is known that the activity of mud volcanoes varies significantly over periods of months and weeks, the assessment of the activity of NAMV focuses on proxies of fluid and gas emanations. Since the initiation of the project in 2007 NAMV has arguably become one of the best-instrumented mud volcanoes worldwide with a network of observatories collecting long-term records of chemical fluxes, seismicity, temperature, ground deformation, and methane concentration.
First results from parallel measurements of fluid flow variations and seismic events in the center of NAMV show a high degree of correlation. Harmonic oscillations of the uppermost gas-saturated part of the sediment conduit (see Lefeldt et al.) clearly stimulate synchronous fluid flow and gas ebullition episodes of several days duration.