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Seismic intensity monitoring: from mature basins in the North Sea to sample-scale porosity measurements.

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We plan the application of a joint velocity, attenuation, and scattering tomography to the North Sea basins. By using seismic phases and intensities from previous passive and active surveys our aim is to image and monitor fluids under the subsurface. Seismic intensities provide unique solutions to the problem of locating/tracking gas/fluid movements in the volcanoes and depicting sub-basalt and sub-intrusives in volcanic reservoirs. The proposed techniques have been tested in volcanic Islands (Deception Island), continental calderas (Campi Flegrei) and Quaternary Volcanoes (Mount. St. Helens) and have been proved effective at monitoring fracture opening, imaging buried fluid-filled bodies, and tracking water/gas interfaces.

These novel seismic attributes are modelled in space and time and connected with the lithology of the sampled medium, specifically density and permeability, with as key output a novel computational code with strong commercial potential. Data are readily available in the framework of the NERC CDT Oil & Gas project.