

EGU21-6570

<https://doi.org/10.5194/egusphere-egu21-6570>

EGU General Assembly 2021

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## Active faulting offshore the Maltese Islands revealed by geophysical and geochemical observations

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The Maltese Islands (central Mediterranean Sea) are intersected by two normal fault systems associated with continental rifting to the south. Because of a lack of evidence for offshore displacement and insignificant historical seismicity, the systems have been considered to be inactive. Here we integrate aerial and marine geological, geophysical and geochemical data to demonstrate that: (i) the majority of faults offshore the Maltese Islands underwent extensional to transtensional deformation during the last 20 ka, (ii) active degassing of CH<sub>4</sub> and CO<sub>2</sub> occurs via these faults. The gases migrate through Miocene carbonate bedrock and the overlying Plio-Pleistocene sedimentary layers to generate pockmarks at the muddy seafloor and rise through the water column into the atmosphere. We infer that the offshore faults systems are permeable and that they were active recently and simultaneously. The latter can be explained by a transtensional system involving two right-stepping, right-lateral NW-SE trending faults, either binding a pull-apart basin between the islands of Malta and Gozo or associated with minor connecting antitethic structures. Such a configuration may be responsible for the generation or reactivation of faults onshore and offshore the Maltese Islands, and fits into the modern divergent strain-stress regime inferred from geodetic data.