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Classifying offshore faults for hazard assessment: A new approach based on fault size and vertical displacement

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For many countries, the methodology for offshore geohazards mitigation lags far behind the well-established onshore methodology. Particularly complicated is the mapping of active faults. One possibility is to follow the onshore practice, i.e., identifying a sub-seabed Holocene horizon and determining whether it displaces this horizon for each fault. In practice, such an analysis requires numerous coring and often ends without an answer.

Here we suggest a new approach aimed for master planning. Based on high-quality seismic data, we measure for each fault the amount of its recent (in our specific case 350 ky) displacement and the size of its plane. According to these two independently measured quantities, we classify the faults into three hazard levels, highlighting the “green” and “red” zone for planning.

Our case study is the Israeli continental slope, where numerous salt-related, thin-skinned, normal faults dissect the seabed, forming tens of meters high scarp, which are crossed by gas pipelines. A particular red zone is the upper slope south of the Dor disturbance, where a series of big listric faults rupture the seabed in an area where the sedimentation rate is four times faster than the displacement rate. We suggest that this indicates seismic rupture rather than creep.