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Spreading and slope instability at the continental margin offshore Mt Etna, imaged by high-resolution 2D seismic data

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Mount Etna is the largest active volcano in Europe. Its volcano edifice is located on top of continental crust close to the Ionian shore in east Sicily. Instability of the eastern flank of the volcano edifice is well documented onshore. The continental margin is supposed to deform as well. Little, however, is known about the offshore extension of the eastern volcano flank and its adjacent continental margin, which is a serious shortcoming in stability models. In order to better constrain the active tectonics of the continental margin offshore the eastern flank of the volcano, we acquired and processed a new marine high-resolution seismic and hydro-acoustic dataset. The data provide new detailed insights into the heterogeneous geology and tectonics of shallow continental margin structures offshore Mt Etna. In a similiar manner as observed onshore, the submarine realm is characterized by different blocks, which are controlled by local- and regional tectonics. We image a compressional regime at the toe of the continental margin, which is bound to an asymmetric basin system confining the eastward movement of the flank. In addition, we constrain the proposed southern boundary of the moving flank, which is identified as a right lateral oblique fault movement north of Catania Canyon. From our findings, we consider a major coupled volcano edifice instability and continental margin gravitational collapse and spreading to be present at Mt Etna, as we see a clear link between on- and offshore tectonic structures across the entire eastern flank. The new findings will help to evaluate hazards and risks accompanied by Mt Etna's slope- and continental margin instability and will be used as a base for future investigations in this region.