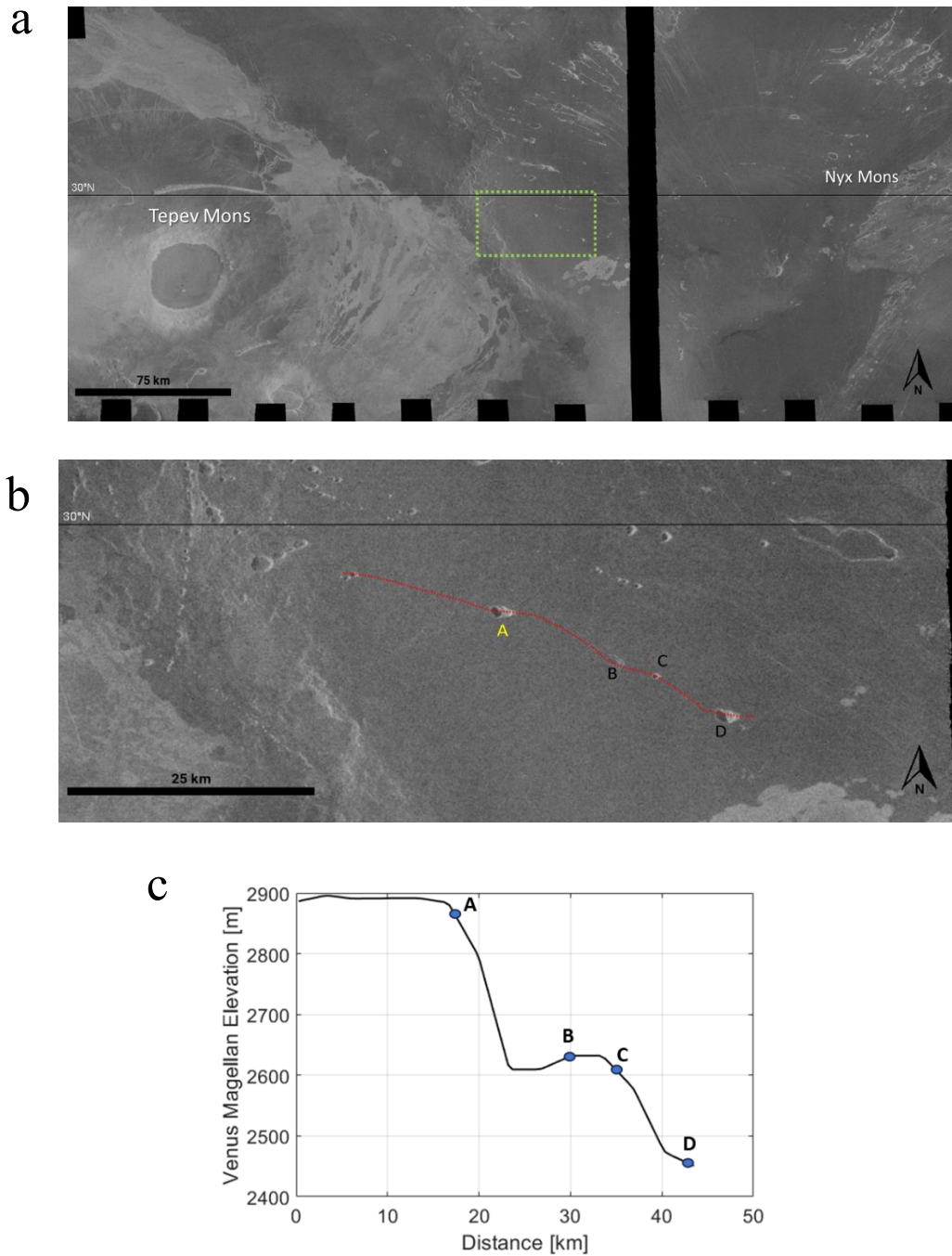
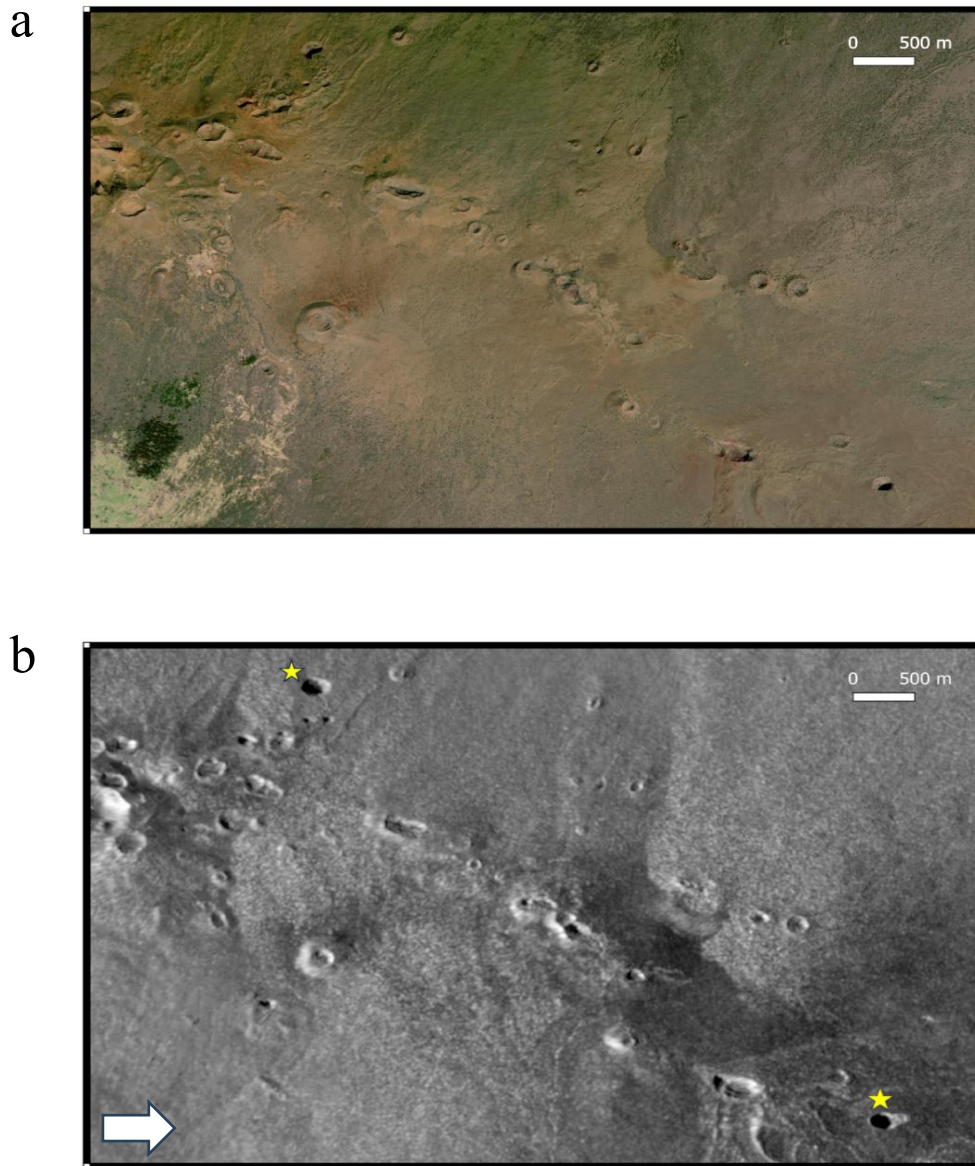


Supplementary Information

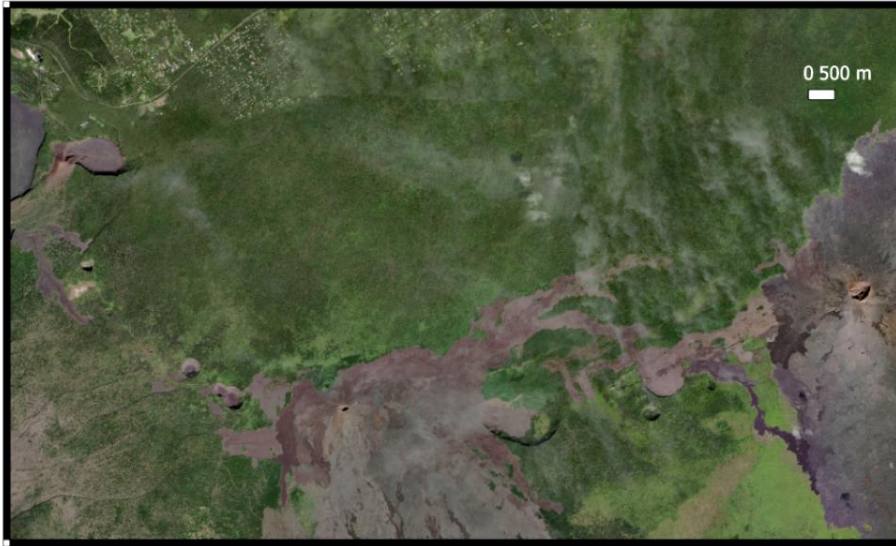


Supplementary Figure 1. Geographical Location of the Study Area. **a**, Magellan Left Look Image of the Nyx and Tepev Mons Region. **b**, Close-up of the green dashed rectangle in panel A highlights a potential development of the hypothesized lava tube, including the skylights labelled A. The features marked as B, C and D are three collapse pits with no access to the subsurface. **c**, Surface elevation profile from Magellan Altimetry²⁹ (standard processing) data of the red line outlined in panel B.

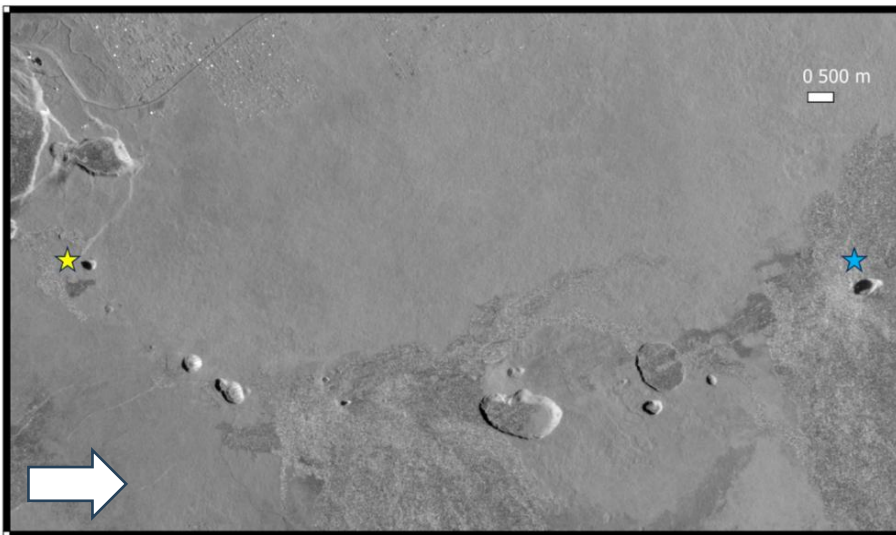


Supplementary Figure 2. Example of results near *Hualālai* Volcano, Big Island, Hawaii, United States. **a**, Optical Image **b**, Sentinel 1 SAR image. Two pit craters (yellow stars) exhibit a bright and elongated backscattering response. However, this response is different in shape with respect to the one originated by lava tubes (See Figure 2). The southernmost pit is named *Na One* and it is an open volcanic vertical conduit of total depth equal to 268 m. Radar look direction is indicated with a white arrow.

a



b



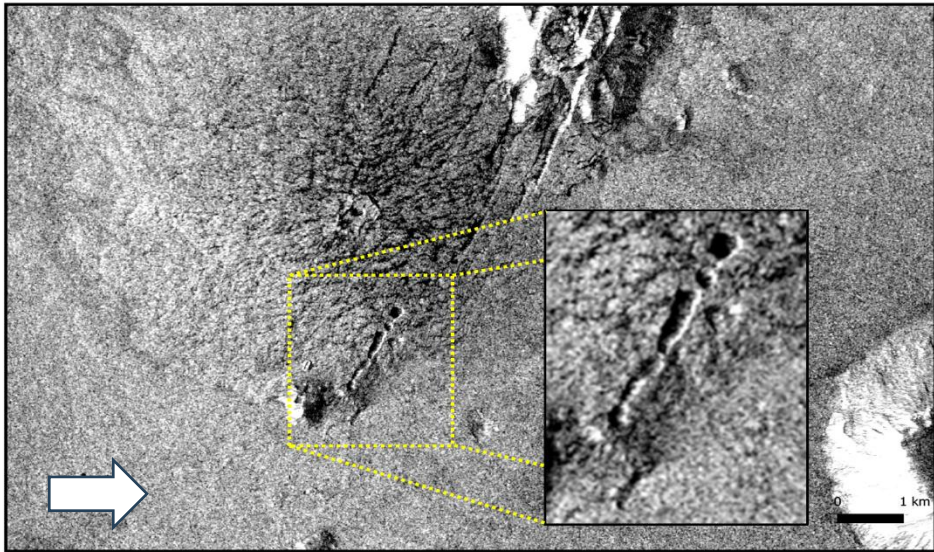
Supplementary Figure 3: Example of results near *Kilauea* Volcano, Big Island, Hawaii, United States.

a, Optical Image **b**, Sentinel 1 SAR image. Two features namely the *Puhimau* crater (yellow star) and the *Pu'u Huluhulu* volcanic vent (blue star) exhibit a bright and elongated backscattering response. However, this response is different in shape with respect to the one originated by lava tubes (see Fig. 2). Radar look direction is indicated with a white arrow.

a

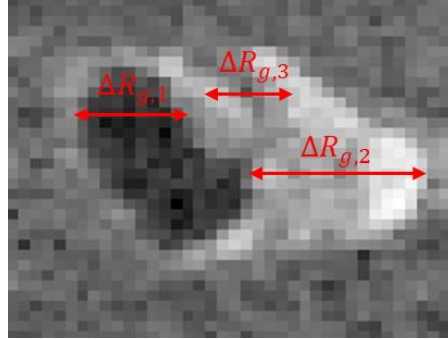


b

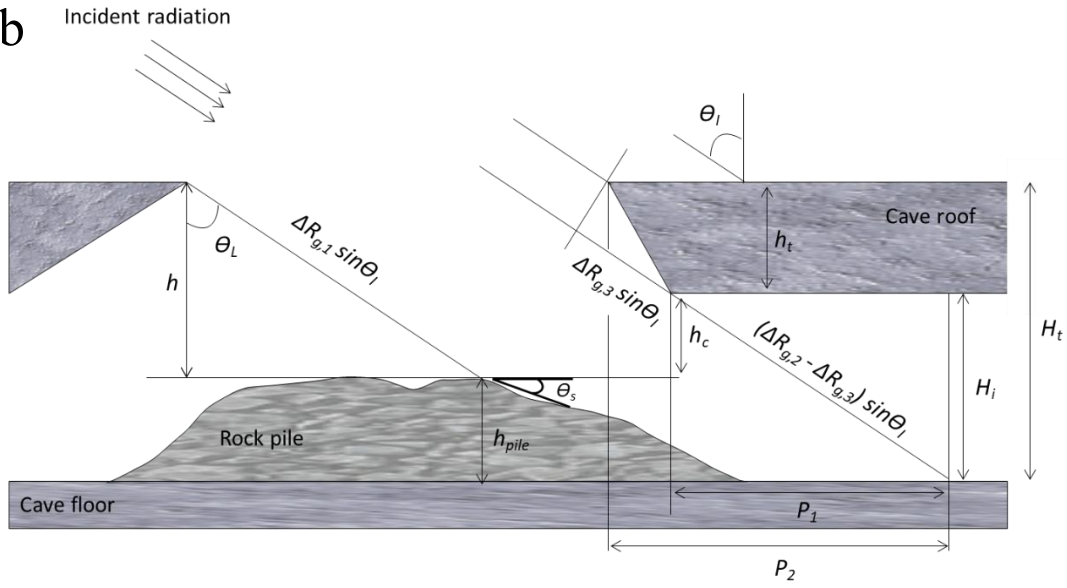


Supplementary Figure 4: Terrestrial Example of a Pit Chain presumably associated with dyke Swarms. a, Optical Image of *Kollóttadyngja* pit chain (65.198125N, 16.541080W, Iceland) **b**, Sentinel-1 SAR image of the pit chain on *Kollóttadyngja* lava shield. Radar look direction is indicated with a white arrow.

a



b



Supplementary Figure 5. Proposed geometric and radar model for assessing the collapse pit and lava tube characteristics. **a**, Ground range intervals measured on the Magellan image and **b**, Side view of the geometric model along with the measured and estimated quantities (see Methods).