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## Integration between data collection through field and UAV-based surveys in volcano-tectonic environments: an example from the Krafla Fissure Swarm (NE Iceland)

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Due to its strategic position at the boundary between European and American plates, Iceland is extraordinarily well suited for the investigation of various geological processes, like the interaction between active rifting processes and magmatic stresses. In this study, we focused on surveying with very high detail different key areas located within the Krafla Fissure Swarm (KFS), an active volcanic system located in the Northern Volcanic Zone, NE Iceland.

The Krafla volcanic rift is characterized by the presence of a central volcano and by a 100 km-long swarm of extension fractures, normal faults and eruptive fissures mainly affecting post-LGM (Late Glacial Maximum) Holocene lavas. Our work focuses on three different areas, located in the northernmost sector of the rift, about 5 km north of the central caldera, and south of the central volcano. All these areas have been investigated through field surveys performed both with classical methods and through two Unmanned Aerial Vehicles (UAVs), the DJI Phantom 4 PRO and DJI Spark: thanks to Structure from Motion (SfM) photogrammetry techniques, we obtained Orthomosaics, Digital Surface Models (DSMs) and 3D models of the study area, with centimetric resolution.

The integration of the above cited methodologies allowed us to collect a huge amount of data, also overcoming difficulties due to logistics, which can sometimes impede classical field survey. More in detail, we collected 2476 structural measurements at 918 sites along extension fractures, and at 185 sites along normal faults. At extension fractures, we measured local fracture strike, dilation and, whenever possible, opening direction. On the other hand, along normal faults we measured local fault strike and the vertical offset. From our data, we obtained an average opening direction of N101°E, thus observing the presence of lateral components of motion along extension fractures. Finally, considering both extension fractures and normal faults, we quantified the cumulative dilation along these sectors, in order to assess the stretch value along the rift.