

On-site Sentinels: participatory contribution to hazard monitoring using low-cost observation technologies

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Currently available low-cost technologies for on-field geographic observation, along with open-access remote sensing data feeds, enable to envision distributed, systematic participatory monitoring of environmental hazard and risk conditions. This type of observation could be a valuable component in planning and prevention strategies, and might also provide some support in disaster and post-disaster management.

A particularly flexible approach would call for the use of low-cost unmanned survey systems (flying drones, crawlers, small ROVs) and basic data processing platforms (e.g. image-based-modelling and GIS). Local observers (the “On-site Sentinels”), selected from the residents and therefore continuously present in monitored areas, could provide data feeds to higher-level institutions. The latter could plan the observers’ work by defining protocols and standards. Institutional monitoring services could also keep regular contacts with the Sentinels, so as to promptly react to their reports if necessary and also to better plan their own operations.

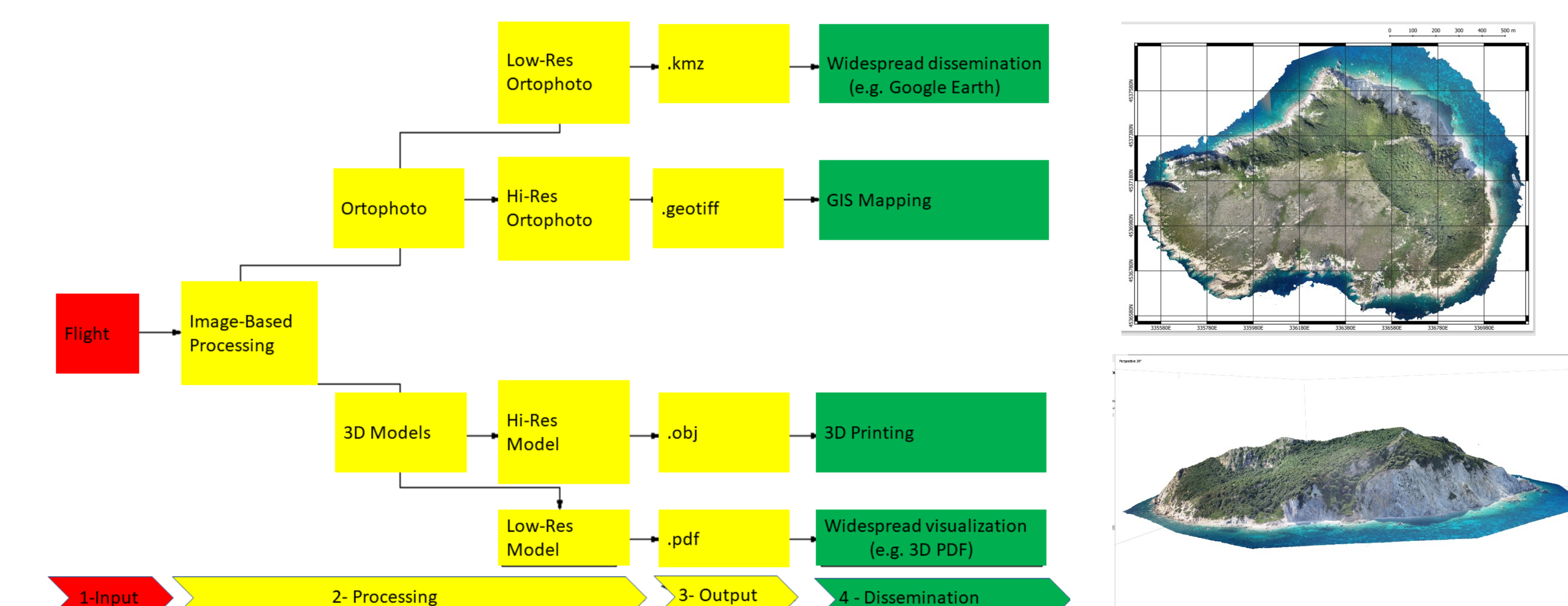
The On-site Sentinels, by using widespread technologies, could furthermore acquire useful data – as in the so-called digital-construction-site model – and transfer them to local authorities, for monitoring development actions and for following-up on interventions carried out by public and private players.



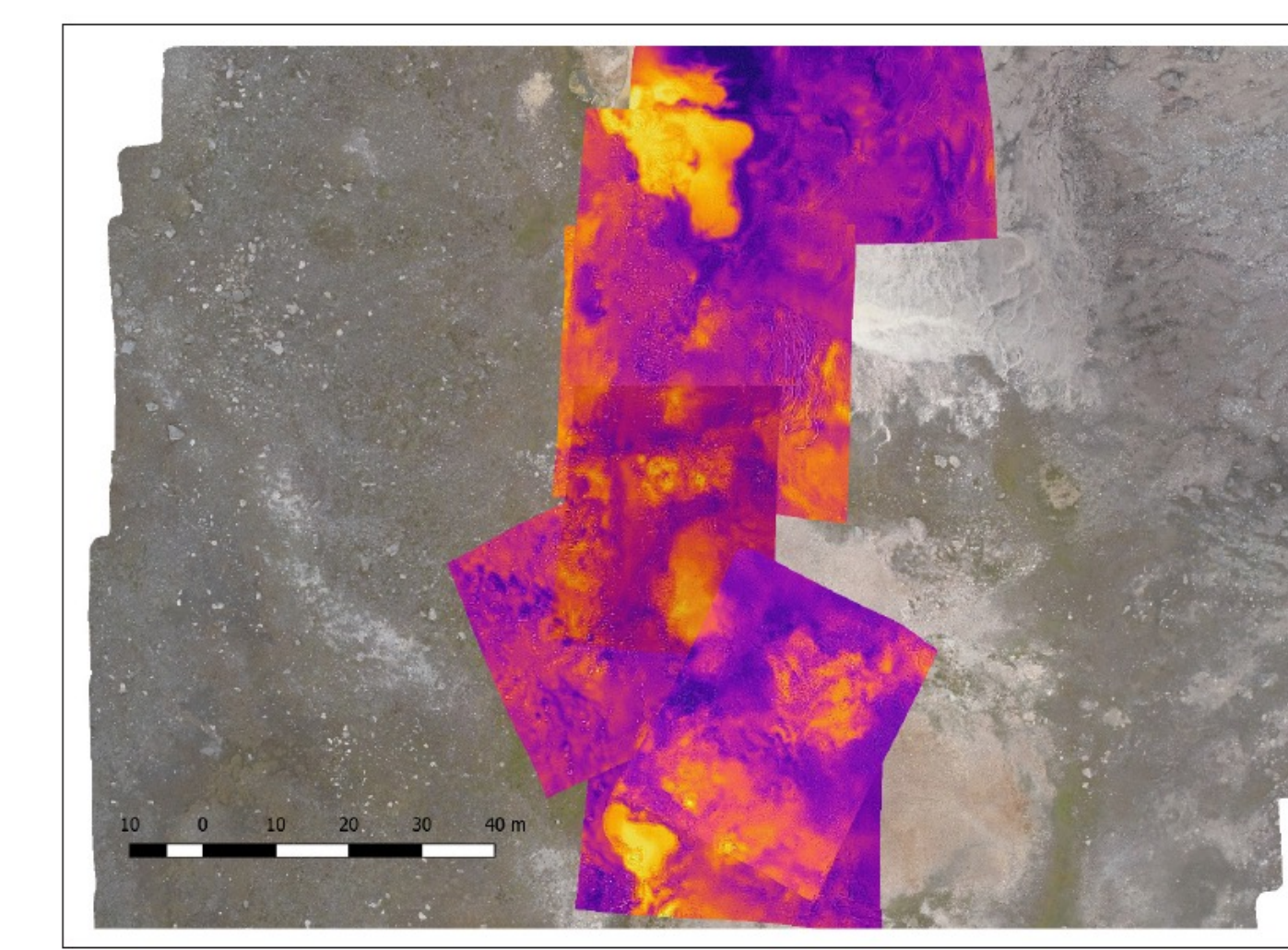
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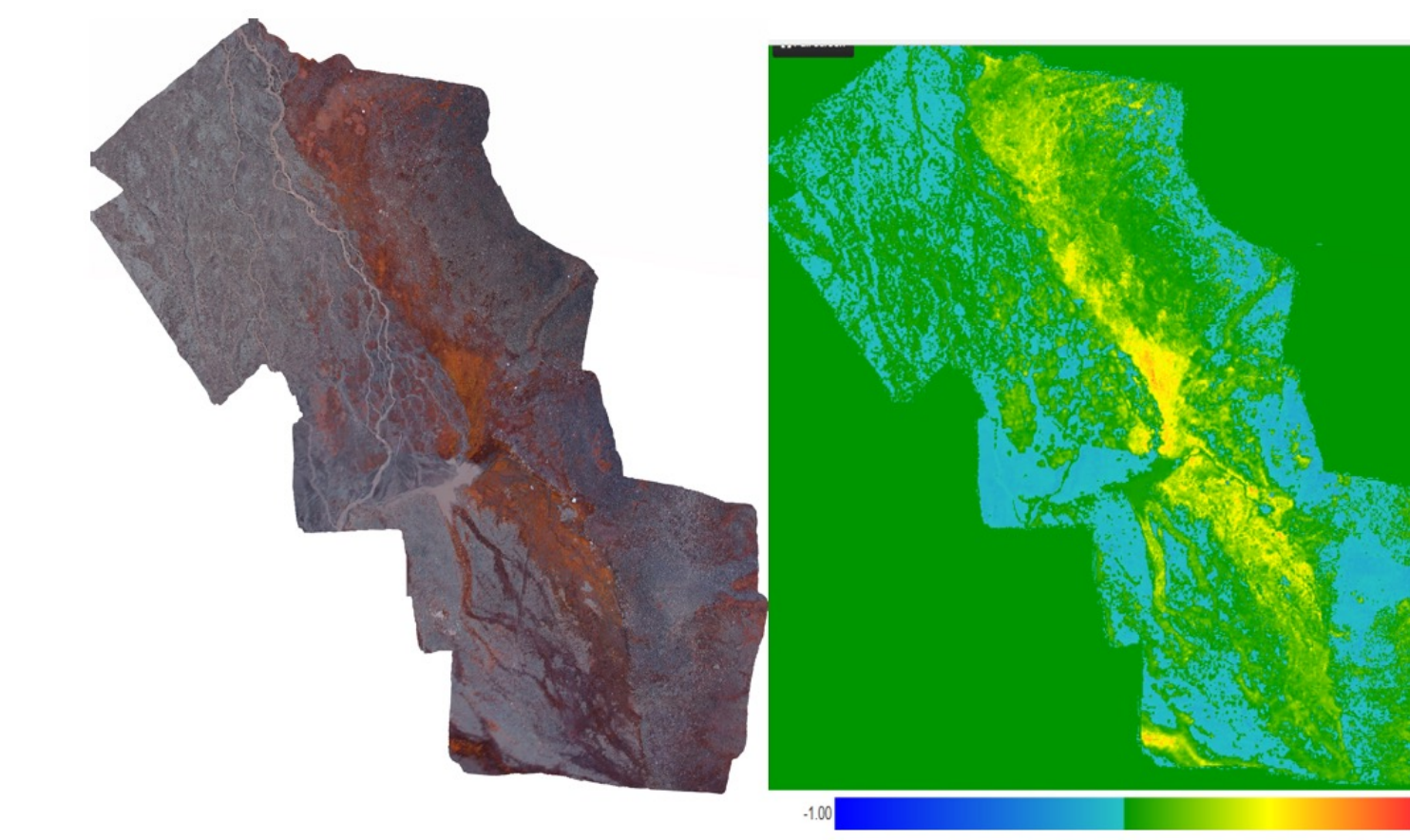
Standard consumer-level UAS drone (DJI Phantom 2 Pro) with additional payload.



Data acquisition and processing workflow for mapping and 3d virtualization (in the visible light), with example of possible outputs from the same data acquisition



Sub-surface warm patches near a thermal spring, as mapped by the drone with a FLIR-ONE TIR camera, and overlaid on a visible light ortophotograph.



Near infrared ortophoto of an area (left) and the NDVI map derived from it (right). The carrier drone was the same

On-Site Sentinels can do their work by using simple and widespread tools...

...observing and processing data about several geographic phenomena that can be detected in the visible light...

...but also, increasingly, in other bands of the electromagnetic spectrum.

