Drone watch: UAVs for flood extent mapping and damage assessment

[Abstract]

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Drone Watch: UAVs for flood extent mapping and damage assessment

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Near real-time (48h) accurate mapping of flood extent and damage in urban areas is required for the management of future flood events. With flood damage estimated to be above £3 billion/event (based on 2007 flooding events) and an average house claim of £40k, flood mitigation and damage assessment are a priority in the Governmental agenda. Current methodologies rely on the use of satellite data (SAR or optical) or aerial imagery collected from aircraft. However, several limitations within the underlying technology curtail the current effectiveness of the strategy: (i) optical imagery cannot provide information under low-cloud cover presence and (ii) satellite (SAR) data, which can penetrate cloud cover, is challenging in urban areas due to its oblique viewing angle and the difficulty of separating the water signature from other urban features. Hence, at present, we do not have sufficient data to robustly calculate flood impact in urban areas.

Small-scale Vertical Take Off (VTO) Unmanned Aerial Vehicles (UAVs) are emerging as a key engineering tool for future environmental monitoring tasks. Within the context of flood extent mapping and damage estimation, UAV aerial imagery offers both timely (on-demand) and increasingly detailed (higher resolution) information than comparable satellite or aircraft imagery. In this project, we contributed to address the gap in the provision of immediate post-event flood extent and visible damage information by (i) proving the feasibility of the development of a novel approach to Unmanned Aerial Vehicles and satellite data integration for urban flood map extent and damage assessment and (ii) providing a definition of the service offer required by the end user for the rapid and accurate mapping of flood extent and damage assessment in urban areas. To the authors’ knowledge, this is the first time the Civil Aviation Authority has give permission to carry out survey work over any congested space in the UK with a range of 1000m from the pilot and up to a potential altitude of 400ft AGL.