



HELP OR HINDRANCE?

UAVS ARE INCREASINGLY PROMOTED AS VALUABLE INFORMATION SOURCES FOR EMERGENCY DISASTER RESPONSE. BUT JUST HOW HELPFUL ARE THEY? HUMANITARIAN MAPPER ALAN MILLS EXAMINES THE PROS AND CONS

Many humanitarian agencies apply data collected by UAVs more and more in their disaster relief operations. This has been particularly helpful in disaster preparation and responses to long-term, complex emergencies. One example is the conflict in South Sudan, where UAVs have been flown across difficult terrain to identify new water sources for displaced people.

It seems sensible, then, that you could use UAVs across the whole panoply of humanitarian emergency relief efforts. However, there are important legal, logistical, practical and conceptual hurdles to consider first, as well as some serious questions about using data just because it's there.

In an emergency, there is little scope for experimenting with new technologies or data sources to see if they work and there's too much data available to process it just in case something good comes out of it. People focus

is primary – humanitarian mappers should source the best data available to meet the needs of decision-makers coordinating aid for affected people as quickly as possible. This requires a mature understanding of what those needs are.

What we use

In a recent internal review, humanitarian mapping charity MapAction, with which I've deployed to numerous humanitarian emergencies over the past 15 years, calculated how much imagery it used in emergency missions. The conclusions were fascinating.

Firstly, we make more use of derived products than we do of original imagery. MapAction's most used dataset comes from the Shuttle Radar Topography Mission (SRTM), captured in 2000. Where other data is unavailable, the SRTM's digital elevation data form a useful backdrop to so many maps. It



In the aftermath of an emergency, normal information management conditions don't apply – multi agency disaster simulation, Norway 2016

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helps responders get a feel for the topography of a disaster-affected area and can assist in logistics, winterisation planning and market analysis. SRTM data is also easily accessible and can be downloaded onto mappers' laptops before they arrive in the affected area. It's old, but it's simple and effective.

Also often used are targeted sensors mapping flood extent derivations and rainfall accumulation models. In addition, MapAction frequently accesses data from other agencies, such as UNOSAT, to detect damage to buildings and infrastructure from imagery after cyclones and earthquakes.

Our use of raw visible imagery is usually restricted to small areas, providing a detailed backdrop for other data – for example, relating to refugee camps or highlighting conditions before and after a disaster. To date, we have not used UAV imagery in any of our published maps.

Do we need UAVs?

So, what can we extrapolate from this about the use of UAVs in disaster mapping? In a rapidly evolving disaster situation, 'normal' information management conditions don't apply. Communications and power networks may be inadequate or disrupted. Downloading large volumes of images can be difficult or impossible. Plus, there is limited time to process and stitch together lots of raw images or analyse bands of data to generate meaning. Information requests come in thick and fast from a range of response managers who cannot wait long for answers.

UAVs do offer timely information and services, including carrying essential medical supplies, surveillance in difficult terrain, capturing data below cloud level and mapping damage. Video captured has an immediate visual impact and is often widely shared in formal and social media.

However, their actual usefulness in emergency relief efforts remains to be proved. Current technical limitations, such as the short flying times of lightweight UAVs and the logistics of getting larger vehicles to affected areas, hamper effectiveness. Getting permissions to fly UAVs in the same areas as helicopters and planes on other relief missions is another barrier. Unfavourable weather conditions can impede capturing clear, georeferenced imagery. Add to this a lack of simple resources such as transport, fuel and mapping to put together flight plans, and the ability to mobilise becomes greatly restricted.

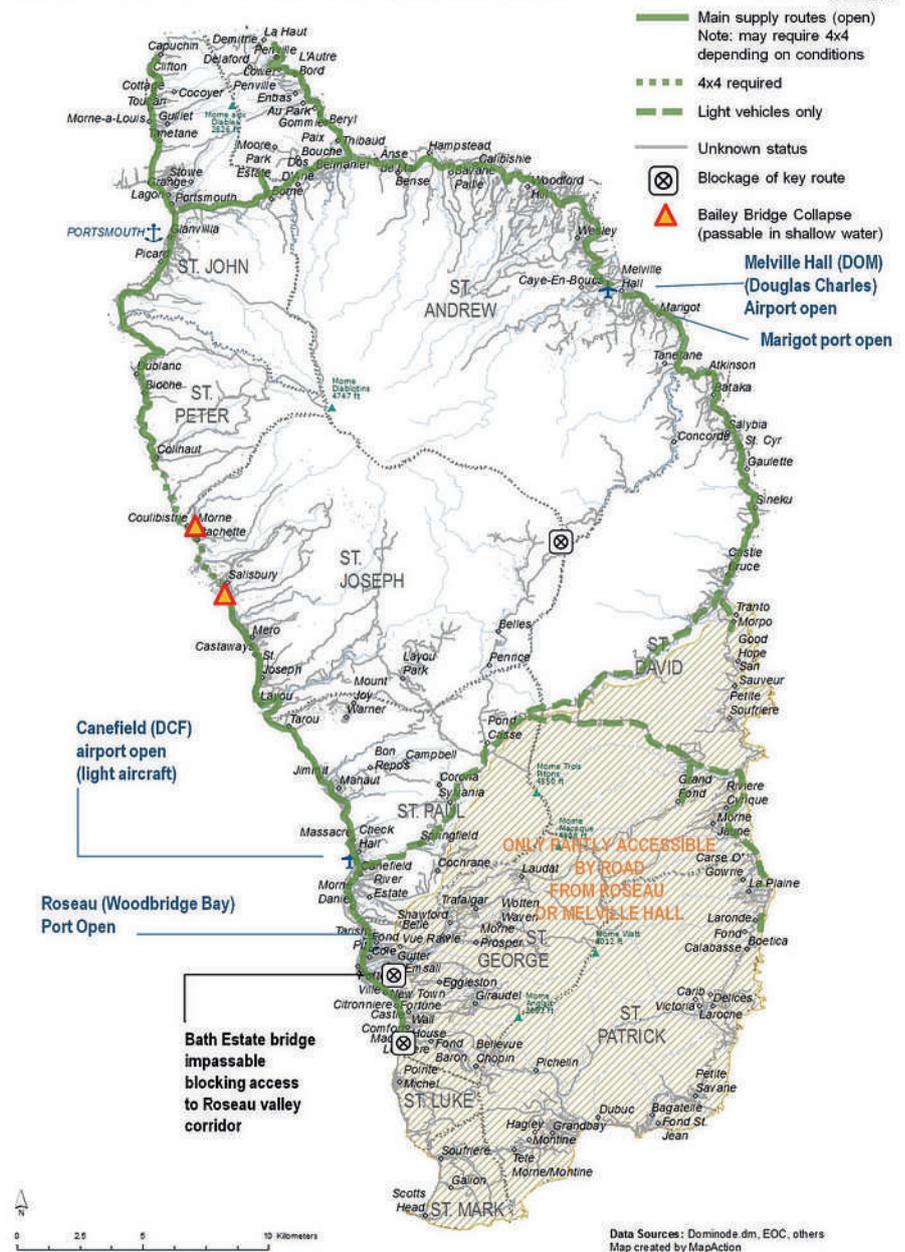
Success stories for UAVs in humanitarian mapping do exist, but to date they have been in disaster preparedness, mitigation and resilience or complex emergencies with a longer trajectory.

Changes are coming

There are, however, signs of a growing maturity in the UAV sector that could soon deliver game-changing information to humanitarians.

Dominica: Hurricane Maria humanitarian access Update 6: 25 Sep 12.00 local

MA605 MAP ACTION



Humanitarian access map, Dominica, 25 September 2017, following Hurricane Maria

Self-organisation, leading to regulation and cooperation, and the emergence of the UAViators network, which promotes safe, coordinated and effective use of UAVs for humanitarian purposes, give cause for legitimate enthusiasm. If, before operating in a disaster zone, UAV operators work together to agree issues such as how to divide up the affected area, standards of operation, output resolution, how to stitch data together and extract useful information, and how to provide that data to humanitarians when and how they need it, their work's potential value increases greatly. UAViators has the potential to provide a one-stop-shop for humanitarians looking to engage with the UAV sector.

Improvements to technology are also relieving some logistical bottlenecks. Better geo-location services on UAVs, faster and more accurate automated geo-correction processes, longer flight and shorter recharge times, recharging in

the field, improved broadband, higher resolutions, and better specifications for lightweight UAVs all contribute to more effective operations.

Localisation of UAV operations in disaster-prone areas is another advance. National operators and international organisations prepositioning their kit in the right places, developing local skills and working through legal issues is reducing barriers and costs.

However, even when all challenges are overcome, humanitarians still need to weigh up the cost-effectiveness of having UAV operators in the field gathering huge amounts of data that might be more easily, cheaply and less disruptively gathered by other means.

A change of mindset

UAV advocates must deepen their understanding of humanitarians' work and information needs. We need to shift from technology-driven, supply-

side innovations to an iterative process of system evolution. The added-value of remotely-sensed data comes from combining it effectively with other digital map and survey information. Simple, focused solutions will work best – but only where they are interoperable with other data sources and multiple systems and open for use by all responders.

Humanitarians can be slow to explore new technologies. Those dealing with information management in emergencies could assist technologists by creating structures to respond to, incorporating information about what data is needed when, by whom and how it should be digested. The Humanitarian Data Exchange (HDX) has proved a useful repository, clocking not just pre-disaster data but situational information during a response. Building a network of data providers has been a fine balance between curation and openness, retaining a measure of quality control. But it's still prone to becoming another behemoth catalogue; efforts are underway to provide more structure that can be easily visualised.

UAV proponents should analyse HDX to see where their technology can help capture the right data. The sector undoubtedly has talents, resources and goodwill towards humanitarian relief. MapAction and other humanitarians look forward to more open dialogue to ensure these are harnessed effectively.

Alan Mills is an independent consultant specialised in GIS/remote sensing and a volunteer with humanitarian mapping charity MapAction (www.mapaction.org)



Aircraft delivering aid following Hurricane Irma, British Virgin Islands, September 2017



Responders surveying a Sierra Leone Landslide © Kathryn Goodenough, British Geological Survey



Flying UAVs in the airspace used by aircraft on humanitarian missions can be problematic

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