

## Bran Black's basic rules for Georeferencing drone imagery

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I am a grad student from Oregon State University in the U.S. who has recently been working with the South Atlantic Environmental Research Institute (SAERI) to finish island-wide maps based on satellite imagery for both the Falklands and South Georgia, as well as to help (alongside a host of people both inside and out of SAERI) create the more detailed maps of localized areas of interest we will be focusing on over the course of this next year.

Until last July, I'd never been farther east than Green Bay, Wisconsin (88.0133°W), nor farther south than Barstow, California (34.8958°N). So, safe to say, any new experiences I encountered in my six weeks in the Stanley area (51.6977°S, 57.8517°W) were going to be something new and different. When I heard that I would be assisting SAERI's Coastal Habitat Mapping Project Manager, Neil Golding, while planning some of that group's first drone surveys, I was super excited!



During this process we were able to nail down a procedure where we could assemble our drone footage into a single, coherent image in fairly short

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order. What we quickly found problematic, though, was really catching the vertical component of our imagery – in other words, we could pinpoint where each pixel was with reasonable accuracy so far as where that pixel went north to south or east to west, but we weren't getting great results for our vertical information, or how far above sea level each pixel stood. As a matter of fact, there were lots of places that our initial maps were saying trended uphill that should, in reality, have been sloping downhill. Huh. Well that's definitely... less than ideal. So how to fix this problem?



Enter Georeferencing. We needed a way to tie specific spots in our drone imagery to those point's real-world positions, north to south, east to west, **and** up and down, so that we could align our imagery to those true locations. To do so, we had to first place temporary markers

(A4 sheets of paper printed with a large black-and-white checkerboard pattern) on the ground throughout the survey area in places where we could later find them again in our recorded drone imagery. Special care was paid to the placement of these markers with the intention of ensuring that points were placed in as wide of a vertical range as possible throughout our map areas. We would then note the ground location of the markers using a hand-held GPS unit. Back at SAERI, we would open the brand-new drone imagery to find and select the locations of the markers we had placed in the field to "teach" the software where the specified sites were in the "real world" by entering the coordinates we had recorded in the field. Remember how I mentioned just now that we tried to get points from places with a wide range of elevations? That choice was made to better "teach" the software where the highest versus lowest points were in the map area. For those of you who have worked with aerial photos, this is a process that is very similar to rubber sheeting.



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That's all well and good as a sky-high overview, but what are the real and useful takeaways from my drone survey experiences in the Falklands? Here are my super streamlined, ultra-distilled rules for Georeferencing in drone work:

- **Don't** forget where you put the georeferenced markers before you can record their position with your GPS. When in doubt, shoot for landmarks. And then, be sure you remember your landmarks.
- **Do** remember to keep your drone batteries warm whilst out on fieldwork; they need to be above  $\sim 20^{\circ}\text{C}$  or else the drone won't take off. Fussy little things.
- **Do** make sure your cell phone is in a pocket you can zip shut when shimmying up a rock crevice to reach a Georeferencing point.
- **Do** try to duck out of the drone's path when it flies close to overhead, otherwise there's going to be duplicate images of the drone operator and spotter popping up all over the final survey .

So there you have it; a basic procedure and four super-simple rules to follow when Georeferencing your drone imagery. **Happy droning!!!**

