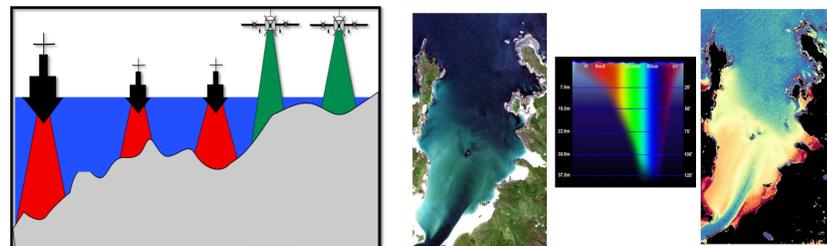
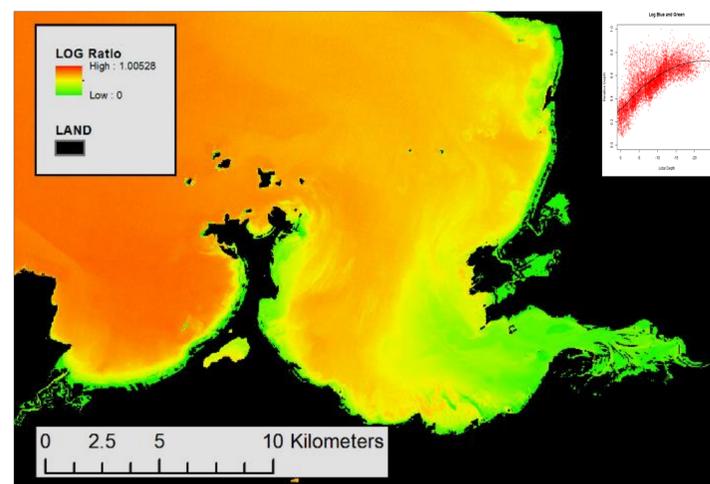


Bathymetry traditionally acquired using SONAR produces accurate depth measurements but is constrained by a high operating cost and an inability to survey very shallow waters. Aerial LiDAR is free of navigation restrictions, however this approach is costly and influenced by turbidity. **Satellite remote sensing offers a promising, alternative method** based on the manner of light transmission in water that potentially offers a **regular, flexible, efficient** and **cost-effective** means of mapping bathymetry over large areas.

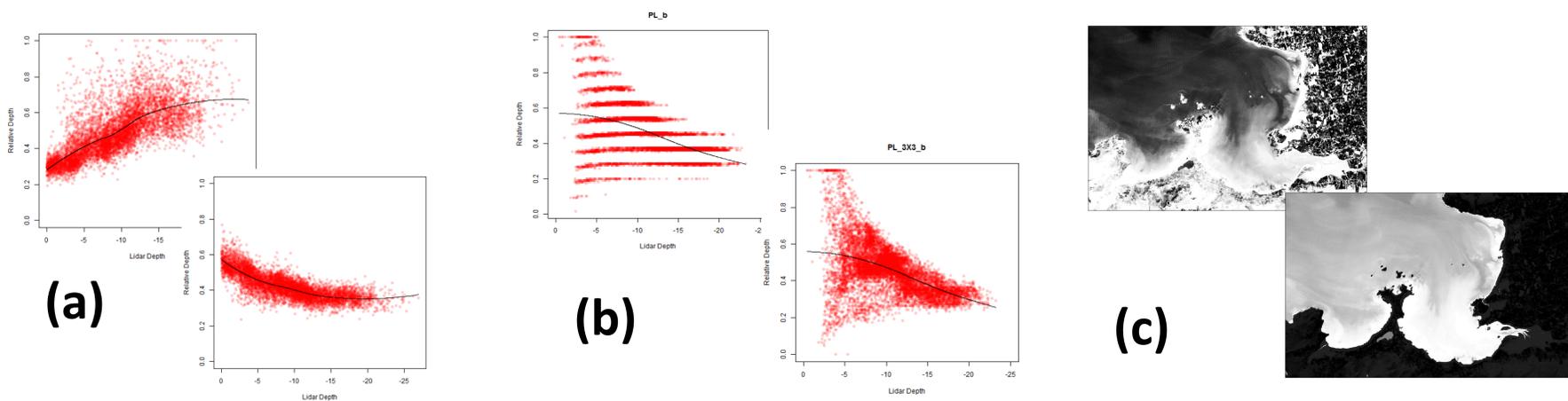


Coastal bathymetry (a) airborne platforms can survey areas of coastal waters where it is not safe for larger boats to go (b) satellite bathymetry utilises free satellite multispectral imagery to enable regular, accurate mapping of the seabed. Digital surface model accuracies can achieve approximately 10% of water depth for analytical, empirical and physics-based approaches independent of ground control.

This **GSI Shortcall 2015** project advances an SFI Industry Fellowship collaboration between the NCG, TechWorks Marine and the GSI exploring bathymetric accuracy improvements through spatial regression. The **Shortcall** objective is to combine satellite and airborne imagery in a **multi-resolution approach** to quantify the influence of spatial, spectral, radiometric and temporal image resolutions on bathymetric accuracy. This approach was applied in Tralee (right) and Dublin bays to incorporate different water bodies.

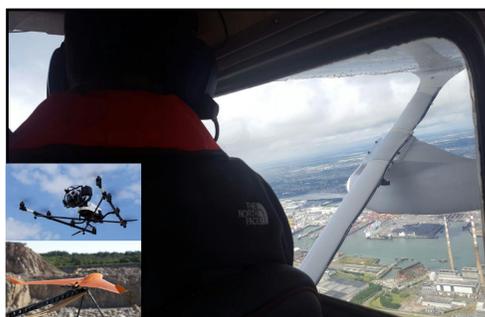


Test Site #1 – Bathymetric Map of Tralee bay

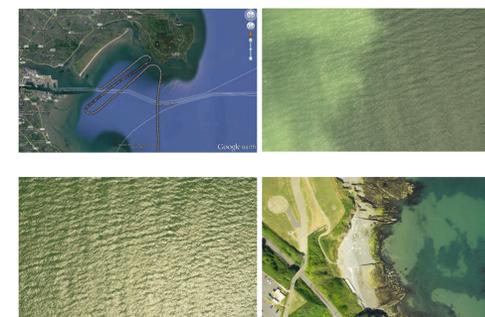


Assessing image correction algorithms and multiple resolutions for bathymetric accuracy, examples such as (a) atmospheric correction over coastal waters (b) radiometric resolution (8 bit v 12 bit) (c) removing sun-glint from the signal returning from the water.

**Phase 2** identified a new set of challenges using very high resolution aerial imagery (**drone and light aircraft**) for bathymetric surveys. Issues such as navigation errors, image geometry, image fusion, spectral band separation in SLRs, environmental effects and tie-point matching all influence bathymetric accuracy.



Application of airborne and drone mounted sensors – Dublin bay surveyed using an aerial sensor pod incorporating thermal, multispectral and RGB imagery.



High resolution imagery brings its own challenges - significant cloud and sun glint contribution v those ideal for bathymetry.