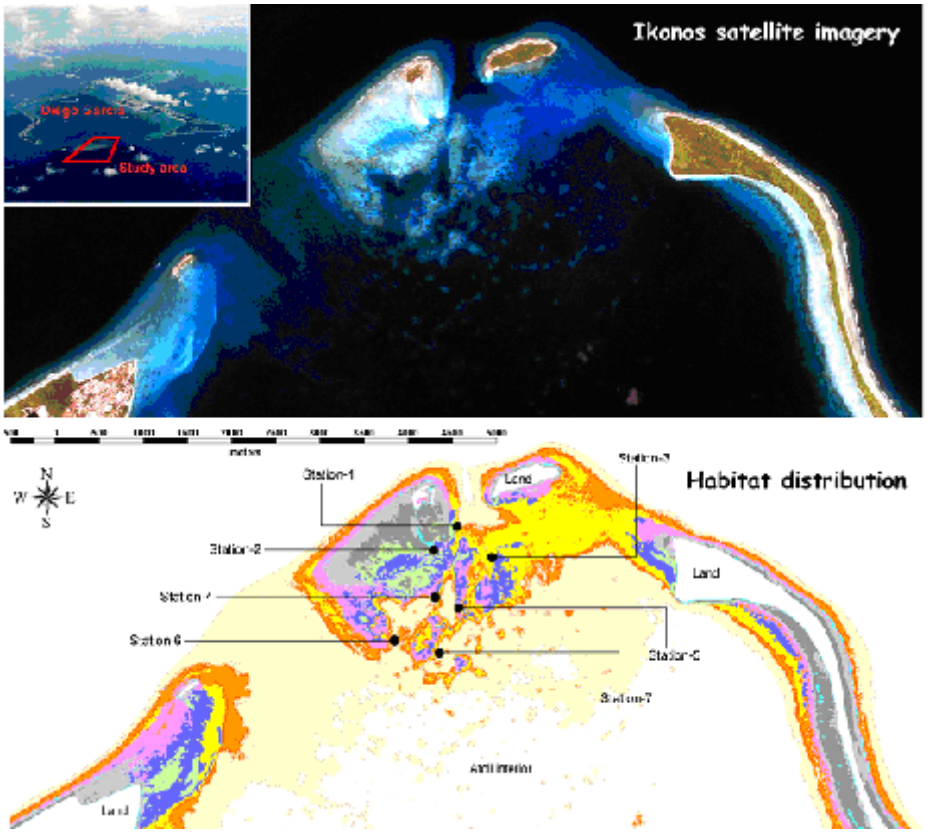

Ikonos satellite data above was processed to show different seabed terrains, shown by the different colours below.

Measuring fish diversity and abundance in the British Indian Ocean Territory

The 3,770Km^2 of the coral reefs of the Chagos teem with fishes, the remoteness of the archipelago giving considerable protection from fishing pressure, helped by the presence of the military base on Diego Garcia. Quantifying the likely distribution of reef fishes across this vast territory is unfeasible through field survey. Alternative means do exist and a pilot study employing a novel application of satellite imagery was trialled during the 2006 Chagos expedition. The heterogeneity and physical complexity of the sea floor is known to be a good predictor for the diversity and abundance of fishes on coral reefs[1]. High resolution remote sensing data offered by commercial sensors such as Ikonos, can be processed to yield such parameters in shallow well-lit waters[2].

During the field campaign in 2006 a study site on the northern tip of Diego Garcia was ground-truthed rigorously at seven stations for the quantity and diversity of fishes, as well as the composition and depth of the seabed. Correlation of the fish information with the satellite imagery showed nine different seabed terrains (coloured above) revealing an ability to predict the abundance of fishes in each different terrain or colour across areas of sea floor as great as 5km^2. The strategy appeared to be most successful for the larger size classes of fishes and in particular those with territorial behaviour[3]. Similar work in more impacted regions, such as Florida, shows a much weaker predictive ability from remote sensing data[4] which is attributed to the fact that the fish populations in these areas are already decimated and structured very differently to more pristine systems such as present in the Chagos. The work offers the possibility that the prediction of fish indices from orbit can be used as a robust and viable tool in stock management and the planning of marine protected areas.

[1] Wilson SK, Graham NAJ, Polunin NVC (2007) Appraisal of visual assessments of habitat complexity and benthic composition on coral reefs. Mar Biol 151:1069-1076.

[2] Stumpf RP, Holderied K, Sinclair M (2003). Determination of water depth with high-resolution satellite imagery over variable bottom types. Limnol Oceanogr 48:547-556.

[3] Purkis SJ, Graham NAJ, Riegl BM (2008) Predictability of reef fish diversity and abundance using remote sensing data in Diego Garcia (Chagos Archipelago). Coral Reefs 27:167–178.

[4] Kuffner IB, Brock JC, Grober-Dunsmore R, Bonito VE, Hickey TD, Wright CW (2007) Relationships between reef fish communities and remotely sensed rugosity measurements in Biscayne National Park, Florida, USA. Environ Biol Fish 78:71-82.