Cloud-based national on-line services to annotate and analyse underwater imagery

Roger Proctor, Integrated Marine Observing System (Australia), roger.proctor@utas.edu.au
Tim Langlois, School of Biological Sciences, University of Western Australia (Australia), timothy.langlois@uwa.edu.au
Ariell Friedman, Greybits Engineering (Australia), Ariell Friedman ariell@greybits.com.au
Sebastien Mancini, Integrated Marine Observing System (Australia), sebastien.mancini@utas.edu.au
Xavier Hoenner, Integrated Marine Observing System (Australia), xavier.hoenner@utas.edu.au
Brendan Davey, University of Tasmania (Australia), brendan.davey@utas.edu.au

Fish image annotation data and benthic habitat imagery is currently collected by various research, management and academic institutions globally (+100,000's hours of deployments) with varying degrees of standardisation and limited formal collaboration or data synthesis.

Two developing software tools have been brought together in the Australian Research Data Cloud to provide marine biologists with a powerful service for image annotation. *SQUIDLE+* (http://squidle.org/) is an online platform designed for exploration, management and annotation of georeferenced images & video data. It provides a flexible annotation framework allowing users to work with their preferred annotation schemes. We have used *SQUIDLE+* to sample the habitat composition and complexity of images of the benthos collected using autonomous underwater vehicles (AUV) and stereo-Baited Remote Underwater Video (BRUV). *GlobalArchive* (http://globalarchive.org/) is designed to be a centralised repository of aquatic ecological survey data with design principles including ease of use, secure user access, flexible data import, and the collection of any sampling and image analysis information. To easily share and synthesise data we have implemented data sharing protocols, including Open Data and synthesis Collaborations, and a spatial map to explore global datasets and filter to create a synthesis.

We present a case study of how these national on-line services, developed within a domain-oriented research cloud, are being used to a) annotate habitat images collected using AUVs and b) synthesise fish annotation data sets from baited remote underwater stereo-BRUVs. These outputs are integrated into GlobalArchive and linked to an R virtual desktop analysis suite to offer an unprecedented capability to deliver marine biodiversity information of value to marine managers and scientists alike.