

Free ranging ocean observation systems: maximising the use of ocean data collected from marine animals

Evans K, Cowley R and Hartog J – CSIRO Wealth from Oceans Flagship, Marine & Atmospheric Research, Hobart, Tasmania, Australia

Over the last ten years CSIRO has invested substantially in electronic tag technology in an effort to understand the spatial dynamics of pelagic species in the Australia region. With recent progress in enhancing the accuracy of sensors incorporated into electronic tags, there is widespread interest in the ocean data collected by electronic tags deployed on animals, particularly as many species move through and collect ocean data from areas that have been traditionally hard to sample using more common oceanographic collection methods (e.g. ship sampling, ARGO floats and ocean moorings). In the Australian region these areas include the continental shelf, the East Australian Current, the Great Australian Bight, the Coral Sea and the Indonesian through-flow. There is therefore great potential for electronic tag data to contribute to regional (e.g. Bluelink) and international (ARGO) ocean observation initiatives.

Development of extraction and data QC routines

Data

Temperature depth profiles from a 72 hour window around Fastloc GPS positions collected by broadbill swordfish (*Xiphias gladius*) tagged with Mk10-F pop-up satellite archival tags on the east (Evans et al. 2011) and west coasts of Australia were extracted from CMAR's Tag Database (Hartog et al. 2009) and saved as a Matlab files. Each Matlab file was converted to a netcdf file and metadata codes required for submission to the GTSP (Global Temperature-Salinity Profile Program – operated by NOAA) generated.

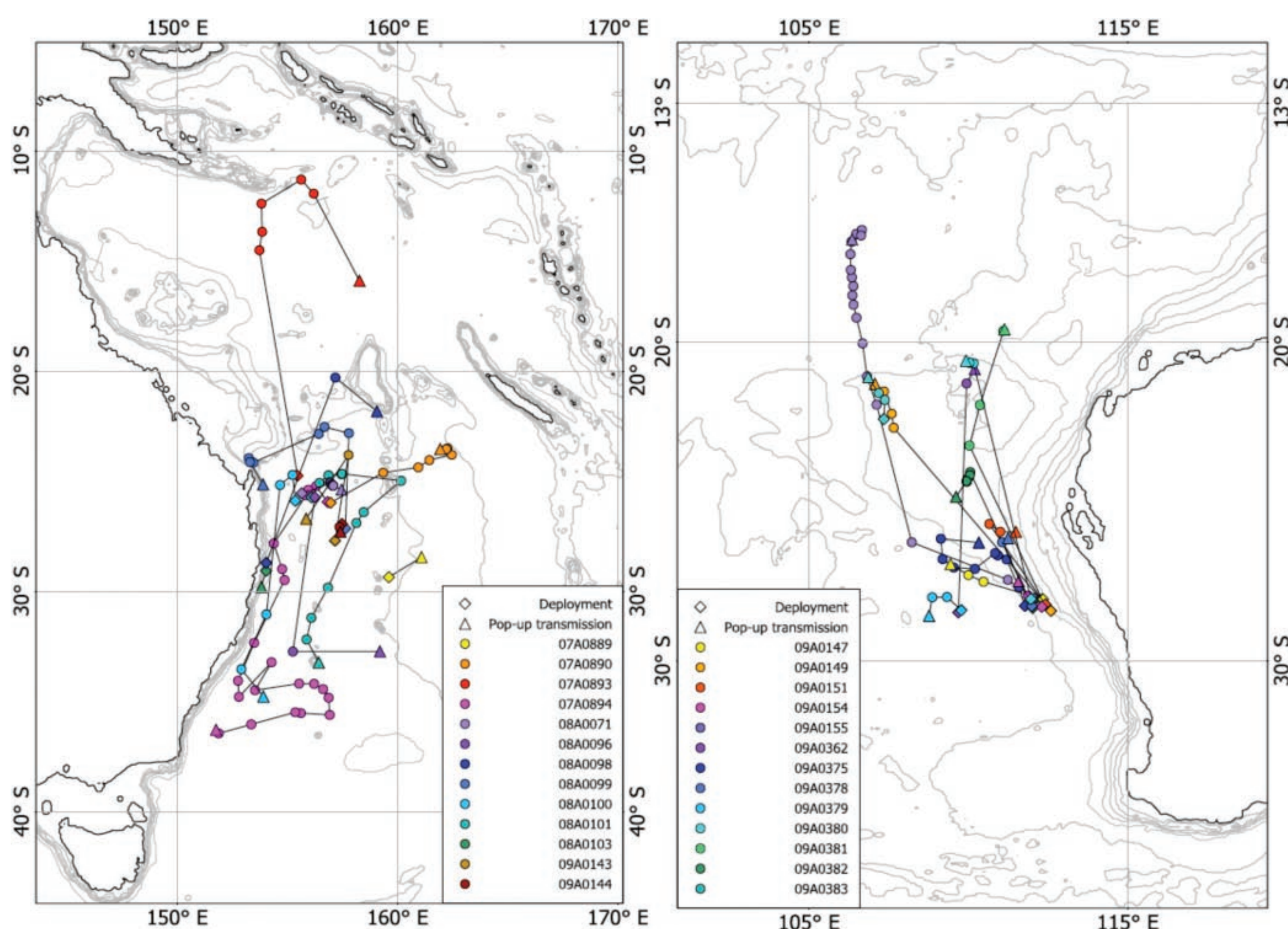


Figure 1: Tracks from Mk10-Fs deployed on broadbill swordfish off the east coast of Australia (left) and the west coast of Australia (right).

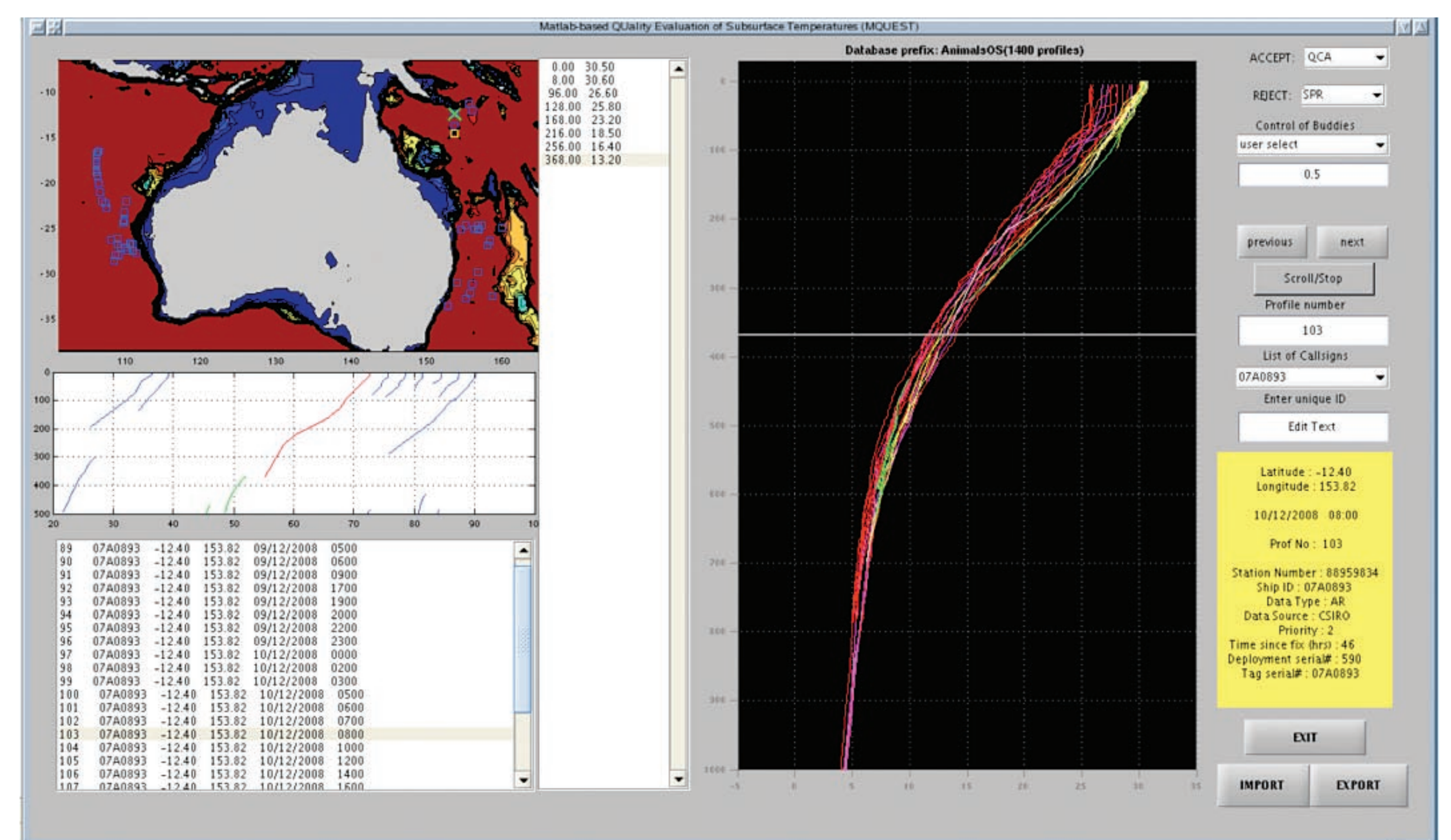


Figure 2: Screen printout of a temperature profile being matched against ARGO data in the program Mquest. The top left hand of the screen displays the location of the profiles, the mid left visualisation of the profiles, bottom left a printout of the locations and the right side of the screen displays and individual profile with ARGO profiles available within 0.5 degrees of the tag profile.

Data quality control

The netcdf files were viewed using 'Mquest' - a program developed by CMAR to QC XBT data (Gronell and Wijffels 2008). Each profile was reviewed by comparing it to background climatology (from the CARS atlas) and then to 'buddy' profiles – profiles from Argo floats, CTDs and XBTs taken within a 0.5 degree radius of the tag profile. Questionable or bad data was flagged using the GTSP system, which allowed individual points or entire profiles to be flagged. The QC'd data was then submitted to the GTSP.

Table 1: Temperature profiles collected Mk10-Fs deployed on broadbill swordfish in the western Tasman Sea, 2008.

	Number of tags	Days of data	No. of profiles	No. profiles passed QC
East coast of Australia	5	33	861	845
West Coast of Australia	7	41	539	503

Progress to date

Data extracted and quality controlled to date has compared very well to background data, even within a 72 hour window. We have submitted on the order of 1,350 profiles to the GTSP which makes ocean data available to the World Ocean Database. These constitute the first animal borne data to have undergone GTSP level QC and the first to be made available to the World Ocean Database at this QC level.

Similar extraction and QC routines for data collected from Argos transmitting tags are currently being developed. Submission of data derived from a number of tag types will result in the expansion of the spatial coverage of temperature profile data available to the GTSP.



References

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Further information

contact: Firstname Lastname
phone: +61 3 6232 5007
email: karen.evans@csiro.au
web: www.cmar.csiro.au
www.csiro.au