## Matt Sherlock

Matt Sherlock leads CSIRO's Marine Instrumentation Group – a team of scientists, engineers and technical experts responsible for developing and maintaining a wide variety of sophisticated marine sampling tools, and providing electronics support to Australia's Marine National Facility. During a long career with CSIRO, he has strived to improve the way in which we collect information from the ocean, and has specialized in the integration of optical and acoustic systems with embedded electronics and electro-mechanical assemblages. Equipment built by Matt has been extensively used to quantify marine biomass, including for stock assessments of important fishery species, quantify marine biodiversity, particularly the habitats and benthic invertebrate fauna of deep continental margins, and measure key properties of water chemistry, especially in the context of ocean acidification.

Matt has had the single largest influence on the technical development of acoustic and image-based sampling tools in Australia. The sampling equipment he has developed includes the deep towed multi-frequency towed instrument (MUFTI); a net-attached Acoustic Optical System (AOS), and an instrument package for obtaining depth stratified sampling of micro-nekton from net catches (MIDOC). He has also developed a variety of towed instrumented camera platforms and other image-based tools including the SmartTrap (STrap), Deepwater Baited Remote Underwater Video System (DeepBRUVS), and the instrumented Benthic-Optical-Acoustic Sampler (BOAGS). His innovations have included the application of fibre-optic communication and data transmission, real-time system control, photographic exposure control, and integration of photographic, navigation and environmental data. The use of multi-frequency acoustics to identify species groups and to non-destructively sample deep water fish populations remains at the leading edge of science.
The Acoustic Optical System was adopted by Australia's integrated Marine Observing System (IMOS) as a sustained observing method in 2011. Other equipment designs developed by Matt have been adopted by a variety of national and international marine agencies including the Australian Antarctic Division, Geoscience Australia, Institute of Marine Research in Norway, *National Oceanic and Atmospheric Administration of* the United States of America and New Zealand's National Institute of Water and Atmospheric Research.

Matt's commitment to delivering the science does not stop at the workshop door. He has spent many long voyages nursing prototype devices through science missions enabling them to deliver the data required. And, over the years, Matt has mentored many other marine research engineers and technicians, instilling in them this same focus on delivery and same gift for "getting the job done", often in extremely difficult and resource-limited conditions. Everyone who has had the pleasure of going to sea with Matt knows the hallmarks of his work are reliability and delivery – combined with a keen sense of duty and a wicked humour.

**Matt's comments..**

**In accepting this award** Matt would like to thank AMSA for its recognition of the important contribution of technical support to marine science in Australia. Matt would like to acknowledge the tremendous breadth of experience and skills of the researchers and technologists in CSIRO and the Science Engineering and Technology program who provide the critical foundations for scientific instrument development. He has found the challenges of providing high tech instrumentation in the

extremes of the marine environment very rewarding and has reveled in the camaraderie of working at sea.

Matt's background has been always been in the areas of extreme environments. After completion of a bachelor degree in electronics engineering at the Queensland Institute of Technology in 1980 he worked as an instrumentation engineer for five years in Mount Isa. Then on to Mawson station in Antarctica for a winter in 1986 which saw his first taste of marine science while helping geophysicists chase and plot the movement of the south magnetic pole from the vessel *Icebird* off the Antarctic coast.

He commenced work at CSIRO as a seagoing electronics engineer in 1987. He notes that he has experienced some nervous times over the years, for example, waiting to learn if a camera system was still at the end of its cable after crashing into an underwater cliff and losing communications, and rescuing lost equipment after 16 hours on the seafloor at 1400 meters using the fishing vessels trawl net. Recovery of both of these systems was a great relief.

Matt feels the secrets for success are to be meticulous and thorough to the best of your ability. In extreme environments there is much scope for error. A simple 'O' ring compromised by damage or contamination can result in failure of critical components.

His advice in designing equipment is to picture yourself on the deck of a heaving ship at night with salt spray and rain falling. Think about what steps you can take in your design to make that instrument easy and safe to use. Always try to think of the worst thing that could happen to your equipment because at some stage it very likely will.

When using data collected from instruments seek to gain a good understanding of the uncertainties in accuracy associated with the instrument. Take nothing for granted in interpreting the data sets you have before you. While technology continues to develop and produce better instruments the ocean will always have a surprise or two to catch you out!