A new 2 km SST Atlas of the Australian Regional Seas (SSTAARS)

Wijffels, Susan1,2, Helen Beggs*3, Christopher Griffin3, John F. Middleton4, Madeleine Cahill1, Edward King1, Emlyn Jones1, Ming Feng1, Jessica A. Benthuysen5, Craig Steinberg5 and Phil Sutton6

1 CSIRO Oceans and Atmospheres, Hobart, Tas, Australia
2 Woods Hole Oceanographic Institution, Woods Hole, MA, USA
3 Bureau of Meteorology, Docklands, Vic, Australia
4 South Australian Research and Development Institute, West Beach, SA, Australia
5 Australian Institute of Marine Science, Townsville, QLD, Australia
6 NIWA, Wellington, New Zealand

helen.beggs@bom.gov.au

We use 25 years of Advanced Very High-Resolution Radiometer (AVHRR) data from NOAA Polar Orbiting Environmental Satellites received by six Australian and two Antarctic reception stations to construct a detailed climatology of sea surface temperature (SST) at 20 cm depth around Australasia. The data are processed to GHRSSST multi-sensor “L3S” format, and bias-corrected using the Sensor Specific Error Statistics (SSES), derived using matchups with regional buoy data. Only night-time nearly cloud-free (Quality Level ≥ 4) data were used to reduce diurnal bias and cloud contamination. A pixel-wise climatology (with four annual sinusoids) and linear trend are fit to the data using a robust technique and monthly non-seasonal percentiles derived. The resulting atlas, known as the SST Atlas of Australian Regional Seas (SSTAARS), has a spatial resolution of ~2 km, and thus reveals unprecedented detail of regional oceanographic phenomena, including tidally-driven entrainment cooling over shelves and reef flats, wind-driven upwelling, shelf winter water fronts, cold river plumes, the footprint of the seasonal boundary current flows and standing mesoscale features in the major offshore currents. The atlas (and associated statistics) will provide a benchmark for high-resolution ocean modellers and be a resource for ecosystem studies where temperatures, and their extremes, impact ocean chemistry, species ranges and distribution. The underlying AVHRR night-only 1-day L3S data and the derived SSTAARS atlas are available from the Australian Ocean Data Network (AODN: https://portal.aodn.org.au).