



Trials of new L4 SST analyses in the GHRSSST Multi-Product Ensemble

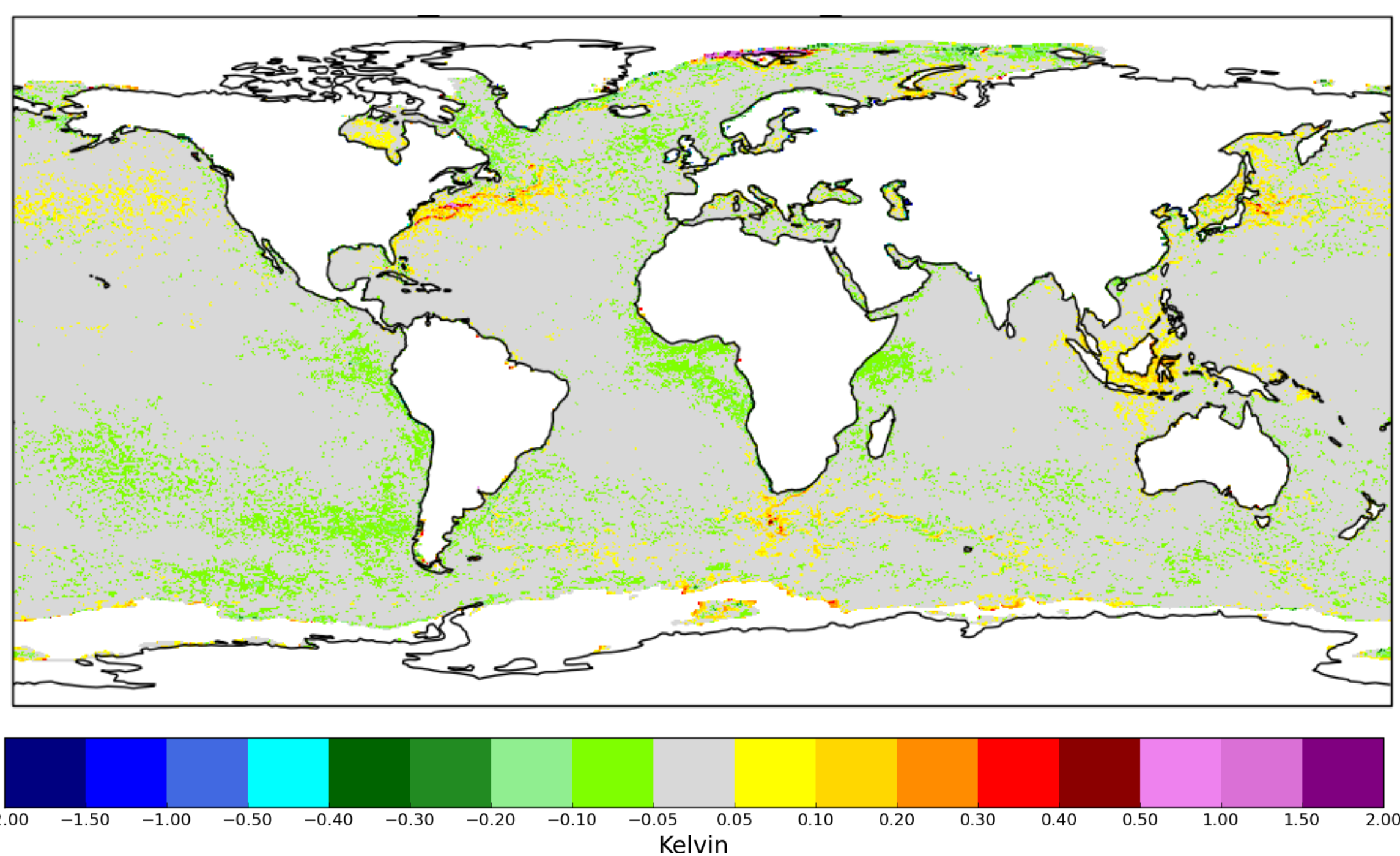
Vanessa Hernaman, Simon Good and Emma Fiedler

The GHRSSST Multi-Product Ensemble (GMPE; Martin et al., 2012) system runs daily at the Met Office and is disseminated via the Copernicus Marine Environment Monitoring Service (CMEMS; marine.copernicus.eu). The GMPE system takes level 4 sea surface temperature (SST) analyses from various international centres as inputs, transfers them onto a common 0.25° grid, and produces an ensemble median and standard deviation. SST gradient fields are also provided, which are calculated on the original analysis grid.

The specification of the current GMPE product includes the products shown in the current analyses section of the table on the right (note that not all are currently produced). Six new analyses were examined with a view to adding them to the specification in the future (see new analyses section of the table). Two versions of the OSPO products were tested although only one is intended to be included. Experiments were conducted to obtain an understanding of the impact the new analyses would have on the ensemble median and to evaluate their performance against Argo reference data.

	Analysis name	Data owner	Grid resolution
New analyses	DMI_OI	Danish Meteorological Institute	0.05° x 0.05°
	MUR	Jet Propulsion Laboratory	0.01° x 0.01°
	G1SST	Jet Propulsion Laboratory	0.01° x 0.01°
	OSPO_all	Office of Satellite and Product Operations	0.05° x 0.05°
	OSPO_night	Office of Satellite and Product Operations	0.05° x 0.05°
	CMC0.1 degree	Canadian Meteorological Center	0.1° x 0.1°
Current analyses	CMC 0.2 degree	Canadian Meteorological Centre	0.2° x 0.2°
	GAMSSA	Australian Bureau of Meteorology	0.25° x 0.25°
	NAVOCEANO K10_SST	Naval Oceanographic Office	0.1° x 0.1°
	AVHRR_OI	NOAA NCDC	0.25° x 0.25°
	AVHRR_AMSRE_OI	NOAA NCDC	0.25° x 0.25°
	OSTIA	Met Office	0.05° x 0.05°
	FNMOCC	Fleet Numerical Meteorology & Oceanography Centre	0.08° x 0.08°
	RSSMW	Remote Sensing Systems	0.25° x 0.25°
	RSSMW_IR	Remote Sensing Systems	0.08° x 0.08°
	MGDSST	Japan Meteorological Agency	0.25° x 0.25°
	RTG	NWS/NCEP/NOAA	0.08° x 0.08°

Average difference between New GMPE and Current GMPE over 28 days (10/11/16-07/12/16)

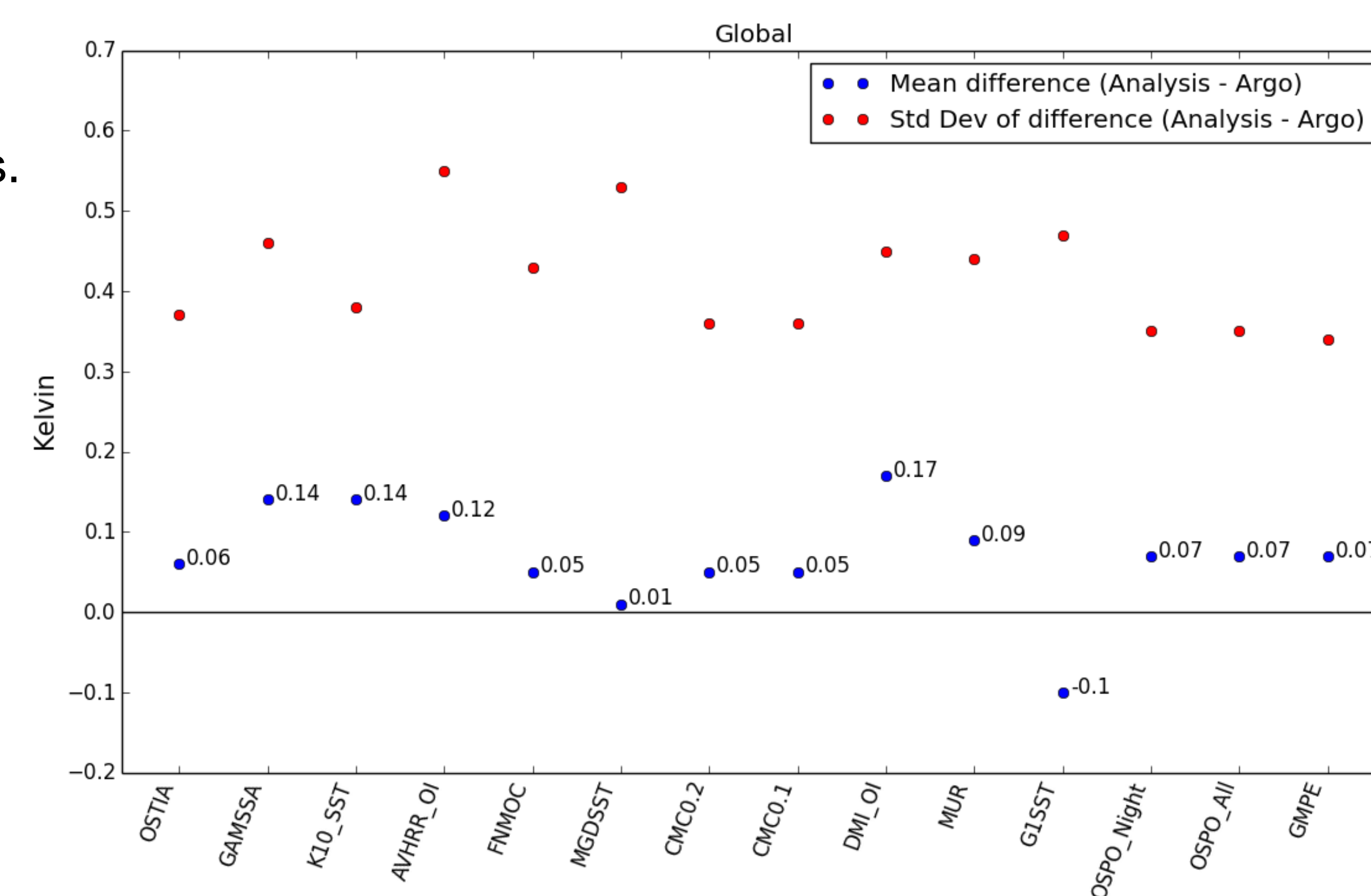


Trials were conducted over a 28-day period (10/11/2016 to 07/12/2016) during which a trial GMPE processing suite (current and new L4 analyses) was run daily and the outputs compared to those obtained from using only the current L4 analyses (termed the baseline).

The results indicated that the addition of all new L4 analyses consistently produced a GMPE median with generally cooler SSTs (relative to the baseline GMPE median produced using only the current analyses; see figure showing SST differences on left) of 0.05-0.30 Kelvin in many broad regions (e.g., west coasts of South America and central Africa; regions of the Arctic), but consistently warmer SSTs (relative to the baseline) of up to 0.40 Kelvin in specific regions (e.g., Gulf Stream; Svalbard region of the Arctic; Indonesia; Japan). When the new analyses were considered individually, the OSPO products generally produced cooler SSTs relative to the GMPE median, with the rest showing a mixture of warmer and cooler regions.

When compared to Argo observations (the shallowest observations between 3-5 m depth, which have been shown to be a good representation of foundation temperature), the GMPE median performance was not greatly affected (within 0.02 Kelvin of baseline GMPE median performance).

Global statistics of the differences between Argo and each of the different analyses are shown in the figure on the right and below are the statistics for six regions (top – Indian Ocean, North Pacific and North Atlantic; bottom – Southern Ocean, South Pacific and South Atlantic). Blue dots indicate the mean difference to Argo and red dots are the standard deviation. The performance of the new L4 analyses varies regionally, with CMC0.1° the most consistently high performer of the new analyses.



In the future the plan is to expand the GMPE specification to include extra analyses in the near real time product that we produce. In contrast to the processing over a historical period shown here, timeliness of the input analyses is an issue. A test system is currently running at the Met Office and this will eventually replace the current operational version.

Reference:

Martin M, Dash P, Ignatov A, Banzon V, Beggs H, Brasnett B, Cayula JF, Cummings J, Donlon C, Gentemann C, Grumbine R, S Ishizaki, Maturi E, Reynolds RW, and Roberts-Jones J. 2012. Group for High Resolution Sea Surface temperature (GHRSSST) analysis fields inter-comparisons. Part1:A GHRSSST multi-product ensemble (GMPE). Deep-Sea Research II 77-80: 21-30.

