Table 2. Similar to Table 1 but for HRSST-2 SVP-BS buoys (each buoy was also fitted with a CT probe).

WMO identifier	Deployment basin	HRSST sensor model and S/N	Start date	End date
4100736	North Atlantic	Digital YSI 46000 10014	14/02/2012	26/01/2013
6200513	North Atlantic	Digital YSI 46000 10011	18/03/2012	17/01/2013
6200505	North Atlantic	Digital YSI 46000 10017	25/03/2012	10/04/2013
6200501	North Atlantic	Digital YSI 46000 10019	29/06/2012	10/12/2012
6100788	Mediterranean Sea	Digital YSI 46000 10020	04/09/2012	16/02/2013
3100739	North Atlantic	Digital YSI 46000 10016	30/11/2012	06/07/2013
3100740	North Atlantic	Digital YSI 46000 10044	01/12/2012	06/03/2013
6100530	Mediterranean Sea	Digital YSI 46000 10013	30/01/2013	19/05/2013
6100525	North Atlantic	Digital YSI 46000 10042	22/02/2013	16/08/2013
6100524	North Atlantic	Digital YSI 46000 10049	22/02/2013	05/05/2013
6200504	North Atlantic	Digital YSI 46000 10045	24/05/2013	27/11/2014
1300899	Tropical Atlantic	Digital YSI 46000 10043	26/05/2013	10/12/2013
6200509	North Atlantic	Digital YSI 46000 10062	27/05/2013	15/10/2013
2300587	Indian Ocean	Digital YSI 46000 10071	09/06/2013	07/09/2013
2300588	Indian Ocean	Digital YSI 46000 10053	09/06/2013	07/09/2013
4100737	North Atlantic	Digital YSI 46000 10059	06/12/2013	10/03/2015
4100800	North Atlantic	Digital YSI 46000 10058	06/12/2013	16/01/2015
6200500	North Atlantic	Digital YSI 46000 10054	12/06/2014	18/02/2016
6500511	North Atlantic	Digital YSI 46000 10056	17/06/2014	25/06/2014
3100719	Tropical Atlantic*	Digital YSI 46000 10020	11/04/2015	20/06/2015

during daytime (the hull sensor being located closer to the surface). The differences are smaller at night and when the Sun is more than 30° below the horizon. The large departures observed sometimes during daytime suggest that one or other of the two SST sensors may have been differentially affected by direct solar radiation, or by the buoy heating up the sensor through heat conduction.

Unlike promising new developments with wave drifters (Centurioni et al., 2016), the HRSST-2 drifters did not provide any information about sea state. In past SST studies, wind speed is generally used to describe sea-state mixing (e.g., Donlon et al., 2002; Morak-Bozzo et al., 2016). In this study, we also consider significant wave height. Information about both parameters can be obtained by co-locating with the ERA5 reanalysis (Hersbach and Dee, 2016; C3S, 2017). The ERA5 reanalysis data are interpolated in space from their original resolution (spectral truncation T639) to the buoy locations, using the nearest-in-time hourly reanalysis map. Figure 2b and c show (respectively) that the large-magnitude SST difference mostly arise when the wind speed is up to moderate (under 8–10 $\mathrm{m\,s^{-1}}$) and when the wave heights are up to moderate (under 2–3 m). The agreement between the sensors increases when there is more wave activity, probably because of greater mixing. When such is the case, almost all SST differences are found in the range from −0.1 to 0.0 K. Sea-state mixing caused by waves cannot be controlled or mitigated by a platform as small as a 40 cm diameter drifter. However, the role of the waves, probably via mixing, is suggested here to be quite important when using the SST data collected by drifting buoys. A knowledge of the local SST dynamics, as the buoy is following a pendulum movement and senses the temperature surface at various depths within the top few meters of the ocean, would help better understand the distribution of SST that is measured, and how it corresponds to satellite measurements, or how it should be considered in the cal/val process.

The differences between the probes can also be inspected as a function of mean solar local time (MSLT) for each buoy. For this, we only retain the buoys that reported at least for 250 days, without issue. For the subsequent data analysis, we filter out 12 cases when differences are larger than 20 K (visible in Fig. 1), likely to be erroneous. Figure 3 shows that the mean differences feature a diurnal cycle, with the maximum positive differences around 12:00 MSLT. This is consistent with the depth difference of the two probes in the context of diurnal vertical stratification of the surface temperature. Diurnal stratification tends to peak around 14 h (e.g., Reverdin et al., 2013; Morak-Bozzo et al., 2016), and temperature stratification larger than 0.1 K within the upper 0.5 m would tend to occur only at the lowest wind speeds. However, this daily cycle in difference may also be partially explained by the hull sensor being heated by the surrounding buoy and/or by direct solar radiation (an effect which might tend to peak more around 12 h MSLT). These latter effects are not related to the environment and should be avoided.

2.3 Recovered buoys

Three HRSST-2 buoys manufactured in 2012, deployed in 2014, ran ashore in 2016 in Great Britain and Brittany. They were recovered and offered together a unique opportunity to