Supplement of

Improving the thermocline calculation over the global ocean

Emmanuel Romero et al.

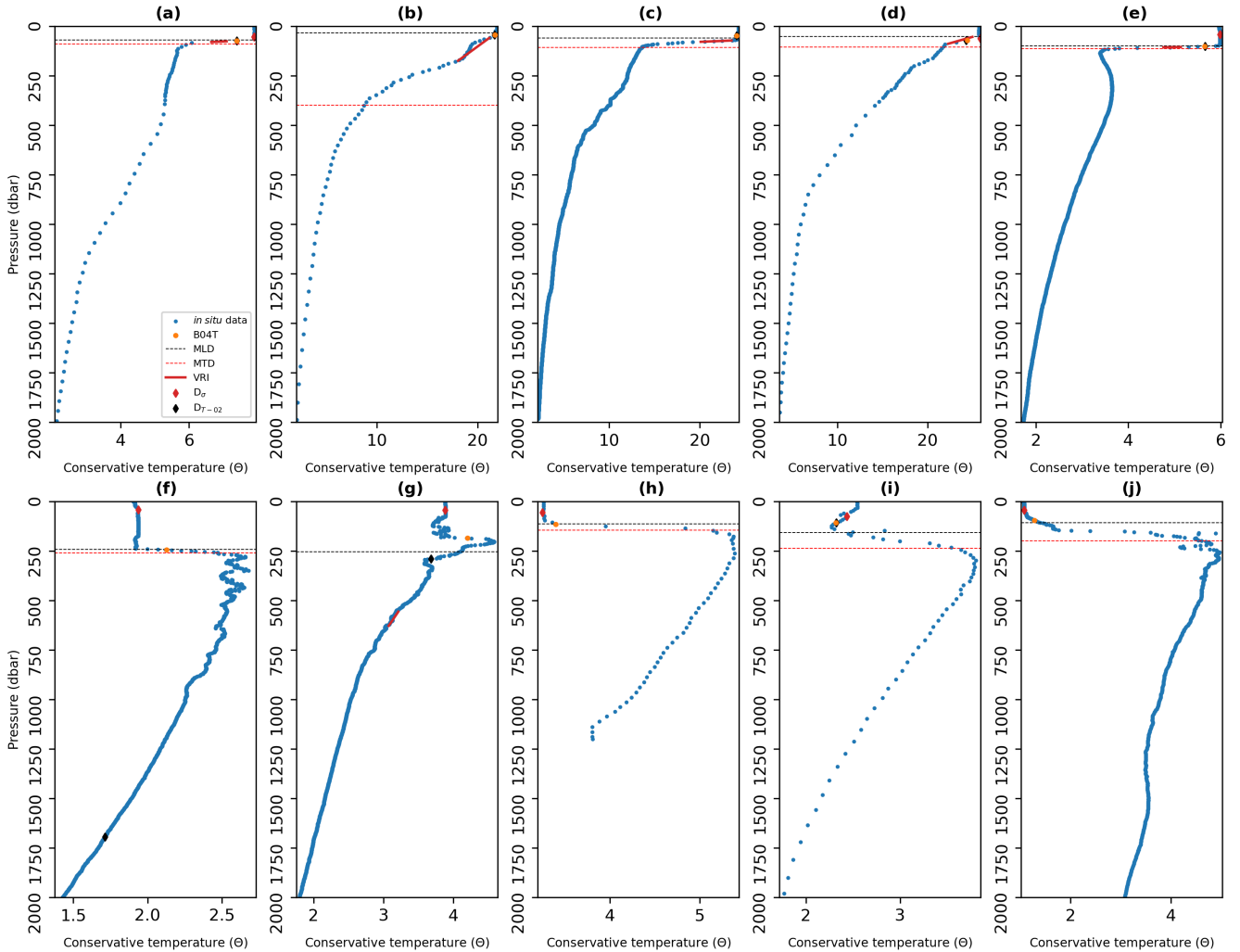*Correspondence to:* Leonardo Tenorio-Fernandez (ltenoriof@ipn.mx)

Figure S1. Location of the thermocline in temperature profiles with the proposed method (dashed lines) and the VRI method (red line), the MLD determined by the threshold of $0.2°C$ (B04T, orange dot) and the criteria (D_σ and D_{T-02}, red and black diamonds, respectively) that limit the barrier layer according to de Boyer Montégut et al. (2007). (a) $52.95°$ S and $90.05°$ W on 23 January 2003. (b) $25.13°$ S and $93.47°$ W on 12 January 2013. (c) $1.90°$ S and $126.07°$ W on 25 August 2013. (d) $20.02°$ N and $41.14°$ W on 15 December 2015. (e) $49.00°$ N and $174.69°$ W on 13 December 2017. (f) $60.00°$ S and $116.86°$ W on 12 August 2015. (g) $55.42°$ S and $162.63°$ W on 12 August 2020. (h) $63.23°$ N and $54.20°$ W on 08 February 2010. (i) $56.07°$ N and $174.91°$ W on 20 February 2014. (j) $61.84°$ N and $54.27°$ W on 01 February 2016.
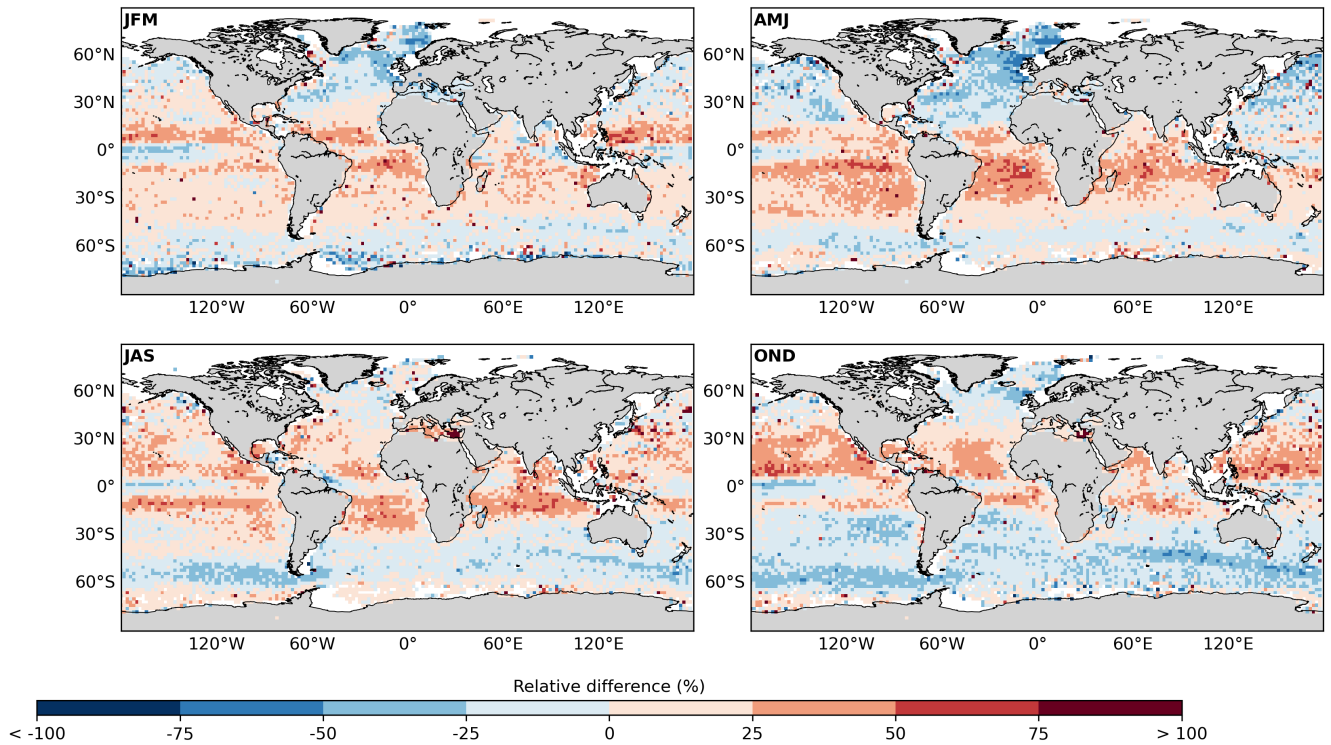
Figure S2. Seasonal relative difference of the MLD results between the proposed methodology and HT09. Averages are shown for the months January-March (JFM), April-June (AMJ), July-September (JAS) and October-December (OND).
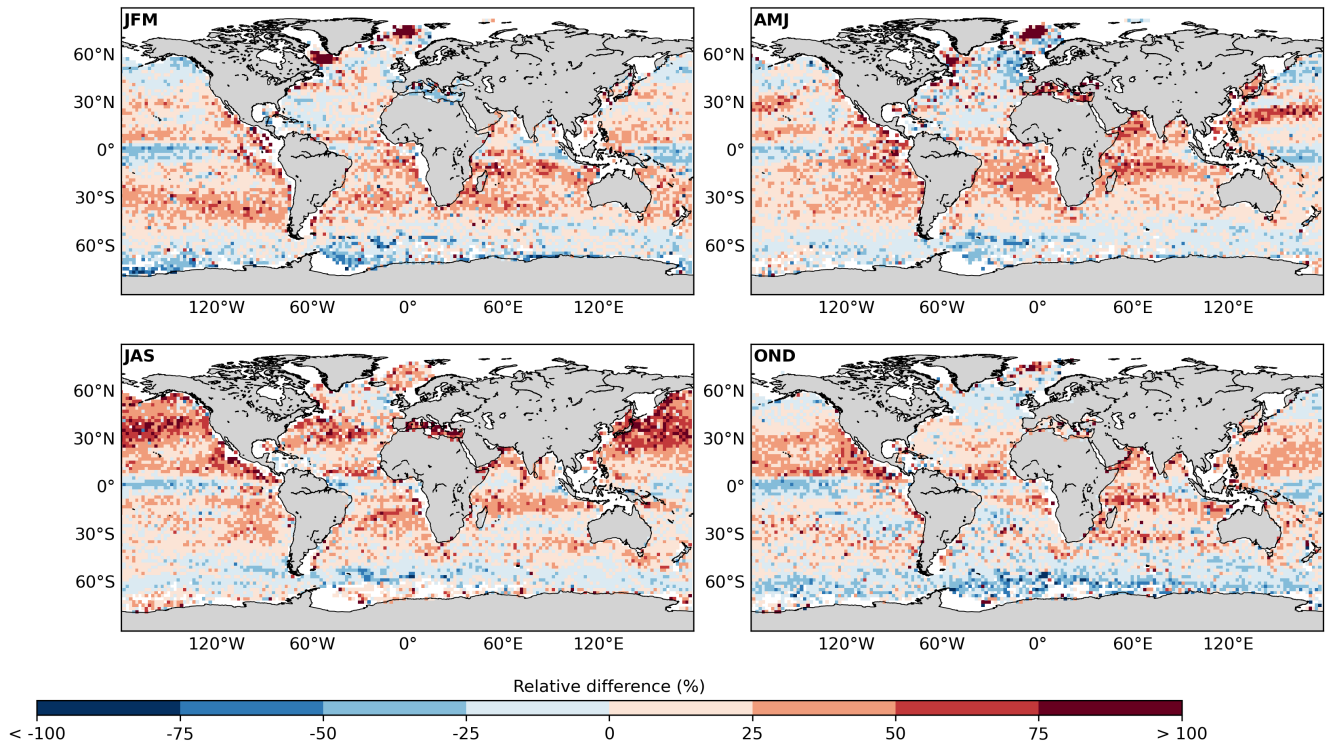
Figure S3. Seasonal relative difference of the MLD results between the proposed methodology and B04D. Averages are shown for the months January-March (JFM), April-June (AMJ), July-September (JAS) and October-December (OND).

Figure S4. Seasonal relative difference of MLD results between the proposed methodology and B04T. Averages are shown for the months January-March (JFM), April-June (AMJ), July-September (JAS) and October-December (OND).
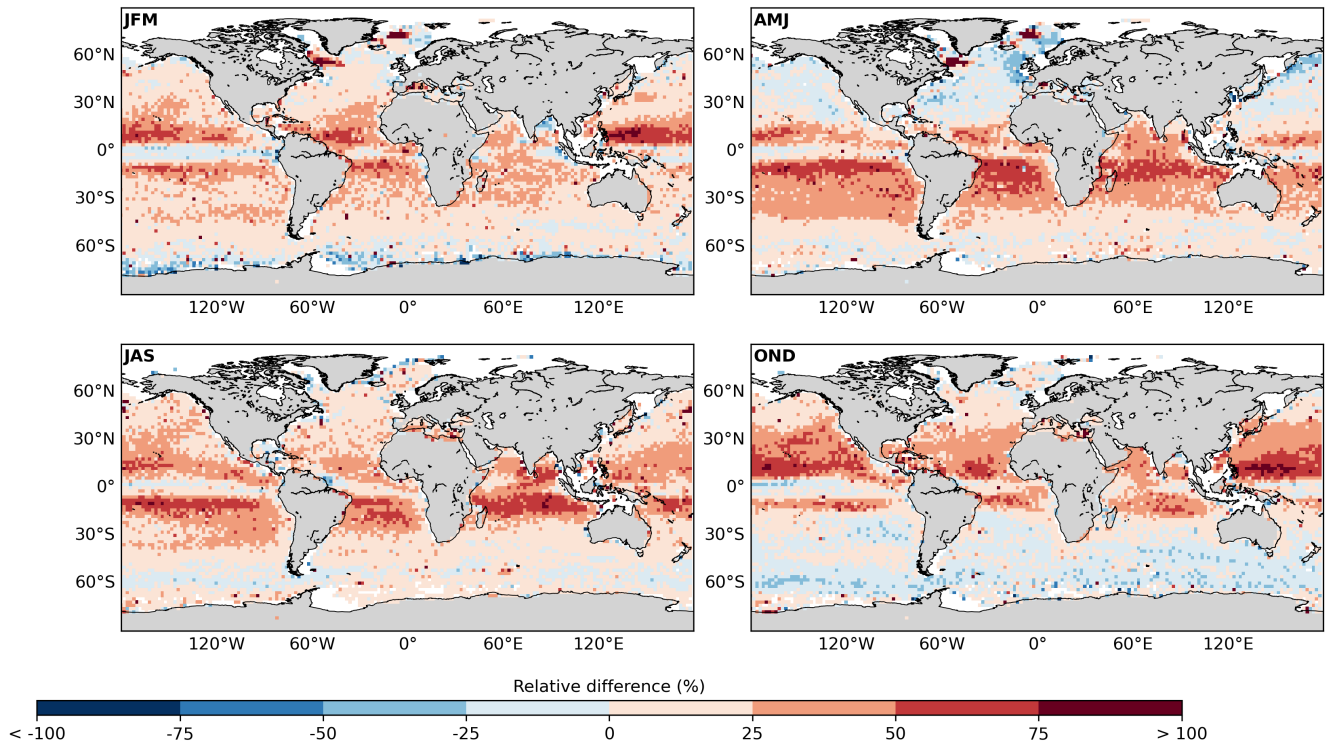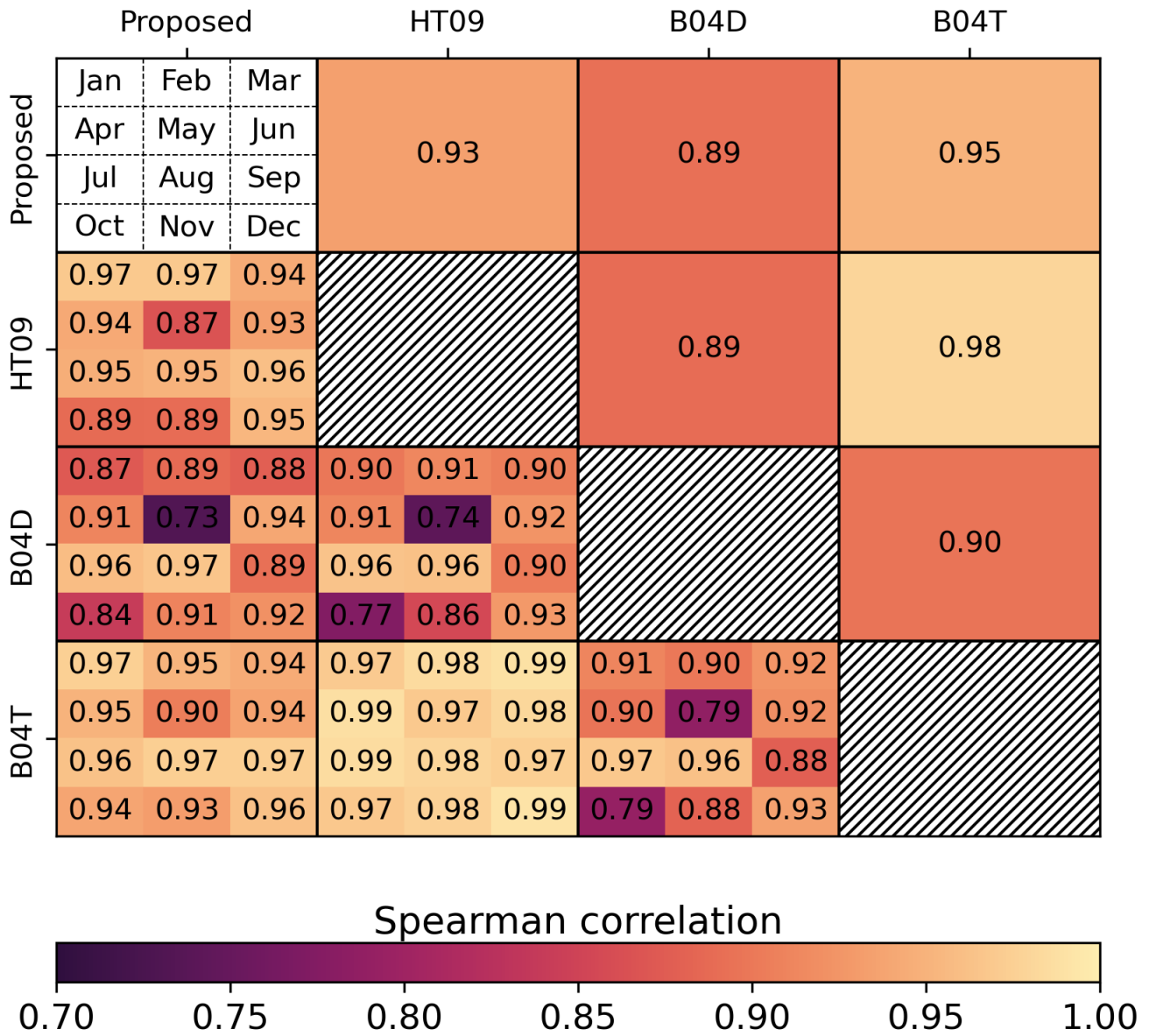
Figure S5. Correlation matrix between the results of the calculation of the MLD of the proposed method, HT09, B04D and B04T. The lower left corner shows the average monthly correlation between methods distributed as shown in the upper left corner. The upper right corner shows the global averages of the correlation between methods.