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Supplement of

Quantifying the influence of CO₂ seasonality on future aragonite undersaturation onset

T. P. Sasse et al.

Correspondence to: T. P. Sasse (t.sasse@unsw.edu.au)

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Supplement S1: Monthly ocean surface $\Omega_{Ar}$ predictions.

Supplement S2: Locations where our results suggest at least month-long aragonite undersaturation ($\Omega_{Ar} < 1$) occurs in the year 2000.

Supplement S3: Geographical separation of independently predicted measurements into 14 regions.

Supplement S4: Comparison between our data-based and model-based seasonal amplitudes.

Supplement S5: Onset year of permanent undersaturation and time difference between annual-mean and permanent onset.
Figure S1: Monthly $\Omega_{\text{Ar}}$ climatologies for the nominal year of 2000 calculated using the dissolved inorganic carbon and total alkalinity climatologies of Sasse et al (2013), in combination with the World Ocean Atlas 2013 Temperature, salinity and nutrient surface decadal averages.
Figure S2: Locations where our $\Omega_{Ar}$ predictions suggest at least month-long aragonite under-saturation occurs in the year 2000.
Figure S3: Geographical separation of independently predicted measurements into 14 regions.
Figure S4: Comparison between seasonal $\Omega_{Ar}$ amplitudes derived using our data-based climatologies for the nominal year of 2000 and the Earth System Model (ESM) ensemble median. (a) Our data-based $\Omega_{Ar}$ seasonal amplitudes (monthly max - min) for the nominal year of 2000. (b) The model based 2006-2016 mean seasonal $\Omega_{Ar}$ amplitudes (monthly max-min). (c) Amplification factor of our data-based seasonal amplitudes compared to the model-based estimates (i.e. data-based / model-based seasonal $\Omega_{Ar}$ amplitudes). An amplification factor of 1 indicates that our data-based amplitude equals the model-based estimate, whereas an amplitude factor of 2 indicates that our data-based amplitude was twice as large as the model-based estimate.
Figure S5: (a) Estimated onset year for permanent aragonite under-saturation under RCP8.5. (b) Time difference (years) between annual-mean and permanent onset.


References: