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Anti-phase seasonality and paleothermometry of *G. ruber* and *G. trilobus* upstream of the Agulhas Current

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To infer past ocean temperatures we examined the first time-series fluxes of planktonic foraminifera retrieved upstream of the modern Agulhas Current. Using deep-moored sediment traps we find a distinct anti-phase response to the seasonal migration of the Intertropical Convergence Zone (ITCZ) in the shell fluxes of common surface-dwelling *G. ruber* and *G. trilobus*. Maximum fluxes of *G. ruber* occur in late austral summer (February – March) when sea surface temperature (SST) averages 30°C. By contrast *G. trilobus* maxima appear five months later in winter (June – July) at lower average SST of around 25°C when chlorophyll a increases. Cross-correlation of the 2.5 year time-series data showed that the *G. ruber/G. trilobus* ratio closely followed the seasonal cycle in SST, as did their paired δ^{18}O and Mg/Ca. From these results we derived five independent temperature equations for improved paleothermometry in the southwestern Indian Ocean that specify summer, winter and flux-weighted annual mean SST. In the boreal Indian Ocean time-series *G. ruber* and *G. trilobus* from offshore Somalia and Oman also show seasonality in shell flux ratios. These are shifted by about four months against southern hemisphere values in concert with increased productivity in the Arabian Sea during monsoon-driven coastal upwelling. We conclude that the *G. ruber*/*G. trilobus* ratio, together with their δ^{18}O and Mg/Ca, not only allow for seasonal paleothermometry but also minimize a large error introduced by differential seasonal productivity.