NOTES AND CORRESPONDENCE

Comments on “Influence of the Indian Ocean dipole on the Southern Oscillation” by S.K. BEHERA et al.

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Circulation mechanisms of climate anomalies in the equatorial Indian Ocean have received more attention over the past decade. In this context, comments are in order on the paper Behera and Yamagata (2003).

1. In their Fig. 2 they compare two time series, the anomaly difference of sea surface temperature (SST) and of sea level pressure between the west and east. That the two series run closely parallel is not surprising, we reported a correlation coefficient of +0.53 a decade ago (Hastenrath et al. 1993).
2. They don't show the correlation coefficients between the western and eastern ingredients to their SST and pressure indices. As we did, they would have found that these are uncorrelated, there is no seesaw = dipole. Inverse correlation between west and east would be characteristic of seesaw. Indeed, their Fig. 2 is intrinsically unsuited to diagnose seesaw = dipole, providing as it does merely zonal differences rather than values of elements in the west and east. In a similar vein, the map Fig. 1a does not evidence seesaw: we know that zonal SST and pressure gradients along the Indian Ocean Equator are highly correlated; and a time series of zonal pressure contrasts naturally has correlations of opposing signs with pressure in the west and east. It is another matter that in tune with the Indian Ocean equatorial westerlies there are variations in zonal pressure and SST gradients, rainfall, etc.; we reported that a decade ago.
3. That the equatorial westerlies affect the zonal contrast in mixed-layer depth (p. 170) is also among our earlier findings.
4. That the boreal autumn equatorial westerlies are the surface manifestation of a zonal circulation cell along the Indian Ocean Equator, with implications for rainfall (p. 170), has been amply documented (Hastenrath 2000, 2001; Hastenrath et al. 2002).
5. The referenced (p. 170) Saji and Yamagata 2001 has evidently not seen the light of day as of 2003.
6. Not to be confused with (2) above is another simple yet important issue. Sophisticated data processing has surely gone into Fig. 1. However, that the pressure in the greater Australasian region plays a role in the zonal pressure gradient along the Indian Ocean Equator as well as in traditional indices of the Southern Oscillation has also long been known.

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In conclusion from this experience come two recommendations: (a) gradients are not compelling evidence of seesaw = dipole; and (b) trivially, pressure in Australasia is an ingredient to zonal pressure gradient over the equato-

rial Pacific as well as over the Indian Ocean. Associations between the Indian Ocean equatorial westerlies and the Southern Oscillation should be appreciated in that spirit.

References

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