DARWIN TROPICAL DIAGNOSTIC STATEMENT

May 2004

ISSUED BY DARWIN RSMC

SUMMARY

Neutral ENSO conditions persisted during May. The monthly SOI has shown large fluctuations in recent months, partly in response to MJO activity, but multi-month averages have been close to zero. Weak warm SST anomalies dominated the tropical Indian and western Pacific Oceans. An active phase of MJO passed through the RSMC region during the month. The northern hemisphere monsoon became active over the Indian sub-continent. Four tropical cyclones formed in the region during May.

INDICES

Troup's Southern Oscillation Index (SOI) for May 2004	+13
5-month mean (centred upon March)	- 1
Darwin mean MSL pressure for May 2004	1010.4 hPa
Pressure anomaly (1933 – 1992 mean)	- 0.6 hPa
Tahiti mean MSL pressure for May 2004	1013.7 hPa
Pressure anomaly (1933 – 1992 mean)	+1.1 hPa

Time series of Troup's SOI:

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002	+3	+8	-5	-4	-14	-6	-8	-15	-8	-7	-6	-11
2003	-2	-7	-7	-5	-7	-12	+3	-2	-2	-2	-3	+10
2004	-12	+9	0	-15	+13							

The above table presents the monthly values of SOI from the year 2002. Fig.1 shows the monthly SOI and its five-month running mean for the past ten years.

The SOI has maintained its large amplitude oscillations centred near zero, by jumping from –15 in April to +13 in May. The 5-month mean figure of –1, is consistent with neutral ENSO conditions.

TROPICAL CYCLONES

[Fig. 2]

Four tropical cyclones formed in the RSMC area during May, two in the Northwestern Pacific (one of them reaching typhoon intensity) and one each in the Bay of Bengal and Arabian Sea in the north Indian Ocean. In addition to these, one cyclone formed in the southern Indian Ocean west of the RSMC area and another formed in the northeastern Pacific, east of the date line. The climatological averages for the northwestern Pacific is one (0.7 typhoons), 0.7 for the north Indian Ocean and 1.0 for the southern Pacific and south Indian Ocean combined.

Unnamed tropical cyclone *(01A)*

The northern hemisphere monsoon trough extended from a low in the Arabian Sea through the India sub-continent. A low level surge and favourable upper level flow helped the low to intensify and reach tropical cyclone intensity by the 6th. It moved slowly north along the west coast of India. On the 10th it moved west out of the RSMC area and dissipated soon after. Media reports indicate the cyclone caused some loss of life and property along affected parts of the west coast of India.

Typhoon Nida

Typhoon Nida started off as one of a pair of lows embedded in the northern hemisphere monsoon trough east of the Philippines on the 12th. Favourable upper level flow and weak vertical shear helped the system to reach cyclone intensity by the 14th. It moved west northwest along the steering flow from a mid-level ridge to the north of the system. It reached typhoon intensity on the 16th as it approached the Philippines coast, but began recurvature to the north and was tracking northeastwards by the 18th picking up speed in the southwesterly flow. As it moved further northeast, it encountered the cooler sea surface temperatures and strong vertical wind shear and weakened to tropical storm intensity on the 20th. It moved out of the RSMC area on the 22nd and dissipated soon after. Media reports indicate widespread loss of life and property in some Philippine islands due to the Typhoon’s related winds and floods, as it passed close to the east coasts.

Unnamed tropical cyclone *(02B)*

A low developed on the 16th over the northern Bay of Bengal within the monsoon trough. A low-level monsoon surge strengthened the system to tropical cyclone intensity by the 18th. It moved in an east-northeast direction, crossed the Bangladesh coast on the 19th and dissipated over land by the 20th. Media reports indicate a widespread loss of life and property due to the tidal surges and flooding in the coastal areas of Myanmar.

Tropical Storm Omais

Tropical Storm Omais had its origin as the second of twin lows which had formed in the northwestern Pacific by the 12th. This low was slow to intensify and it was not until the other system (Typhoon Nida) passed close to the Philippines east coast on the 18th that Omais reached Tropical Storm intensity. It followed an almost parallel track to Typhoon Nida while being guided by the flow from a mid-level STR to the north of the system. By the 20th it tracked more towards the north due to a change in the steering flow. As it moved north it entered into an unfavourable upper air environment and stronger vertical wind shear zone. It weakened to a low by the 22nd and dissipated soon after over the sea.

SEA SURFACE TEMPERATURE

[Figs. 3a, 3b]

Tropical Indian and Pacific Ocean SSTs remained slightly warmer than normal during May, though the tropical Indian Ocean has shown a mild cooling trend since April. The northwestern Pacific remained warmer than normal. Seas adjacent to Southeast Asian countries and areas north of PNG remained mostly warmer than 30^oC. The SST anomalies in the eastern Pacific close to the South American coast (not shown in the map) indicate cooling a trend with some patches cooler than 2^oC and cool anomalies extending westwards up to 130°W. Overall the SST pattern is consistent with neutral ENSO conditions.

MSL PRESSURE

[Figs. 4a, 4b]

Mean sea level pressures in the tropical areas of the RSMC region was mostly above average. Exceptions included some parts in the western equatorial Indian Ocean, equatorial western Pacific near the date line and in the vicinity of northern Australia, where pressures were slightly below average. The STR in the northern hemisphere was well defined and remained close to its mean location over the northwestern Pacific resulting in lower than normal pressures over southern China and higher than normal to the east of it over the sub-tropical northwestern Pacific. The southern hemisphere STR remained weaker than normal and close to the climatological mean location resulting in negative pressure anomalies over southern Indian Ocean and southwestern Pacific.

850 hPa FLOW

[Figs. 5a, 5b]

The 850-hPa wind flow over most of the tropical northwestern Pacific was close to normal. Above average westerly winds prevailed in the tropical Indian Ocean as a result of a monsoon surge in the northern hemisphere and an above average NET in the southern hemisphere. The weak anomalies in the equatorial Pacific close to the date line are in line with the neutral ENSO pattern.

200 hPa FLOW

[Figs 6a, 6b]

The upper level STR's in both hemispheres were positioned slightly polewards of their respective mean positions. Greater than $5ms^{-1}$ westerly anomalies prevailed over the tropical Indian Ocean as a result of the stronger than normal westerly return flow from the northern hemisphere and stronger than normal STR in the southern hemisphere. Equatorial western Pacific remained close to mean, consistent with neutral ENSO pattern.

VELOCITY POTENTIAL

[Figs 7a, 7b]

Velocity potential, which is a proxy for convergence and divergence, indicates a good alignment of low-level convergence and upper level divergence associated with the northern hemisphere monsoon. The centres of maximum upper divergence and low-level convergence at the respective levels coincide with cyclone genesis areas in the Bay of Bengal and the tropical northwestern Pacific and are also coherent with the OLR pattern.

OUT-GOING LONG-WAVE RADIATION (OLR)

[Figs 8a, 8b]

The OLR anomalies for the month of May are consistent with the wind and velocity potential fields in depicting the areas of active convection over the Indian sub-continent and the tropical northwestern Pacific. Negative OLR anomalies prevailed over northern Australia demonstrating the above average convection over the region due to the passage of a few cloud bands caused by a mid-level circulation. The convection over the tropical areas near the date line appears to be below average.

CROSS-EQUATORIAL INTERACTION

[Fig. 9]

The vertical cross-section of the meridional wind pattern across the equator is shown in the figure 9. The enhanced monsoon circulation over the Indian sub-continent was consistent with good low level southerlies and upper level northerlies in the area. The relatively convection free area over the date line is indicated by the upper level southerlies but there is not much low-level counter flow.

850 hPa WIND COMPONENTS AT DARWIN

[Figs. 10a, 10b]

A mostly southeasterly flow prevailed over Darwin during May. There were two easterly surges, one around the 5th and the other around the 29th of the month, which passed through Darwin, and both were due to flow from a strong high-pressure system situated over southeastern Australia. Though May is considered as a dry month in Darwin, it recorded a total monthly rainfall of 54.0 mm (average 21.3 mm).

INTRA-SEASONAL VARIATIONS

[Figs. 11,12,13]

An active phase of the MJO became apparent in western parts of the RSMC longitudes early in the month, and coincided with monsoon onset over the Indian sub-continent. The active phase progressed eastwards during first three weeks of the month before easing. The previous active phases of the MJO were apparent during the southern hemisphere monsoon first in mid-December, the beginning of February and finally a mid-March event and were of consistent periodicity.