

MJO and Western Pacific Tropical Cyclogenesis

Maria Flatau
NRL Monterey

Data:

2003-2007 TRMM daily and 3h precipitation from Giovanni database
Microwave OISST (TRMM and AMSR-E) from RSS database
Winds from NCAR reanalysis and NOGAPS analyses
Filtering:
2D spectral filtering of equatorial modes, following Wheeler and Kiladis 1999

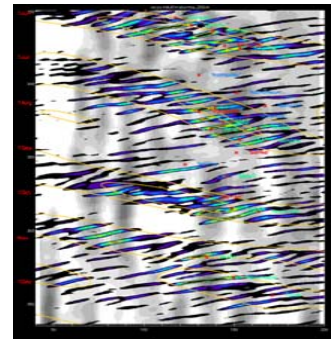
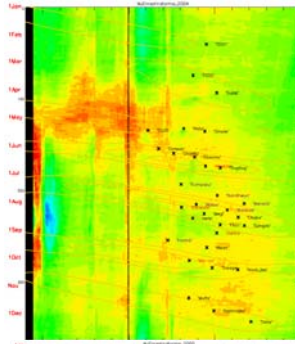
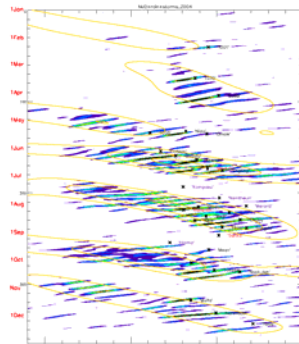
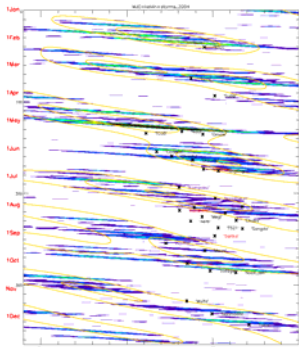
TRMM precipitation in the equatorial belt (5S-5N) filtered for MJO (contours) and Kelvin waves (shading). Only the positive anomalies are shown.
The crosses denote locations of Western Pacific cyclogenesis.
The near equatorial locations (south of 15N) are shown in black, the 15-20 N are shown in red and storms that develop north of 20N are shown in purple

MJO and easterly waves with 3-9 days period in the northern tropics (5-15N)

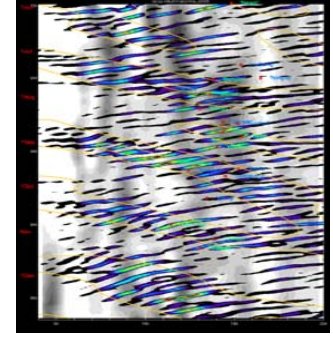
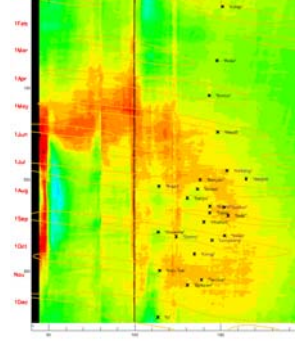
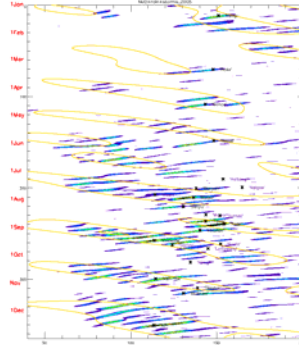
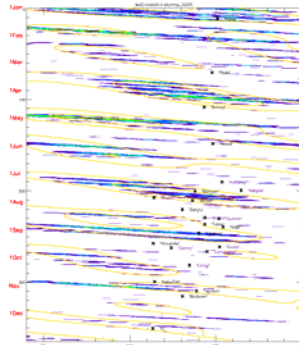
MJO and SST in the northern tropics (5-15N)

MJO (contours) easterly waves (shading in color) and 30 day running mean of the zonal wind confluence (black and white shading) in the northern tropics from June to December. Darker shading shows the areas where confluence could contribute to wave accumulation

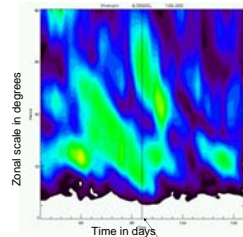
2004



2005



Scale collapse preceding the formation of Khanun.
The 700 mb winds from NOGAPS analysis are filtered using the wavelet transform applied in zonal direction. The dominant scales are shown at the location of Khanun formation. Scale collapse can be observed for about 5 days preceding the development of Khanun



cyclogenesis

Results:

Almost all near-equatorial tropical cyclones are related to westward propagating waves, that originated within MJO envelope. Even the storms that developed during the dry MJO period are related to the disturbances that have origins in the active MJO phase.

Tropical cyclone that develop outside the MJO envelope have usually higher SST's during the cyclogenesis stage.

The majority of the storms develop within the regions of positive confluence. In some of the storms the scale contraction can be seen in wavelet analysis. The positive confluence is not always related to the active MJO phase observed in rainfall. Therefore, it seems that main influence of the MJO on the Western Pacific cyclogenesis is the intensification of the tropical waves.

The analysis indicates that MJO propagates over the Maritime continent as with the speed of the Kelvin wave, while over the Western Pacific the propagation is related to the MRG wave trains, as shown by Straub and Kiladis (2003). The maximum power of the Kelvin wave modes is observed in west of Sumatra, just south of the equator.