Organized Convective Momentum Transport (OCMT): Analysis of a NICAM Simulation

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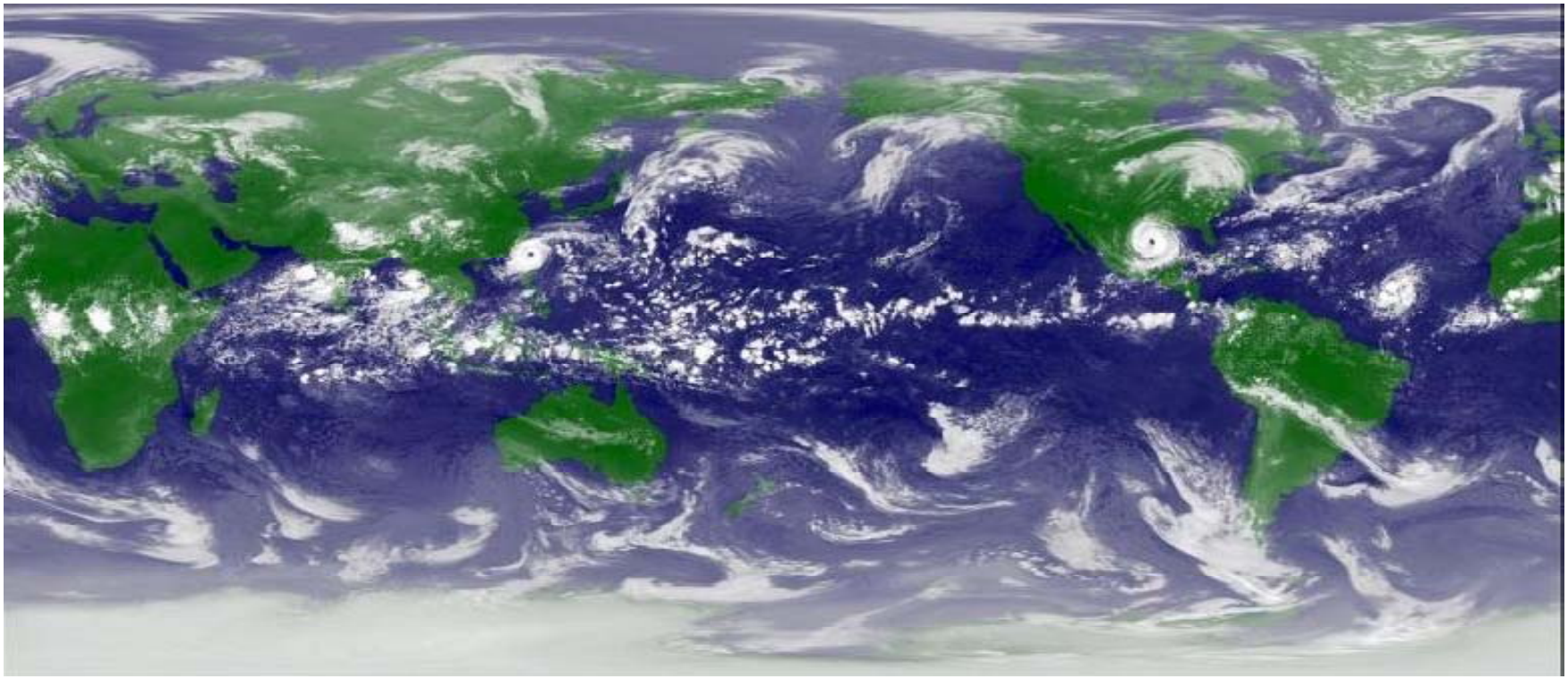
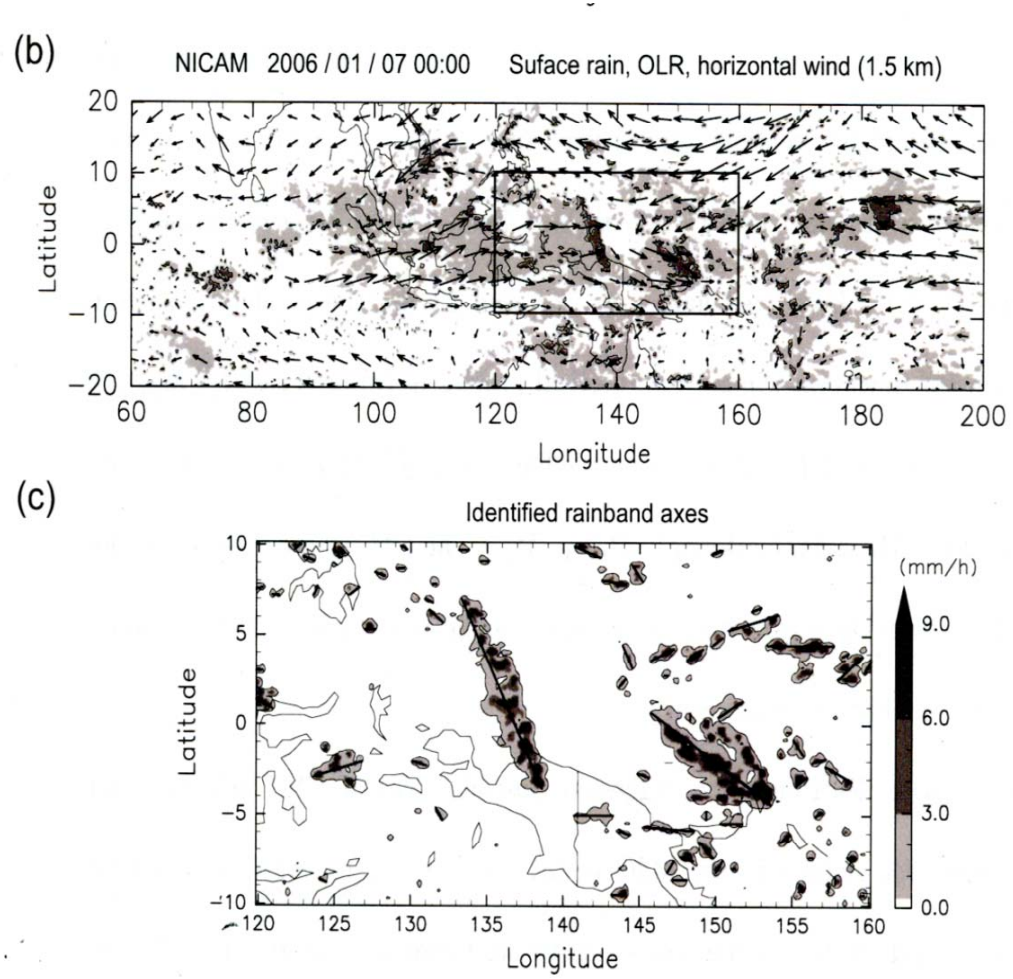


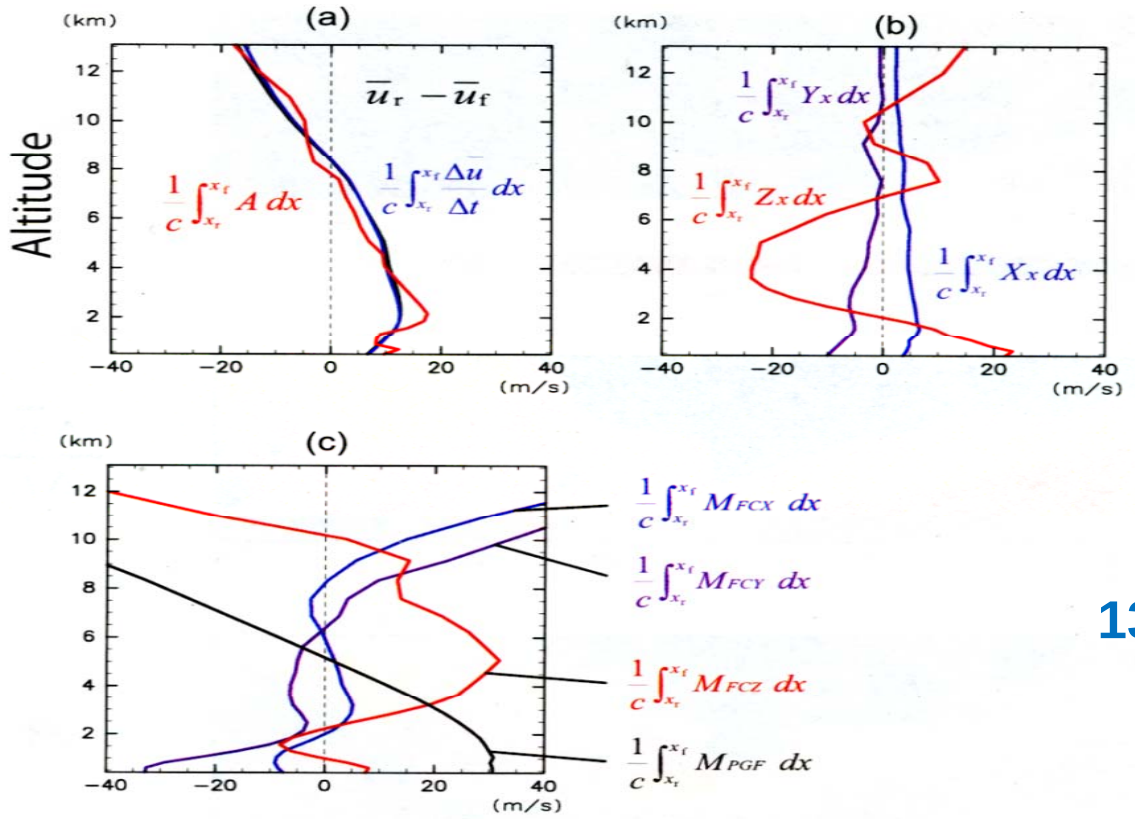
Courtesy: NICAM Team

MJO-like systems in NICAM: Organized Convective Momentum Transport



Miyakawa et al. (2012)

Zonal momentum budget



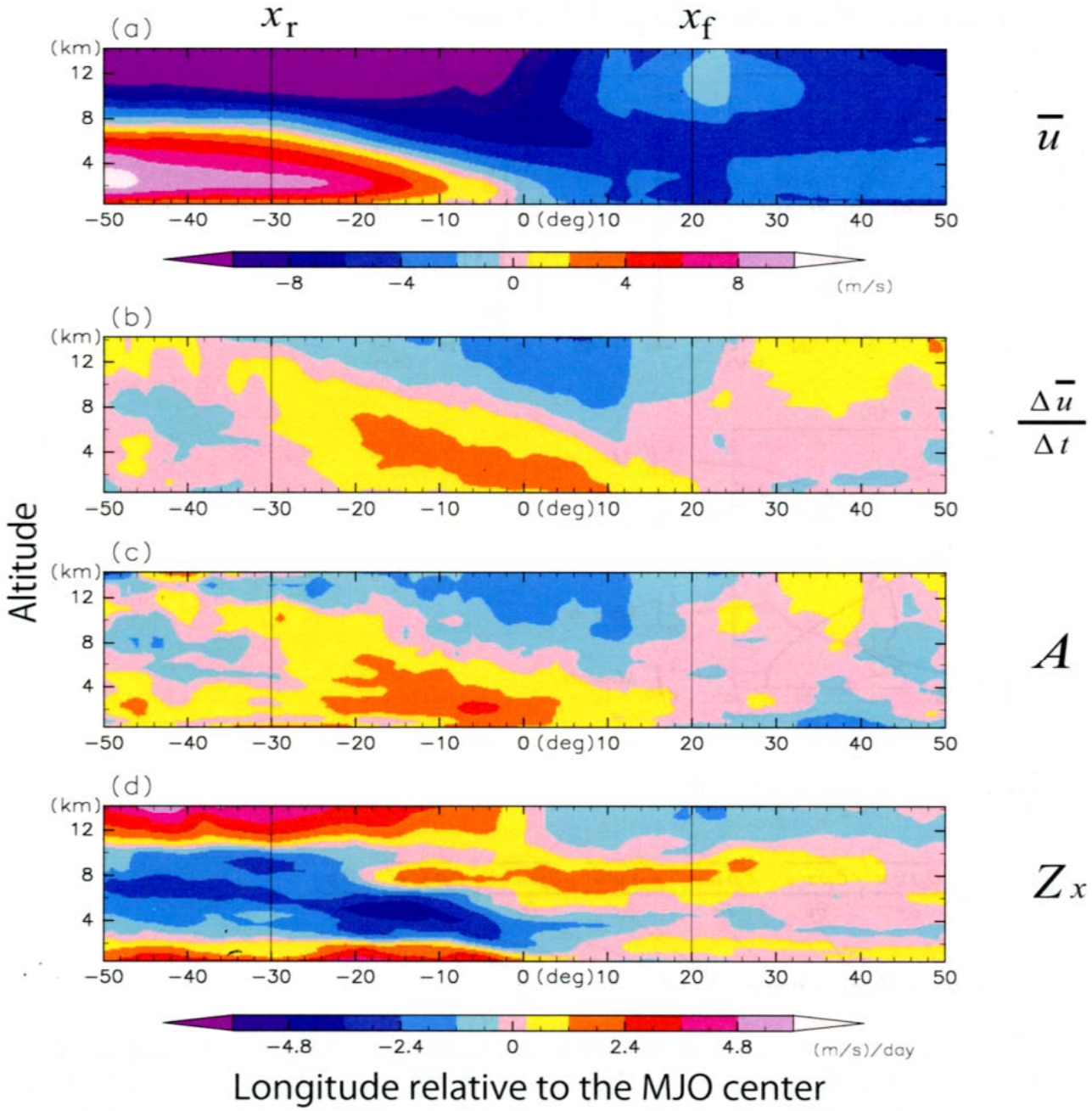
Over 13,000 sections

$$\overline{u}_r - \overline{u}_f \approx \frac{1}{c}\int_{x_r}^{x_f} \frac{\Delta \overline{u}}{\Delta t}\,dx \approx \frac{1}{c}\int_{x_r}^{x_f} A\,dx$$

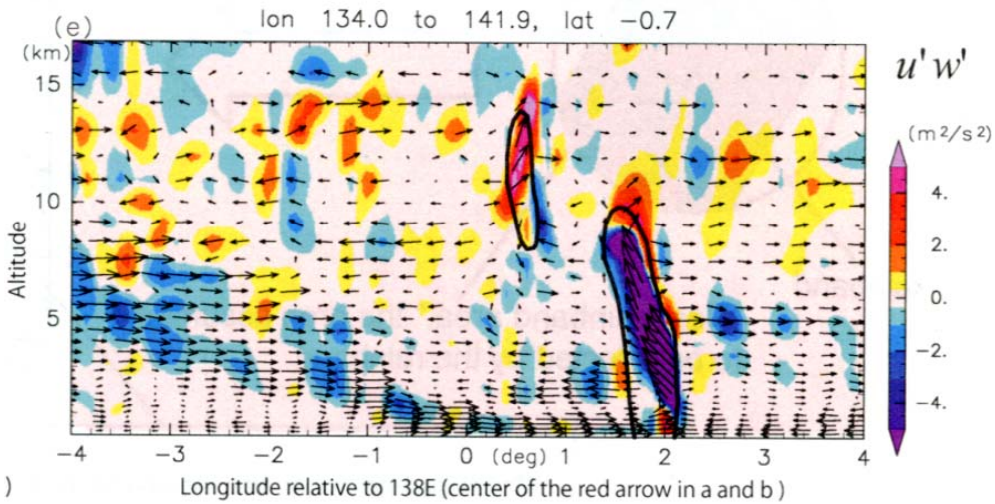
$$A = -\frac{1}{\overline{\rho}}\left(\frac{\partial \overline{\rho}\,\overline{u}\,\overline{u}}{\partial x} + \frac{\partial \overline{\rho}\,\overline{u}\,\overline{v}}{\partial y} + \frac{\partial \overline{\rho}\,\overline{u}\,\overline{w}}{\partial z} + \frac{\partial \overline{\rho}\,\overline{u'u'}}{\partial x} + \frac{\partial \overline{\rho}\,\overline{u'v'}}{\partial y} + \frac{\partial \overline{\rho}\,\overline{u'w'}}{\partial z} + \frac{\partial \overline{p}}{\partial x}\right)$$

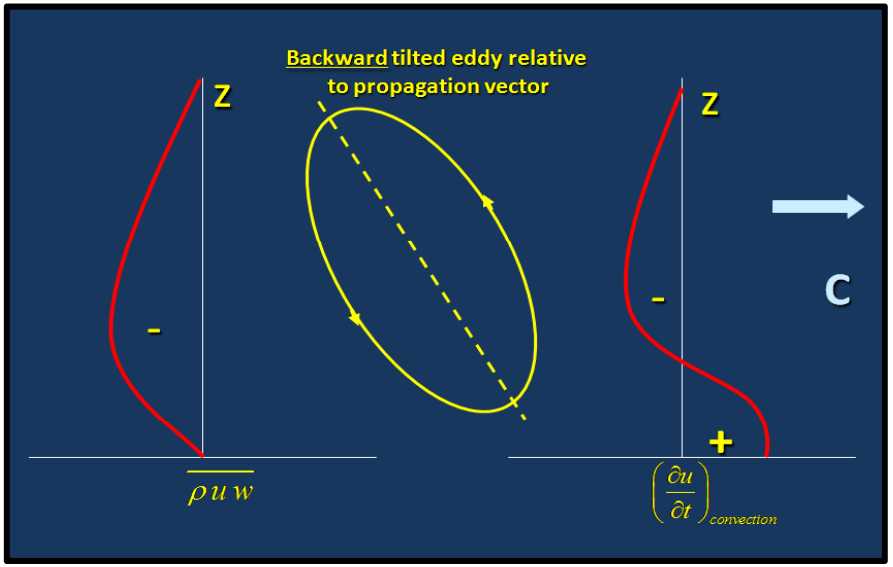
$$= M_{FCX} + M_{FCY} + M_{FCZ} + X_x + Y_x + Z_x + M_{PGF}$$

Meridional averages

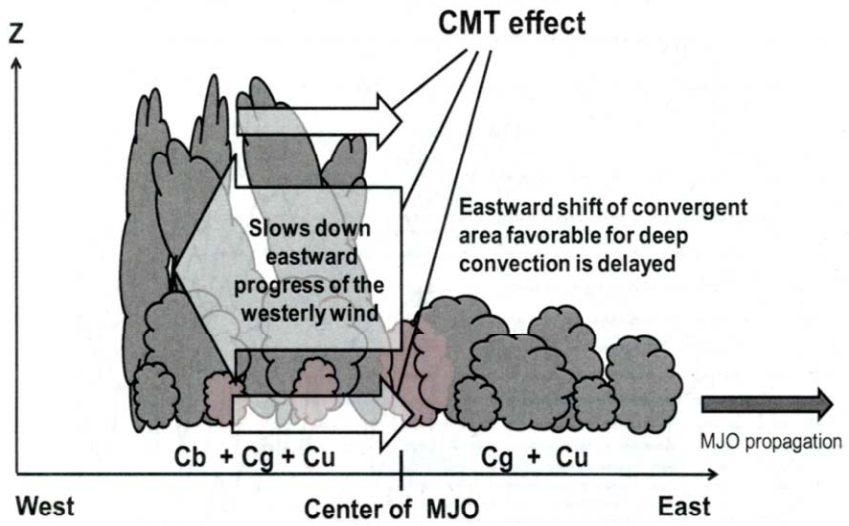


Effects of OCMT on MJO Structure/Propagation





$$\frac{\partial \bar{u}}{\partial t} + \text{.....} = -\frac{\partial}{\partial z}\left(\overline{u_m w_m}\right) = \left(\frac{\delta u}{\delta t}\right)_{convection}$$



Miyakawa, T., and Co-authors, 2012: Convective Momentum Transport by Rainbands within a Madden–Julian Oscillation in a Global Nonhydrostatic Model with Explicit Deep Convective Processes. Part I: Methodology and General Results. *J. Atmos. Sci.,* 69, 1317-1338

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