### 1. Introduction

During the 2011–12 DYNAMO field campaign, the NCAR dual-polarization S-band radar (S-PolKa) observed three active MJO events separated by suppressed periods. Insights into convective evolution during both suppressed and active periods have been possible using nearly continuous S-PolKa data. Analyses highlight various organizational modes of convection, including bursts of rainfall activity from mesoscale convective systems (MCSs) during which microphysical processes evolve in connection with synoptic-scale wave passages. Recent work using S-PolKa data shows an effective mechanism for quantifying convective organization revealing distinct modes of clustering during the major rain events. These results are described here, and highlight future needs for better understanding and representing important feedback mechanisms associated with convective organization.

### 2. Suppressed MJO periods

S-PolKa observed three MJOs during DYNAMO with active periods (MCSs) separated by suppressed periods (less rainfall).

- Early in suppressed period, nonprecipitating clouds formed in shear-parallel lines along boundary rolls in early morning
- By afternoon, some clouds began to precipitate, producing cold pools that served as focused secondary initiation

### 3. Active MJO periods

- During active MJO periods, MCSs mostly responsible for rainfall and occurred within 24–day bursts (Zhou and Houze 2013; Rowe et al. 2019).
- During 24-day rain events:
  - Shallow convection transitions to deep convection under unstable conditions
  - Eventually grow to wide convective entities as rainfall and large-scale vertical motion with pronounced low-level convergence
  - Then to broad stratiform regions with periods of embedded convection

### 4. Convective Organization

- Convective properties ➔ Contiguous Convective Echoes (CCEs)
- Spatial clustering as proxy for convective organization

### 5. Conclusions and Looking Forward

- Through a sensitive, dual-polarization radar (S-PolKa), the evolving cloud population during MJO events could be evaluated. Results highlight various organizational modes of convection from early organization of nonprecipitating clouds along boundary layer rolls to the large MCSs characteristic of the active period.
- An effective mechanism for classifying convective organization reveals two distinct phases of clustering during major MJO rain events that are being further investigated related to cold pool updraft feedbacks and mesoscale circulations.
- This research highlights the need to better understand and represent these feedback mechanisms and their role in convective organization, emphasizing the need for high-quality combined measurements of the following over both ocean and land:
  - Properties of cold pools
  - Ice-phase microphysics (variations in types of MCSs, influence on latent/radiative heating)
  - Mesoscale organized flow patterns (coincident observations of vertical velocity and hydrometeors)
  - Environmental conditions (across multiple scales)

- Observations from recent RELAMPAGO-CACTI field campaign valuable for understanding of convective lifecycle including rapid updraft growth, coincident kinematic and microphysical observations along with cold pool properties.

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E-mail: akrowe@atmos.washington.edu

Funded by NSF Grant AGS-1355567 and DOE ASR Grant DE-SC0016223

US CLIVAR Atmospheric Convection and Air-Sea Interactions Workshop, Boulder, CO, May 2019