

Uncertainties in Atmospheric River Life Cycles by Detection Algorithms

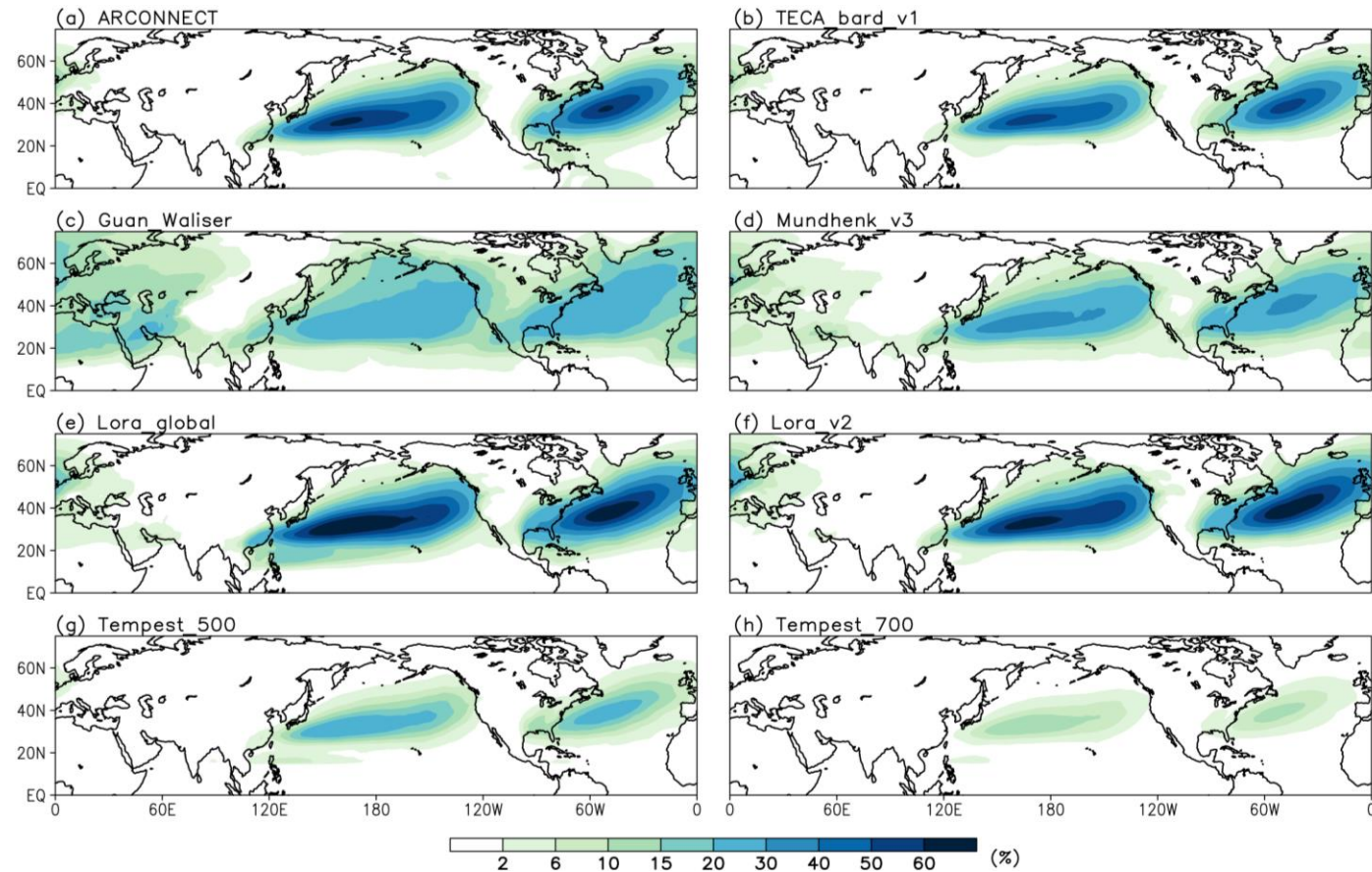
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- ARTMIP Tier1 datasets (detection on MERRA2)

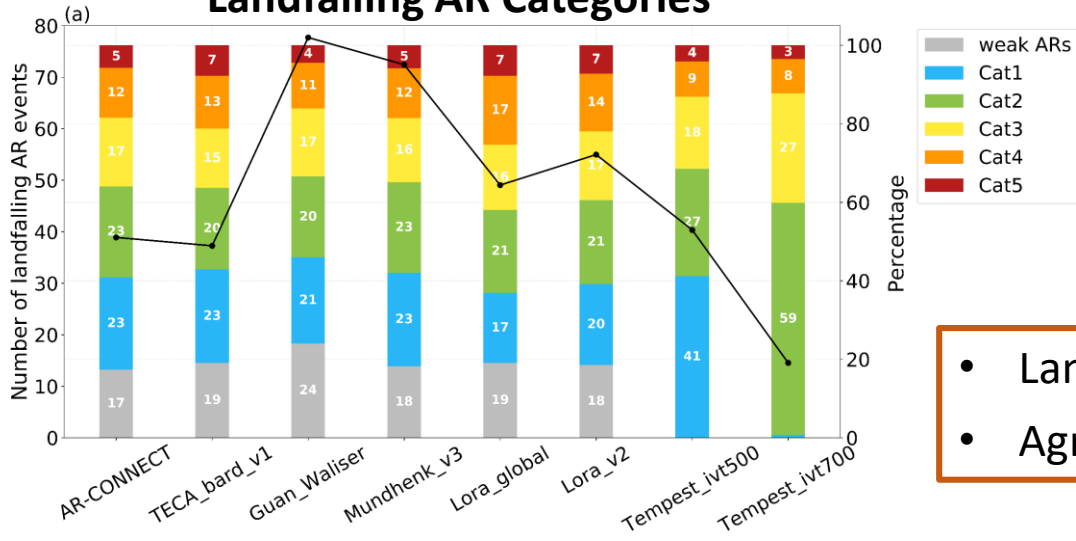
- Detection algorithms introduce uncertainties in AR lifecycle characteristics

- AR-impacted time steps
- Landfalling activity
- Understanding of lifecycle processes

Winter AR Frequency



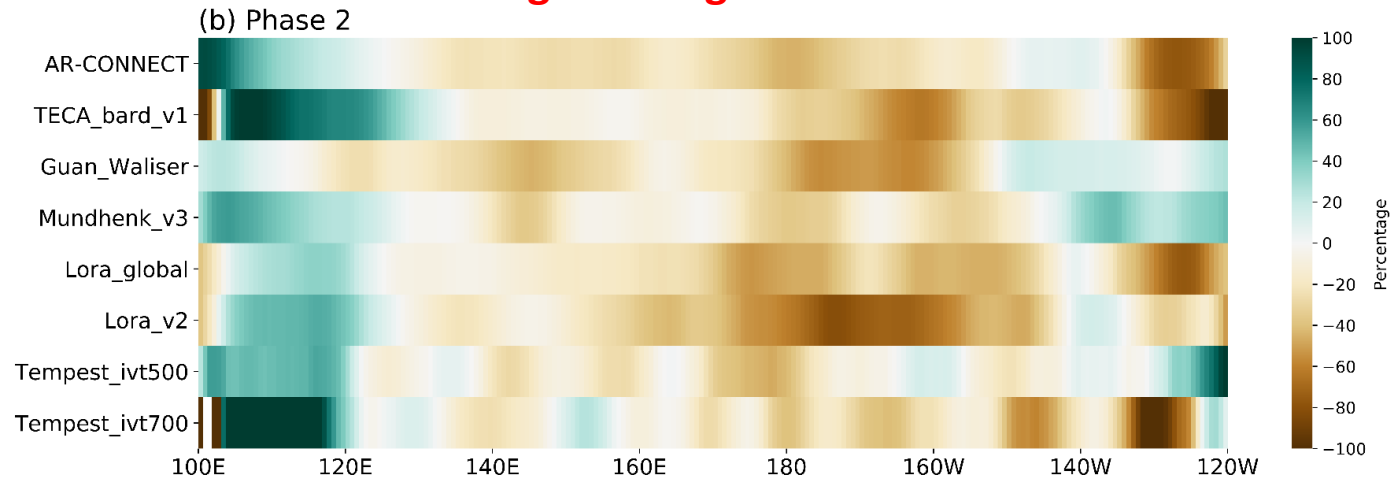
Landfalling AR Categories



- Landfalling AR events can vary by a factor of 5 due to detection algorithms
- Agreement increases with stronger landfalling ARs.

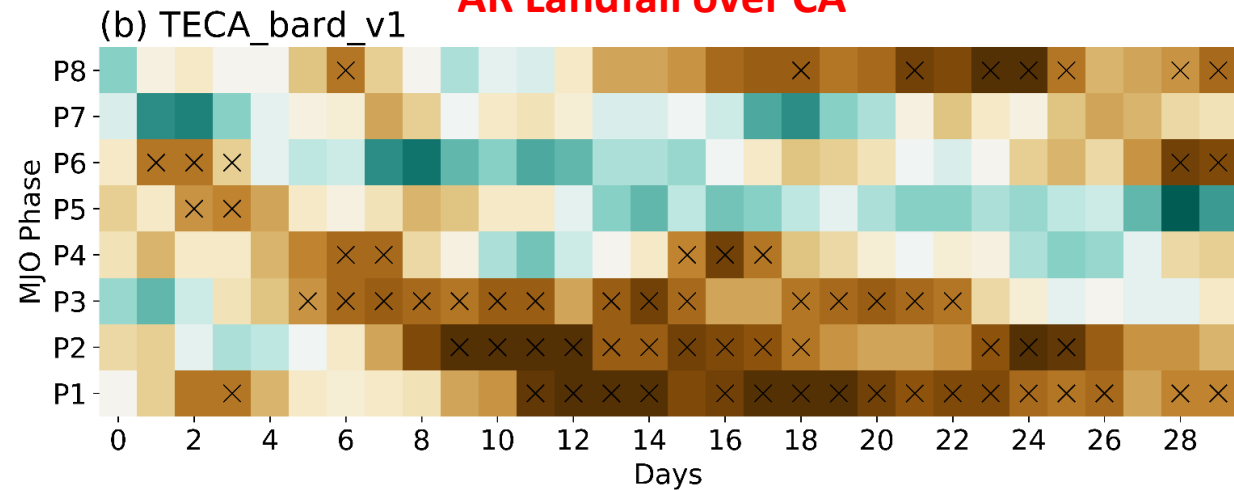
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AR Origin during MJO Phase 2



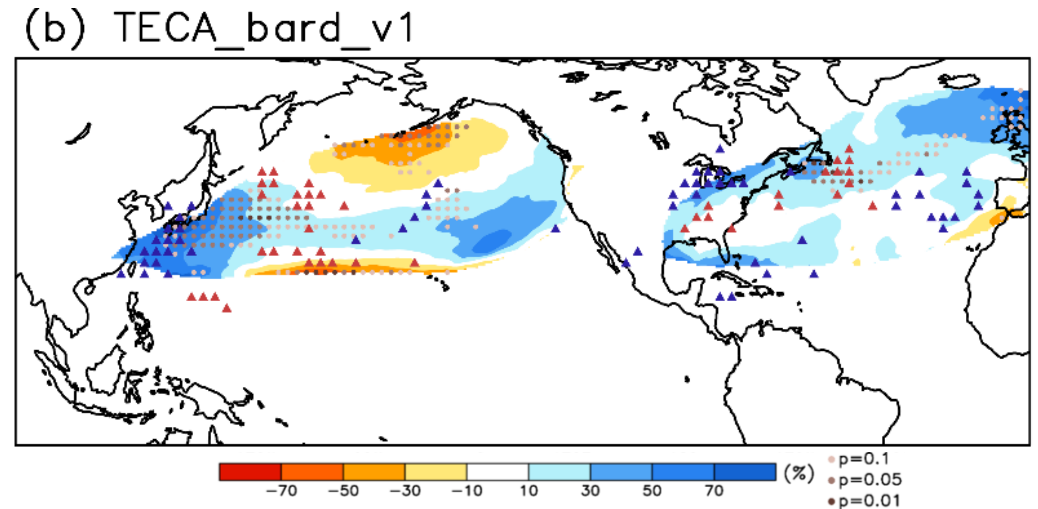
- More origin over northwestern Pacific
- Less origin over central & northeastern Pacific

AR Landfall over CA



- A decrease of 30-45% during phase 1-4
- An increase of 25-35% during phase 5-7

AR Frequency during El Nino



- Enhanced AR activity over subtropical North Pacific
- Consistent pattern among algorithms

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Summary:

- Detection algorithms introduce uncertainties in AR lifecycle characteristics
- Agreement increases with stronger landfalling ARs.
- Uncertainties may be smoothed out when investigating AR activity at a time scale longer than ARs
- Disagreement exists in amplitude and regional distribution

Ongoing work:

- Detection uncertainties of AR life cycles in CMIP5&6 historical and future simulations
- MJO-AR and ENSO-AR relationships in future climate projections