Description and Capabilities of an Automated Objective Technique for Identifying Atmospheric Rivers

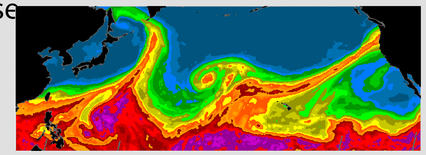
Darren L. Jackson and Gary A. Wick

Atmospheric River Characteristics

Atmospheric rivers (ARs) are poleward-directed narrow bands of intense water vapor transport in the lower atmosphere

- 90% of the meridional poleward transport in midlatitudes occur in these narrow bands
- Integrated water vapor (IWV) used as proxy for vapor transport

Satellite IWV
November 7, 2006



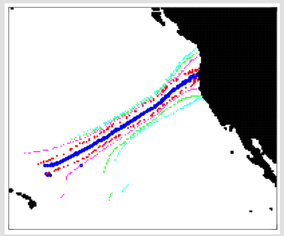
Atmospheric rivers can result in extreme precipitation that causes flooding and mudslides

- 25-50% of annual precipitation on West Coast associated with ARs
- West Coast extreme precipitation events highly correlated to ARs

Automated Objective Technique

The Atmospheric River Detection Tool (ARDT) developed at PSD identifies and characterizes ARs in observed and modeled IWV fields

- Wick et al. (2013a) uses thresholds and skeletonization to define AR axis
- Key outputs are AR width, IWV, and angle at each identified axis location and flag indicating landfall

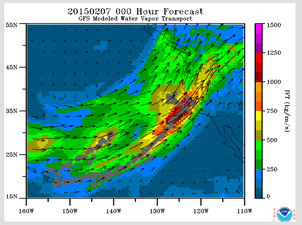


Validation

- Critical Success Index = 92.8%
- Probability of Detection = 98.1%
- False Alarm Rate = 5.5%

Real-Time Web Products

- Real-time monitoring of ARs from GFS and satellite IWV available on PSD web site
- Web site used by NWS and CalWater 2015 field program

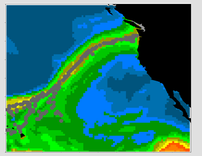


NWP Model Evaluation

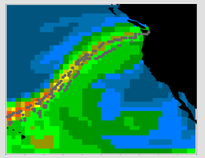
ARDT used to evaluate how well ARs are represented and predicted in forecast models

Wick et al. (2013b) evaluated lead times for five NWP models over three NE Pacific cool seasons

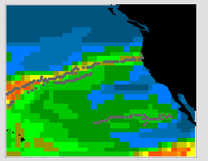
Satellite

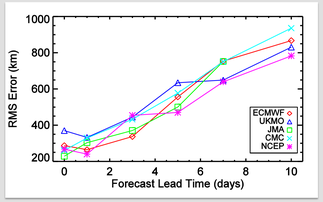


3-day forecast



7-day forecast





Overall AR occurrence well forecasted but landfall location has significant errors at longer lead times

Future Research

- Extending ARDT to new regions such as the Southeast U.S.
- Updating ARDT to use integrated vapor transport for model and reanalysis data sets