

Recent examples of the Orographic Rain Index (ORI) satellite product

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Topics: Hydrology

Program: Proving Ground



2. Introduction

- The Orographic Rain Index (ORI) combines:
 - TPW data from polar orbiting satellites.
 - an estimate of the upslope wind.
 - high resolution topographic data to indicate the potential for orographic enhancement to precipitation.
- Intended for atmospheric river events along coastal ranges.
- Motivated by WFO Monterey need for new tools to assist in predicting flash flooding in the Big Sur burn scar region.
- Adopted within Proving Ground demonstration activities after initial development

Orographic Rain Index (ORI) Short-Term Forecasting Tool

Satellite/Model Fusion Product:

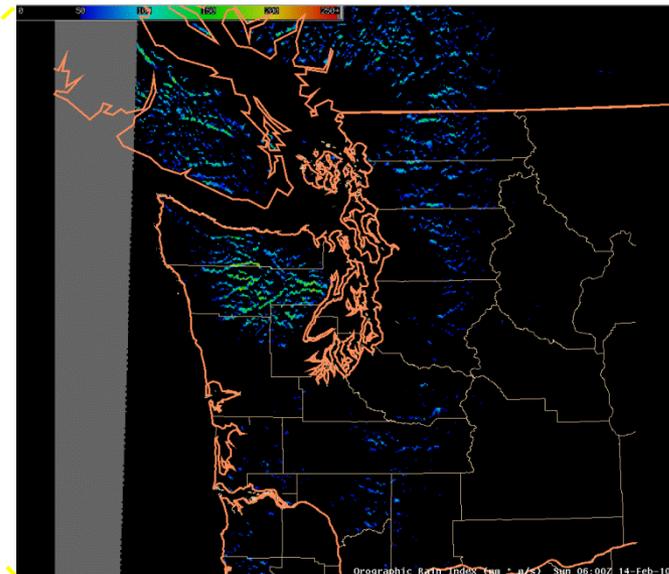
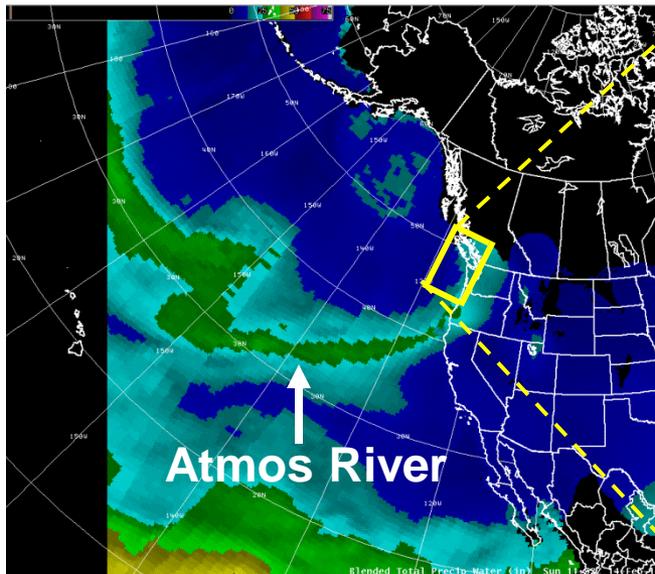
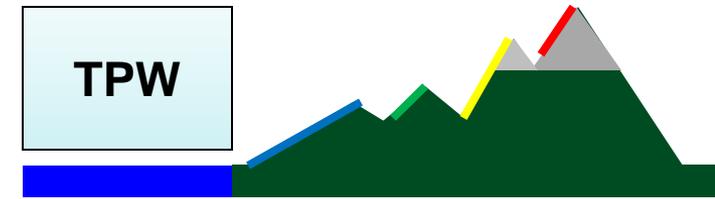
1. TPW retrievals from GOES/AMSU/GPS
2. Model wind fields from GFS
3. High resolution (30 s) terrain database

→ Predicts where land-falling moisture plumes will interact with strong terrain gradients.

V(850mb)



$$\text{ORI} = \text{TPW} * \mathbf{V} \cdot \nabla H$$

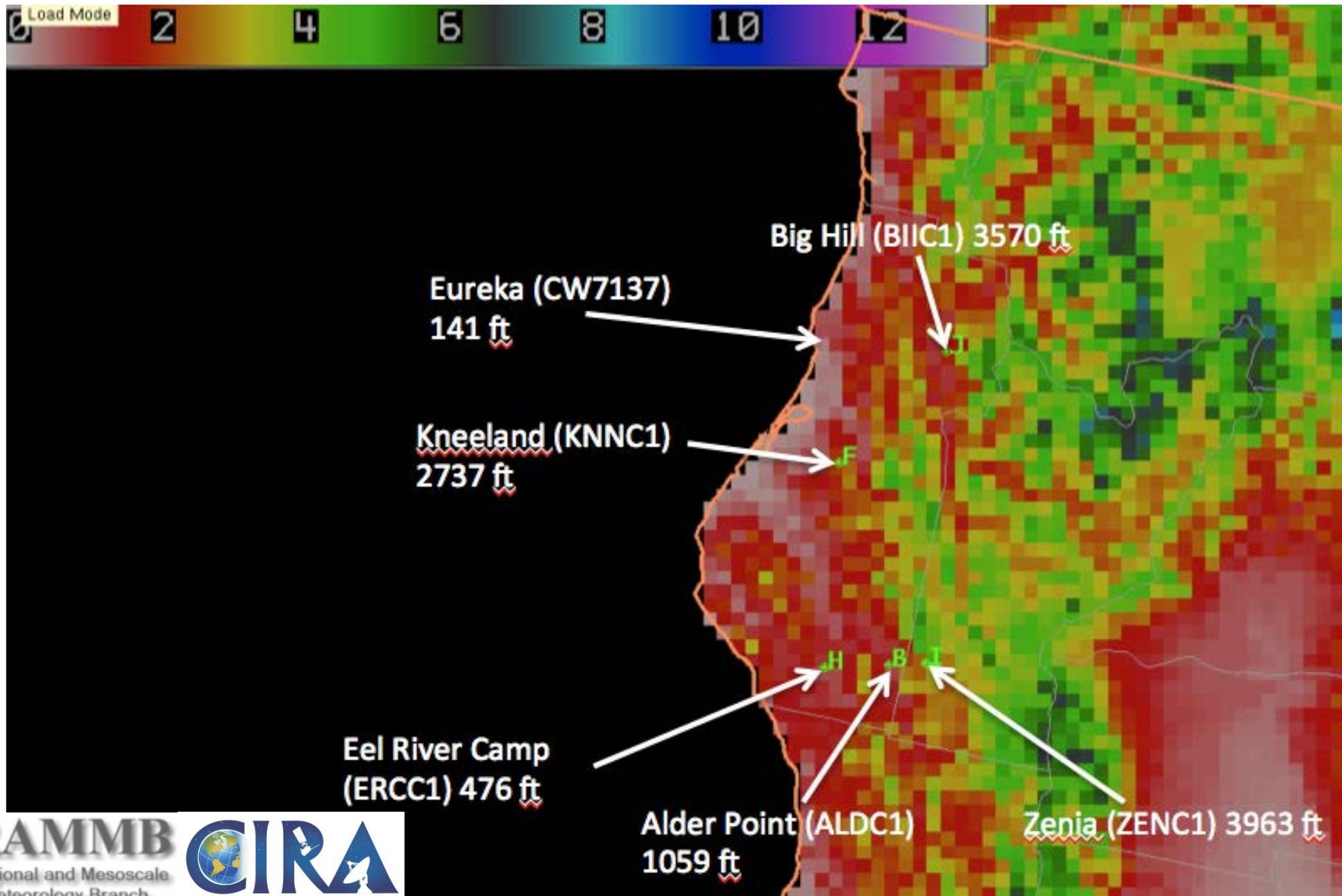


3. Methodology/Expected Outcomes

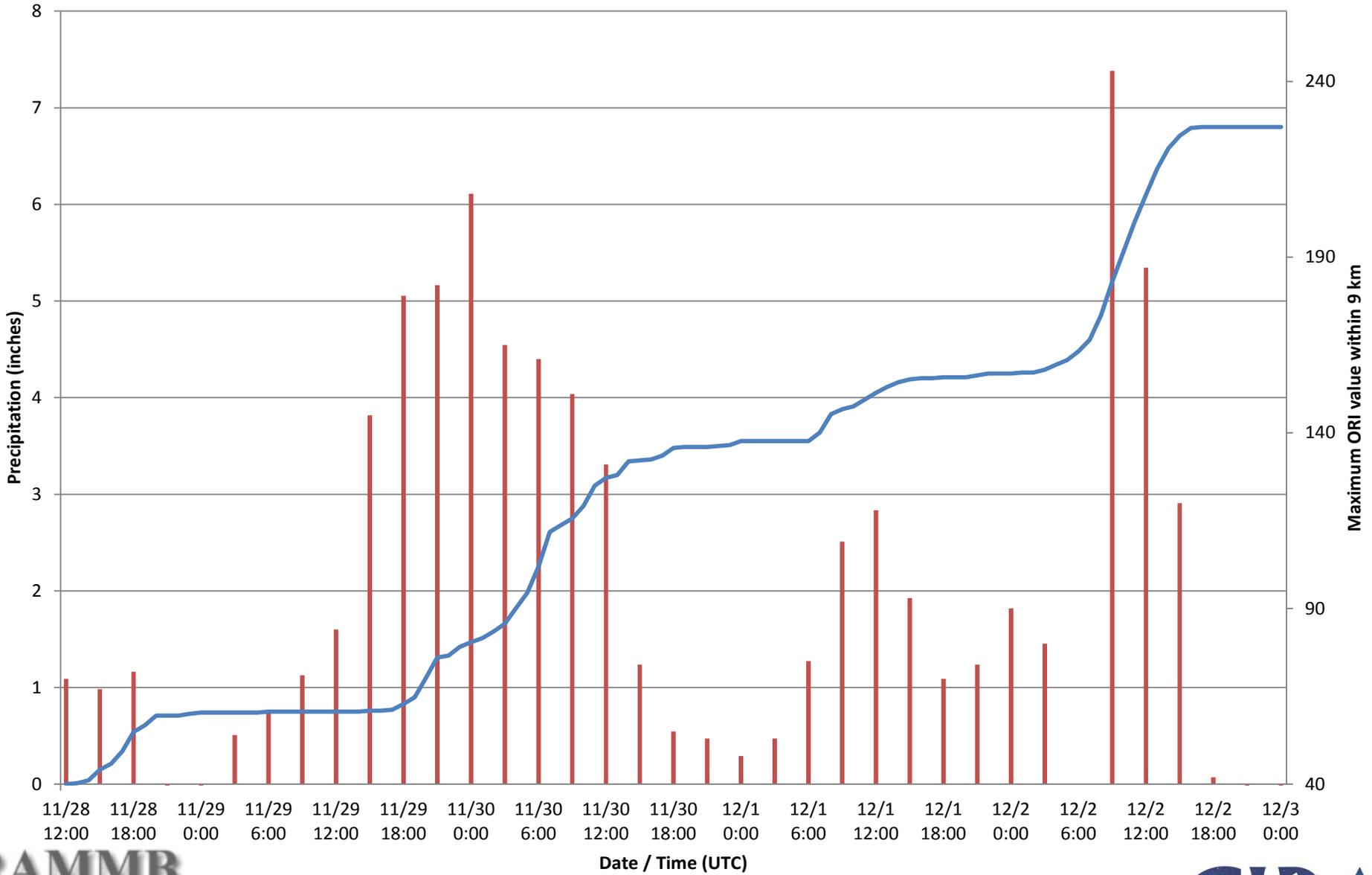
- ORI can assist forecasters in concentrating on a particular region
 - Potential “hot spot” for orographic enhancement / flash flooding
- The relationship between ORI and observed rainfall / river basin streamflow values is unclear
 - Cases are examined to attempt to quantify this relationship
 - Expected outcome: Useful tool for forecasters.

4. Results

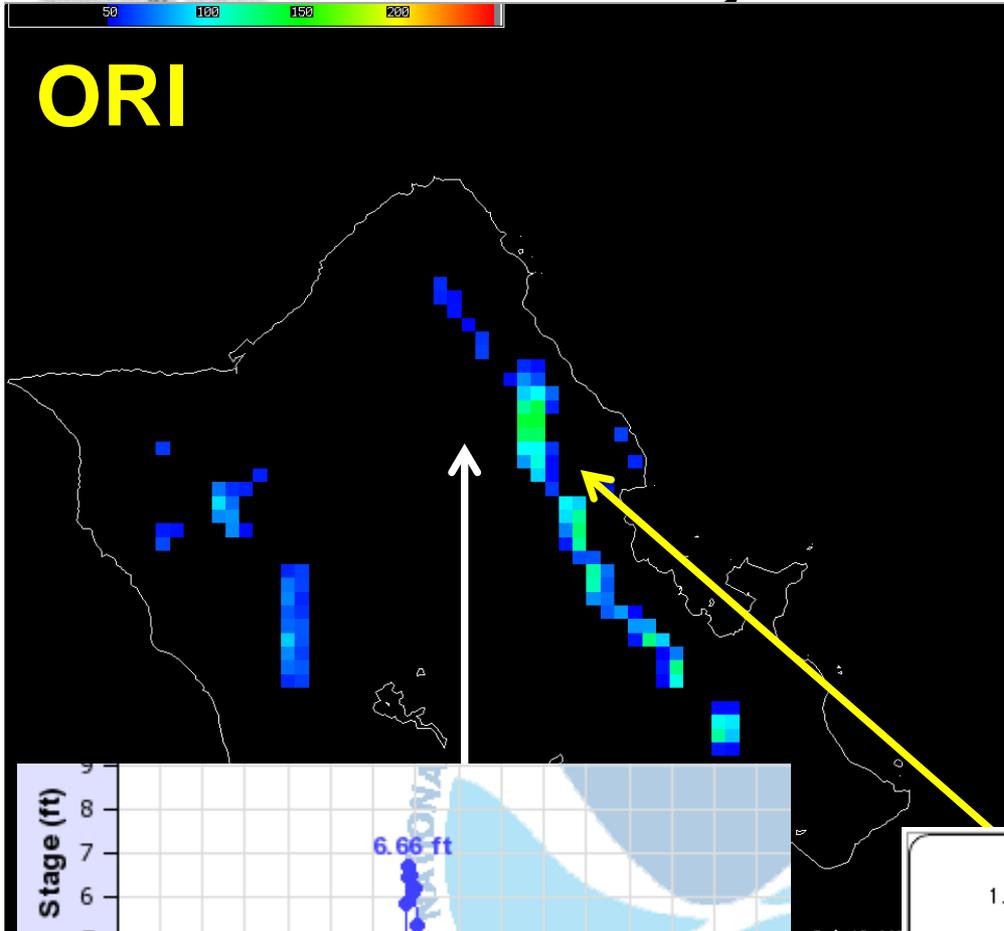
Validation Points for 28 Nov – 2 Dec 2012 Case



1 hr Accumulated Precipitation at ALDC1 for 11/28 - 12/3, 2012 versus maximum ORI value within 9 km of site

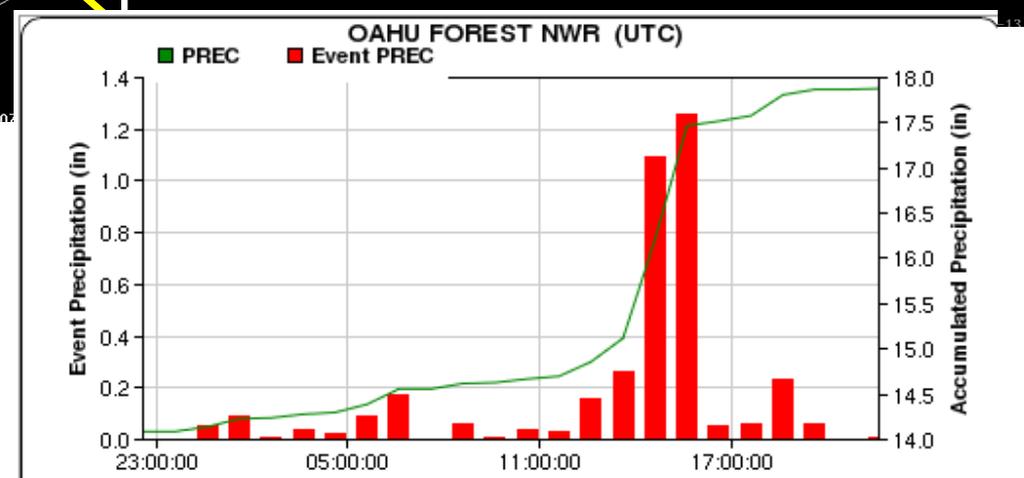
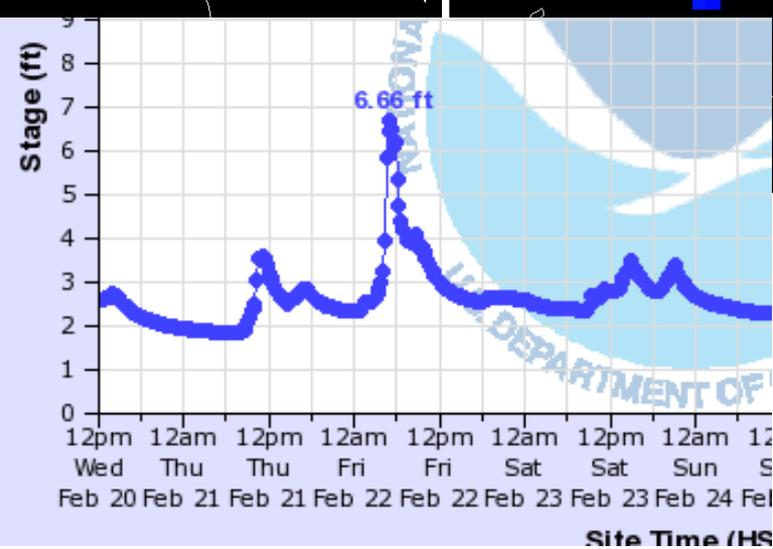
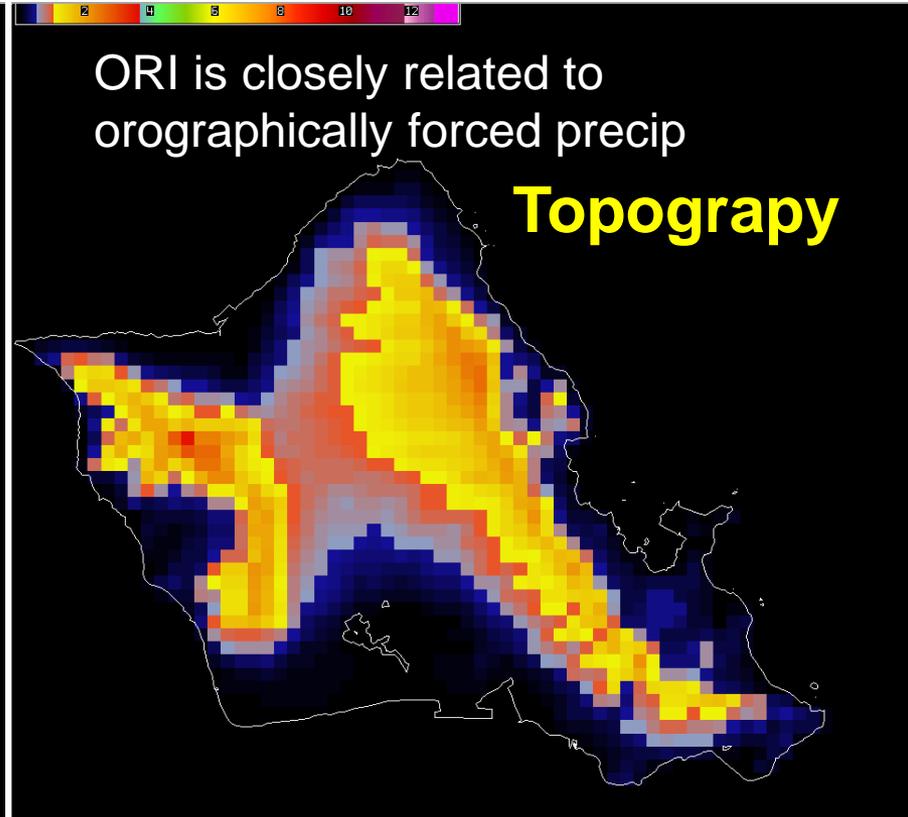


ORI



ORI is closely related to orographically forced precip

Topography



5. Possible Path to Operations

- Currently has been considered by a few West Coast WFO's
 - A more organized assessment is needed
- Formal evaluation with additional West Coast WFO's (Fall 2013) in coordination with Chad Gravelle

6. Future Plans

- Based on case studies
 - Potential improvements (i.e., optimum wind level / layer to use)
 - Transition product description to training module
 - Full validation study is still needed
- Expand to Hawaii and other regions

7. Publication List

- Project Publications
 - <http://www.goes-r.gov/downloads/2010-OCONUS/ORI-Kidder.pdf>