Howard Hanson Dam Rapid Response and NOAA's New Mobile Atmospheric River Observatory

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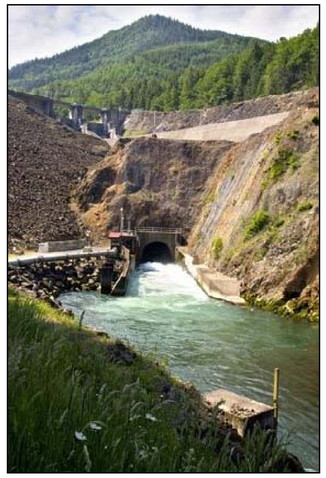
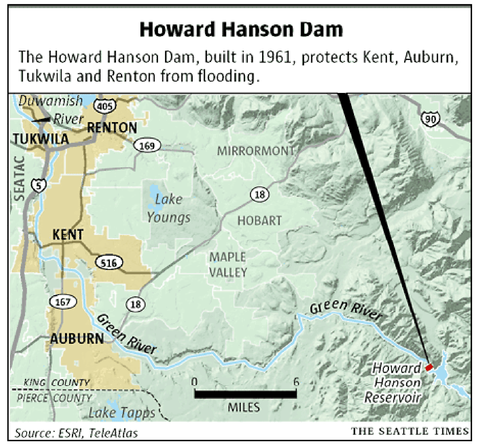
The Problem





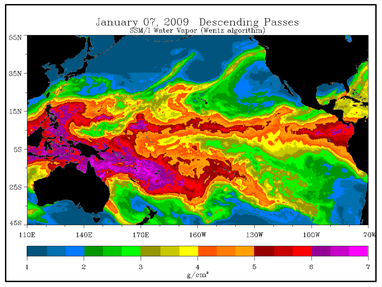
- Dedicated in 1962, the Howard A. Hanson Dam (HHD) brought necessary flood relief to the Green River Valley and opened the way for increased valley development.
- Following a record high level of water behind HHD in January 2009, the U.S. Army Corps of Engineers became concerned about the Dam's safety.
- Flood damage prevented by HHD from the January 2009 event is estimated at about $4 billion.
- Despite short-term measures to improve HHD, the chance for significant flooding is estimated to be 1/25.

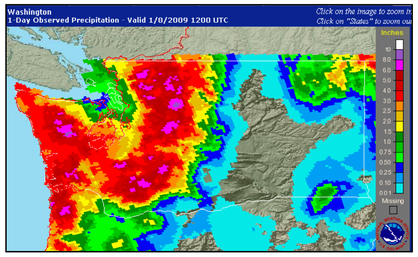
Flood Phase Information (Alerting Information from the National Weather Service)

Phase	*Green River gage at Auburn (measured or expected flow)* *	*Description*	*Condition*
1	5,000 c.f.s.	Internal Alert	
2	9,000 c.f.s. (61.7 ft.)	Minor Flooding	Lowland flooding in valley upstream of Auburn.
3	12,000 c.f.s. (63.5 ft.)	Moderate Flooding	Flooding of varied depths occurs in valley upstream of Auburn and lower Mill Creek basin. SE Green Valley Rd and West Valley Rd may overtop.
4	14,000 c.f.s. (64.6 ft.)	Extreme Flooding	Levees may exhibit seepage and/or weaken from saturation.

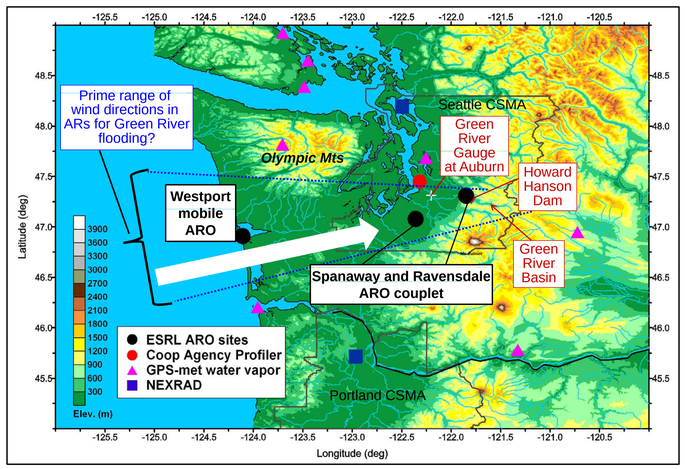
* Phase is determined by current Auburn gage reading or the expected flow based on Howard Hanson dam operations information from the U.S. Army Corps of Engineers.

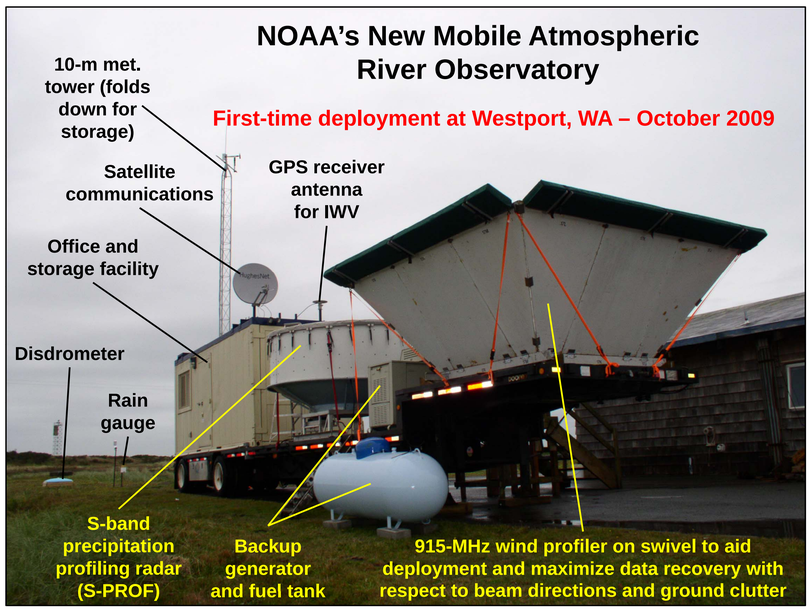
The Atmospheric River Observatory

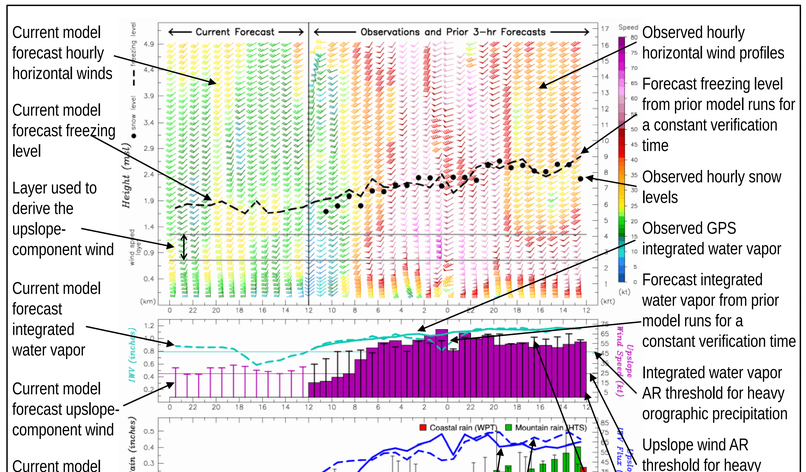


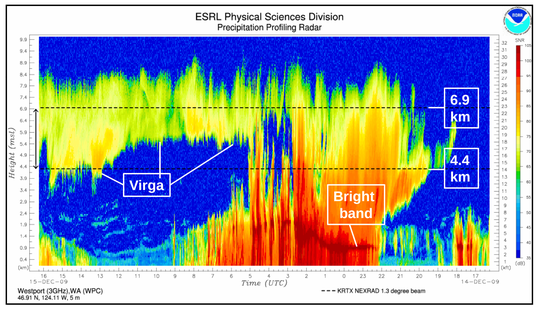


- More than a decade of West Coast winter storm research conducted primarily in CA by PSD has identified atmospheric rivers (ARs), narrow regions of enhanced water vapor transport, as the culprits that cause extreme precipitation events, such as the January 2009 event that stressed HHD.
- PSD extended this AR research to WA by deploying a mobile atmospheric river observatory (ARO) at Westport, WA.
- PSD also responded to the HHD crisis by deploying an ARO closer to HHD in order to detect and monitor the atmospheric river conditions that potentially could lead to flooding along the Green River.



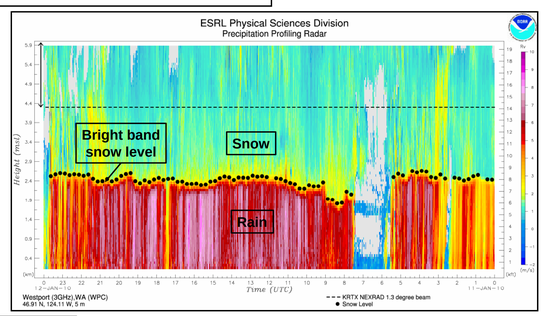


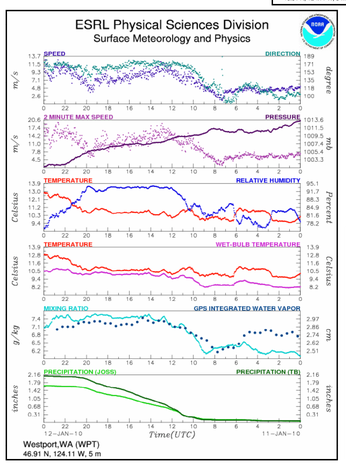




Sample ARO data: Moisture flux tool (above), S-PROF radar reflectivity (left)

Sample ARO data: S-PROF Doppler velocity and snow level (right), Surface meteorology (below)





Forecast Impacts

# of product displays viewed by Seattle WFO[1]	# of times obs. from an ARO site were quoted in an AFD
2,233	50

[1]During Nov. 24–Dec. 23, 2009 and Jan. 11–Feb. 9, 2010

From U.S. ACE meteorologist, Larry Schick, regarding a mid-January 2010 AR event: **"We were right on the threshold of taking over Wynoochee Dam today for flood control, but we had high confidence we didn't need to with the ARO info that the rain would taper off quickly -- and it did."**