

CW3E Extreme SWE (Snow) Event Summary: 4 – 7 January 2022

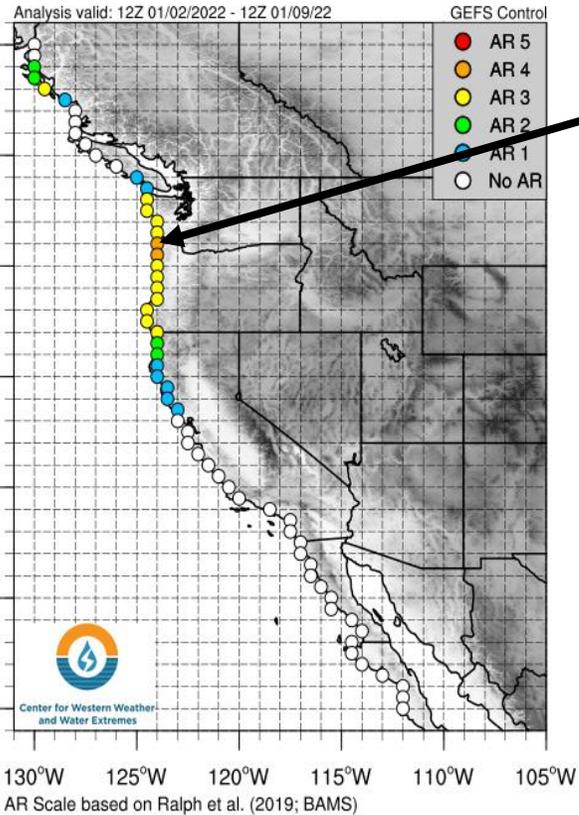
Inland-Penetrating Atmospheric River Brings Record-breaking Heavy Snow to the Upper Colorado Basin's Yampa and Green River Basins

- An extreme atmospheric river (ranked as AR4) made landfalling over the Washington and Oregon coast during January 4th – 6th, 2022.
- The inland penetration of this AR brought over 250% of normal water vapor transport from the Washington and Oregon coast to the Upper Colorado River Basin.
- The AR inland penetration produced record-breaking heavy snow in the Yampa River Basin. The Snow Water Equivalent (SWE) increase at SNOTEL site Tower was 7.6 inches during Jan 4th – 6th.
- In addition, another SNOTEL site, “Tony Grove Lake” but in Northeast Utah, was also along the axis of the inland penetrating AR (well west of the Tower site in Colorado), and also set it's all-time record for their wettest single day and back-to-back days.
- **The 3-day SWE gains of 7.6 and 7.9 inches represent 15-25% of max annual SWE at these sites**

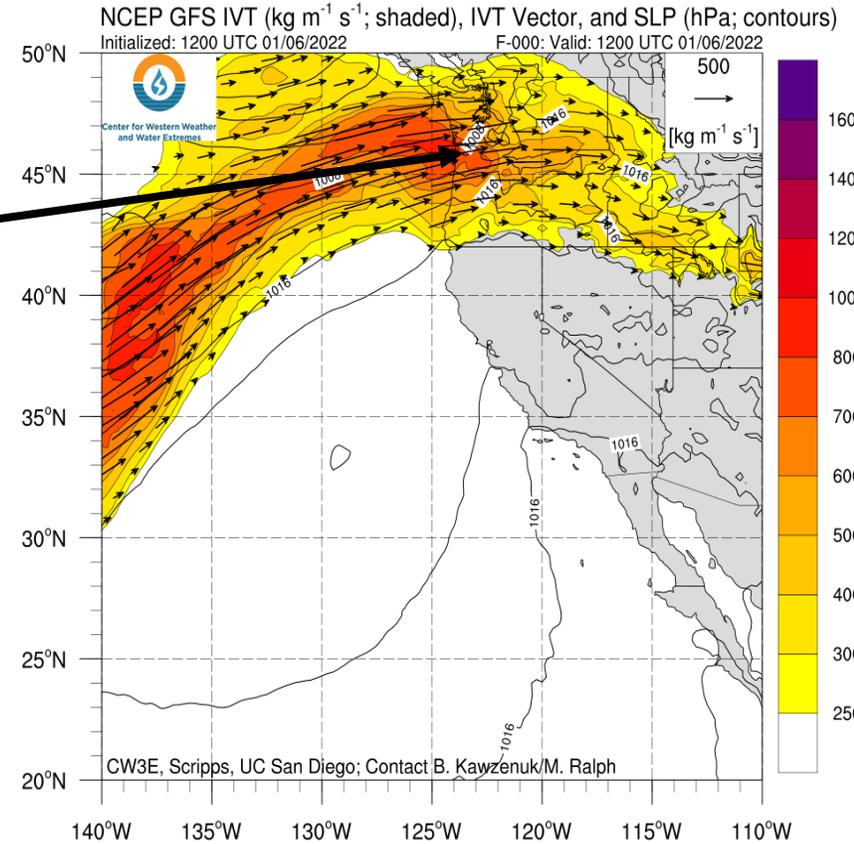
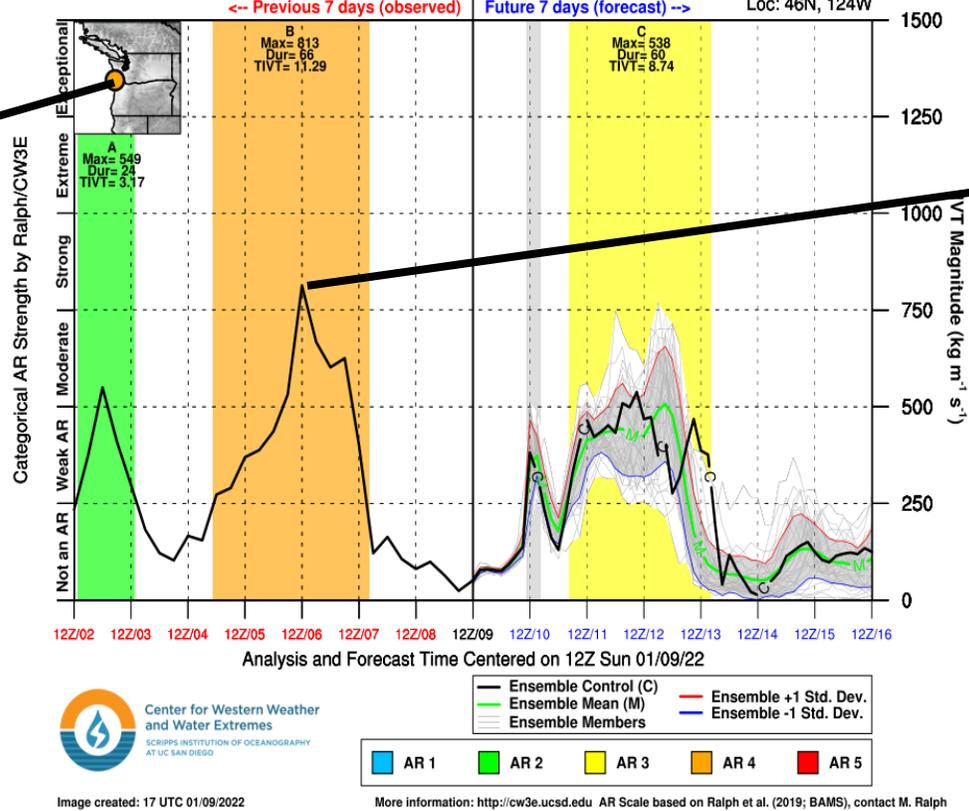
Zhenhai Zhang, Marty Ralph, & Jason Cordeira (CW3E, SIO UCSD, Jan 9th, 2022)

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Maximum Observed AR Scale

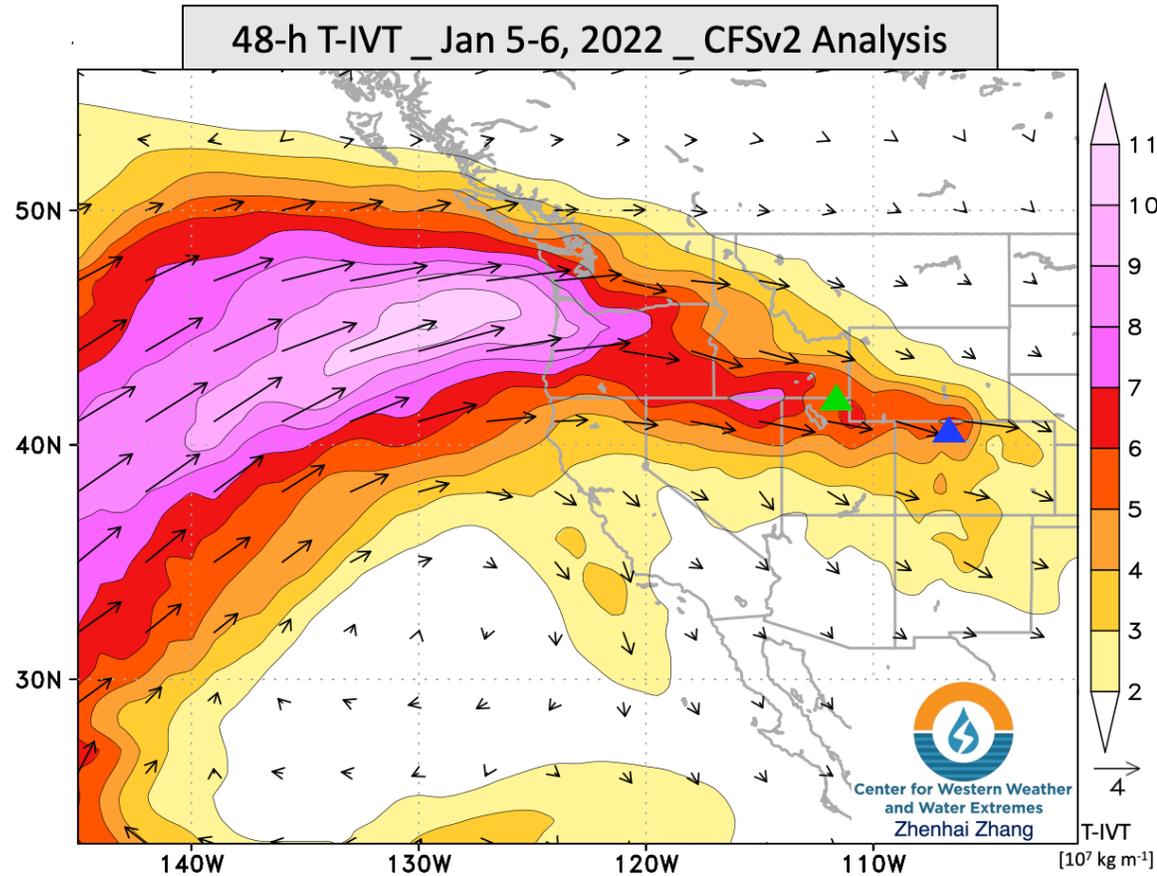


GEFS AR Scale & IVT Analysis/Forecast Initialized 12Z Sun 01/09/22

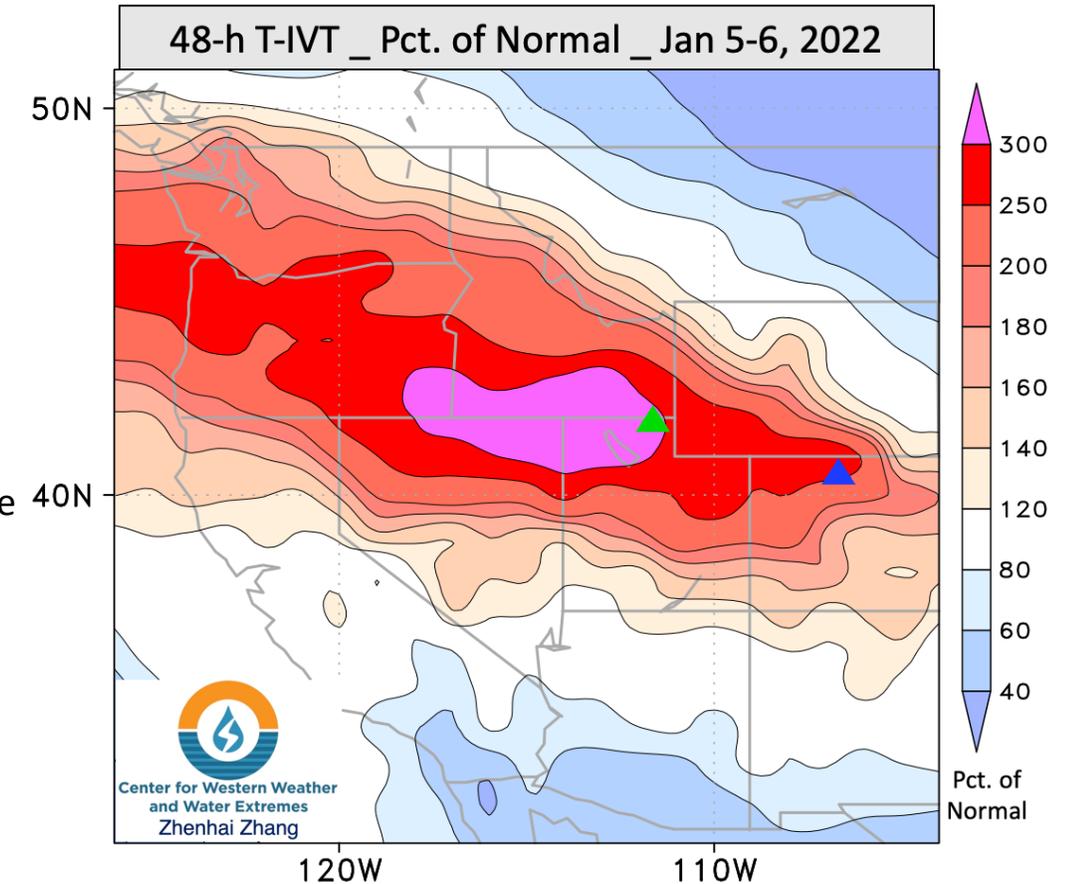


- The landfalling AR ranked as an AR4 over the northern Oregon coast from Jan 4th to 7th, 2022.
- The inland penetration of the AR produced heavy snow in the Upper Colorado River Basin.

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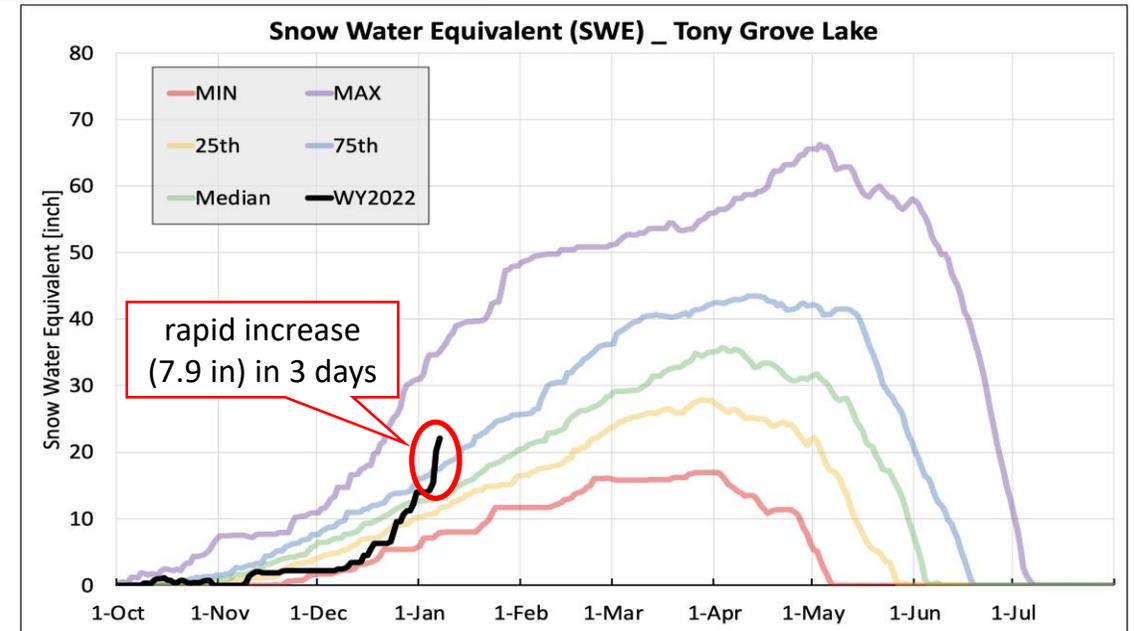
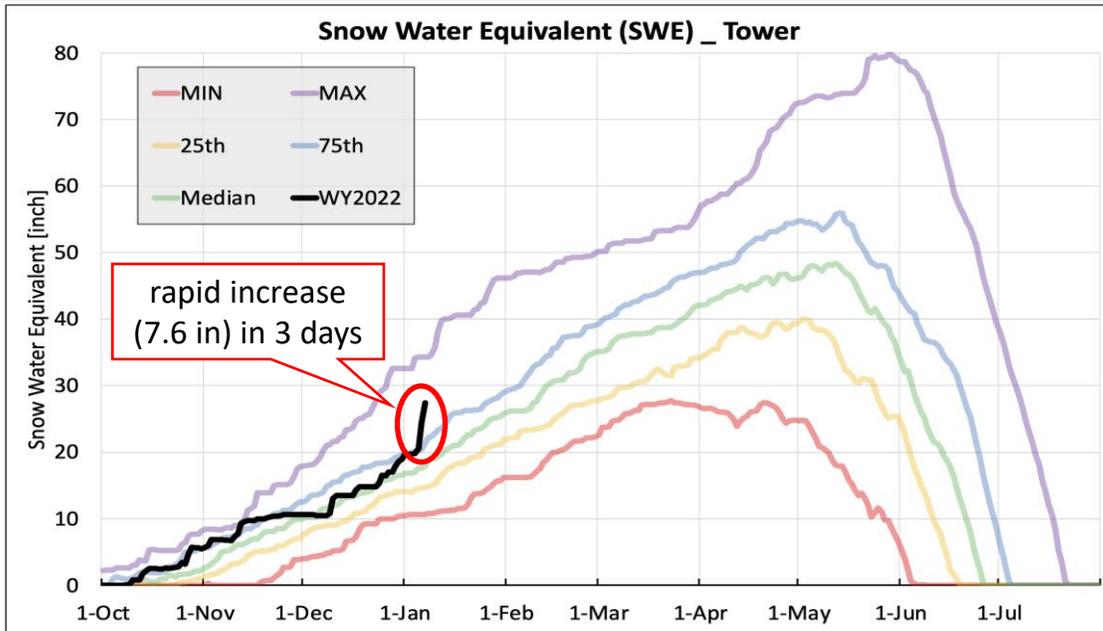
48-h Time-integrated IVT (colors and vectors, 10^7 kg m^{-1}) during Jan 5-6, 2022, based on NCEP CFSv2 analysis.



48-h Time-integrated IVT (colors) during Jan 5-6, 2022, as percentage of normal (1991-2020).

- The landfalling AR penetrated the water vapor from the WA-OR coast to the Upper Colorado River Basin.
- The water vapor transport during Jan 5-6 was over 250% of normal along the corridor from coast to inland.

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1-day SWE (inch)		
	Date	SWE
1	JAN 05, 2022	4.0
2	JAN 04, 2017	3.2
3	JAN 06, 2022	2.9

2-day SWE (inch)		
	Date	SWE
1	JAN 05-06, 2022	6.9
2	FEB 08-09, 2014	5.0
3	MAY 21-22, 1981	4.8

3-day SWE (inch)		
	Date	SWE
1	JAN 04-06, 2022	7.6
2	FEB 07-09, 2014	5.8
3	FEB 08-10, 2014	5.5

1-day SWE (inch)		
	Date	SWE
1	JAN 05, 2022	4.8
2	JAN 11, 1998	4.0
3	DEC 06, 1983	4.0

2-day SWE (inch)		
	Date	SWE
1	JAN 05-06, 2022	6.7
2	JAN 10-11, 1998	6.2
3	JAN 12-13, 1980	6.0

3-day SWE (inch)		
	Date	SWE
1	JAN 09-11, 2017	8.3
2	JAN 04-06, 2022	7.9
3	JAN 10-12, 1998	7.1

The rankings of 1-day, 2-day, and 3-day total SWE at each SNOTEL site, from WY 1980 to present (WY 2022, Jan 9)

- The inland penetration of the AR brought record-breaking heavy snow to the Yampa River Basin.
- SWE increase at Tower during Jan 4-6 was 7.6 inches, 16% of normal (1991-2020 median) max. SWE at Tower.
- Before this event, the snowpack in the Upper Colorado River Basin got a large increased in [the late Dec event](#).