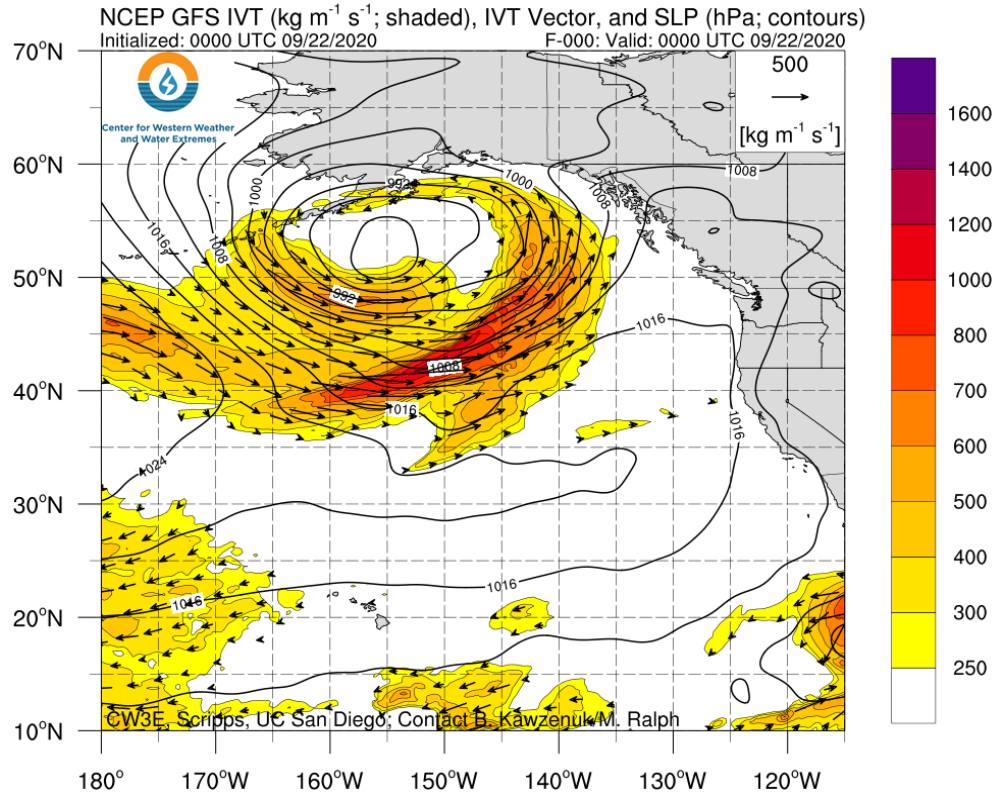
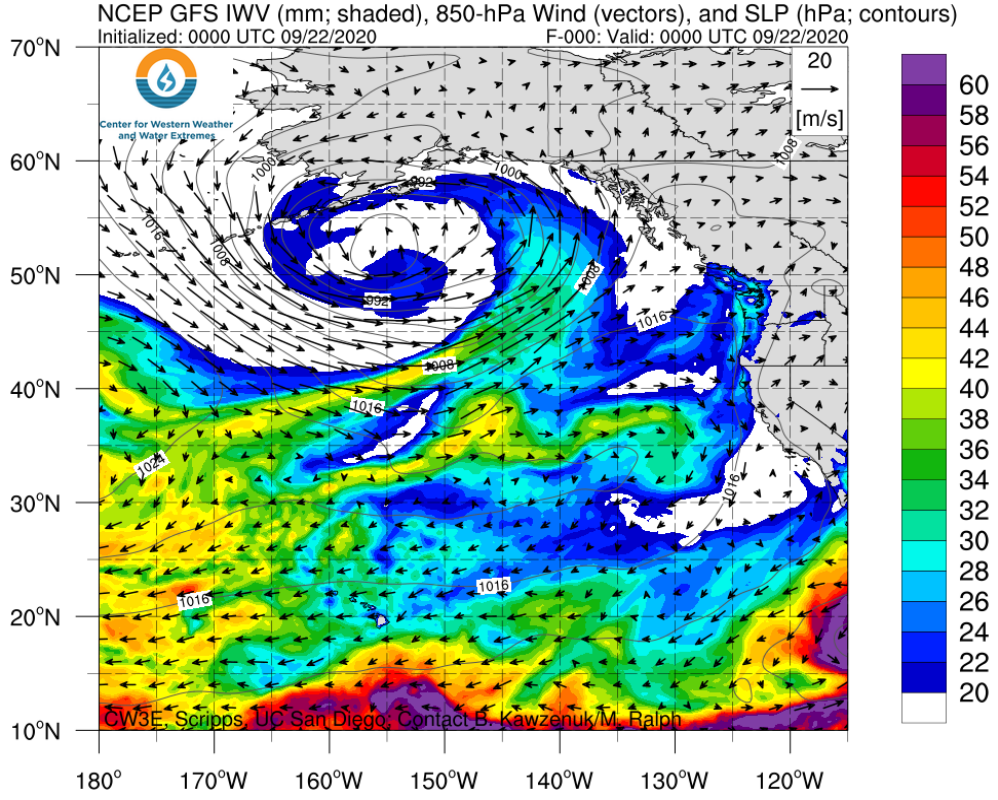
CW3E Event Summary: 23–27 Sep 2020

Center for Western Weather and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UC SAN DIEGO

Active weather pattern brings first major precipitation event of the season to the Pacific Northwest

- A family of landfalling ARs produced heavy rainfall across western North America during 23–27 Sep
- Some locations along the northwestern coast of Oregon experienced AR5 conditions [based on the Ralph et al. (2019) AR scale]
- Total estimated 7-day precipitation ending 28 Sep exceeded 2 inches across most of western Washington and northwestern Oregon, with more than 5 inches (locally > 10 inches) in the Olympic Mountains and North Cascades





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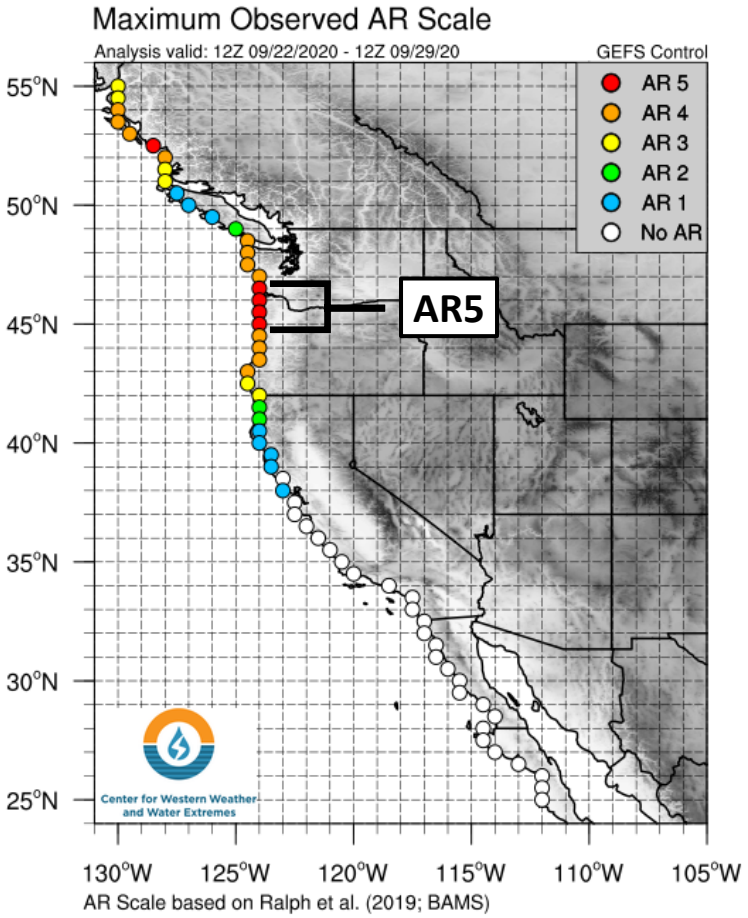

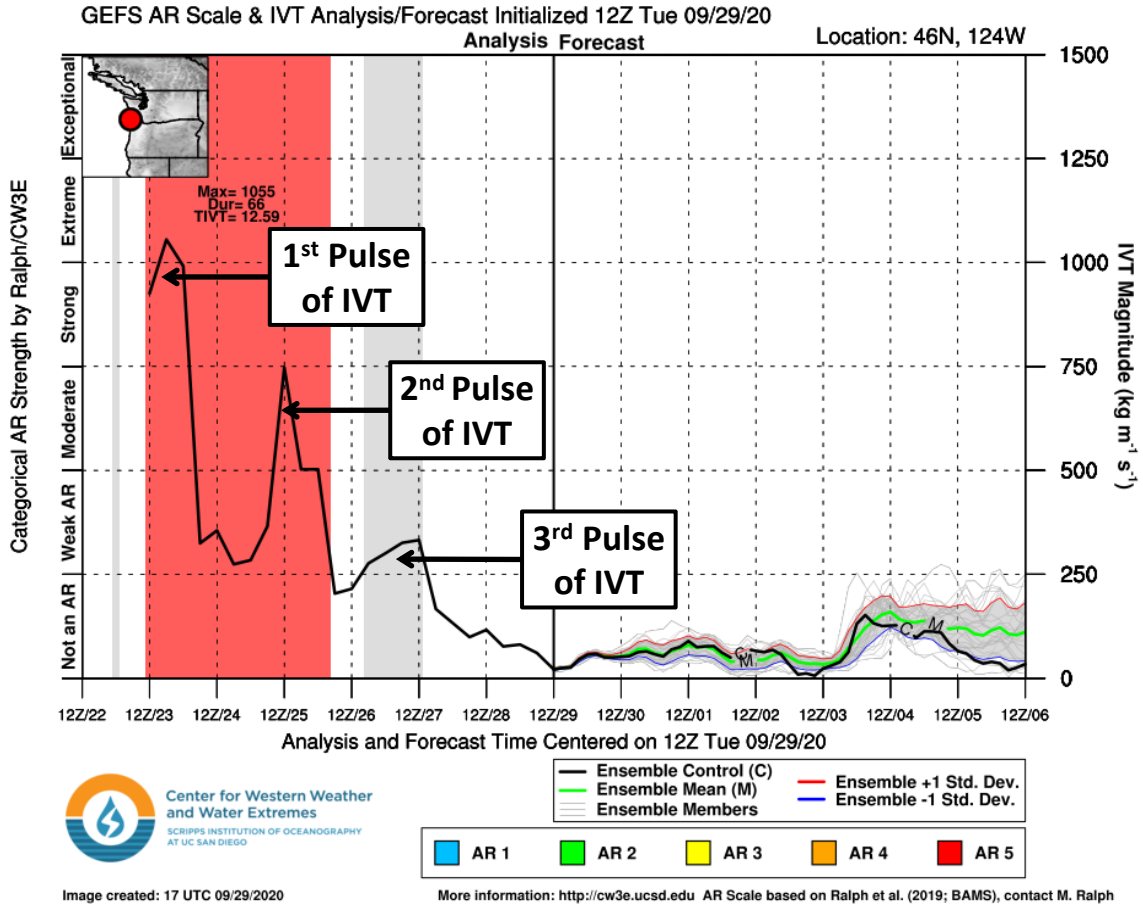

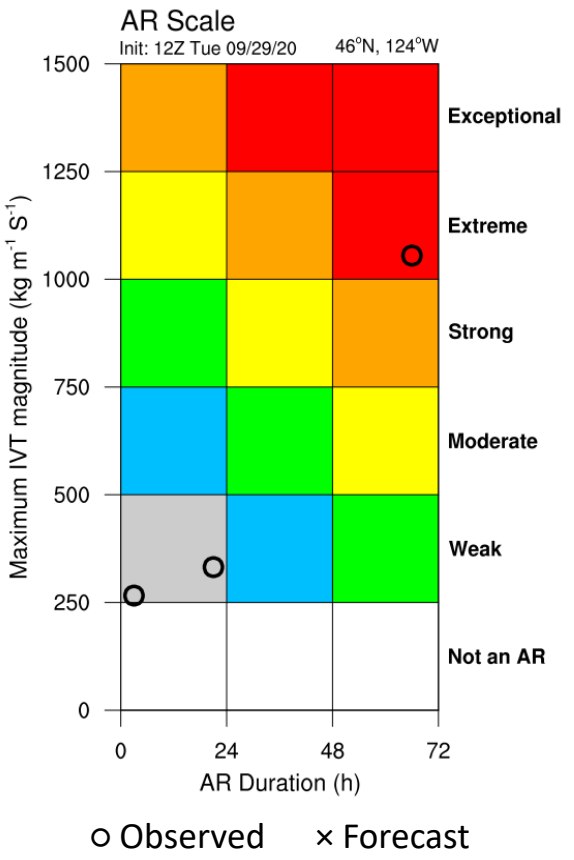

- A family of ARs over the Northeast Pacific Ocean brought a prolonged period of AR conditions to the Pacific Northwest
- This AR family produced multiple distinct pulses of IVT, with the last episode primarily affecting British Columbia
- Maximum IVT values exceeded 1000 kg m^{-1} s^{-1} and AR conditions (IVT ≥ 250 kg m^{-1} s^{-1}) persisted for more than 48 consecutive hours along the northwestern coast of Oregon [AR5 based on the Ralph et al. (2019) AR scale]

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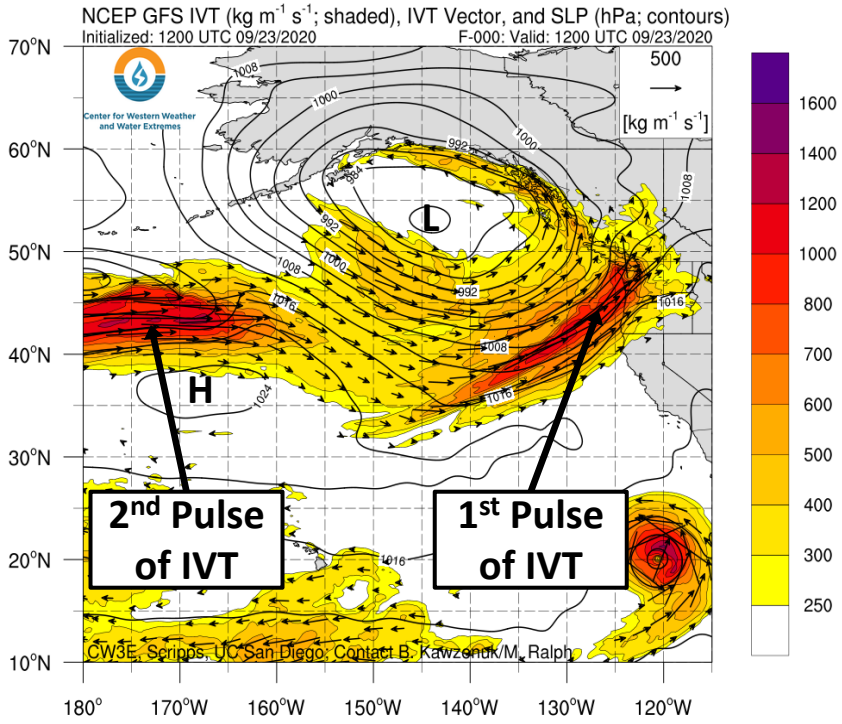
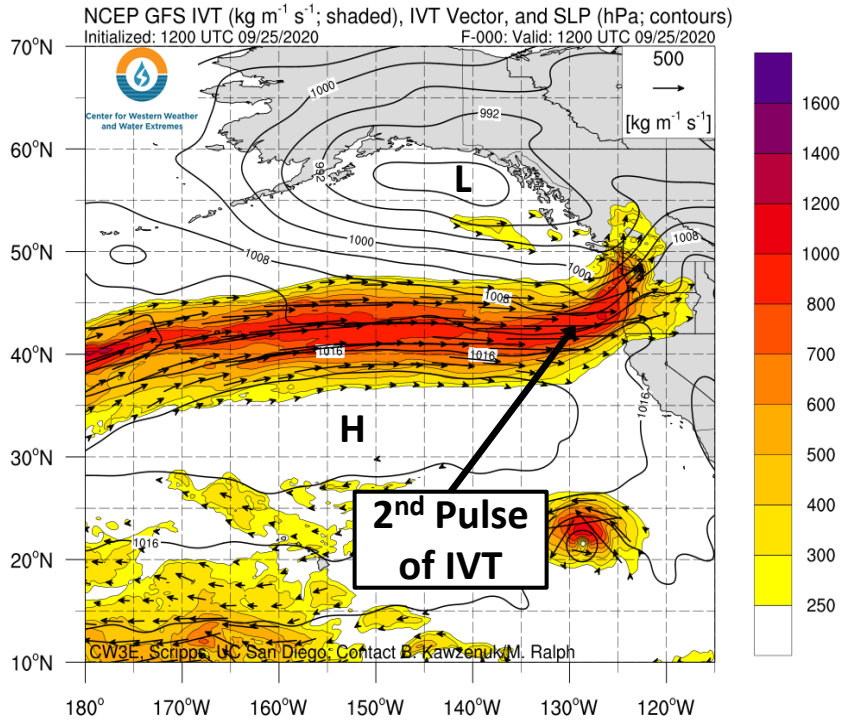
GFS IVT Analyses

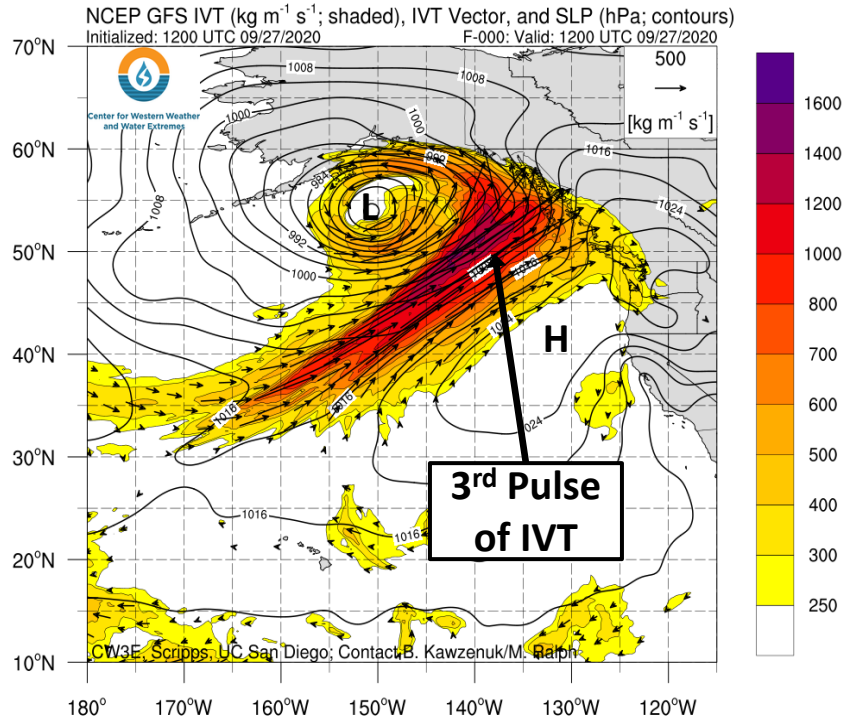
A) Valid: 1200 UTC 23 Sep



B) Valid: 1200 UTC 25 Sep



C) Valid: 1200 UTC 27 Sep



- A family of ARs formed over the North Pacific Ocean and made landfall over western North America between 23 and 27 Sep
- The first pulse of IVT was associated with a large decaying surface cyclone in the Gulf of Alaska (Figure A)
- The second pulse of IVT developed on the poleward side of an elongated region of surface high pressure and propagated eastward with a series of frontal waves (Figure B)
- The third pulse of IVT developed in the warm sector of a rapidly deepening surface cyclone, but primarily impacted southeastern Alaska and British Columbia (Figure C)

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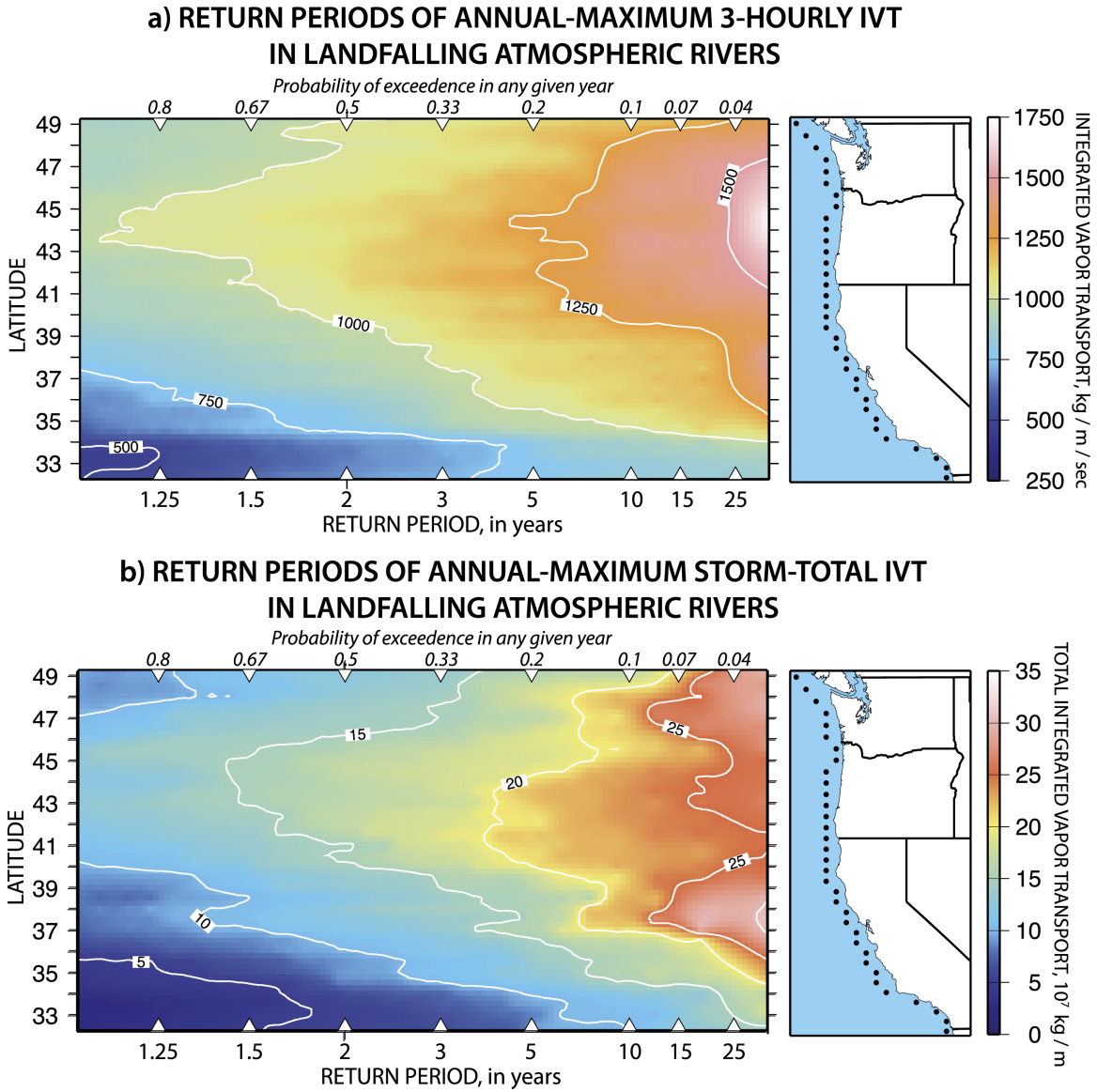
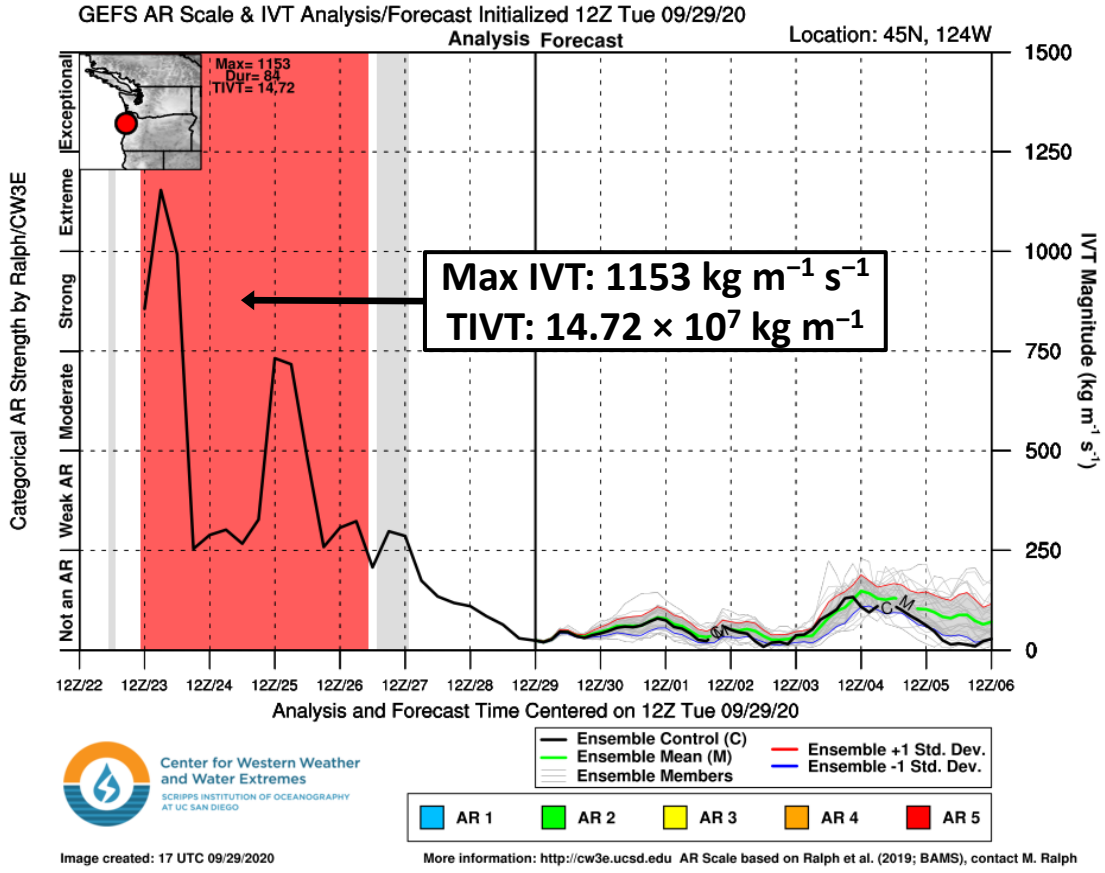


Source: Figure 7 from Dettinger et al. (2018), https://doi.org/10.1175/JHM-D-17-0247.1



- **The highest maximum IVT and storm-total IVT (TIVT during a period of continuous AR conditions) occurred at 45°N, 124°W**
- **Based on a study by Dettinger et al. (2018), the expected return periods for these values of IVT and storm-total IVT would be approximately 2–2.5 years and 1.25–1.5 years, respectively**

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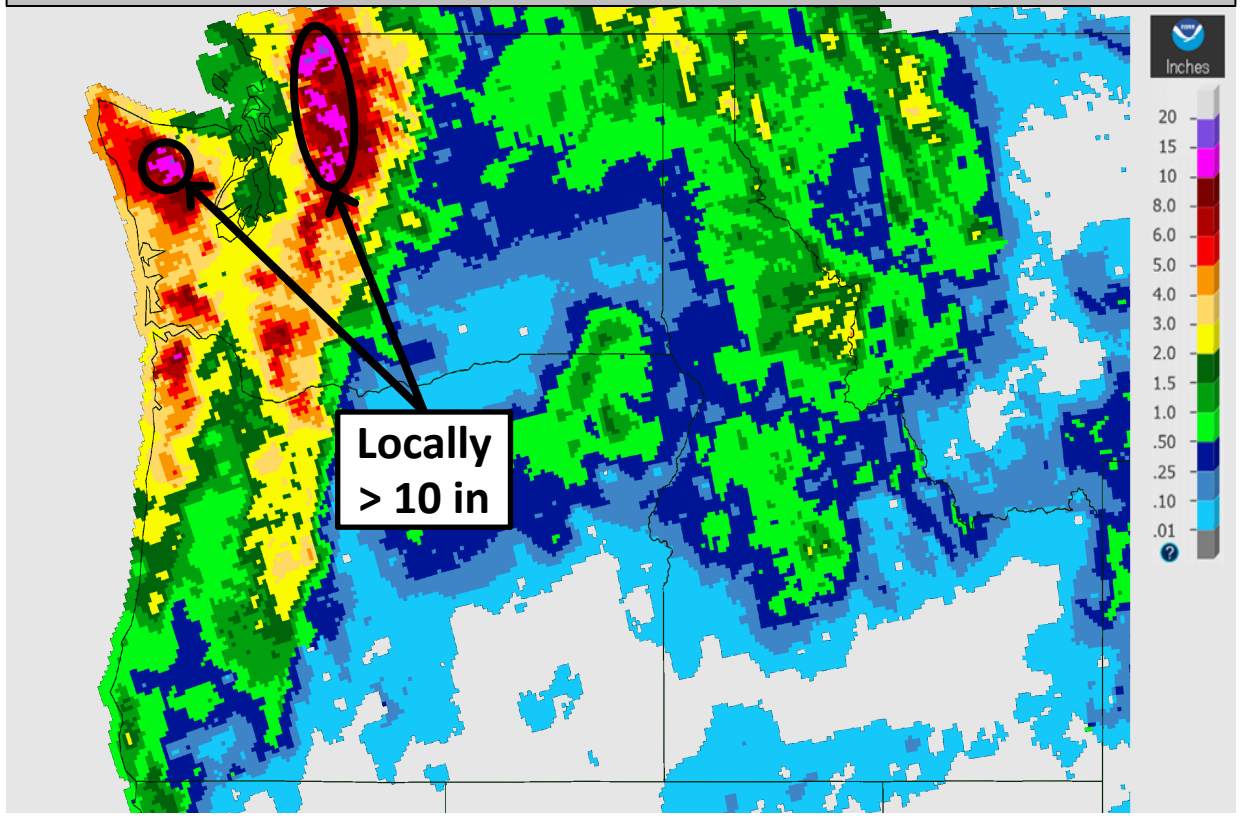
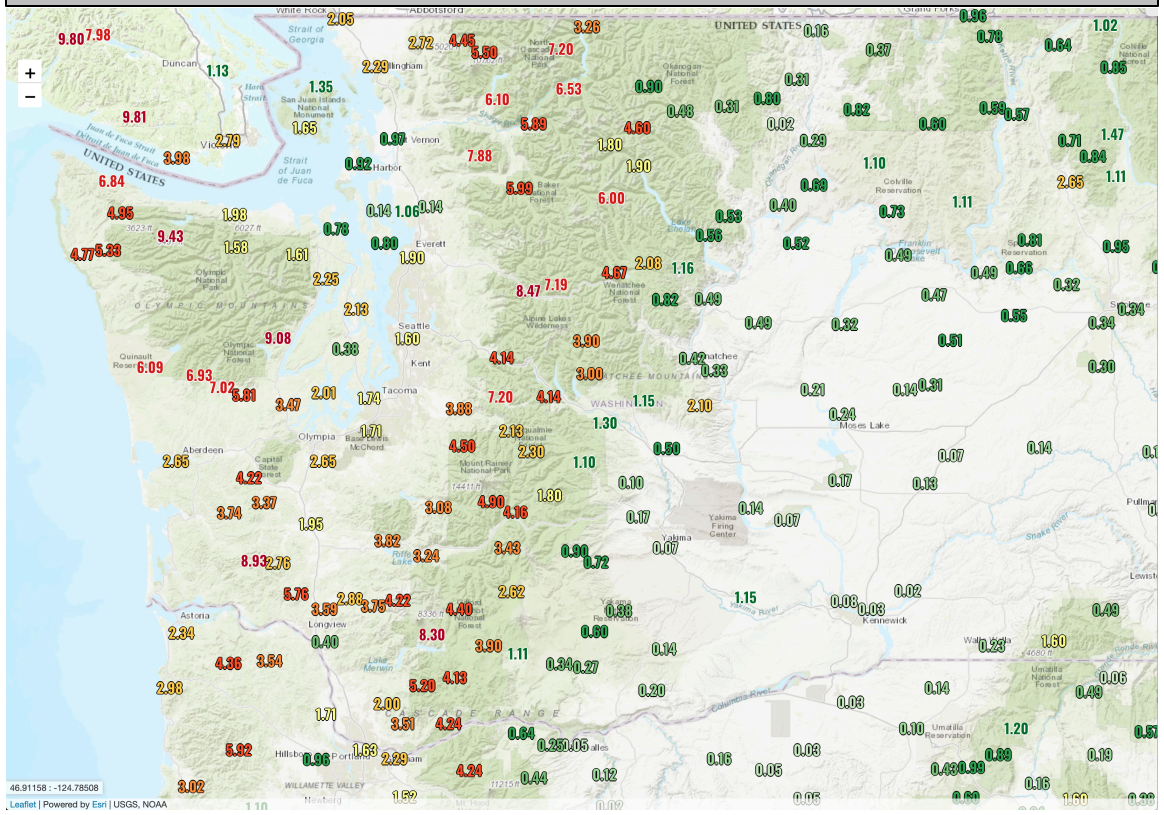
NWS 7-day Stage IV Precipitation: Valid 1200 UTC 28 Sep



Source: NOAA/NWS Advanced Hydrologic Prediction Service, https://water.weather.gov/ahps/

7-day Observed (Raw) Precipitation: Valid 1200 UTC 28 Sep



Source: NOAA/NWS Western Region Headquarters, https://www.wrh.noaa.gov/

- **Total estimated precipitation over the 7-day period ending 1200 UTC (5 AM PDT) 28 Sep exceeded 2 inches over much of western Washington and northwestern Oregon, with the highest amounts (5–10 inches; locally > 10 inches) in the Olympic Mountains and North Cascades**
- **Generally lighter amounts (0.50–2 inches; locally > 2 inches) were observed across elevated portions of the interior northwestern US**

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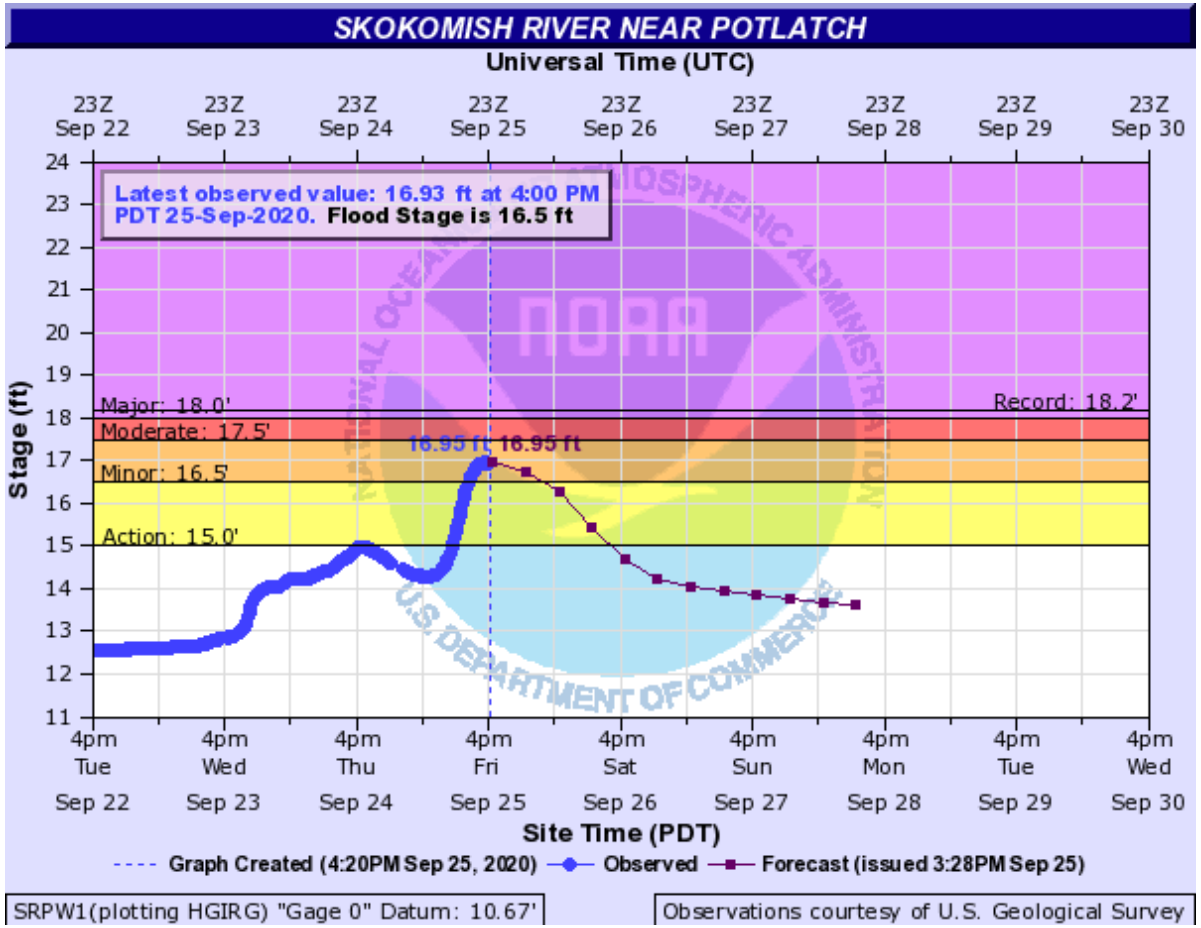
Station	3-day Total Precip (23–25 Sep)	Normal September Precip
Bellingham International Airport	1.61”	1.78”
Seattle–Tacoma International Airport	1.91”	1.50”
Hoquiam Bowerman Airport	2.19”	2.28”
Olympia Airport	2.27”	1.71”
Quillayute Airport	4.41”	3.82”

Source: NWS Seattle, WA, https://www.weather.gov/sew/



Source: NOAA/NWS Advanced Hydrologic Prediction Service, https://water.weather.gov/ahps/

- **Several locations in western Washington received more rainfall during a 3-day period (23–25 Sep) than the normal total monthly rainfall**
- **Seattle–Tacoma International Airport set new daily precipitation records on 23 Sep (1.08”) and 25 Sep (0.75”)**
- **Although flooding was not a major concern with this event given the dry antecedent soil conditions, the Skokomish River (near Potlatch, WA) reached minor flood stage (Max = 16.95’, Minor flood stage = 16.5’) during the afternoon of 25 Sep**