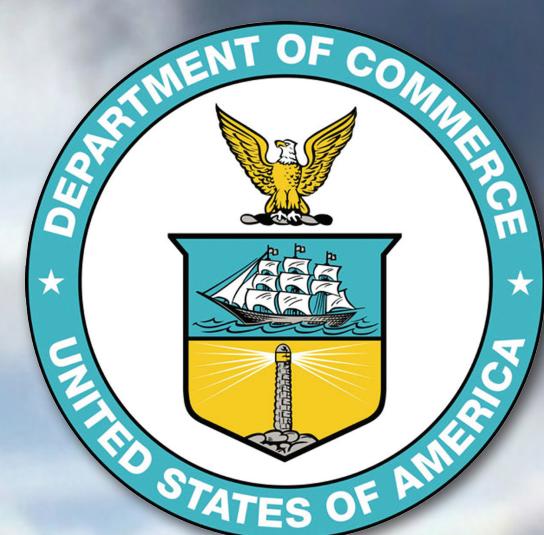
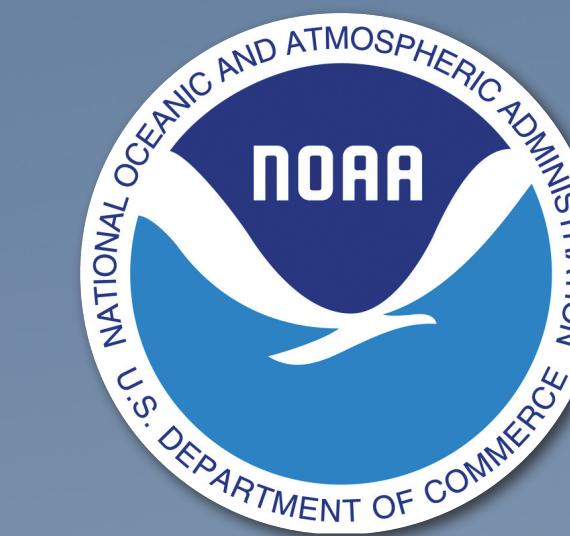


# On the Application of Climate Indices for Assessing Variability and Trends in Extreme Rainfall across Coastal Watersheds in the Pacific Northwest



David H. Levinson, NOAA National Climatic Data Center • Asheville, NC

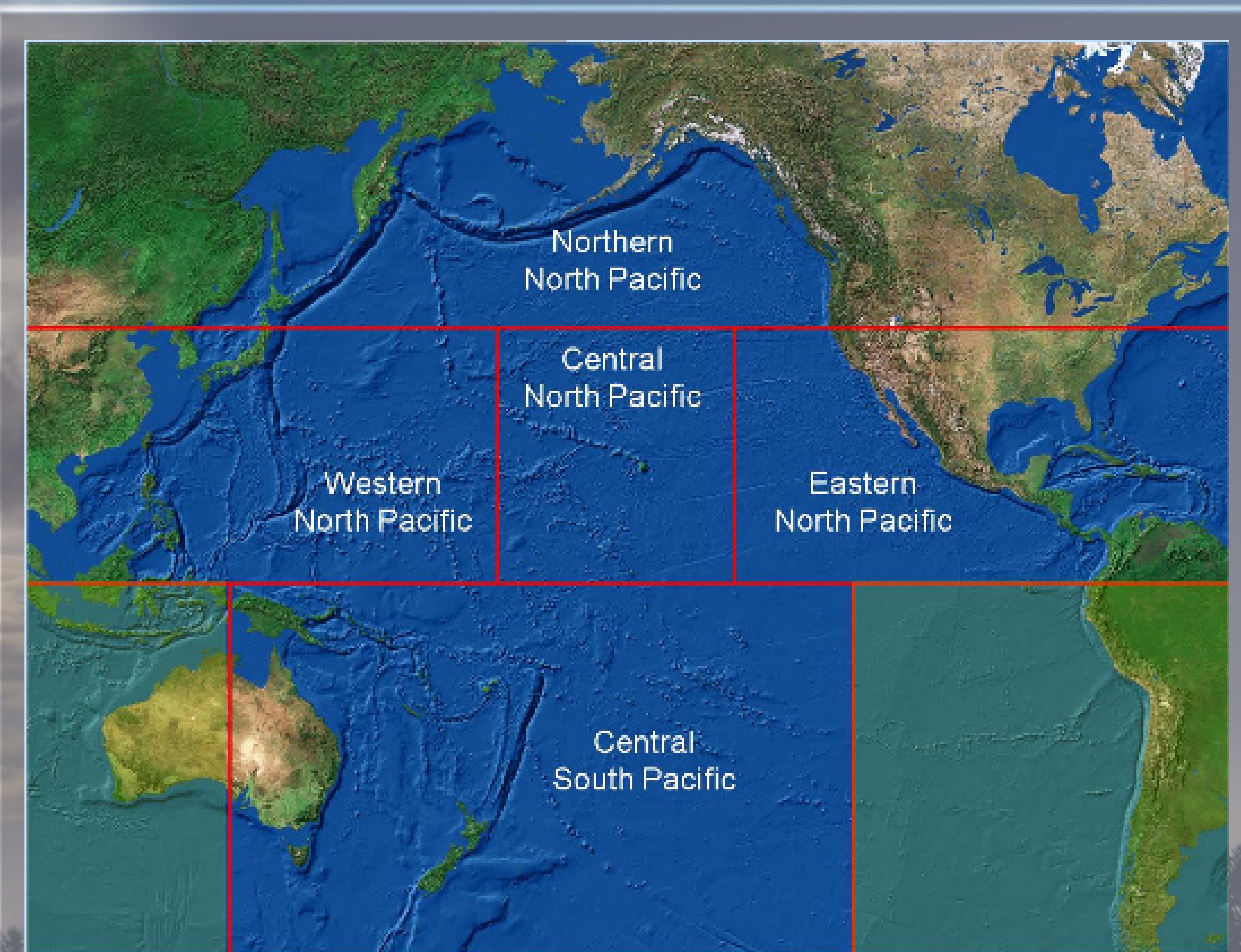
Michael C. Kruk, STG Inc. • Asheville, NC



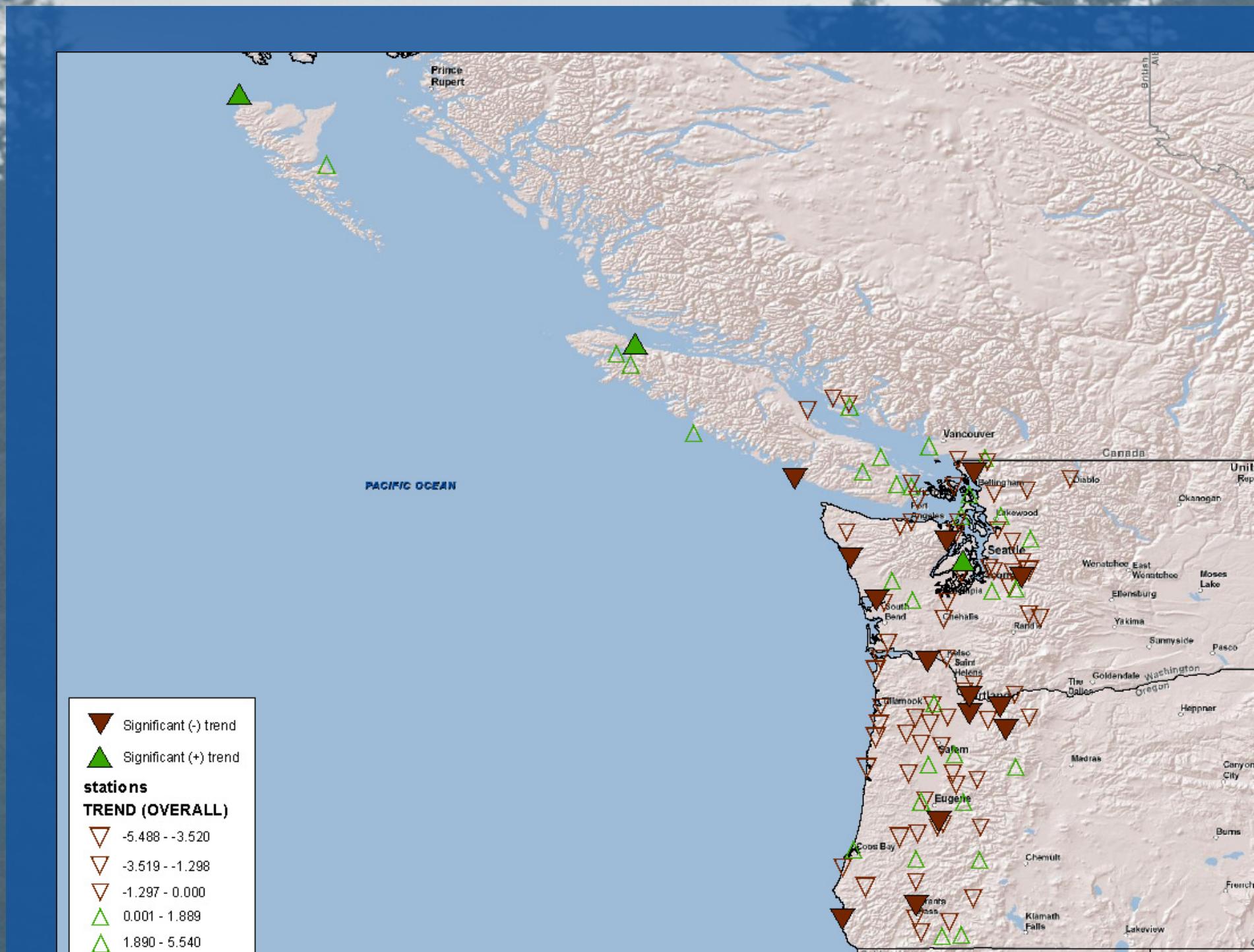
## PACIFIC STORMS CLIMATOLOGY PROJECT (PSCP):

- Formed in 2006 as a part of NOAA's Pacific Region Integrated Data Enterprise (PRIDE) Program
- Intended to improve scientific understanding of patterns and trends of storm frequency and intensity - "storminess" - and related impacts of extreme events

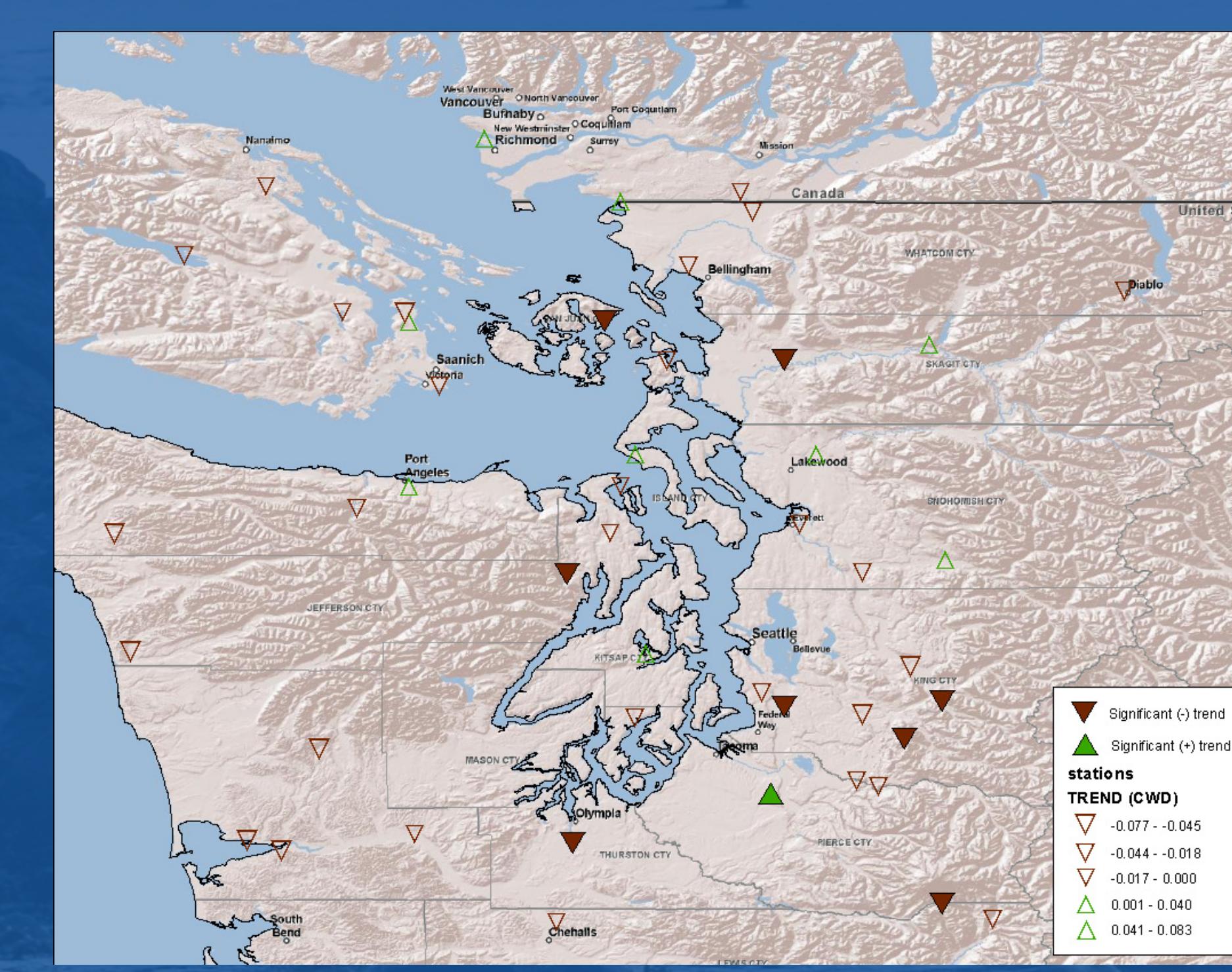
- PSCP is exploring how the climate-related processes that govern extreme storm events are expressed within/between three thematic areas: Heavy Rains, Strong Winds, and High Seas.
- PSCP is focusing on developing analyses of historical climate records collected throughout the Pacific region
- Integration of these climatological analyses with near-real time observations is essential for understanding the longer-term climatological perspective



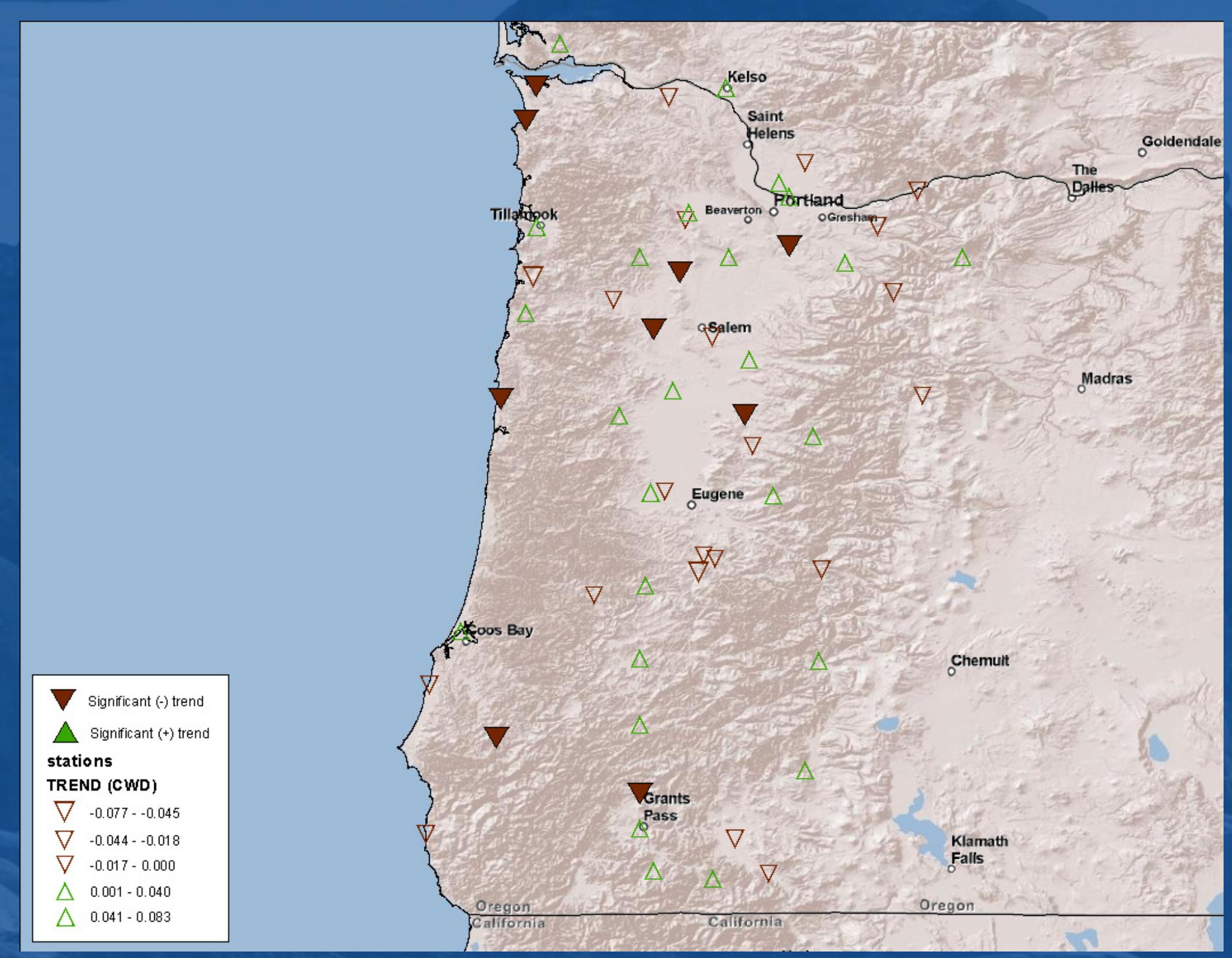
- Initial efforts have focused on improved understanding of trends in extreme rainfall for coastal areas of Hawaii, Alaska, and the Pacific Northwest
- GHCN (Global Historical Climatology Network)- Daily database provides historical daily temperature, precipitation, and snow records over global land areas
- GHCN-Daily includes the following meteorological elements:
  - Daily maximum temperature
  - Daily minimum temperature
  - Temperature at the time of observation
  - Precipitation
  - Snowfall
  - Snow depth



Regression based trends in annual precipitation over the period 1950-2008 at coastal stations across the Pacific Northwest. Solid triangles denote trends at or above the 95% confidence level.



Regression based trends in annual number of Consecutive Wet Days (CWD) over the period 1950-2008 for coastal stations across Washington. Solid triangles denote trends at or above the 95% confidence level.



Regression based trends in annual number of Consecutive Wet Days (CWD) over the period 1950-2008 for coastal stations across Oregon. Solid triangles denote trends at or above the 95 % confidence level.

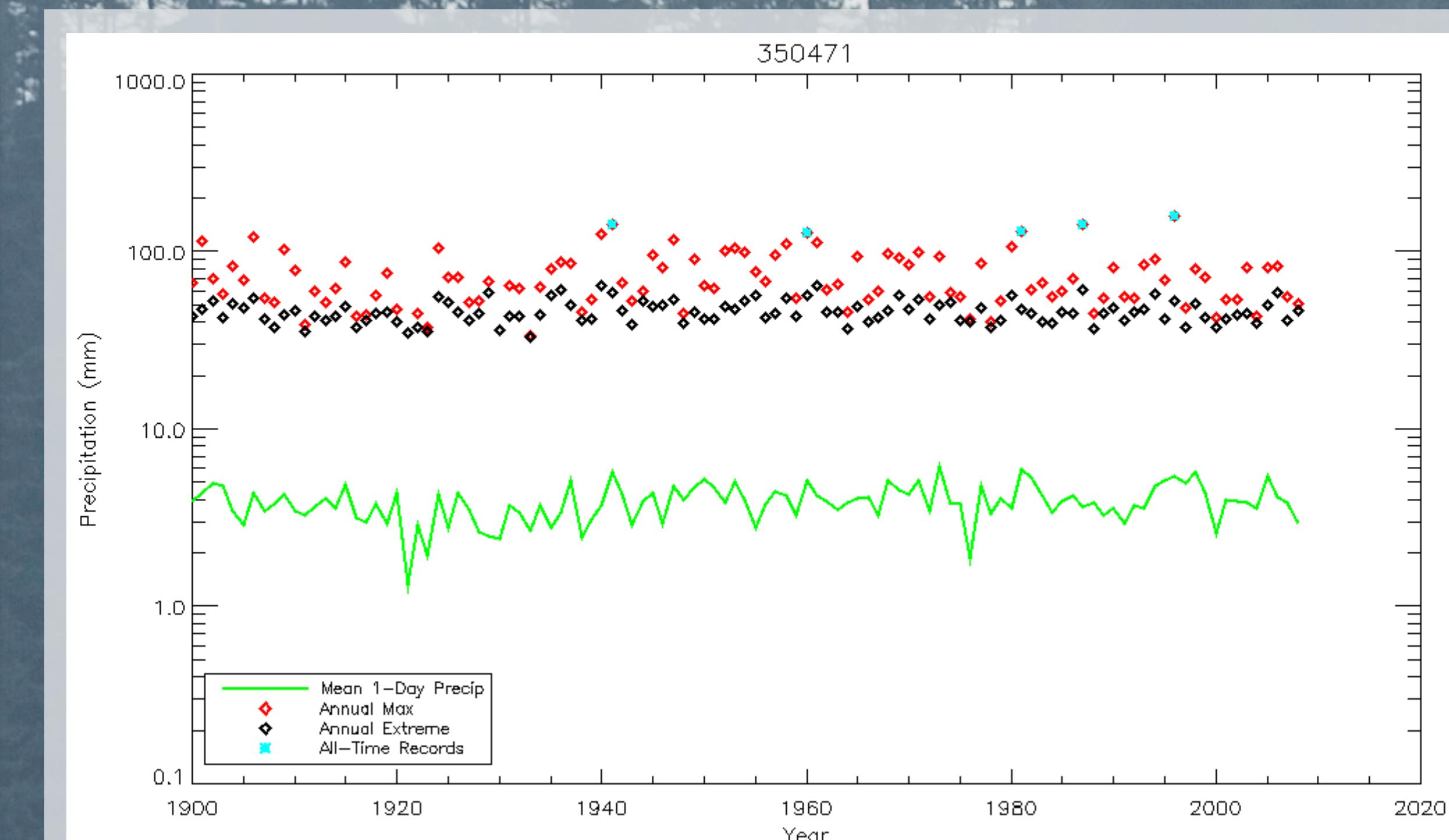
## HEAVY RAINS THEME DERIVED DATA PRODUCTS:

- Product Type 1 – Period or Record Time Series
- Product Type 2 – POR Cumulative Distribution Function
- Product Type 3 – Frequency Counts
- Product Type 4 – Exceedance Probabilities
- Product Type 5 – Long-term Trends and Epochal Change

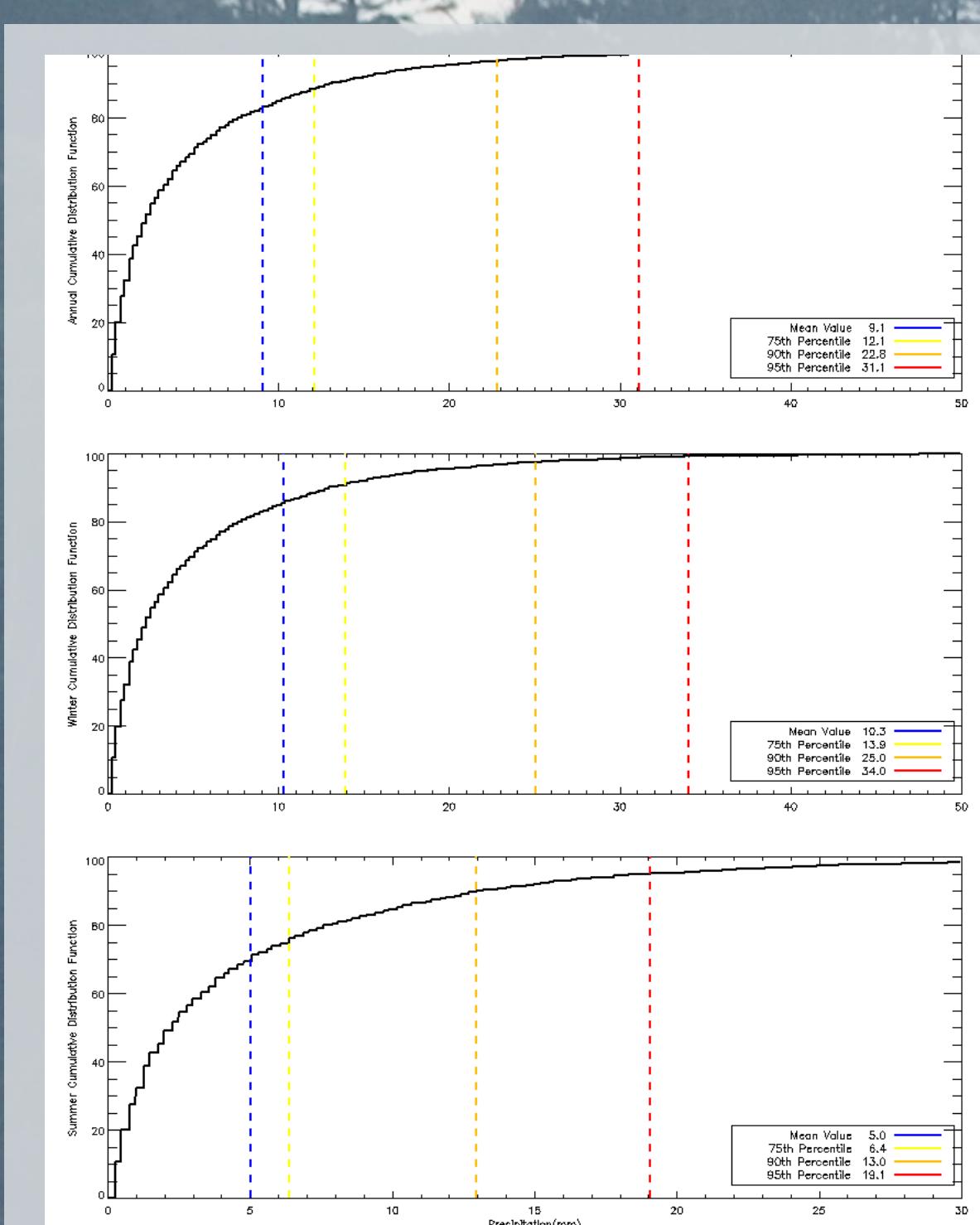
## STANDARDIZED PRODUCTS FOR EXTREMES CLIMATOLOGIES:

- Long-term records allow analysis of both climate variability and trends over inter-annual and inter-decadal time scales
- Multiple products allows for more complete picture of observed changes relative to variations in climate indices (i.e. PDO) and the influence of global climate change

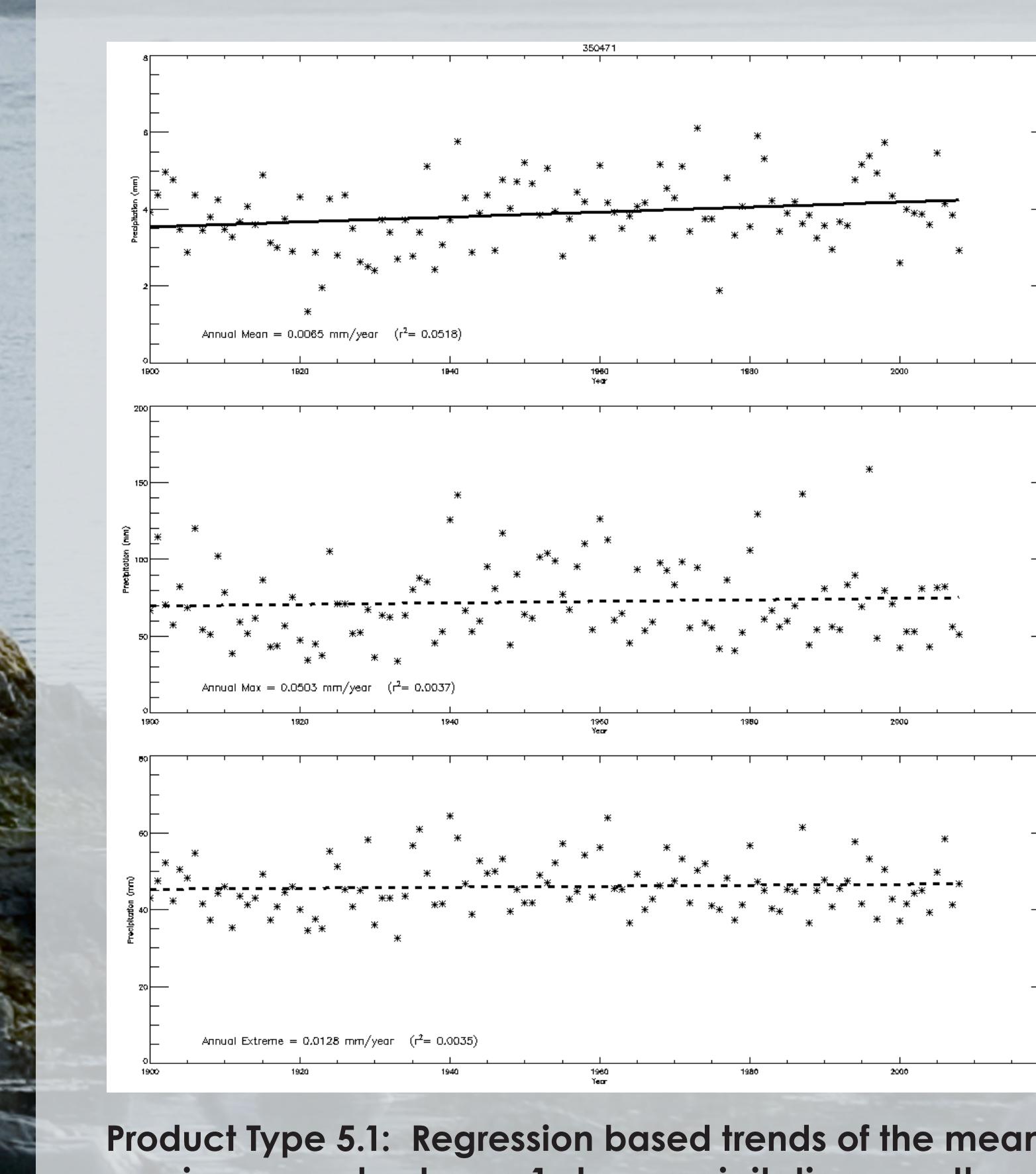
Product type examples shown below are for the southern Oregon coastal station at Bandon (OR\_BANDON\_2\_NNE)



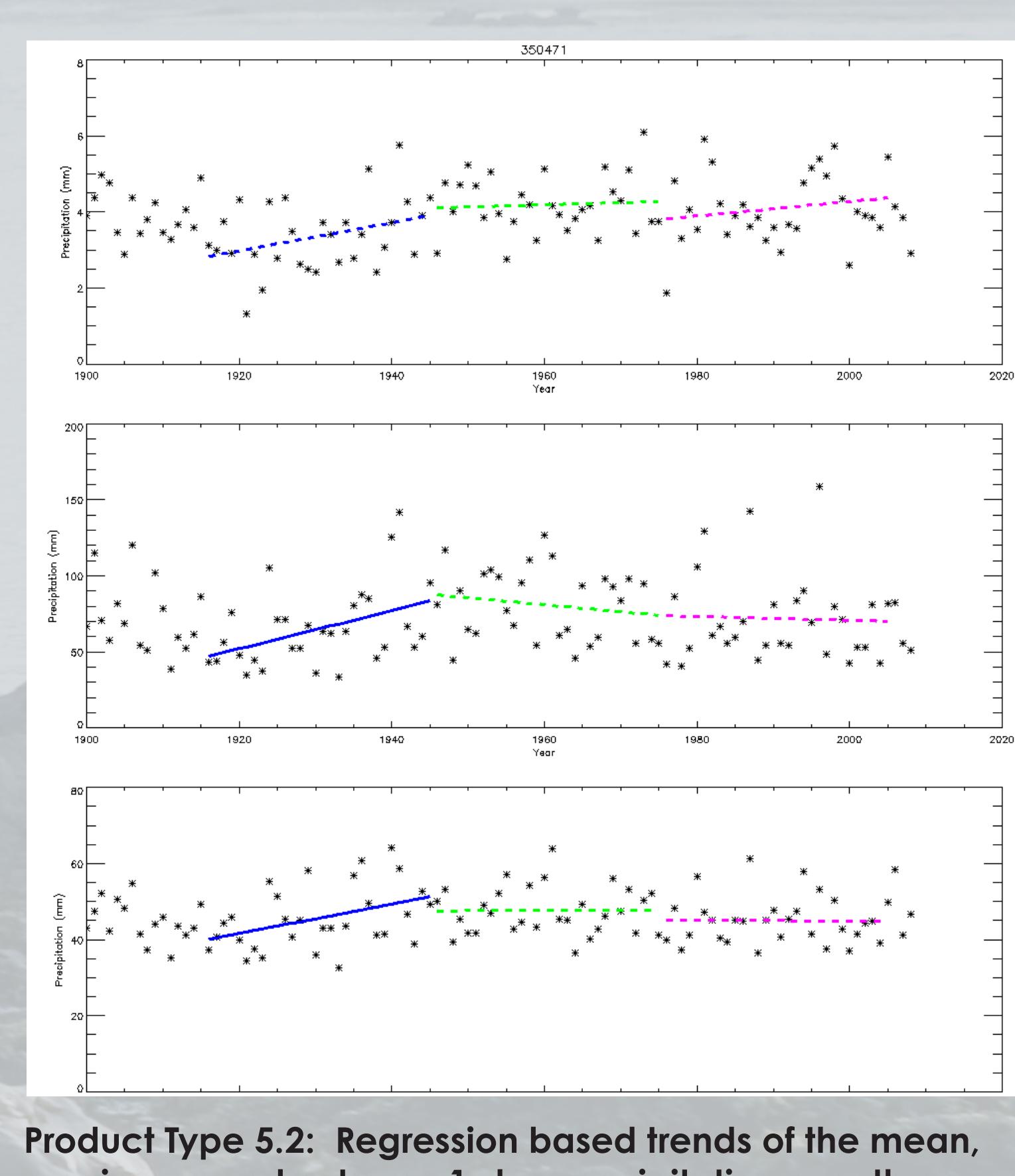
Product Type 1: Time history of 1-day precipitation, with the annual mean, annual maximum, and annual extreme plotted for each year.



Product Type 2: Cumulative Distribution Function (CDF) showing the annual and seasonal 1-day precipitation over the period of record.



Product Type 5.1: Regression based trends of the mean, maximum, and extreme 1-day precipitation over the station period of record.



Product Type 5.2: Regression based trends of the mean, maximum, and extreme 1-day precipitation over three different 30-year epochs.