

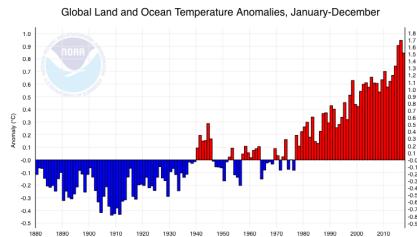


Climate 101 for Alaska

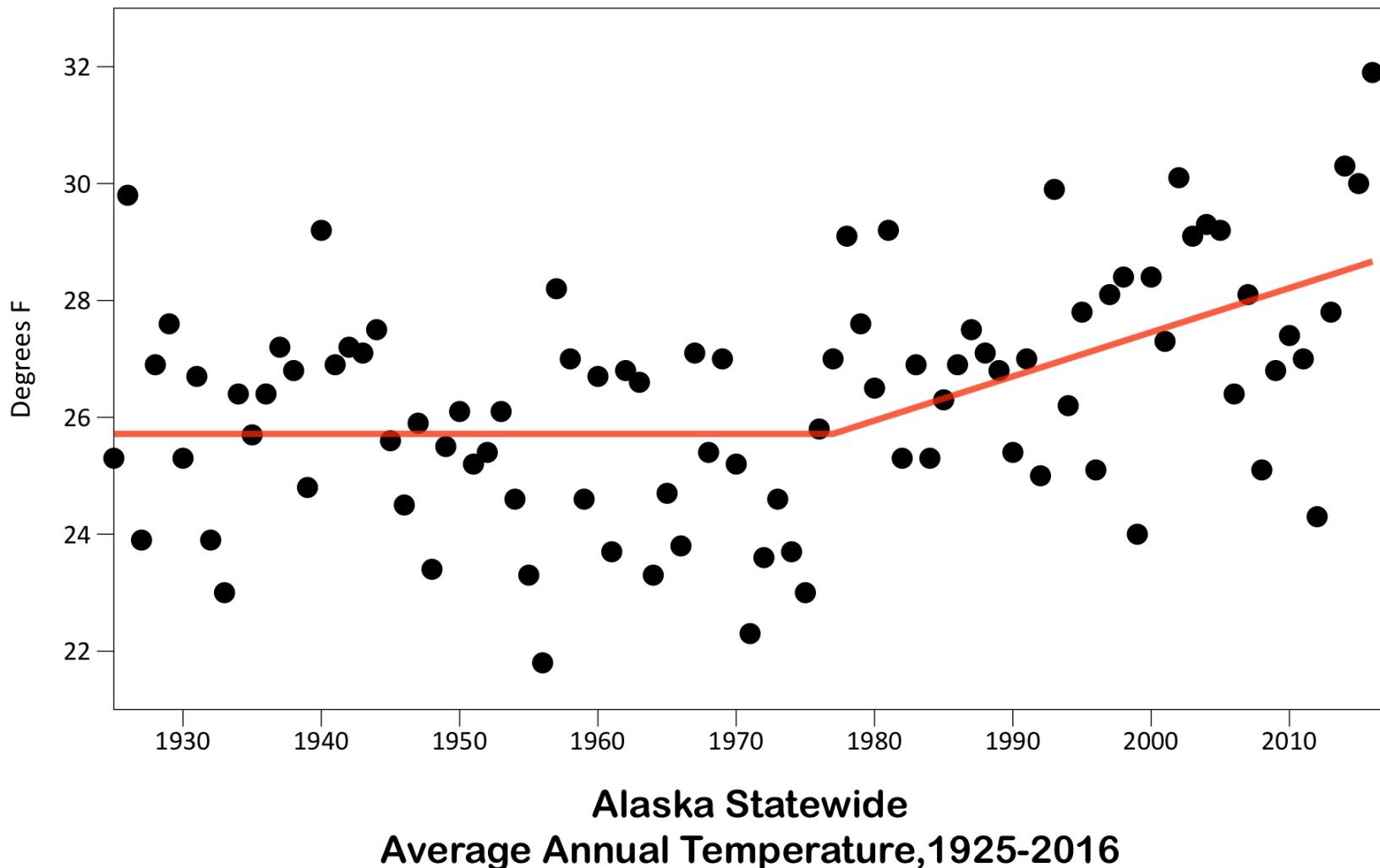
Jeremy Littell, USGS
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Three messages for Alaska

- Weather observations show that Alaska has already (1970–2016) **warmed about two and a half times faster** (+7.3 °F/ century) than the average for the whole Earth (about +3.0 °F / century).
- By the 2080s, annual average temperature in the state is likely to increase by +7° F in SE Alaska and **by +14° F on the North Slope.**
- Precipitation will likely increase, but the increases will not be sufficient to offset temperature increases, resulting in much increased permafrost thaw, shorter snow season, and longer fire seasons.



Alaska temperature is increasing



+0.7°/decade since the mid 1970s, over twice the global average

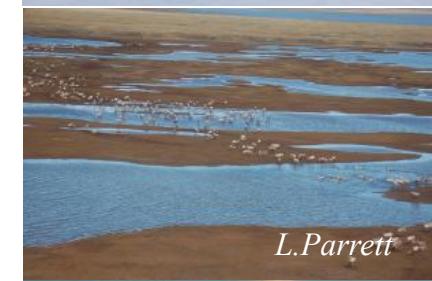
Temperature graph: Rick Thoman, National Weather Service. Data: NOAA NCEI, from surface stations

Other lines of evidence in Alaska

- Glacier area and volume are decreasing
- Sea ice extent is decreasing
- Permafrost is thawing and the seasonal active layer is deeper
- Fire area burned is increasing



T. Paris



L. Parrett



USFWS

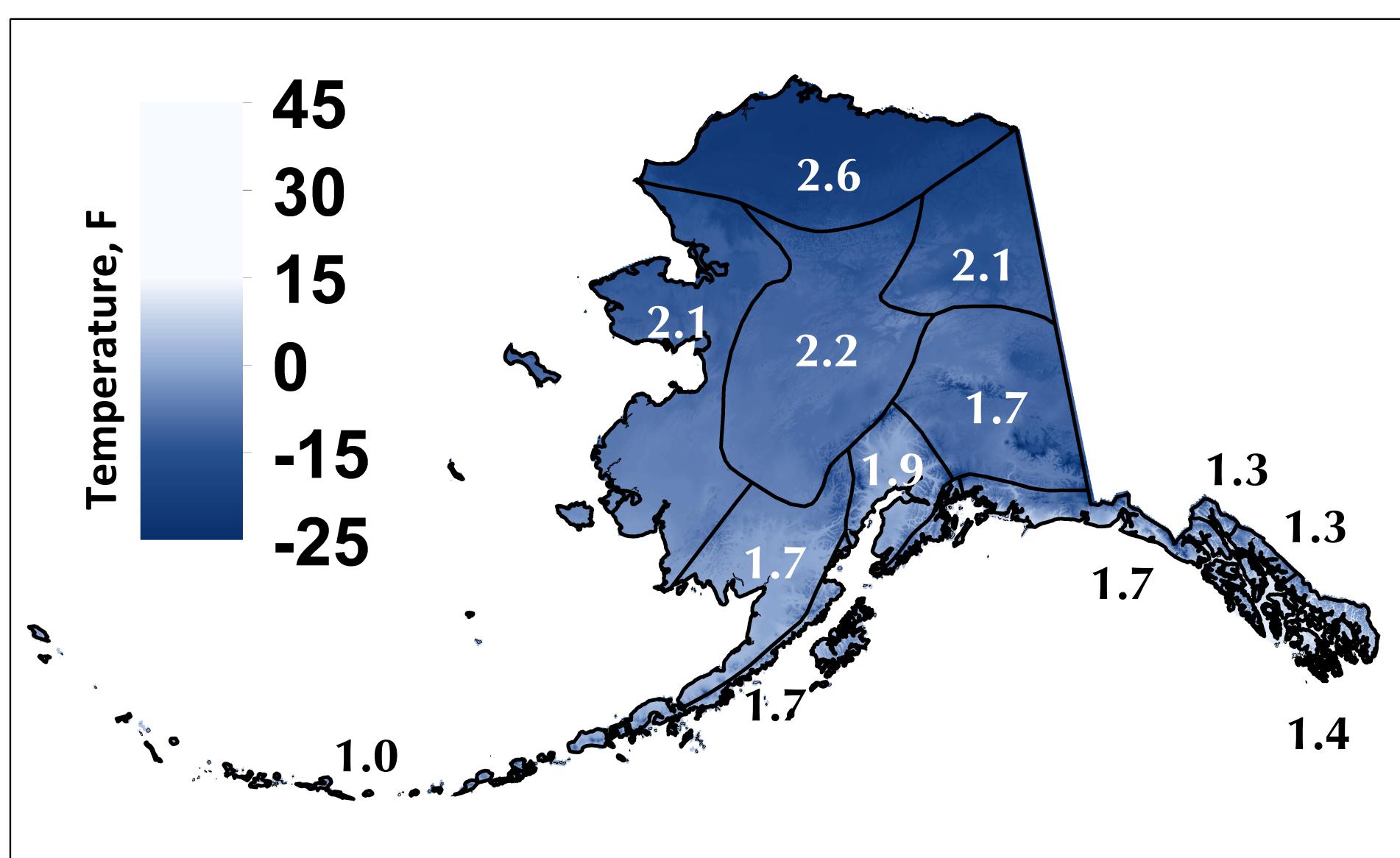


F. Kelley



D. Haggstrom

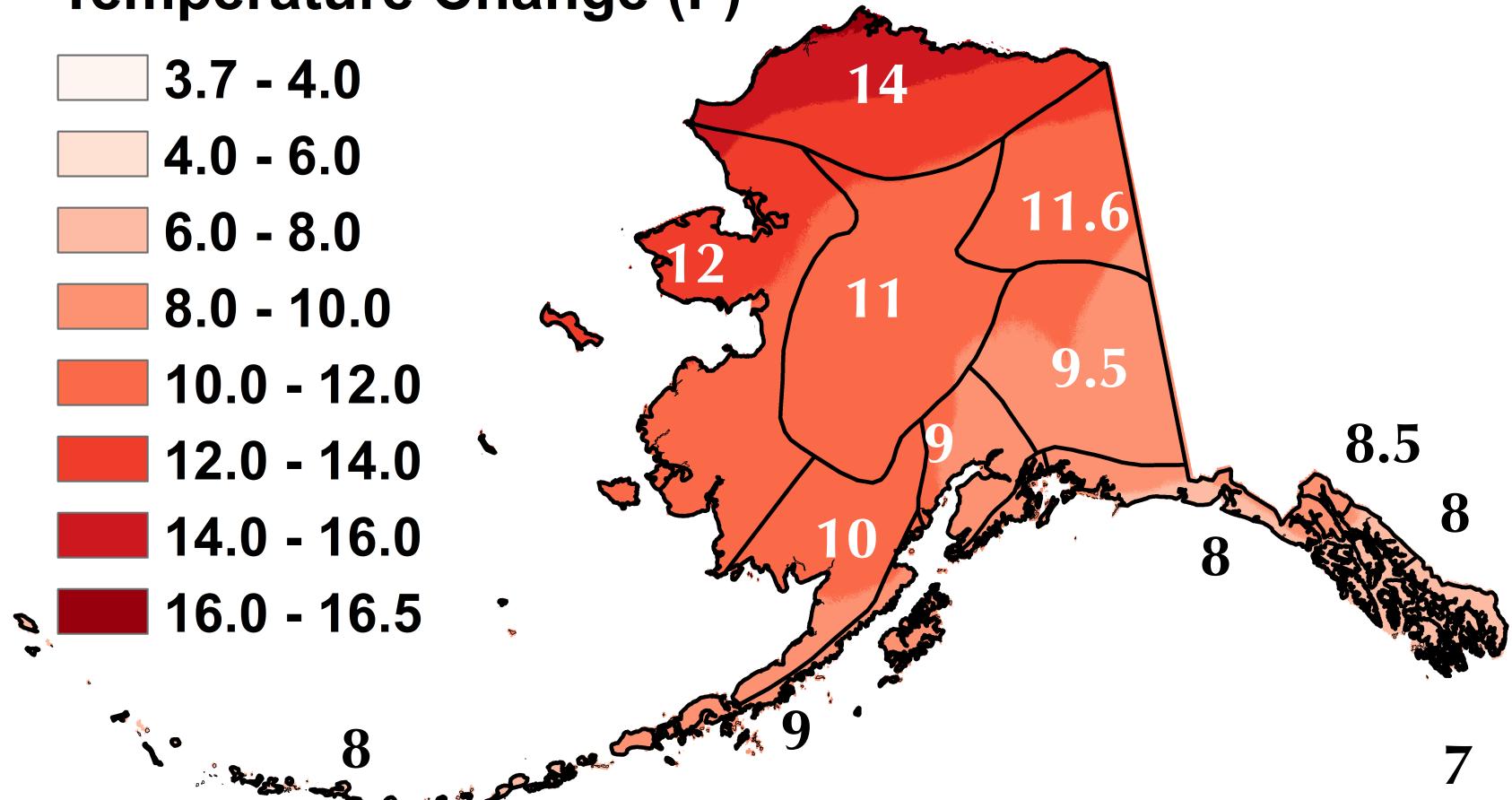
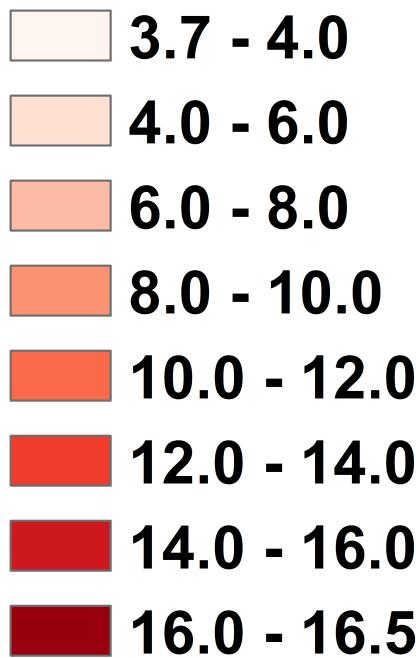
The global and regional historical 20th century temperature record cannot be explained without considering both human drivers (primarily greenhouse gasses) and natural variability. These impacts can therefore be expected to continue.



The rate of change is not the same everywhere – it is faster in the Arctic.

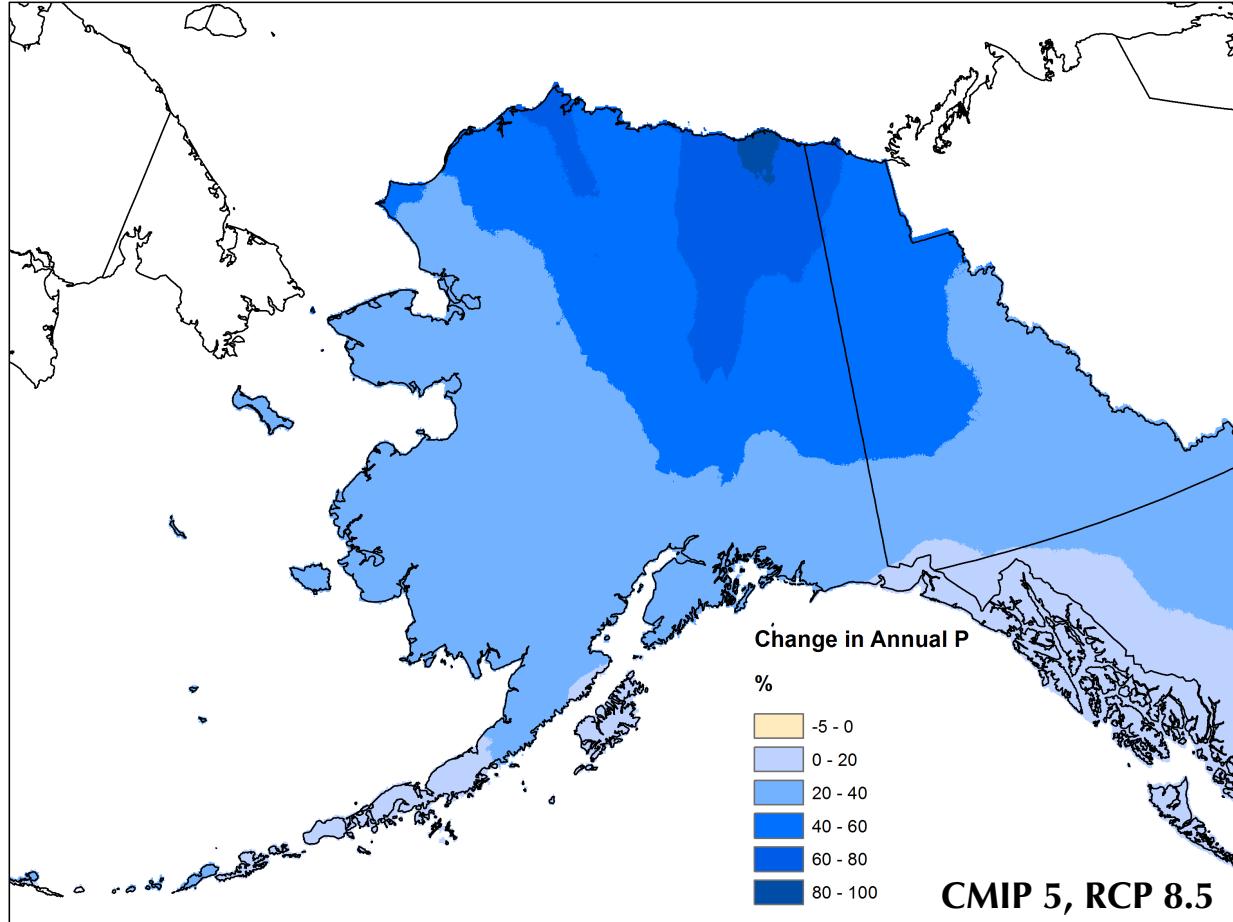
1970-1999 average annual temperature, with state climate division rates of change compared to US average for 1970-2016.

Temperature Change (F)



2070-2099 projected change in annual average temperature compared to 1970-1999 for AK climate divisions. 5 climate model average, higher emissions.

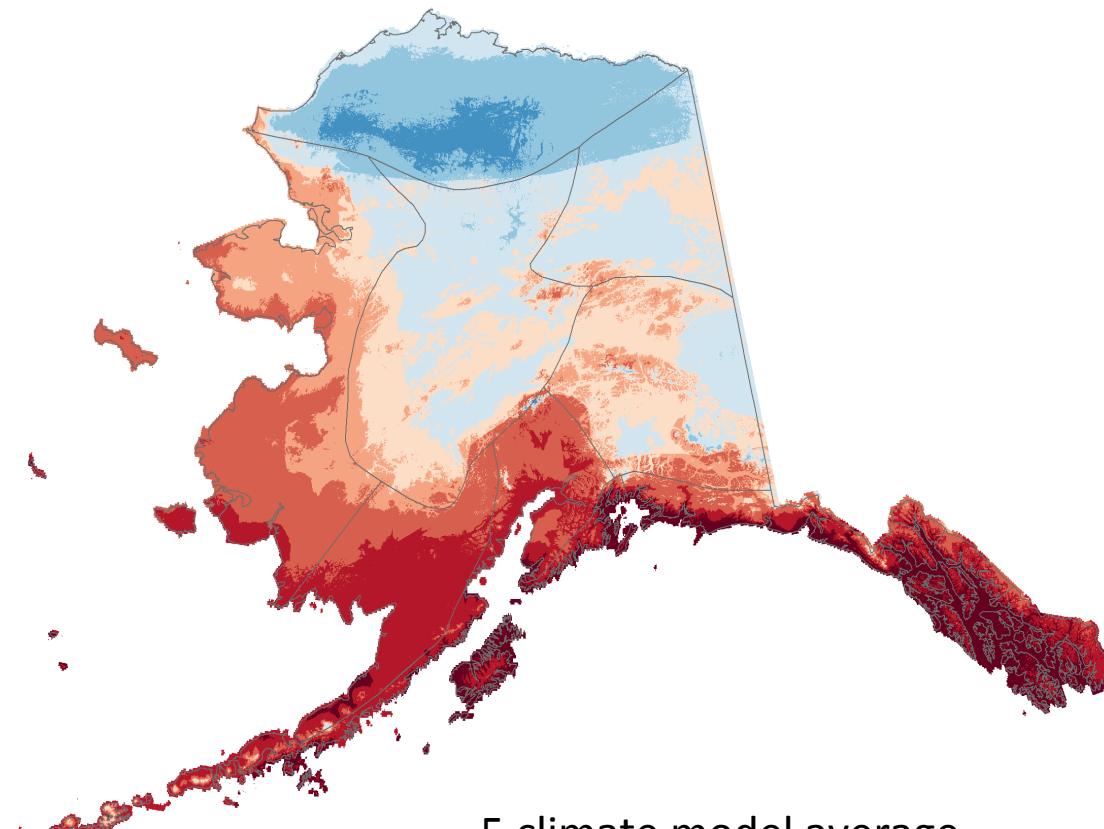
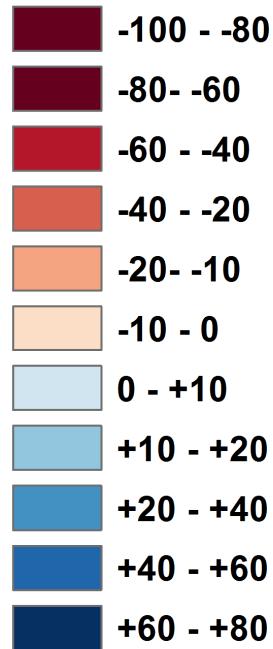
Precipitation changes: 2070-2099



Change in annual total precipitation. Increases are projected in all seasons. Increase in summer is not enough to offset the increased evaporation driven by temperature increases. 5 climate model average, higher emissions.

2070-2099 changes in April 1 Snowpack

PAS (%)



5 climate model average,
higher emissions

Decreases at mid and lower latitudes and, but smaller increases at highest latitudes and elevations.



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