Thoughts on Graduate Student Research
03. Figures & Tables

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Key Features

- Caption
  - Informative description, can include short-forms in the table or figure
- Table
  - Headings then other data below
- Figure
  - Map, plot or graph, photograph or image, or combination thereof
- Be careful and consistent with formatting
  - What format does the target journal use?

Captions

- Location
  - table caption on top
  - figure caption on bottom
- Be insightful
- Do not include results, don't describe the figure
- Cite data and other sources

Tables and Figures from Others

- Be careful with their use
- Is it absolutely necessary to include
- Is it copied from elsewhere or your interpretation
- Usually need copyright to publish
  - Could include in the Introduction chapter as background, if necessary
  - Often need copyright, even if it is your own figure
- Cite in the caption

Table versus Figure

- Do we need to see the specific numbers (data)
  - Or do we want to see a graph
- Can it be represented as a figure
- Can it be merged with a figure
  - e.g., station information on a site map
- Don't repeat in a Table and a Figure

Table Formatting

- Keep it simple
- Do you need to highlight, bold, etc. the headings
- Sometimes add emphasis to certain numbers
  - e.g., statistical values that are significant
    - Explain in the caption
- Keep the table easy to understand

Figure Planning

- Think through how you want to present the information
- Make a sketch
- Prepare a quick draft to see if the information is being conveyed
- How else can the information be presented
- Can the information be summarized
  - Do you need all the details
- What is the point of the figure
- Figures (and Tables) help you write the Results (and later the Discussion)

Figure Formatting

- The Default is for the uncreative
  - EXCEL default graphic is a starting point
  - Make figures more crisp than the default

- Use
  - Black font
  - Same size (for same element , e.g., axis title), appropriate size
  - Tick marks (and black axes)
  - Remove chart titles, those are in the caption
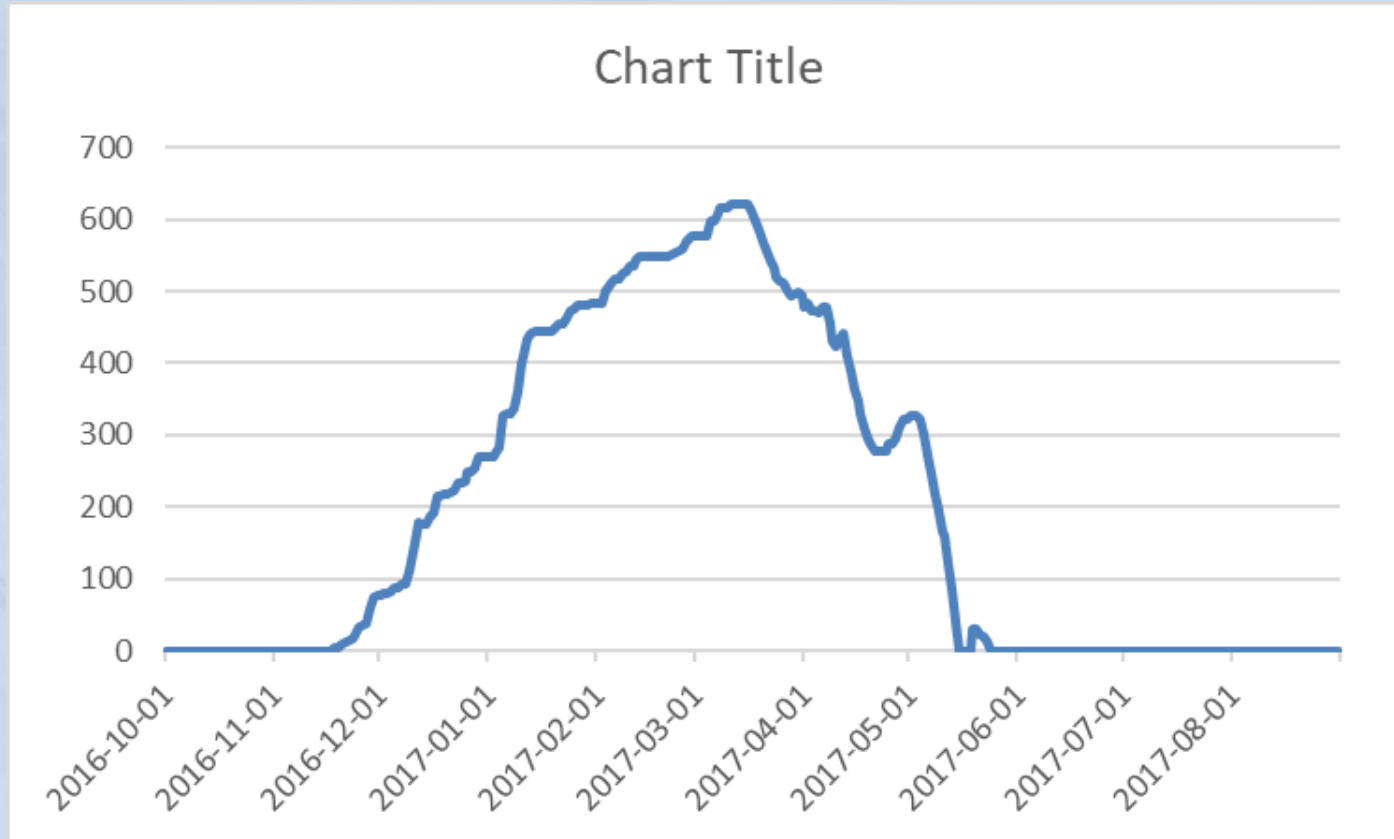 - A legend, where necessary

Color Schemes

- Use informative colors (e.g., cold = blue, hot = red)
- Be careful with color ramps
  - What is more vs what is less
  - What is zero (0)
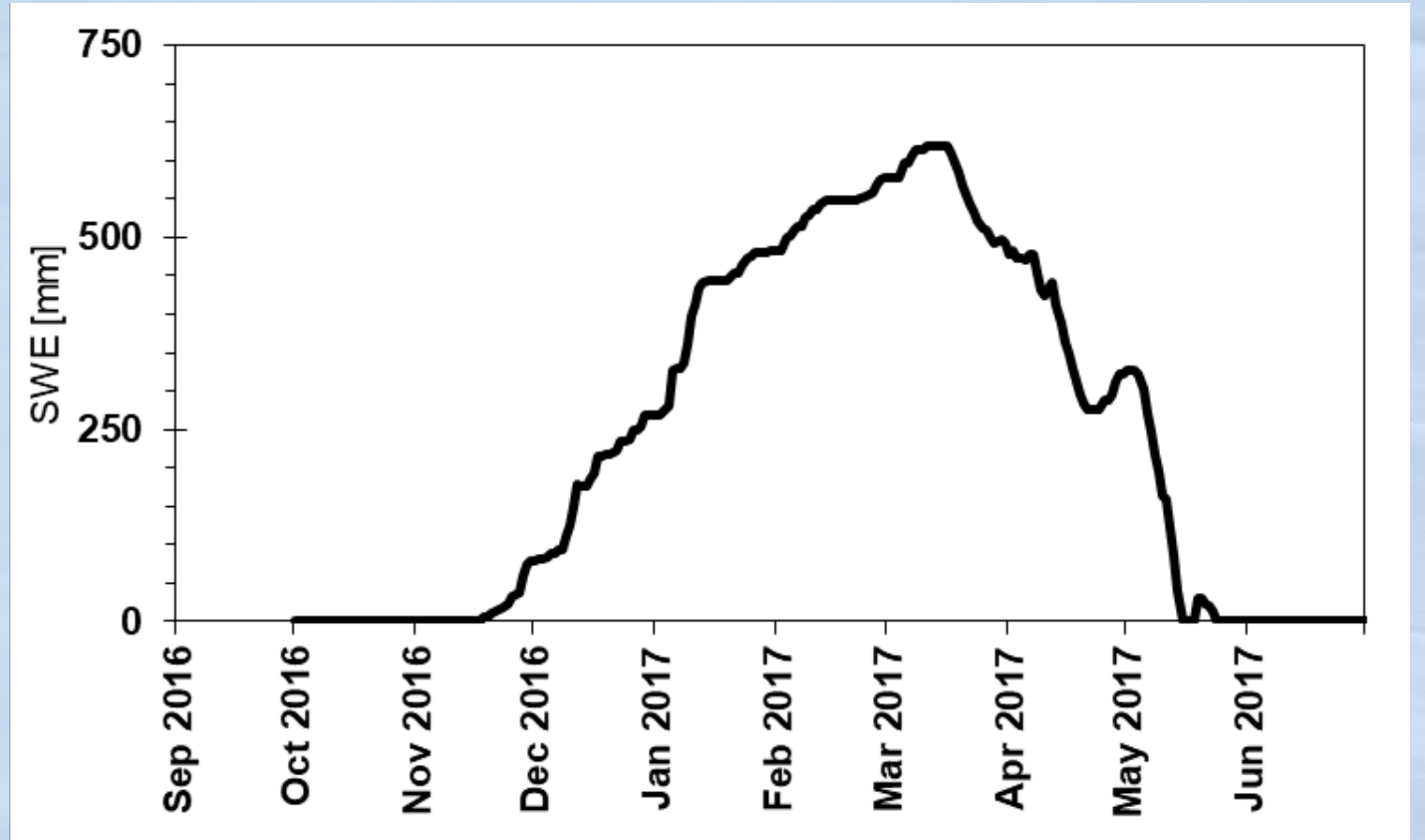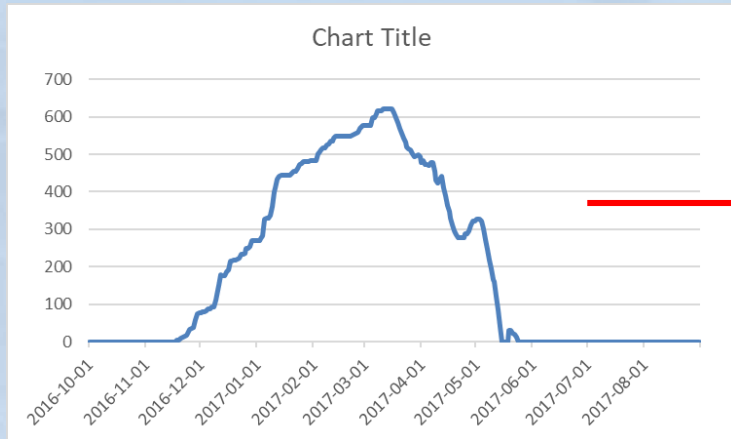   - Should there be a buffer around zero (0)?

A Bad Figure

- So many things wrong with this default figure

A Bad Figure corrected

- Make the figure crisp

Map Example

- Site map with location maps
  - Country and state
    - Not everyone knows where Colorado is
- Add additional information
  - e.g., station elevation (used later)

from Fassnacht et al. (2020; https://doi.org/10.3390/hydrology7030038)

Figure 1. Location of (a) the 13 SNOTEL data collection stations (b) within the Northern Front Range of the state of Colorado (c) in the Western United States. The median niveograph and the daily SWE trend of each station over the period of record is presented in (a), scaled according to the legend. The SNOTEL orange and purple stations refer to those on the western and eastern side of Rocky Mountain National Park, as used by Clow (2010) and Fassnacht et al. (2018).
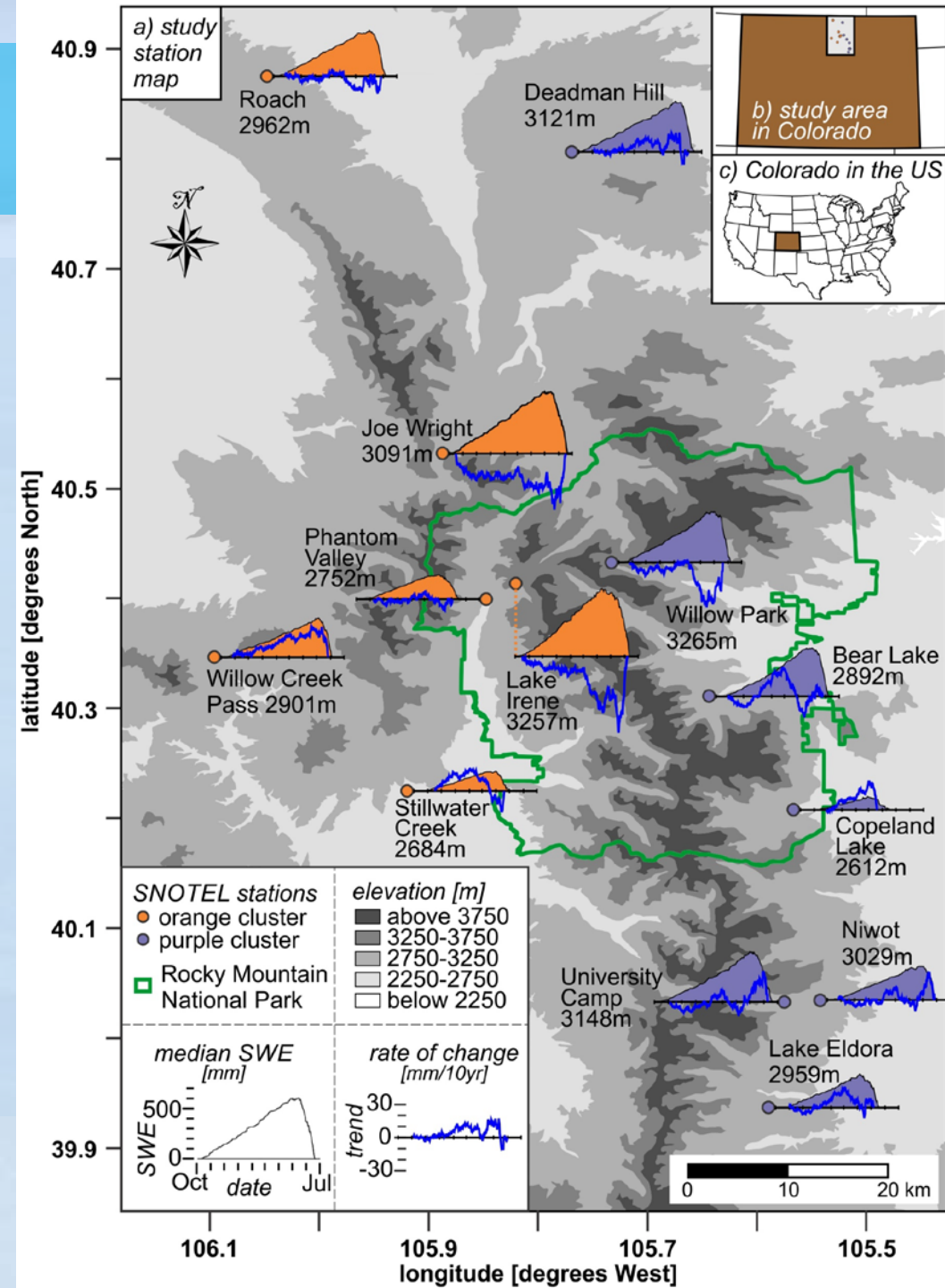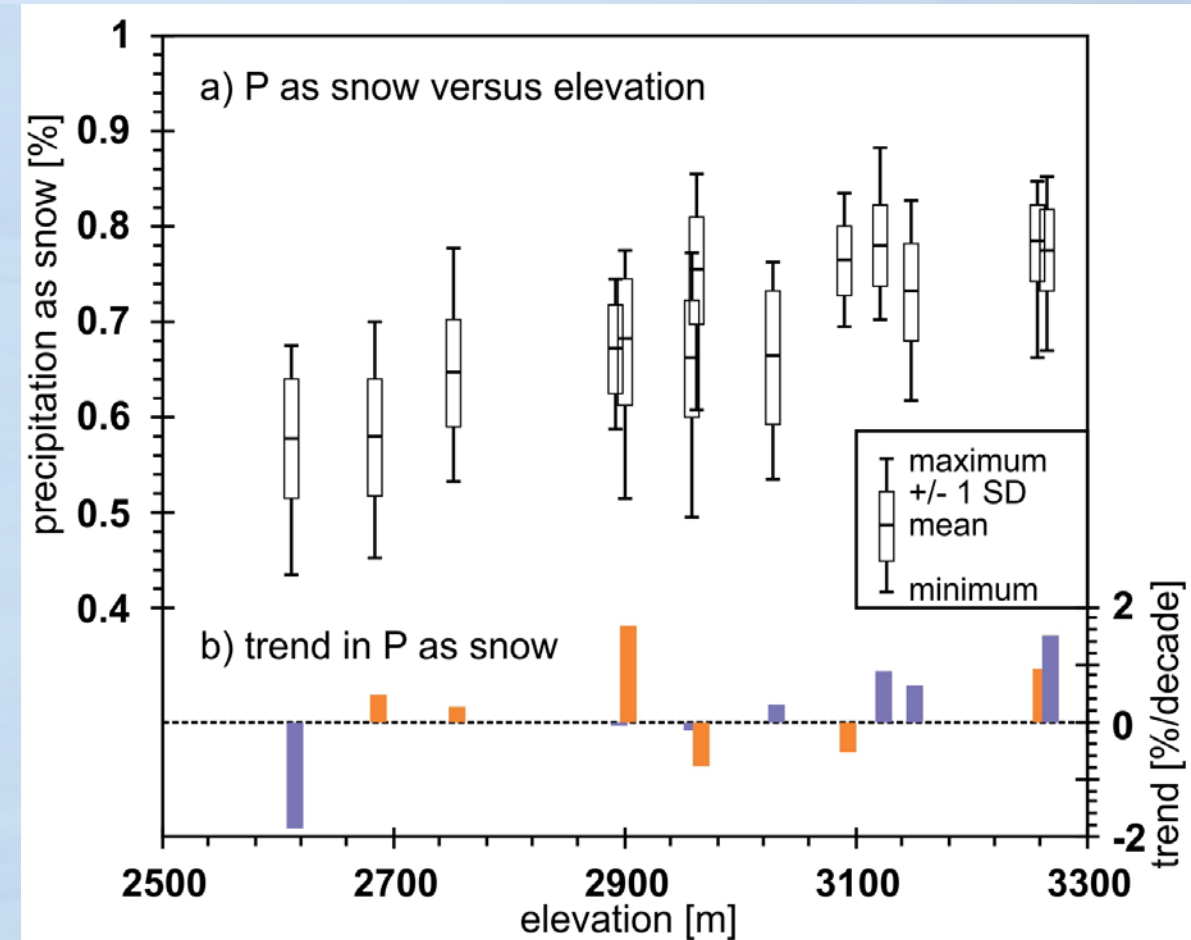
Figure Example

- Stacked 2-part figure
  - Coincident information
    - Amounts and Trends
- Consistent axes
- Colors, as per previous Figure
  - Last slide

from Fassnacht et al. (2020; https://doi.org/10.3390/hydrology7030038)

Figure 3. (a) Variation of precipitation as snow as a function of elevation, and (b) trend in the annual total precipitation as snow. Note that none of the trends are statistically significant.

Stacked Information

- Stacked 4-part figure
  - Time-Time raster
  - Line – bar charts (3)

from Fassnacht et al. (2020; https://doi.org/10.3390/hydrology7030038)
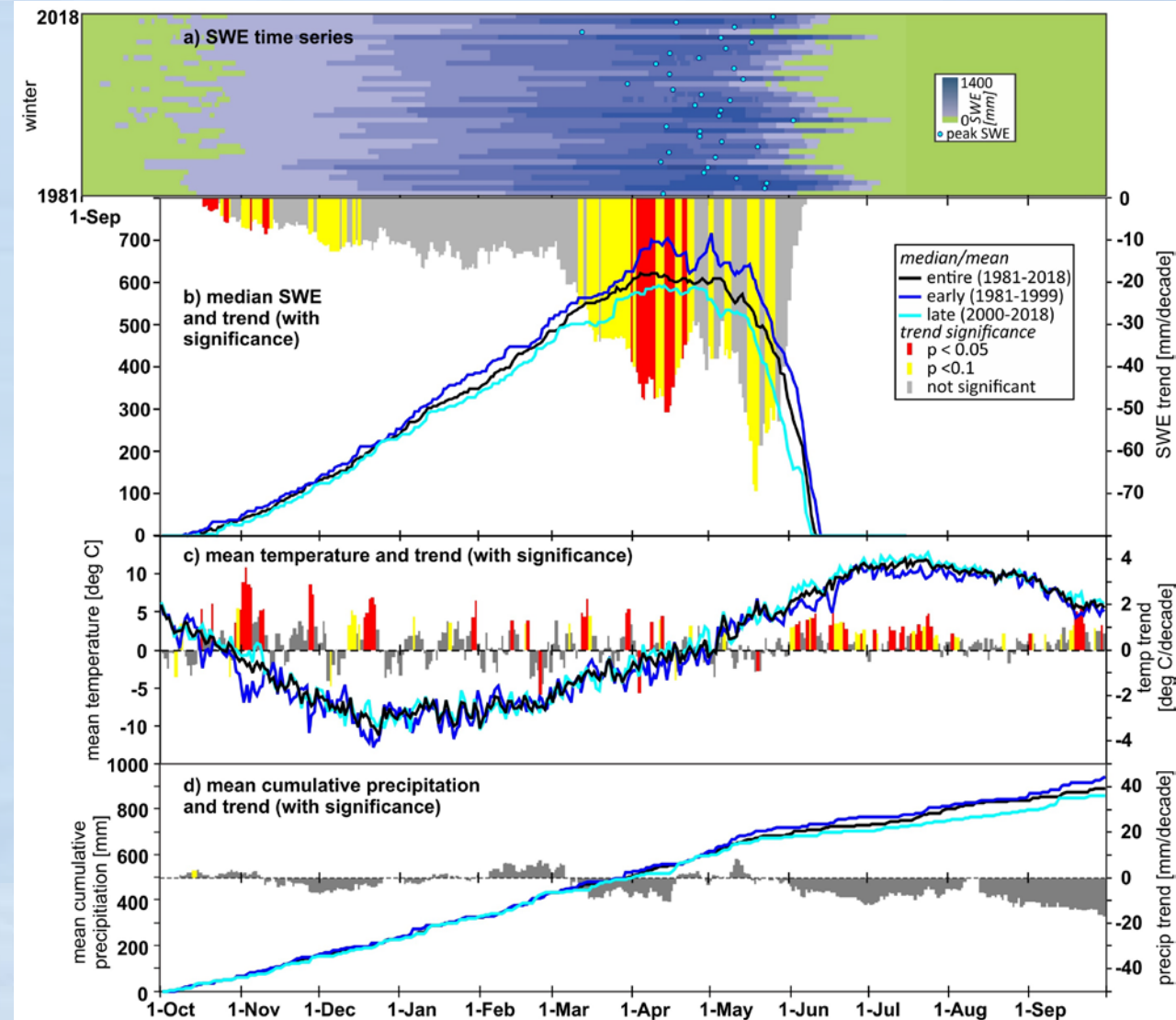
Figure 2. Lake Irene SNOTEL station (a) SWE time series for each year from 1981 to 2018 and the inter-annual autocorrelation (red line), (b) median SWE, (c) mean temperature, and (d) mean cumulative precipitation, all for entire period of record plus first and last half of the period of record. The SWE time series (a) starts in September to illustrate that snow does fall and occasionally accumulates prior to the start of the water year, October 1.
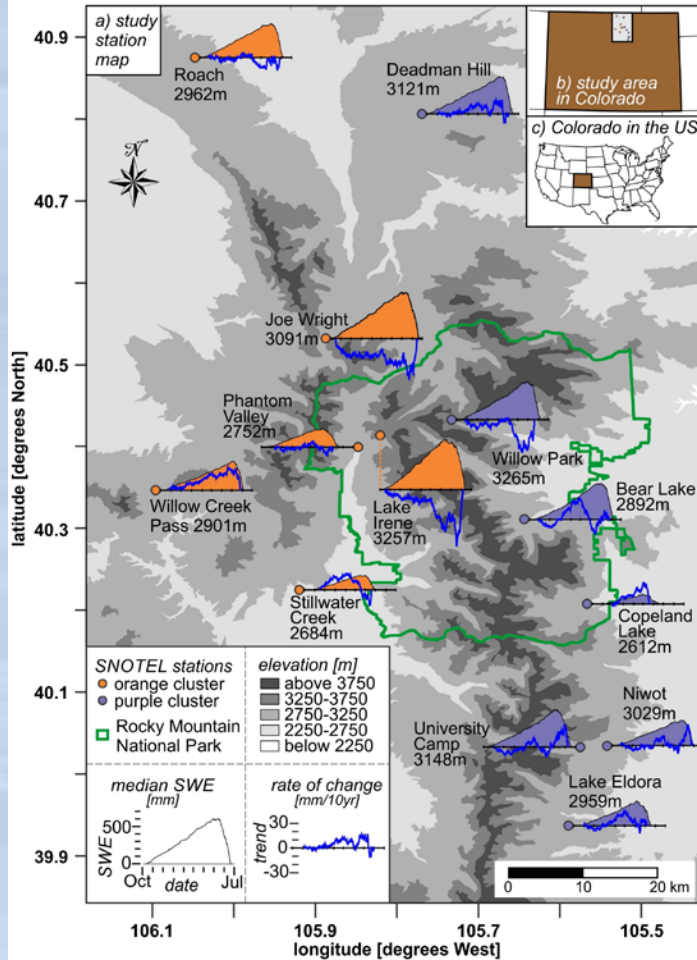
Spot the Inconsistencies from Figure 3
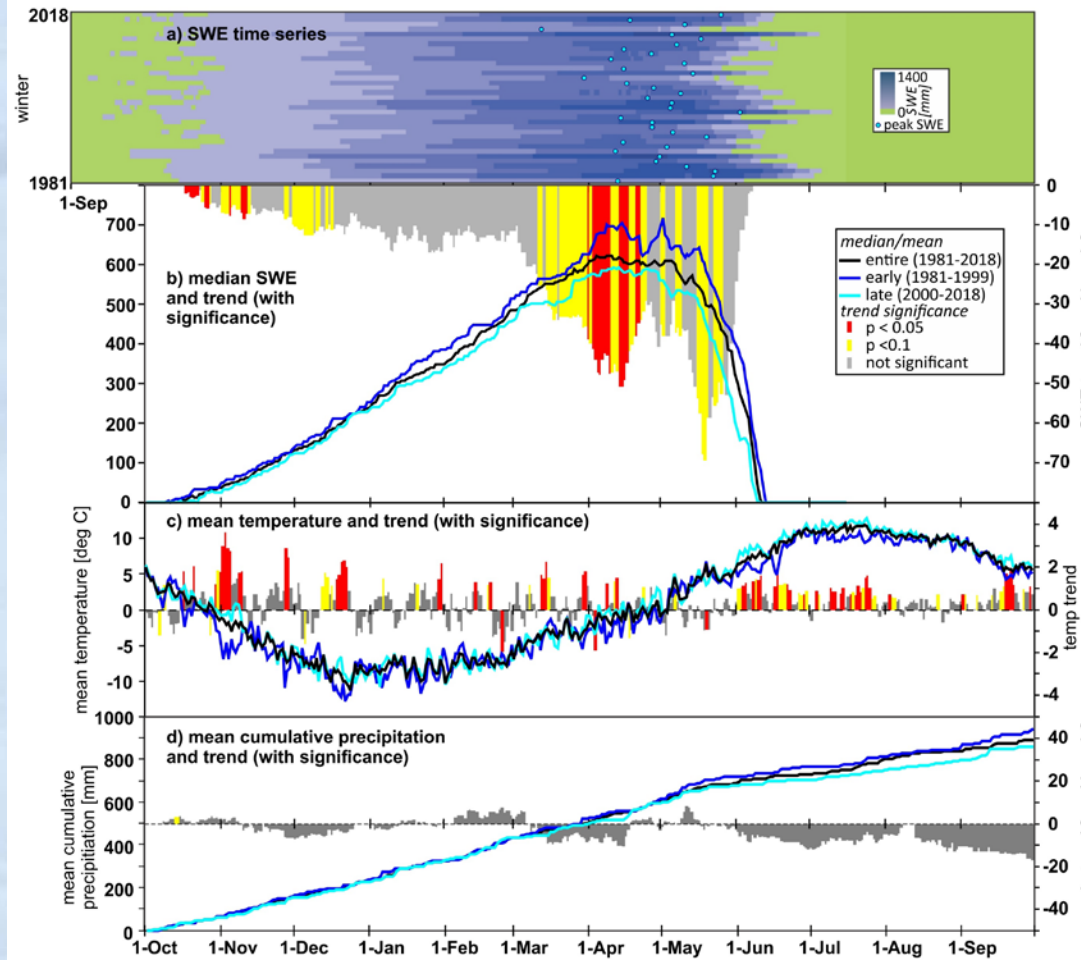

Figure 1. Location …

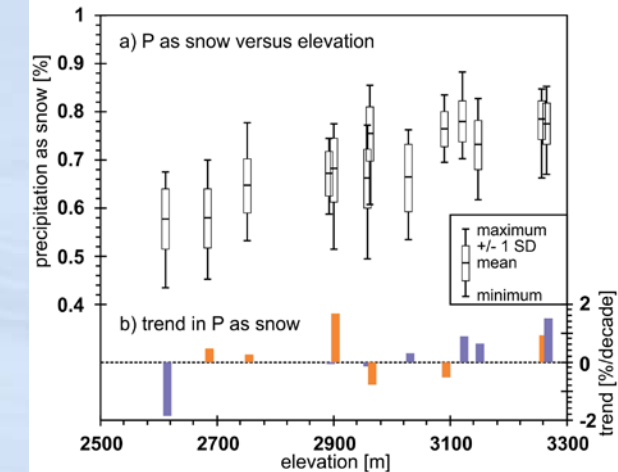**Figure 2**. Lake Irene SNOTEL station (a) SWE time series …

Figure 3. (a) Variation of precipitation as snow …

Consider the Details