FLASH DROUGHT PROJECT MEETING #9

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Jess

- Has started transferring Jupyter notebook code into functions – set up to extract all different data sets we are interested in (reanalysis, model, projections). All of BARRA, MERRA2 and ERA5 have been extracted.
- Writing code for reference ET to do checking.
- Writing a skeleton of the narrative we want to speak to - to inform plots we'd like to see etc.
- Identifying events – should we have a threshold across all datasets to set of example events we want to speak to? – e.g. 15th percentile ET – does this match our understanding of key events in the reanalysis space?

Mike

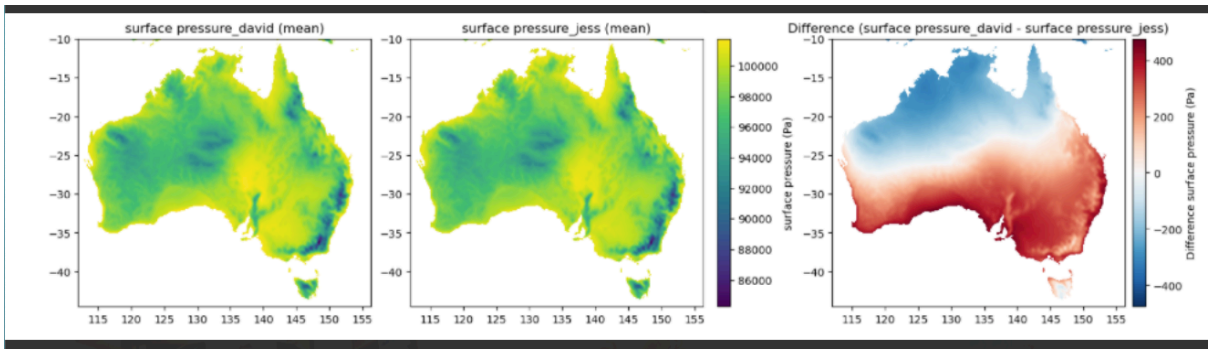
- Do we want to apply a threshold to pull events? Do you come up with "you must be faster than this" or this much change in intensity over this period – x percentile jump in x week period? This was done for the Nature CC paper for the experimental EDDI-based drought monitor. Didn't work!
- Sitting in pixel land, do we ever see a drought that is so fast it's inside our decision tree? It's too fast to respond to, and something different is going on. The three criteria for EDDI FD – are they ever met? Or – another approach – some droughts are fast! 10% of them are the fastest – for that pixel. This eliminates the ones that happen regularly. We don't have to include all the flash droughts. *Celerity* (rapidity of action) threshold – it has to be a drought (we know the thresholds for drought) so set a drought threshold. But then pick only the *fastest* droughts. The problem with the old definition is when you go to pixels with super variable reference ET, you get flash but no drought often. So say we know there are FDs everywhere – they're our fastest droughts. This won't necessarily change the way you identify FD in that pixel – but we choose just the fastest. So set >40th to below 20th threshold as usual but then take the fastest events.
- This is what Jason Otkin and Jordan Christian do to some extent – SESR – standardised evaporative stress ratio – which is a double standardisation.
- This will be citeable in terms of SESR and negatively to the Pendergrass paper. Mike can provide maps for the US where you know intuitively that there aren't flash droughts, e.g. in the PNW: - i.e. our metric is wrong.
- Another way to do this is to do it both ways and see if you get the same results.
- Similar to the way we define heat waves – above 35 deg in Dubai, who cares – in Hobart, that's a heat wave. Do this for FD.
- Nobody has done this for EDDI – double standardisation – they've done it for evaporative stress ratio.

Jess

- Has overlaid wheat belts on standard maps.
- Dominant driver of FD at a pixel over historical, contemporary and future period?
- **First things:** Finalise the drivers decomposition first. The closure error looks reasonable. Transfer code into a functions version. There will always be a small manual component – need to download variables you're your dataset and decide which calculations to use for e.g. surface pressure (from elevation/geopotential height, or model output?).

Mike – when looking at what drives the variability in evaporative demand, surface pressure is always the least important driver.

See David's plot of differences in SP for Aus: ACCESS ESM 1.5



David has done the same for all the variables. Sat vapour pressure 0.1 Pa.

Jess – plot mean reference ET etc.

Run in reanalysis space and compare to Australian Water Outlook plots for ref ET.

Mike:
What we have found is that drought and wildfire separately have always been fruitful for funding. Combining them makes the projects attractive. So for FLARE bushfire lab, think of what Mike is doing for his attribution manuscript – most impactful fire for CO and third worst fire for CA in same year. Do the analysis of drivers of evap demand for Black Summer 2019 bushfires.

There is the demand for a paper that looks at all the handwavy arguments about do we need a definition, what impact do we need? We will need to write the motivation for this clearly.