

Interactive comment on “The climate of desiccation in the SW Cape” by Mark R. Jury

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The paper uses a novel approach to study a topical question from a mechanistic perspective and the approach in this context could yield valuable physical insight and understanding into potential future changes over the south-western Cape region of South Africa. However, the paper suffers from a few major shortcomings; namely:

1. Long-term internal rainfall variability over the region is substantial and work by others (e.g., Wolski, 2018) suggests that for the entire available record (since the late 19th Century), variability overwhelms trend. However, this paper makes no attempt to distinguish between variability and trend and does not acknowledge the possibility that some apparent trends may be products of internal modes of variability. The period between the 1980s and 2010s has mostly coincided with a drying period of the lowest frequency internal mode in the observational record.
2. The datasets which are compared have different periods of records over which patterns of internal variability and trend vary considerably. However, the potential biases thus introduced are neither acknowledged, nor corrected for in any apparent way.
3. Although rainfall trends are shown separately for different months, the argument around which the article is developed does not consider seasons separately.

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Changes in wind and humidity during summer, when easterlies appear to be strengthening, will have little overall impact on rainfall over most of the southwestern Cape, where winter rainfall concentration is quite large. The rainfall seasonality and mechanisms (frontal systems, mainly) are also never mentioned. Consequently there is no discussion of the impact of the observed trends on rain-bearing synoptic systems. Without this, the argument made would appear to focus mainly on the secondary matter of evaporation in the dry season, rather than the matter of primary concern, namely wet season precipitation. This contribution is certainly valuable, but the author appears to suggest that the work explains the primary causes of drying in the area, which does not appear to be the case.

4. The “vegetation fraction trend” analysis has numerous severe shortcomings, in that it fails to account for (or, at least it is not explicitly stated how any of this is done, if it is):
 - (a) land use changes or urban expansion;
 - (b) the distribution of agricultural land, plantations and wild vegetation;
 - (c) the presence of natural or alien vegetation;
 - (d) time since last fire (which recent work by Wilson, Slingsby and others has shown to be the most important determinant of NDVI in fynbos)

Additionally:

1. Formatting of mathematical content, formulae and quantitative data is utterly appalling, to the extent where certain quantitatively dense sections are barely readable and difficult to follow. Basic conventions regarding typesetting of variables and numbers are apparently entirely ignored. At the very least, some in-line formulae should be displayed separately.

2. The suggestion that the hottest period over the region occurred during January 2011 is suspect, given that previous investigations have generally found March 4, 2015 to be the warmest day recorded at most stations over the considered area, while the hottest extended period occurred during January 2016. These assessments admittedly consider air-temperature, but further substantiation of the methodology used to select the case study in 3.3 should be provided. The SAWS airport data used for this case study appear to have been sourced through Weather Underground, but this is not stated explicitly enough; in my experience, these data are not always consistent with those published subsequently by SAWS in daily weather bulletins.
3. Cape Town does probably have around 4 million people, but this should be substantiated from somewhere.
4. The collective storage in the dams supplying Cape Town did not at any stage drop to 13% of capacity, as the author appears to suggest. Perhaps by including other regional dams not used by Cape Town, this quantity could be obtained, but then this is a little misleading.
5. Many abbreviations are not defined and the style is often terse, such that the writing seems somewhat rushed.

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