Hydrol. Earth Syst. Sci. Discuss., 10, C2885–C2889, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C2885/2013/


Hydrology and Earth System Sciences
Open Access
Discussions

# *Interactive comment on* "Observed variability and trends in extreme rainfall indices and Peaks-Over-Threshold series" *by* H. Saidi et al.

**M. Kamruzzaman**

mohammad.kamruzzaman@unisa.edu.au

Received and published: 30 June 2013

General comments

I would like to thank the authors for the opportunity to review their article entitled "Observed variability and trends in extreme rainfall indices and Peaks-Over-Threshold series" in the northwest of Italy. The paper provides an example through the use of the statistical tools that aims to observed variability and trends in extreme rainfall indices and peak-Over-threshold series. The study is optimistic and provides some evidence of the benefits of using nonparametric Mann Kendal test and Generalised Pareto Distribution (GPD). While this is a scientific paper, there is insufficient coverage over the range of previous work that aims to observed variability and trend in rainfall extreme.



The technical contribution is, arguably, rather less than the applied contribution might be in an expanded article. This is necessary to place the technical contribution in context. How does this work improve upon previous attempts to observed non-stationarity and trends in rainfall extreme using statistical tools?

For example, Kamruzzaman et al, 2011 (Hydrological Process) present non-stationarity of rainfall pattern in Murray Darling River Basin. Todeschini, 2012 ( Journal of Climatology) demonstrated the long term trends in rainfall series in the northern Italy combining with time series and Bayesian statistics through the Markov Chain Monte Carlo (MCMC) method of Gibbs sampling for assessing trends, Castellarin, et al (2009) demonstrate extreme rainstorm events and so on(see references therein). The introduction also ends rather abruptly, leaving the review "hanging," i.e.. What were the limitations of previous work that are addressed by this technical contribution?

The topic and the tools employed although are of interest, there are a number of concerns to which the authors should respond before it can be considered for publication as follows:

1. It is not clear to me what the main contribution to the work done is, when it is compared with other most-recent scientific report/ publications mentioned. It does not seem that the Mann-Kendall and GPD have been used for the first time in observed variability and trends in extreme rainfall in this work. The authors need to explicitly comment on the main contribution to their work.

2. The explanation of choice of rainfall indices needs to be expanded. Definition of seasonal indices required at least a parametric test, like using the regression model. For example, a multivariate regression model has been described by Kamruzzaman and Beecham (2012, pages 41) is to objective of evidence of trend and seasonal effects on Australian rainfall. The multivariate RM with seasonal indicators is given as

Where t is time series and is the average of observed time series. is defined as a rainfall or temperature series and MEI stands for multivariate CIs , SI stands for seasonal indicators from January up to December, $\beta$j (j= 1,2.3……..12) are the coefficients of the SI. The indicator variables January up to December will be denoted X1, X2,…. . X12 respectively.

The results is present in Table 1, there is statistical significant evidence of trend, climatic influence and seasonal effects on Australian rainfall. Table 1: Fitted regression model with linear, quadratic and climatic indicators with seasonal indicators

So, Saidi et al (2013) could be adopting regression technique at the initial stage to assess the rainfall variability and trend in extreme rainfall. I do think the results could be very interesting if author expanded with these powerful statistical tools and properly explained within the context. If the authors elect to keep this as a technical paper, it would help to more precisely clarify the technical contribution (in the introduction) in the relation to other papers that use more powerful statistical tool to observed trend in rainfall extreme (see references therein).

3. Abstract need to be rephrase according to their findings

In conclusion, the result analysis required more in depth analysis in section 4 and clear interpretation in discussion section.

Reference

1.Kamruzzaman, M., Beecham, S. and Metcalfe, A. (2011), Non-stationarity in Rainfall and Temperature in the Murray Darling Basin, Journal of Hydrological Processes, 25(10), pp 1659-1675 2.Kamruzzaman, M., and Beecham, S., (2012): Water Resources Management Strategies and Hydrological Modelling, Lap Lambert Academic Publishing, pp 301, ISBN:9783659294686 3.Todeschini, S. (2012), Trends in long daily rainfall series of Lombardia (northern Italy) affecting urban stormwater control. International Journal Climatology, 32: 900–919. doi: 10.1002/joc.2313 4.Langousis, A., and D. Veneziano (2007), Intensity-duration-frequency curves from scaling representations of rainfall, Water Resources Research, 43, W02422, doi:10.1029/2006WR005245.



5.Willems, P. (2000), Compound intensity/duration/frequency relationships of extreme precipitation for two seasons and two storm types, J. Hydrol., 233, 189–205. 6.Caporali, E., Cavigli, E. and Petrucci, A. (2008), The index rainfall in the regional frequency analysis of extreme events in Tuscany (Italy). Environmetrics, 19: 714–724. doi: 10.1002/env.949 7.Castellarin, A., R. Merz, et al. (2009). "Probabilistic envelope curves for extreme rainfall events." Journal of Hydrology 378(3–4): 263-271.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/10/C2885/2013/hessd-10-C2885-2013-supplement.pdf

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 6049, 2013.

Fig 1.

| | Co efficient | Adelaide Airport | Broken hill | Canberra Airport | Hume Dam | Lake Victoria | Loxton met | Melbourne Airport | Mildura Airport | Murray Bridge | Sydney obs. Hill |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intercept | $\beta_0$ | -195.200 | 485.700 | -376.900 | -221.900 | -81.710 | -68.550 | 248.800 | 87.760 | 60.050 | -944.700 |
| linear | $\beta_1$ | -0.002 | 0.019 | -0.017 | -0.005 | -0.009 | 0.002 | -0.010 | -0.005 | 0.004 | -0.034 |
| Quadratic | $\beta_2$ | 0.000 | 0.000 | 0.000 | 0.000* | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Niño1+2 | $\beta_3$ | -2.097 | 0.492 | 6.810 | -0.310 | -0.744 | 0.770 | 5.961 | -1.509 | 1.121 | 19.130 |
| Niño3 | $\beta_4$ | 9.665 | 9.101 | -31.98** | 5.176 | 5.346 | 4.205 | -9.517 | 9.197 | -3.323 | -57.400 |
| Niño4 | $\beta_5$ | 6.808 | 5.680 | -13.790 | 5.424 | 4.310 | 4.767 | -2.488 | 8.415 | -2.573 | -17.980 |
| Niño3.4 | $\beta_6$ | -8.626 | -4.061 | 29.23* | -5.594 | -1.776 | -2.625 | 7.832 | -6.243 | 6.322 | 57.580 |
| N-Atlantic | $\beta_7$ | 1.186 | 0.389 | 1.181 | 7.693 | 0.770 | 2.773 | 4.466 | 0.181 | -0.375 | 8.491 |
| S-Atlantic | $\beta_8$ | 4.044 | 9.293* | -4.026 | 7.686 | 6.603* | 7.773** | 8.288 | 5.707 | 4.507 | 25.540 |
| Global tropics | $\beta_9$ | -2.505 | -36.08* | 27.790 | -8.903 | -9.899 | -13.340 | -20.250 | -17.340 | -6.549 | 6.177 |
| DMI | $\beta_{10}$ | -9.299** | 0.190 | -10.420 | -16.48** | -5.958* | -5.015* | -6.393 | -4.765 | -6.247 | 0.170 |
| PDO | $\beta_{11}$ | -0.055 | 0.349 | 0.754 | 1.857 | -0.559 | 0.325 | 0.487 | 0.601 | 1.763 | -2.627 |
| SOI | $\beta_{12}$ | 0.498*** | 0.625*** | 1.067*** | 1.052*** | 0.595*** | 0.439*** | 0.062 | 0.611*** | 0.132 | 1.368* |
| SAM | $\beta_{13}$ | -0.584 | 1.551* | 2.885*** | 0.769 | 1.188 | 0.544 | 1.953 | 1.309* | 0.909 | 8.479*** |
| PDO*SOI | $\beta_{14}$ | -0.243** | -0.275* | -0.123 | -0.061 | -0.236 | -0.142 | 0.073* | -0.239** | -0.111 | 0.015 |
| Jan | $\beta_{15}$ | -8.550 | -2.694* | 10.990 | -4.348 | -6.707 | -7.212 | -14.130 | -6.886 | -3.626 | 5.684 |
| Feb | $\beta_{16}$ | -13.420 | -22.790 | 12.720 | -17.440 | -15.350 | -11.740 | -18.200 | -15.400 | -7.085 | 3.726 |
| Mar | $\beta_{17}$ | -14.650 | -18.920 | 4.066 | -16.920 | -22.86* | -19.44* | -20.41 | -18.290 | -0.561 | 6.247 |
| Apr | $\beta_{18}$ | -2.329 | -9.362 | -3.164 | -4.504 | -14.33 | -10.910 | 0.413 | -12.230 | 6.807 | -9.763 |
| May | $\beta_{19}$ | 19.74* | 3.202 | -10.570 | 9.641** | -6.044 | 0.163 | 2.065 | -4.316 | 17.01* | -1.214 |
| Jun | $\beta_{20}$ | 24.41*** | -7.244 | -7.013 | 13.37* | -3.851 | 3.530 | 1.215 | -5.818 | 17.24** | 62.86** |
| Jul | $\beta_{21}$ | 35.39*** | -4.593 | 0.257 | 31.630 | 5.776 | 13.78** | -2.991 | -1.232 | 22.75** | 26.120 |
| Aug | $\beta_{22}$ | 27.7** | -6.196 | 5.111 | 32.140 | 8.085 | 13.520* | 8.142 | 0.967 | 23.81* | 65.9* |
| Sep | $\beta_{23}$ | 24.53** | 1.072 | 11.200 | 21.750 | 10.880 | 14.790* | 11.640 | 2.743 | 25.48* | 37.960 |
| Oct | $\beta_{24}$ | 16.910* | 10.430 | 12.420 | 18.740 | 14.230* | 17.050** | 20.210 | 7.383 | 15.130 | 47.300 |
| Nov | $\beta_{25}$ | 1.124 | 3.374 | 10.790 | -0.980 | 4.847 | 8.368 | 19.820 | 1.601* | 11.550 | 40.950 |

*coefficients are statistically significant at the 5% level
* *coefficients are statistically significant at the 1% level
* * * coefficients are statistically significant at the 0.1% level

**Fig. 1.** Fitted regression model with linear, quadratic and climatic indicators with seasonal indicators