

## ***Interactive comment on “On the validity of representing hurricanes as Carnot heat engine” by A. M. Makarieva et al.***

**U. Pöschl (Editor)**

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### **Final editor comment on the manuscript acp-2008-250 by Makarieva et al.**

Following up on the appeal of Dr. Makarieva and co-authors (Makarieva et al., 2009), the editorial decision of Dr. Haynes not to accept the manuscript for publication in ACP (Haynes, 2009) has been carefully re-assessed by the ACP executive committee supported by independent referees.

As detailed below, we respect the work of Dr. Makarieva and co-authors (Makarieva et al., 2008), but we have come to similar conclusions as Dr. Haynes and decided not to accept the manuscript for final publication in ACP. The decision is supported by the entire ACP executive committee, but for clarity and simplicity the following editorial report is formulated from my perspective as the chief-executive editor who led the re-assessment.

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In appendices to this editor comment, the referee call and the comments of the five referees consulted upon re-assessment of the revised manuscript and the preceding editorial decision will be published (Appendices A1–A6, Referee Call and Comments of Referees A1–A5). In the spirit of interactive open access publishing, a response of the authors will also be appended (Appendix A7, Makarieva et al.).

Personally, I sympathize with the author's attempt of challenging established paradigms and proposing alternative concepts based on first principles. However, most of the expert referees and other members of the scientific community consulted in the course of the review process and public discussion have argued that crucial assumptions in the author's manuscript and hypotheses are not justified.

With regard to the criticism of the hurricane models of Emanuel et al. (Carnot cycle), the referees have pointed out that the arguments of Makarieva et al. are based on classical equilibrium thermodynamics and thus not directly applicable to the criticized models that are based on non-equilibrium thermodynamics.

With regard to the concept of an evaporative/condensational force that the author's proposed as the driver of hurricanes and other forms of atmospheric circulation, the referees have pointed out that the effects of volume reduction upon condensation are much smaller than the effects of the concurrent release of latent heat.

I am not a specialist in atmospheric dynamics and meteorology, and I found the exchange of arguments between authors and referees interesting and challenging. In this regard, I would like to express my appreciation for the clear formulation and mathematical precision of the line of arguments and comments of Dr. Makarieva and co-authors.

After all, however, I have come to share the specialist referees' concerns that crucial assumptions underlying the arguments, comments and manuscript of Makarieva et al. appear not to be justified.

In particular, I share the specific concerns expressed by Referee A5 about applying classical equilibrium thermodynamics to the hurricane models of Emanuel et al. and the concerns expressed by Referee A4 (Dr. Rosenfeld) about separating the effects of water vapor removal from the effects of latent heat release upon condensation of water in the atmosphere.

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Nevertheless, I agree with the general arguments expressed by Referee A3 (Dr. Savenije) about the substance of the paper, the process of discussion, and the ethics of publishing. In particular, I share the view that the error of publishing a controversial but potentially innovative scientific hypothesis that turns out to be flawed is likely less severe than the error of not publishing a controversial hypothesis that is groundbreaking. If ACP were a traditional journal with closed peer review and without discussion forum, I would probably have followed the recommendation of Dr. Savenije to accept a revised version of the manuscript for publication. Along the lines of critical rationalism and open societies, not only the referees but also the scientific community and the public should have a chance of noticing, testing and falsifying or validating the authors' controversial hypotheses.

Due to the interactive open access publishing approach of ACP, however, the original manuscript and the scientific hypotheses of Makarieva et al. have already been published as a discussion paper in ACPD, which remains permanently archived, publicly accessible and fully citable.

As detailed on the journal web pages in several papers outlining the interactive open access publishing concept of ACP, free speech of scientists and public documentation of controversial scientific issues (flaws or innovations) are among the main reasons why my colleagues and I have developed this concept and established ACP and ACPD (Pöschl, 2004; Pöschl, 2009; and references therein).

In the present case, free speech and public documentation have already been achieved by publication of the discussion paper in ACPD, and Makarieva et al. have also taken the opportunity of publishing a revised version of their manuscript in the form of interactive comments in ACPD. As mentioned above and detailed on the ACP web pages, the discussion paper as well as the interactive comments will remain permanently archived, accessible and citable. Therefore, publication precedence is secured for the authors, and a lasting record of the exchanged concepts and arguments is provided for the scientific community. Existing and future search engines and indexing services will also ensure continued visibility of the discussion paper. Note, for example, that ISI-SCIE currently does not cover ACPD, but Elsevier-SCOPUS and Google Scholar do.

Publication of a manuscript in ACPD implies that the editor and/or referees think that the manuscript is worthy of public review and discussion (rated at least “fair” with regard to the

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criteria listed below). Beyond that, publication in ACP is meant to imply that the editor and/or referees rate the manuscript as excellent or good in all of the review criteria specified below and on the journal web pages:

1) Scientific Significance: Does the manuscript represent a substantial contribution to scientific progress within the scope of Atmospheric Chemistry and Physics (substantial new concepts, ideas, methods, or data)?

2) Scientific Quality: Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)?

3) Presentation Quality: Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)?

Four of the five referees involved in the re-assessment of the preceding editorial decision have rated the revised manuscript as less than “fair” with regard to the above criteria and have not recommended publication in ACP. As in most scientific journals, the editors of ACP have full responsibility and authority to decide about acceptance or rejection of a manuscript submitted for publication. They are not bound by the referees’ ratings and recommendations, but obviously they should have good reasons if they overrule the referees’ recommendations.

In case of doubt and along the lines critical rationalism, I usually recommend and take decisions in favour of the authors of scientific papers, in particular when they address controversial topics and when the referees do not provide substantial and convincing arguments against acceptance and publication of the manuscript.

In the present case, however, a large number of expert referees consider the discussion paper as seriously flawed, and they have clearly explained their objections and explicitly recommended not to accept the revised manuscript for publication in ACP. The manuscript does not just present new concepts and results, but it also strongly criticizes and fundamentally opposes a large number of earlier studies (hurricane models and other meteorological concepts) and has already attracted substantial attention in the interactive public discussion in ACPD and beyond. If the criticisms and concepts presented by the authors were valid, they could and would most likely be pursued by other members of the scientific community on the basis of the

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discussion paper and the accompanying comments published in ACPD, regardless of whether or not a revised manuscript achieves publication in ACP. If, however, the referees' and editors' concerns are valid, final publication in ACP might mislead other scientists and authors to erroneously build upon and cite the work as a generally accepted scientific theory.

Therefore, the ACP executive committee and I have come to the conclusion not to accept the revised manuscript for publication in ACP but to confirm the preceding editorial decision of Dr. Haynes. At the same time we also support Dr. Haynes' suggestion that the authors might want to consider further clarification and validation of their hypotheses, and we hope that they will also re-consider ACP and ACPD for future publications of their work. According to the principles of critical rationalism and interactive open access publishing, ACP and ACPD will remain open for the publication, public review and interactive discussion of controversial and innovative scientific concepts and results.

Ulrich Pöschl on behalf of the ACP executive committee

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