Atmos. Chem. Phys. Discuss., 10, C10973–C10975, 2010
www.atmos-chem-phys-discuss.net/10/C10973/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Where do winds come from? A new theory on how water vapor condensation influences atmospheric pressure and dynamics" *by* A. M. Makarieva et al.

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Received and published: 12 December 2010

I agree that there are important implications here, and that this process is misrepresented or only partially represented in some numerical models. The neglect of this mechanism could be important. Other models do account correctly for this mechanism.

However, I disagree that this idea is new. Some years ago, I had thought that I was on to something with this idea myself, but when we scanned the published literature, we found several previous studies that had discussed it (just a few of these references are provided below). We studied this effect for a hurricane, and found that it did make a

difference, but was not a dominant effect:

Lackmann, G. M., and R. M. Yablonsky, 2004: The importance of the precipitation mass sink in tropical cyclones and other heavily precipitating systems. J. Atmos. Sci. 61, 1674-1692.

Makarieva and collaborators seem to neglect the compensating divergent/convergent motions that mitigate the pressure tendency due to this effect, and over-state its importance. It is troubling that despite several past interactions, they keep submitting and marketing this idea as if nobody else had thought of it, and as if it were a dominant process. At first, I was pleased to see that they were pursuing this idea futher, and I would encourage other investigators to do so. However, it is also important to:

(i) cite previous studies who have examined this effect, (ii) use numerical models to determine its importance, because using diagnostic equations to study a time-dependent problem such as this omits important nonlinear feedbacks, and (iii) recognize that several current models, such as the WRF model, correctly account for the mass-sink effect, and this is an offshoot of work by Qiu et al. (1993) from what I understand.

For those interested in this, please see

Qiu, C.-J., J.-W. Bao, and Q. Xu, 1993: Is the mass sink due to precipitation negligible? Mon. Wea. Rev., 121, 853–857.

Lackmann, G. M., and R. M. Yablonsky, 2004: The importance of the precipitation mass sink in tropical cyclones and other heavily precipitating systems. J. Atmos. Sci. 61, 1674-1692.

Ooyama, K. V., 1990: A thermodynamic foundation for modeling the moist atmosphere. J. Atmos. Sci., 47, 2580–2593.

Ooyama, K. V., 2001: A dynamic and thermodynamic foundation for modeling the moist atmosphere with parameterized microphysics. J. Atmos. Sci., 58, 2073–2102.

Trenberth, K. E., J. R. Christy, and J. G. Olson, 1987: Global atmospheric mass, surface pressure, and water vapor variations. J. Geophys. Res., 92, 14 815–14 826.

Van den Dool, H. M., and S. Saha, 1993: Seasonal redistribution and conservation of atmospheric mass in a general circulation model. J. Climate, 6, 22–30.

There are numerous additional papers that have discussed these ideas, many of which are ignored by the current authors (and are not listed here for brevity). To end with a quote... "... in such a complex and unsurveyable field as Meteorology–partly due to inefficiency of international bibliography and terminology, or to lack of reading on the part of the meteorologists themselves–old knowledge will often be rediscovered and presented under new labels, causing much confusion and impeding progress."

T. Bergeron, 1959, The Atmosphere and the Sea in Motion

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 24015, 2010.