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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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A lot of discussions are going on, on the concept of volumetric extinction of vapor in the condensation process and its role in hurricanes, tornadoes and on "Where do winds come from? A new theory on how water vapor condensation influences atmospheric pressure and dynamics." Here I am putting forth the concept in visual form which gives us a confusion free and quantitative idea of its importance.

I am attaching herewith a pdf file (CONDENSATION.pdf) in which the phenomenon of Volumetric Extinction or in other words Vapor Volume Reduction on condensation and its importance in Hurricanes and Tornadoes is explained with the help of figures. The

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Interactive Discussion
Discussion Paper

vapor volume reduction in the condensation process, which is the base of the concept, is theoretically explained on the basis of Avogadro's law which gives us the exact values in terms of volumes when water vapor condenses into liquid water. This forms a sound theoretical foundation and gives a new perfect direction for further research in its application to hurricanes and tornadoes.

The concept based on Avogadro's law and its importance in hurricanes has been filed as a Disclosure Document with the U.S. Patent and Trademark Office on 22nd September 2005. A patent on Hurricane Modification is also filed on 19th January 2006 in which the role of Vapor Volume Reduction and its importance in Hurricanes and Tornadoes is discussed.

I have also presented my concept on 22nd Oct. 2007 at WMO's 9th scientific conference on weather modification held at Antalya, Turkey.

Hence I suggest that my work based on Avogadro's law which gives a sound theoretical foundation to the concept should be quoted in the research in hurricanes and tornadoes when Vapor Volume Reduction in the Condensation process is taken into consideration.

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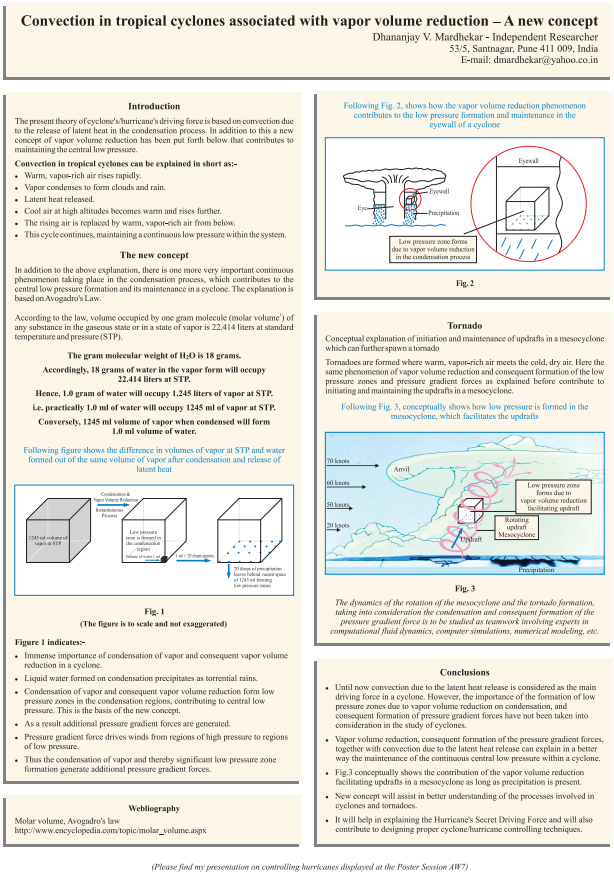
Interactive comment on Atmos. Chem. Phys. Discuss., 10, 24015, 2010.



Convection in tropical cyclones associated with vapor volume reduction – A new concept

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Introduction

The present theory of cyclone's/hurricane's driving force is based on convection due to the release of latent heat in the condensation process. In addition to this a new concept of vapor volume reduction has been put forth below that contributes to maintaining the central low pressure.

Convection in tropical cyclones can be explained in short as:-

- Warm, vapor-rich air rises rapidly.
- Vapor condenses to form clouds and rain.
- Latent heat released.
- Cool air at high altitudes becomes warm and rises further.
- The rising air is replaced by warm, vapor-rich air from below.
- This cycle continues, maintaining a continuous low pressure within the system.

The new concept

In addition to the above explanation, there is one more very important continuous phenomenon taking place in the condensation process, which contributes to the central low pressure formation and its maintenance in a cyclone. The explanation is based on Avogadro's Law.

According to the law, volume occupied by one gram molecule (molar volume) of any substance in the gaseous state or in a state of vapor is 22.414 liters at standard temperature and pressure (STP).

The gram molecular weight of H_2O is 18 grams.

Accordingly, 18 grams of water in the vapor form will occupy 22.414 liters at STP.

Hence, 1.0 gram of water will occupy 1.245 liters of vapor at STP.

i.e. practically 1.0 ml of water will occupy 1245 ml of vapor at STP.

Conversely, 1245 ml volume of vapor when condensed will form 1.0 ml volume of water.

Following figure shows the difference in volumes of vapor at STP and water formed out of the same volume of vapor after condensation and release of latent heat

Fig. 1

(The figure is to scale and not exaggerated)

Figure 1 indicates:-

- Immense importance of condensation of vapor and consequent vapor volume reduction in a cyclone.
- Liquid water formed on condensation precipitates as torrential rains.
- Condensation of vapor and consequent vapor volume reduction form low pressure zones in the condensation regions, contributing to central low pressure. This is the basis of the new concept.
- As a result additional pressure gradient forces are generated.
- Pressure gradient force drives winds from regions of high pressure to regions of low pressure.
- Thus the condensation of vapor and thereby significant low pressure zone formation generate additional pressure gradient forces.

Webliography

Molar volume, Avogadro's law
http://www.encyclopedia.com/topic/molar_volume.aspx

Following Fig. 2, shows how the vapor volume reduction phenomenon contributes to the low pressure formation and maintenance in the eyewall of a cyclone

Fig. 2

Tornado

Conceptual explanation of initiation and maintenance of updrafts in a mesocyclone which can further spawn a tornado

Tornadoes are formed where warm, vapor-rich air meets the cold, dry air. Here the same phenomenon of vapor volume reduction and consequent formation of the low pressure zones and pressure gradient forces as explained before contribute to initiating and maintaining the updrafts in a mesocyclone.

Following Fig. 3, conceptually shows how low pressure is formed in the mesocyclone, which facilitates the updrafts

Fig. 3

The dynamics of the rotation of the mesocyclone and the tornado formation, taking into consideration the condensation and consequent formation of the pressure gradient force is to be studied as teamwork involving experts in computational fluid dynamics, computer simulations, numerical modeling, etc.

Conclusions

- Until now convection due to the latent heat release is considered as the main driving force in a cyclone. However, the importance of the formation of low pressure zones due to vapor volume reduction on condensation, and consequent formation of pressure gradient forces have not been taken into consideration in the study of cyclones.
- Vapor volume reduction, consequent formation of the pressure gradient forces, together with convection due to the latent heat release can explain in a better way the maintenance of the continuous central low pressure within a cyclone.
- Fig.3 conceptually shows the contribution of the vapor volume reduction facilitating updrafts in a mesocyclone as long as precipitation is present.
- New concept will assist in better understanding of the processes involved in cyclones and tornadoes.
- It will help in explaining the Hurricane's Secret Driving Force and will also contribute to designing proper cyclone/hurricane controlling techniques.

(Please find my presentation on controlling hurricanes displayed at the Poster Session AW7)

Fig. 1. Convection in tropical cyclones associated with vapor volume reduction - A new concept

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Interactive Comment