ATM 311 Lake-effect journal review

On the course website, you'll find the following journal article on the role of the Tug Hill Plateau in contributing to enhanced precipitation during a long-lake-axis-parallel band, studied during the Ontario Winter Lake-effect Systems (OWLeS) field campaign:

Campbell, L. S., and W. J. Steenburgh, 2017: The OWLeS IOP2b Lake-Effect Snowstorm: Mechanisms Contributing to the Tug Hill Precipitation Maximum. *Mon. Wea. Rev.*, **145**, 2461–2478.

After reading the article, answer the following questions **in your own words**.

1. (Introduction/Lit. Review): From previous research on the topic, Minder et al. (2015) summarized seven mechanisms whereby terrain plays a role in modifying lake-effect precipitation. In your own words, name and describe one of these mechanisms. You may need to read other cited work to answer this question.

2. (Data and Methods): The WRF simulations used in this study use two "nested" domains, each with higher resolutions than their "parent" domain. What is the highest-resolution (smallest grid-point) domain used in this study?

3. (Data and Methods): There are two WRF simulations presented in this paper. One is the "Control" simulation. What is the name of the second simulation, and what is different about the terrain used in this simulation?

4. (Event Overview and Model Validation): Figure 4 depicts radar-derived precipitation (panel a: what *actually* occurred), and precipitation totals from the two model simulations in this study. In your own words, **relative to the terrain**, what are the primary differences in total precipitation between the two models?

5. Figure 10 depicts three vertical cross-sections through the lake-effect band in the Control simulation. The wind vectors in these panels represent the wind speed and direction relative to the north—south cross sections (A'-A, B'-B, C'-C). Describe the wind vectors relative to the lake-effect precipitation (described using "hydrometeor mixing ratio", the mass of precipitation relative to mass of the dry air) and relate them to the long-lake-axis-parallel (LLAP) band cross-section schematic we drew in class.