YORK UNIVERSITY
DEPARTMENT OF EARTH AND SPACE SCIENCE AND ENGINEERING
and
CENTRE FOR RESEARCH IN EARTH AND SPACE SCIENCE

S E M I N A R

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Environment Canada / University of Toronto

How will the moist atmospheric heat engine change in a warming climate?

ABSTRACT

Incoming and outgoing solar radiation couple with heat exchange at Earth's surface to drive weather patterns that redistribute heat and moisture around the globe, creating an atmospheric heat engine. Here, we investigate the engine's work output using thermodynamic diagrams computed from reanalyzed observations and from a climate model simulation with anthropogenic forcing. We show that the work output is always less than that of an equivalent Carnot cycle and that it is constrained by the power necessary to maintain the hydrological cycle. In the climate simulation, the hydrological cycle increases more rapidly than the equivalent Carnot cycle. We conclude that the intensification of the hydrological cycle in warmer climates might limit the heat engine's ability to generate work. [*Abstract courtesy American Association for the Advancement of Science, Laliberté et al, DOI: 10.1126/science.1257103*]

BIOGRAPHY

Dr. Laliberté is currently a visiting fellow at Environment Canada in the Climate Processes group of the Climate Research Division. Previously, he was working as a postdoctoral fellow with Paul Kushner in the Earth, Atmospheric and Planetary Physics group of the Physics Department at U of T. During that time he was a participant in the ExArch project. He is the author of the python tools cdb_query for the efficient management of CMIP5 data and pyteos_air for the computation of thermodynamic quantities of wet air. He graduated in January 2011 from the PhD in Mathematics and Atmosphere-Ocean Sciences at the Center for Atmosphere-Ocean Sciences of the Courant Institute of Mathematical Sciences, New York University.

Refreshments will be served at 1:15 p.m. in PSE 422.

DATE: **Tuesday, March 31, 2015**
TIME: **1:30 p.m.**
LOCATION: **422 Petrie Science and Enginering Building**