3. Seasonal forecasting of the North Atlantic Oscillation in observations and models

The atmosphere and Earth's climate are physical systems that undergraduate physics students can investigate while learning about weather and climate, fluid dynamics, numerical modelling, partial differential equations, and analysis of large datasets. For your NSERC USRA, why not use your physics toolkit to study issues related to climate variability and climate change in the EAPP group (https://www.physics.utoronto.ca/research/eapp) at the University of Toronto?

This project in the Kushner group (http://uoft.me/pjk) deals with variability on multiple-week timescales in and around the region of the North Atlantic. The "North Atlantic Oscillation" is an important pattern of variability of the atmospheric circulation that is linked to temperature, winds, and precipitation over North America and Europe. Recent collaborative work involving the Kushner group has revealed three sources of predictability of the wintertime North Atlantic Oscillation based on predictors from the previous autumn season: predictability from the distribution of sea ice in the fall, from the distribution of ocean surface temperatures, and from conditions in the stratosphere (the upper atmosphere). These linkages are robust but relatively poorly understood. This project will focus on the dynamics of these predictions, including atmospheric wave analysis and investigation of mechanisms in climate simulations. The project will involve analysis of observed atmospheric circulation and a range of models from simplified to comprehensive.