DataWave is the acronym for "A Data-informed Framework for the Representation of Sub-grid Scale Gravity Waves to Improve Climate Prediction". The project is led by an international consortium working on improving our understanding of gravity waves (GWs) and their representation in weather and climate models. Atmospheric GWs play an important role in the exchange of momentum across the full depth of the atmosphere. Uncertainties in GW momentum transport limit our ability to predict the response of the tropospheric and stratospheric circulation to global warming and impact subseasonal-to-seasonal forecasts. Current state-of-the-art parameterizations are severely limited by computational necessity and the scarcity of observations. The DataWave project is focused on improving our modeling capability for GWs and the large scale circulation, and particularly on developing novel observationally constrained and data-driven GW parameterization schemes.

The main objectives are (i) to make available the data source from Loon LLC, which offers unprecedented, high-resolution observations of atmospheric conditions across thousands of balloon flights, and (ii) to use machine learning to develop one- and three- dimensional data-driven GW parametrizations to more accurately and efficiently represent GW momentum fluxes.

While Loon observations can provide comprehensive estimates of GW momentum fluxes in the lower stratosphere, they cannot provide a complete view of GW momentum deposition. To infer the drag, DataWave performs GW resolving simulations at DKRZ with the ICON model that are suitable for direct comparison with Loon observations.