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Simulating HIRDLS Gravity Wave Observations

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The effect of gravity wave dissipation on global transport and heat fluxes has not been realistically represented in gravity wave parameterizations employed in most numerical models due to a lack of observations of the global distribution of gravity wave sources, propagation, growth and breakdown. Therefore, developing a global climatology of gravity waves has great potential for example for weather and climate and atmospheric chemistry applications. Satellites have been used to observe gravity waves for about a decade since Fetzer and Gille first retrieved global fields of gravity wave temperature perturbations in 1994 using the LIMS (Limb Infrared Monitor of the Stratosphere) instrument. Satellite instruments have a great advantage over ground-based instruments because of the consistent global coverage. However, gravity waves can have quite small vertical and horizontal scales. Therefore, satellite gravity wave observations can be a really challenging task. HIRDLS (HIgh Resolution Dynamics Limb Sounder) with the highest vertical resolution ($\sim$1 km) compared with previous instruments is such an instrument ready to meet the challenges of remotely observing vertically propagating gravity waves from space. A new approach to testing HIRDLS' ability to observe gravity waves is being developed at the University of Leicester.

We are simulating HIRDLS, based on the Oxford RFM (Reference Forward Model) and our own temperature retrieval code, to generate small scale vertical waves that are believed to be observable by the instrument. The simulation model will eventually be coupled with a gravity wave extraction algorithm to study the observed gravity waves, and the results will be used to improve the capability of HIRDLS and validate the

observations.