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A Forecast Model for Atmospheric Internal Waves Produced by a Mountain[1] JAMES ROTTMAN, Science Applications International Corporation, DAVE BROUTMAN, Computational Physics, Inc. — The breaking of mountain-generated internal waves in the atmosphere is an important mechanism for mixing in the upper parts of the troposphere and the stratosphere, and the associated turbulence also is a hazard for aircraft. We describe a new forecast model for mountain waves in a height-dependent atmosphere. The model is based on a nonlinear numerical simulation of the near-field flow around the topography combined with a ray-tracing of the far-field propagation of the internal waves generated by the near-field flow. A mesoscale model is used to simulate the near-field flow. This flow can be substantially nonlinear, with vortex shedding, flow separation, and wavebreaking. The more linear internal wavefield that emerges from this low-level flow is modeled by a Fourier ray method, which is initialized with the mesoscale model results. The Fourier ray method is used to propagate the waves to higher altitudes. The ray model allows for the refraction and reflection of the waves by height-dependent winds and stratification, including the possibility of two turning points, and with much higher resolution than is practical with a mesoscale model.

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James Rottman
Science Applications International Corporation

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