Preface

The International Workshop on High-Resolution and Cloud Modeling took place on the 3–5th of October 2006, in Kusatsu, Japan. As evident by the sub-title "Fusion of satellite observations and high-resolution modeling", the workshop was organized to promote collaborations between high-resolution modeling and satellite observations especially for cloud and precipitation properties. The motivation was to create a forum for exploring ways to better constrain and improve a whole new generation of atmospheric general circulation models—ones which for the first time could realize the dream of resolving convective scale circulations on a global grid. At the FRCGC/JAMSTEC (Frontier Research Center for Global Change, Japan Agency for Marine-Earth Science Technology) and CCSR (Center for Climate System Research, Univ. of Tokyo), efforts to develop NICAM (the Nonhydrostatic ICosahedral Atmospheric Model), as a prototype of such a system (http://www.ccsr.u-tokyo.ac.jp/~satoh/nicam/) were well underway; and so a workshop seemed timely.

NICAM marks a new chapter in the history of attempts to model and understand the atmospheric general circulation. It is currently able to resolve deep-cloud cores and meso-circulation systems with a few-km horizontal-interval-mesh over the globe. Short-term global "cloud-resolving" simulations with a 3.5 km-horizontal-mesh have been performed on the Earth Simulator, and with continuing advances in computing power such simulations will be extended to climate timescales, richer ensembles and finer grid meshes. Increasingly weather centers have begun to adopt similar approaches: as both the Deutscher Wetterdienst and the UK Met Office have begun to routinely run regional models on cloud resolving scales. The march to high resolution is also the centerpiece of development efforts at other research centers; for instance, the Center for Multiscale Modeling of Atmospheric Processes in Ft. Collins Colorado. These efforts are changing the landscape of atmospheric modeling as they shift the emphasis away from the cumulus parameterization and to the question of how to parameterize the microstructure of convective systems. Perhaps even more significant is that cloud-system resolving models of climate and weather begin to represent scales commensurate with those being observed by state of the art satellite and ground based remote sensing, thereby opening entirely new opportunities for model evaluation.

Participants to the International Workshop on High-resolution and Cloud Modeling, 2006.
The Hotel Village, Kusatsu, Japan. 3 Oct. 2006.

The history of atmospheric modeling demonstrates that the development of qualitatively new modeling approaches rarely make some component of the existing hierarchy of model obsolete, but rather expands and enriches the existing hierarchy. Thus the challenge is to put these new tools for probing atmospheric circulations in the context of existing and emerging capabilities, both with respect to models and data.

For this purpose, the workshop strived to promote collaborations between the community of scientists specialized in high-resolution modeling and those specialized in the use of satellite based high-resolution active remote sensing (CloudSat/CALIPSO, TRMM, GPM, EarthCare, etc) of clouds and precipitation. The idea being to better learn how to use new satellite data for improvements in the representation of cloud and precipitation systems by numerical simulations on the one hand, and to investigate the possibility of using high-resolution models to improve retrieval algorithms on the other. The thought being that such an exchange, as well as interactions within the respective groups, could help to advance the level of understanding in the atmospheric sciences more broadly. The workshop was co-sponsored by CREST/JST (Core Research for Evolutional Science and Technology, Japan Science and Technology Agency, Japan), CCSR, and FRCGC/JAMSTEC. The papers in this special issue were solicited from those presented at the workshop, a full agenda of the meeting and abstracts of talks can be obtained from the workshop web page: http://www.ccsr.u-tokyo.ac.jp/~satoh/kusatsu2006/.

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