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HR: 16:30h

AN: **A34B-03**

TI: Observational and Modeling Studies of Mixed-Phase Arctic Stratus: Results From M-PACE and Future Investigations as a Part of SEARCH

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AB: A combination of unique observational and modeling tools is being utilized at the University of Wisconsin-Madison to investigate mixed-phase Arctic stratus formation and evolution, and aerosol influence on these processes. The combination of detailed measurements and advanced simulation techniques provides increased insight into processes governing the existence of these cloud structures. Simulations are completed using the Univ. of Wisconsin Non-Hydrostatic Modeling System (UW-NMS). The NMS is fully scalable, and currently being updated to include the Spectral Habitat Ice Prediction System (SHIPS). This new form of microphysics is built on interacting predictive systems for ice and liquid hydrometeors, and aerosols. The hydrometeor size spectra evolve through a modified spectral approach. No a-priori assumptions are made about ice characteristics such as habit, size and density. Instead, they evolve freely. The Univ. of Wisconsin Arctic High-Spectral Resolution Lidar (UW-AHSRL) was designed for long-term unattended Arctic operation and features unique measurement capabilities. Utilizing a molecular reference channel, the AHSRL provides absolutely calibrated measurements of aerosol backscatter cross-section, polarization, and optical depth, in addition to traditional lidar backscatter profiles. Algorithms utilizing AHSRL data in conjunction with millimeter radar data determine microphysical properties such as particle equivalent radius, and potentially liquid and ice water content. The AHSRL was deployed to Barrow, AK as part of M-PACE and is currently located in Eureka, Canada for the SEARCH campaign. Both of these locations host a NOAA Millimeter Wave Cloud Radar, aiding in the implementation of the above-mentioned algorithms. The AHSRL, combined with additional cloud and aerosol measurement instrumentation at these Arctic locations, provides an expansive source of mixed-phase cloud data to be used individually and as validation for

UW-NMS simulations. We will outline current work being completed at the Univ. of Wisconsin, as well as present results from M-PACE simulations and data analysis and preliminary SEARCH measurements.

UR: **http://lidar.ssec.wisc.edu**
DE: 0305 Aerosols and particles (0345, 4801, 4906)
DE: 0320 Cloud physics and chemistry
DE: 0321 Cloud/radiation interaction
DE: 0394 Instruments and techniques
SC: Atmospheric Sciences [A]
MN: Fall Meeting 2005

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