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ΔΙΑΛΕΞΗ

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ΘΕΜΑ: First light observations from the Earth Cloud Aerosol Radiation Explorer (EarthCARE) Cloud Profiling Radar (CPR)

Ομιλητής: **Prof. Pavlos Kollias**, Stony Brook University, Brookhaven National Laboratory

Abstract

The EarthCARE satellite (Earth Cloud, Aerosol, and Radiation Explorer) is a joint ESA/JAXA mission for improving our understanding of the role of clouds and aerosols in the climate system. EarthCARE was successfully launched on 28 May 2024 and its payload includes a 94-GHz Doppler cloud profiling radar (CPR), a high-spectral-resolution atmospheric lidar (ATLID), a multi-spectral imager (MSI) and a broadband radiometer (BBR). With the decommissioning of NASA's CloudSat and CALIPSO satellites in 2023, the launch of EarthCARE could therefore not come at a more opportune time. Cloud, aerosol and radiation processes remain key areas of uncertainty in climate modelling, and in recent years we have also seen the advent of global km-scale convection-resolving models that are in urgent need of evaluation at a appropriate level of detail and resolution.

The EarthCARE CPR (hereafter EC-CPR) is the second 94 GHz radar in space after NASA's CloudSat radar. The EarthCARE CPR uses a larger antenna (2.5 m compared to 1.6 m diameter for CloudSat) and operates at a lower altitude (400 km versus 710 km for CloudSat) than the CloudSat profiling radar. The EC-CPR higher sensitivity and smaller footprint is expected to detect more non-precipitating clouds and provide improved estimates of shallow precipitation. In addition, the EC-CPR will be the first atmospheric

radar with Doppler capability in space. The Doppler velocities from the EC-CPR are expected to provide the first-ever climatology of hydrometeor sedimentation rates and convective motions. Here, we will present a preliminary evaluation of the first light EC-CPR observations during the first 10 months in orbit. Examples of EC-CPR observations from different cloud, precipitation and convection systems will be presented to highlight some of its salient features. In addition, we will provide a quantitative evaluation of the EC-CPR Doppler velocity measurements.

Short Bio: Kollias is a Professor at Stony Brook University – State University of New York and has a joint appointment with the Department of Energy Brookhaven National Laboratory. Kollias is internationally recognized as one of the leading thinkers in the use of radars for the study of atmospheric phenomena. He is interested in cloud and precipitation microphysics and dynamics, smart sensors, instrumentation, and participates in several national and international projects that involve the development and application of novel phased array and spaceborne radars for weather and climate research. Prior to being hired as a joint appointment at Stony Brook University and Brookhaven National Laboratory, Kollias was a prestigious Canada Research Chair and Professor at McGill University, Montreal Canada. He has authored and co-authored over 200 peer-reviewed scientific articles, and he is the recipient of a Humboldt Research Fellowship from Germany in 2013 and of the AGU Atmospheric Sciences Ascent Award in 2020.
