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"Fueling of Catastrophic Weather Events in the Middle Latitudes by Hurricanes in the Tropics"

Thursday, April 11, 2019, 7:00 PM
Columbia University, Davis Auditorium, 412 CEPSR, 530 W. 120th Street, New York, NY 10027
Host: Michael Previdi <mprevidi@idec.columbia.edu>

Over the past two decades, an unusually large frequency of major flooding rain events, strong winter storms, severe weather outbreaks, Mediterranean Storms, and wayward polar vortices have been impacting the middle latitudes. In many of these instances, these events can be shown to be triggered by “tropical plumes” (TPs) that periodically burst poleward in an atmospheric region called the Upper Troposphere-Lower Stratosphere (UTLS), centered around 14 km above the surface. This region is in the so-called “overworld”, where the air resides above the maximum height, in the tropics, that the net radiation loss of energy to space is able to bleed off the geopotential energy placed there. Hence, air lifted to the tropical UTLS by the actions of tropical convection and tropical storms, becomes thermodynamically trapped in an overworld bubble. On the global scale, the bubble itself is dynamically trapped in tropical latitudes by the effect of the Earth’s rotation. To relieve pressure built up in the bubble, UTLS air squirts out the sides of the bubble in the form of poleward bound TPs of potential energy. In doing so, TPs transport considerable amounts of energy into the middle latitudes that eventually becomes available to fuel extratropical weather events. In this talk, we will examine the process by which tropical cyclones fill the UTLS energy bubble, and track how several hurricanes and typhoons have directly triggered the formation of consequential tropical plumes and extratropical weather events.

Prof. Tripoli has been a professional atmospheric scientist focusing on atmospheric and oceanic research for nearly 43 years and performing atmospheric research overall for over 50 years. He has been involved in the early development of a barotropic forecast model (1967-1968), development and use of first computerized satellite-derived atmospheric motion vectors (MOAA/NESS/CFDB 1972-1973), development of a Global ocean analysis system (NOAA/GFDL 1974), initial development of the first multiply nested tropical cyclone modeling system (NOAA/GFDL 1974-1976), development of the first 3D explicitly resolving cloud/mesoscale model using bulk microphysics (CSU RAMS, 1976-1987) and the first variable stepped topography model capable of explicitly simulating microphysics and aerosol chemistry on all scales of the atmosphere. University of Wisconsin Nonhydrostatic Modeling system (UW-NMS). Professor Tripoli has expertise in mesoscale modeling, cloud modeling, microphysics processes and modeling, nonhydrostatic and fluid dynamics and thermodynamics, mesoscale dynamics, tropical cyclone dynamics, thunderstorm dynamics, tornado and supercell dynamics, tropical dynamics, extratropical dynamics, operational and research tropical cyclone modeling, Mediterranean storms, and global circulation and jet stream dynamics. Currently, Tripoli’s research is focused on tornado dynamics, Hurricane outflow dynamics, and the dynamics of tropical plumes and their interaction with the extratropical Rossby wave train.

No registration required – this is a public event. The seminar will be followed by a food/drink reception.