



SCOSTEP Distinguished Young Scientist Award 2016 – Dr. Nicholas Michael Pedatella

*Dr. Nicholas Michael Pedatella from the University Corporation for Atmospheric Research (UCAR) is the recipient of the SCOSTEP **Distinguished Young Scientist Award** for 2016 for his work on atmospheric variability and data assimilation and ground-breaking contributions to our understanding of the influence of lower atmospheric waves on the spatial and temporal variability of the mesosphere, ionosphere, and thermosphere.*

Dr. Pedatella's in-depth study using GPS TEC observations as well as simulations including solar and lunar tides, have established the mechanisms that are involved in coupling the sudden stratospheric warming (SSW) phenomenon to ionospheric variability. He has also identified the ENSO phenomenon as a possible tropospheric source of ionospheric variability. His large number of refereed publications (35) with 27 as first author, high citations (h-index of 14) and 6 invited talks in major international conferences, point to the significant impact that his work has already had in the field. He is the team leader for an ongoing International Space Science Institute International study on ground-to-space understanding of SSWs.

During his postdoctoral fellowship within the NCAR Advanced Study Program he studied the variability of migrating and non-migrating tides due to the presence of traveling planetary waves (PW). This work was motivated by his analyses of tidal signatures in the thermosphere and ionosphere using satellite and ground-based observations. Using NCAR's numerical models, he unambiguously demonstrated that the mean wind changes do not significantly affect either the migrating or non-migrating tides, and that the tidal variability is mainly caused by the nonlinear PW and tidal interaction and zonal asymmetry introduced by the PWs. Dr. Pedatella's work on lunar tides is particularly noteworthy. Interest in lunar tides has grown since analyses of thermosphere and ionosphere observations (including analyses he conducted) indicated that the lunar semi-diurnal tide signal in the ionosphere is strong during sudden stratospheric warming (SSW) events. Dr. Pedatella demonstrated, using a combination of global atmospheric and ionospheric models, that both the magnitude and phase of the simulated vertical drift perturbation during SSW improves significantly compared with observations when the lunar tide is included. This study provides the most definite evidence in support of lunar tidal impacts on the ionosphere during SSW so far. Finally, Dr. Pedatella's more recent study of ENSO control of upper atmospheric tides provides new insights in the link between tropospheric climate and near space environment.

Equally at home with using large numerical models and analysis of satellite and ground based observations, Dr. Pedatella has more recently focused on the development and application of data assimilation techniques. Within a relatively short time he successfully collaborated with researchers outside of his scientific discipline to implement a data assimilation system using the NCAR Whole Atmosphere Community Climate Model. He has used these to better understand the short-term variability in the middle and upper atmosphere and the response of the ionosphere to geomagnetic forcing. His scientific breadth is further demonstrated by his most recent work that aims to improve ionosphere remote sensing techniques. One example of which is his development of an improved inversion of ionospheric electron density profiles from FORMOSAT-3/COSMIC observations.

Dr. Pedatella has already shown scientific leadership in STP research. He is the team leader for an ongoing International Space Science Institute International Team on the "A three-dimensional ground-to-space understanding of sudden stratospheric warmings." Within that team, he led the inter-comparison of four leading whole atmosphere models, and demonstrated that one of the major causes of model bias is the uncertainty associated with gravity wave parameterization. He was the chair of the Student Program at the Eighth FORMOSAT-3/COSMIC Data Users' Workshop, and is a co-chair of the International Association of Geomagnetism and Aeronomy Working Group II-D: "External Forcing of the Middle Atmosphere."