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EPP-climate link by reactive nitrogen polar winter descent: Science studies for the EE11 candidate mission CAIRT

Polar winter descent of NO_y produced by energetic particle precipitation (EPP) in the mesosphere and lower thermosphere affects polar stratospheric ozone by catalytic reactions. This, in turn, may affect regional climate via radiative and dynamical feedbacks. NO_y observations by MIPAS/Envisat during 2002–2012 have provided observational constraints on the solar-activity modulated variability of stratospheric EPP-NO_y.

ESA's Earth Explorer 11 candidate Changing Atmosphere Infra-Red Tomography (CAIRT) will observe the atmosphere from about 5 to 115 km with an across-track resolution of 30 to 50 km within a 500 km wide field of view. CAIRT will provide NO_y and tracer observations from the upper troposphere to the lower thermosphere with unprecedented spatial resolution. We present the science studies using WACCM-X high resolution model runs simulating a Sudden Stratospheric Warming event to assess its potential to advance our understanding of the EPP-climate link and to improve upon the aforementioned constraints in the future.

Topic

Upcoming Earth observation limb and occultation instruments

Author: BENDER, Stefan (Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain)

Co-authors: Dr FUNKE, Bernd (Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain); SINNHUBER, Björn-Martin (Karlsruhe Institute of Technology); Dr POLI, Gabriele (Institute of Applied Physics "Nello Carrara", Italian National Research Council, Italy); STILLER, Gabriele (KIT, IMKASF); Dr LIU, Hanli (University Corporation for Atmospheric Research, Boulder, CO, USA); UNGERMANN, Jörn (Forschungszentrum Jülich); Dr LÓPEZ PUERTAS, Manuel (Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain); Dr GARCIA-COMAS, Maya (Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain); HÖPFNER, Michael (Karlsruhe Institute of Technology); Dr SINNHUBER, Miriam (Karlsruhe Institute of Technology); Dr PEDATELLA, Nick (University Corporation for Atmospheric Research, Boulder, CO, USA); PREUSSE, Peter (Forschungszentrum Jülich); Dr ERRERA, Quentin (Royal Belgian Institute for Space Aeronomy, Brussels, Belgium); Dr RHODE, Sebastian (Forschungszentrum Jülich)

Presenter: BENDER, Stefan (Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain)