Virtual BSC RS/ ES inDust Webinar: Advances towards dust seasonal predictions

Objectives

The lecture will focus on the advances done on the development of dust seasonal predictions in the framework of the S2S project (http://s2sprediction.net/).

Abstract: In recent years, user demand for forecasts that fill the gap between medium-range weather (up to 15 days) and long-range or seasonal (3–6 months) forecasts has increased. Skillful subseasonal to seasonal prediction can support decision-making and help optimizing resource management decisions. Prediction at the S2S scale, however, is particularly challenging because it is both an initial value problem, much like the standard Numerical Weather Prediction (NWP) medium-range, and a boundary value problem like seasonal prediction. Over the years, researchers have been trying to find source of predictability at this scale, looking at natural-occurring patterns or processes both in the troposphere and the stratosphere that have a periodicity of weeks up to a few months. The Madden-Julian oscillation has been identified as one of the most important of such patterns. However, much debate is still ongoing as far as what the triggers of the MJO and what the important feedbacks connected to it are. Recent work has shown that the atmospheric constituents such as aerosols and other tracers (i.e. ozone) can be important modulators of the radiative processes at the S2S scale. For example, the direct effect of aerosols may influence predictability via the MJO modulation of the aerosol fields. In clear-sky, the cumulative aerosol forcing can modify the radiative balance of the atmospheric column and introduce temperature perturbations which depend on the dominant aerosol types and their optical properties. Wind-emitted aerosols such as desert dust appear to be the main contributors. However, sensitivity studies performed with the ECMWF's coupled Ensemble Prediction System have shown that biomass burning aerosols may also play an important part, in particular for areas where extensive seasonal biomass burning takes place such as central Africa and Indonesia. Aerosols of volcanic origin have also been shown to affect stratospheric processes and to also have a large impact on the S2S prediction. In this talk a review of current efforts to understand the impact of aerosols on the S2S prediction will be presented and discussed with particular focus on dust. The possibility of dust prediction *per se* at the S2S scale will also be discussed.

Dr. Angela Benedetti is a Senior Scientist at the European Centre for Medium-Range Weather Forecasts, Reading, United Kingdom. She received her master degree in Physics at the University of Rome, "La Sapienza" and earned a PhD in Atmospheric Science at Colorado State University in Colorado. She joined ECMWF over 16 years ago as a research consultant to work on assimilation of cloud and precipitation information from active sensors. After 2 years, she started working on GEMS, MACC and MACCII, the precursor programs of the EU Copernicus Atmosphere Monitoring Service whose mission is to provide services related to prediction and monitoring of atmospheric composition. Her role in these projects has been that of developing and maintaining the aerosol assimilation system. She has been since at the forefront of aerosol prediction, and has contributed to the enhancement of the field by cofounding the International Cooperative for Aerosol Prediction, by serving in several international committees (WMOS-SDS, GAW SAG, Aeolus Mission Advisory Group), and by publishing several contributions in international scientific journals. She also contributes yearly to the Bulletin of the American Society State of Climate with her articles on aerosol anomalies. She has taught the atmospheric composition module in the ESA-sponsored MOOC on Climate Change and she is a regular lecturer at the yearly ECMWF's training course on Data Assimilation.

Together with Dr Frederic Vitart, she has pioneered the investigation of the aerosols radiative impacts o n the subseasonal-to-seasonal (S2S) prediction which has been summarized in a recent publication in Monthly Weather Review. She is also a PI of an ESA-funded activity on assimilation of aerosol reflectance data, and work package leader for the modelling activity in ACTRIS-2. She can be contacted at Angela.Benedetti@ecmwf.int.

Speakers

Angela Benedetti , European Centre for Medium-Range Weather Forecasts (ECMWF), United Kingdom
Host: Sara Basart, BSC Earth Sciences Recognised researcher, Atmospheric Composition Group

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