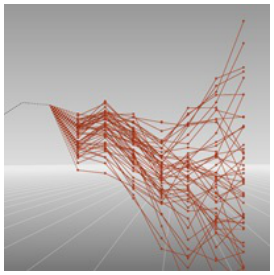

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The role of atmospheric composition in the predictability at the S2S scale

Tuesday, 3 September 2019 14:00 (50 minutes)

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 problems, 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, ozone and other trace gases 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 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.
Aeorols of volcanic origin have also been shown to affect stratospheric processes and to have also a large impact on the S2S prediction.
Interactions between stratosphere and troposhere are also considered to play
an important role. A correct definition of the stratosphere in models is connected to a correct representation of ozone. While this has been explored at the seasonal scale, investigation in the role of interactive ozone at the S2S scales is ongoing.

In this talk a review of current efforts to understand the impact of atmospheric constituents on the S2S prediction will be presented and
discussed.

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