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ENSO-Driven Skill of ENSEMBLES STREAM 2 Multimodel Seasonal Precipitation Hindcasts over the Globe

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Seasonal forecasting is a promising research field with enormous potential impact in different socio-economic sectors. The ability to forecast unusual climate conditions such as droughts or hot spells a few months in advance is particularly interesting in agriculture, energy requirements and other human affairs in order to avoid severe consequences.
This study assesses the skill of state-of-the-art seasonal forecast considering five coupled atmosphere-ocean general circulation models from the Stream 2 multimodel experiment of the European ENSEMBLES Project. The methodology applied by Frías et al 2010 over Spain is here extended to the world to present a map of regions with a significant seasonal predictability related to ENSO. To this aim, seven month hindcast simulations produced four times per year (November, February, May and August initializations) in the period 1961-2000 are analyzed.
In a first step, validations are carried out separately for each season; winter (DJF), spring (MAM), summer (JJA) and autumn (SON), considering both one and four-months lead time predictions (e.g. initializations of November and August are considered for winter). Then, since ENSO is considered to globally dominate interannual climate variability, the same process is repeated, but restricting validations exclusively to the years of the strongest El Niño and La Niña events.
The obtained results indicate that models seem to capture the ENSO phenomenon, yielding statistically significant skill over vast areas of the globe (not only restricted to the tropics) in the whole period. Moreover, a substantial gain in skill is obtained for the ENSO-conditioned validations, identifying this phenomenon as a potential source of seasonal predictability. The intensity of this signal depends strongly on the season and location, being usually stronger for La Niña episodes than for El Niño ones. Seasonal forecasts from the five models present quite different behaviours and in most cases, the multimodel outperforms any single model skill.
A global study of ENSO teleconnections is also performed attempting to link the increase of skill found over certain regions in the ENSO-conditioned validations to the existence of teleconnections. In some cases ENSO clearly appears as the physical cause of the predictability (Northern South America and South Eastern Asia droughts in autumn are the most clear examples); however, in other cases there seems to be additional sources of predictability.

References:
M. D. Frías, S. Herrera, A. S. Cofiño and J. M. Gutiérrez (2010): Asessing the Skill of Precipitation and Temperature Seasonal Forecasts in Spain. Windows of Opportunity Related to ENSO Events, Journal of Climate, 23: 209-220.