Master thesis Niti Mishra

context

The climate seasonal prediction are currently under used for prevention, adaptation and prediction by the public and economic sectors in Europe. This is partly due to the fact that the dynamical forecasts are difficult to access, poorly understood, untailored to specific needs, and therefore under-utilised by end user groups. In addition, Recent hydrological extreme events demonstrate the vulnerability of European society to water-related natural hazards, and there is strong evidence that climate change will worsen these events.
The first aim of present internship is to assess the forecast quality of the most comprehensive set of subseasonal and seasonal probabilistic predictions of temperature and precipitation over Europe.

Overview project
The aim of this project if to assess the skill of different seasonal forecast system and seasonal hindcasts performed at BSC in the different region of interest for the European project H2020 IMPREX:

- Calculate map of skill with different metric (Correlation, BrierSkillScore, CRPSS) in different forecast system available and hindcast available at BSC (ECMWF S4, EUROSIP, NMME...) over Europe.
- Perform the same analysis in the sub-regions of interest for the project: South-eastern French river basins, UK South-western river basin, Lake Como Italy, Bisagno river basin Italy, Jucar river basin Spain and Segura river basin Spain, Llobregat river basin Spain, Messara region Greece, Umeälven river Sweden, Central European rivers
- A specific effort will be put on the visualization of the score and data.

Time schedule

<u>Task 0:</u> Read :

Wikipedia (Week 1): General Circulation Models, Climate Change, ENSO

SPECS factsheets (Week 1): http://www.specs-fp7.eu/Fact%20sheets

<u>Task 1 Papers (Week 1 -4):</u>

Doblas-Reyes FJ, García-Serrano J, Lienert F, et al (2013) Seasonal climate predictability and forecasting: Status and prospects. Wiley Interdiscip Rev Clim Chang 4:245–268. doi: 10.1002/wcc.217

Prodhomme, C., F. Doblas-Reyes, O. Bellprat, and E. Dutra, 2015: Impact of land-surface initialization on sub-seasonal to seasonal forecasts over Europe. Clim. Dyn., doi:10.1007/s00382-015-2879-4. http://link.springer.com/10.1007/s00382-015-2879-4.

Pepler AS, Díaz LB, Prodhomme C, Doblas-reyes FJ (2015) The ability of a multi-model seasonal forecasting ensemble to forecast the frequency of warm , cold and wet extremes. Weather Clim Extrem 9:68–77. doi: 10.1016/j.wace.2015.06.005

Epstein ES (1969) A Scoring System for Probability Forecasts of Ranked Categories. J Appl Meteorol 8:985–987. doi: 10.1175/1520-0450(1969)008<0985:ASSFPF>2.0.CO;2

Brier, G. W. (1950). Verification of forecasts expressed in terms of probability. *Monthly weather review*, *78*(1), 1-3.

https://usclivar.org/sites/default/files/amoc/Latifetal_JCL_2006a.pdf

<u>Task 2 (Week 1-4):</u> Write few pages (~5) summary on the reading (with a part on the general context and a page on statistical aspect)

<u>Task 3 (Week1~3):</u> Follow Chloe's tutorial on s2dverification
http://ic3.cat/wikicfu/index.php/Tools/s2dverification#Presentation
http://ic3.cat/wikicfu/index.php/File:Tutorial_specs.pdf
http://ic3.cat/wikicfu/img_auth.php/Tutorial_ICTP.pdf

<u>Task 4 (Week 4~6):</u> Produce a map of skill (correlation, BSS and CRPSS) over Europe for all the considered systems

<u>Task 5 (Week 7~9):</u> Assess the skill and compute the reliability diagram for the different regions considered.

Task 6 (9~12): Write a report on this skill assessment, trying to answer the following question for each considered region: Are seasonal forecast valuable for the region? What is the best forecast system for this region? The report will also include an introduction, a data/method section and a section summarizing the main findings.