

Thursday 27 October 2022

Onsite: h.14 - Aula Palazzina Dip. Scienze della Terra

Remote: [via webex at this LINK](#)



Department of Earth Sciences - Torino
Contact: geoseminar.dst@unito.it

Seminars of geology

Drought in northern Italy. Actual and future observations and impacts on vegetation communities

Alice Baronetti

Istituto di Geoscienze e Georisorse, Pisa



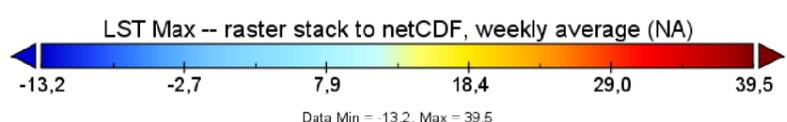
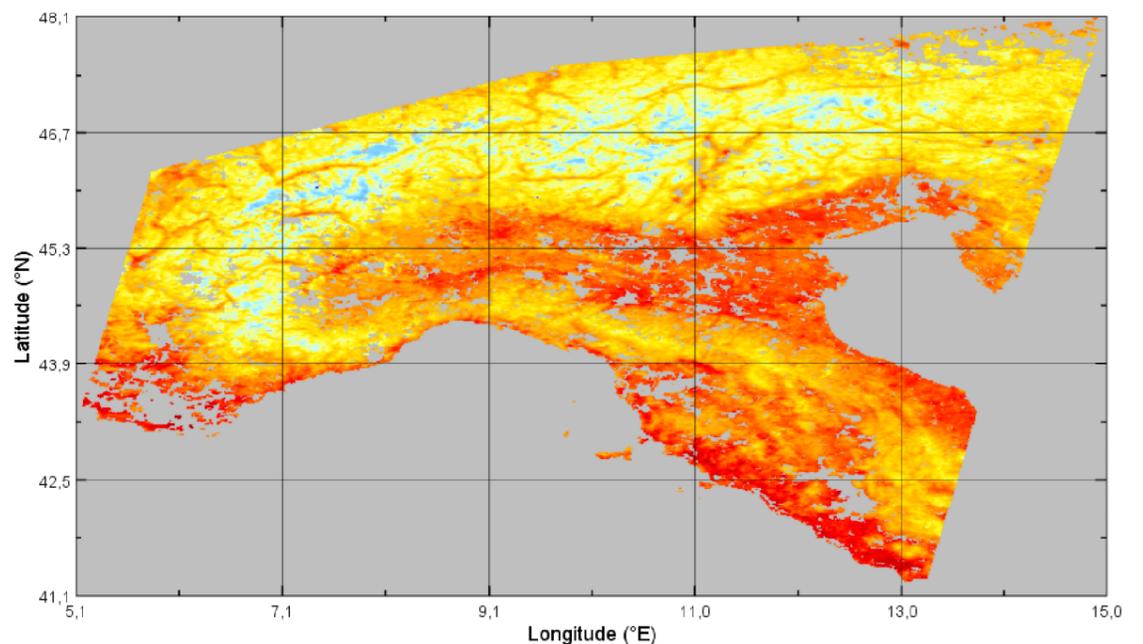
Drought is one of the most important consequences of climatic change for natural and socioeconomic systems. Northern Italy is historically rich in water resources, and one of the most fertile area. Recently drought events increased, affecting the hydrological behaviour of the Po River and the vegetation growth.

This study aims to quantify the spatial distributions of the drought events and identify its effects on vegetation greenness in northern Italy during the 2000-2020 period using MODIS images at 1 km of spatial resolution. For this purpose, correlation maps between fields of bi-weekly vegetation indices (NDVI and EVI) and drought indices (SPI and SPEI) were computed.

Firstly, the NDVI and EVI indices, were extracted from the atmospherically corrected MODIS images and vegetation trends were investigated by mean on the Mann-Kendall test. To investigate on drought events, 150 daily precipitation ground series were collected, aggregated at bi-weekly scale, reconstructed, homogenised and spatialised at 1km of resolution by mean of the Universal Kriging with auxiliary variables. Lands Surface Temperature (LST), assumed as air temperature, was collected, pixels with clouds were removed, and its accuracy was determined against the temperature high resolution gridded dataset in northern Italy. The NDVI-LST space was investigated as the yearly investigation of the link between NDVI and LST for 6000 random points in the study area. The evapotranspiration was than estimated by means of the Hargreaves equation and severe and extreme drought episodes were detected by means of drought indices (SPI and SPEI) calculated at 12-, 24- and 36-months. Trends were analysed, and the main drought events were characterised, identifying percentage of area under drought, magnitude, length and frequencies. Finally, each pixel was analysed spatially to investigate on the impacts of severe and extreme drought events on vegetation dynamics, and the Pearson's correlation between NDVI/EVI and SPEI/SPI at different time scales was calculated.

The results have figured out that in the last 20 years, the western portion was mostly interested by a drought intensification, with severe negative trends. The investigation on drought duration has figured out that the longest extreme drought events were detected in the Po Valley. Moreover, in the Po Plain negative impacts on vegetation are observed. At first droughts interest herbaceous vegetations, subsequently affect sparce and open forests.

LST Max -- raster stack to netCDF, weekly average



The Speaker

Alice Baronetti has a Postdoc at the Institute of Geosciences and Earth Resources (IGG) of the National Research Council of Italy (CNR) Pisa. She earned the PhD in Earth Sciences at the University of Turin in the Doctoral School of Science and Innovative Technologies. She is a scientist who has a rather wide range of interests in the fields of meteorology, climatology, and geosciences in general. She is focusing her activity in the study of climatic changes, with a specific interest towards precipitation, snow depth and drought events and vegetation, analysed using data from meteorological stations but also projection models (EURO-CORDEX and MED-CORDEX) and remote sensing images (MODIS and Landsat). During her career she won several scholarships in order to collaborate with European and International centres of excellence in climate change researches as University of Zaragoza and Instituto Pirenaico de Ecologia (IPE) in Spain, University of Moncton in Canada, and University of Rennes 2 in France.

