GISC405-22S1(C) (21 February to 03 June 2022)
GIS Programming and Databases
# "Advanced Earth and Environmental Analytics"

Assignment 1b
Due: Monday, 14th of March 2022, 10:00pm

Hand in you Jupyter Notebook into the Learn assignment dropbox and rename it with your user code: *abc123_Ass01b.ipynb Use commenting within your notebook to explain the objective of the scripts you write.* To download your notebook from see-trx4001 Jupyter Lab onto your local computer please right click the file in the notebook file browser and choose "Open in New Browser Tab" instead of "Download" (see screenshot example). A download tab will show and prompt you to download the file.
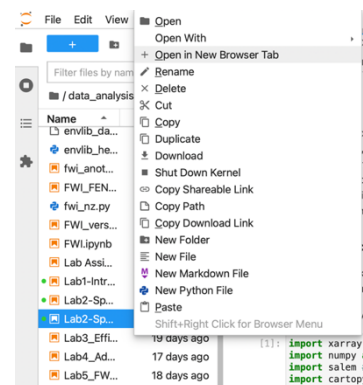
This assignment will help you develop on Lab 02 learnings and give you the opportunity to revise the Jupyter notebooks for these labs and associated online learning resources. This Assignment 1b will be marked 12.5%.

Task
To build Python functions for use in upcoming assignments and lab exercises.

1. The first function you will build should be able to read the U and V wind velocity variables from the WRF Netcdf files for the month of January 2020 and perform a monthly average wind speed calculation. The U (V) velocity are the west-to-east (south-to-north) components of the wind velocity vector and are extracted at multiple height levels. For this function, use one height level calculation at 10m above ground level and make sure you return the wind speed output. **Call this function *ws_monthavg_10m.***
   Tips
   a. Calculate the windspeed based on the equation: $WS = \sqrt{U^2 + V^2}$
   b. Average across time for the entire month after you calculate the wind speed
   c. Return your monthly averaged wind speed

2. The second function is a plotting function. Continue in the same notebook to build a new function that will take the wind speed output of the first function and produce a filled contour map of the wind speed over New Zealand at 10m above ground level. This function should be flexible enough to allow the user to enter a colormap of choice and a plotting range of wind speed values . **Call this function *ws_monthavg10m_map***
   Tips:
   a. Make sure you to use a geographic projection and add coastlines to your plot

For further information please contact the course coordinator/lecturer:
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