

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



Assignment 3 (marked 25%)

Due: Monday, 2nd of May 2022, 10:00pm

Hand in your Jupyter Notebook into the Learn assignment dropbox and rename it with your user code: **abc123_Ass03.ipyn**. Use commenting within your notebook to explain the objective of the scripts you write and rely on markdown to structure your notebook including discussion text and analysis whenever relevant in the assignment.

In this assignment you will be interacting with the calculated Fire Weather Index from both the Automatic Weather Station (AWS) and meteorological model gridded data from WRF. Use all the available time range in the database. ***Demonstrating the use of data chunking for optimizing the code is necessary whenever possible in your notebook. Do not forget to use geographic projections for producing maps.***

1. ***Objective: To understand how the modelled FWI compares to observations from AWSs leading to a real event of the Port Hills Fire that started on the afternoon of 13th of February 2017. Remember the dataset uses the UTC time zone and units of temperature for FWI calculations should be in Celsius.***
 - a. For this subtask use the nearest FENZ weather station to Early Valley Road (EVR), Christchurch. From the selected FENZ AWS construct the time series of FWI based on three different starting date scenarios (1 week prior to the fire event, 1 month prior, and 2 month prior). Avoid starting on a day when precipitation was occurring so adjust accordingly. Please revisit our Lab 07 course recording if you forget how to access the FENZ weather station data.
 - b. Repeat task 1a but with data from the nearest WRF grid point to EVR.
 - c. Compare and discuss the FWI from task 1a and 1b. Give possible explanations to the differences and use data/figures to support.
2. ***Objective: To develop a national fire weather climatology that can help in answering the following two questions***
 - a. Where are the regions in New Zealand that exhibit the highest occurrence of extreme fire weather conditions? Explain the potential reasons for the spatial heterogeneity.
Hint: Use the minimum extreme FWI threshold of 31 (inclusive) to calculate the number of days exceeding this threshold for each pixel in the WRF data. You will need to produce one map at the end of this subtask.
 - b. Over the last 20 years, is New Zealand experiencing a shift in fire weather to earlier times in the season?
Hint: Use the extended spring-summer-autumn months from September to March (7 months) for these calculations. Use a minimum FWI threshold of 17. Aim to produce a time series that aggregates all New Zealand pixels for a specific month of all the years. You should end up with 7 time series plots (each represents a certain month).

For further information please contact the course coordinator/lecturer:

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