

Internship certificate – Hira Zafar

02.08.2021

Hira Zafar joined Terranea as a geospatial analyst between April 01 and July 31, 2021 for her mandatory internship as part of her studies 'Copernicus Master in Digital Earth' at the University of Salzburg, Austria.

Terranea is a German location-based services consultancy. During her internship Hira was involved in the following of our activities:

- **Land cover classification (Corine Land Cover Plus)**
The aim of this project was to contribute to the preparation of training data to produce the new Corine Land Cover Plus dataset. The data was collected through visual interpretation of point samples on the basis of orthophotos and VHR satellite imagery. Labelling was according to the CLC+ nomenclature.
- **QGIS Action to visualize NDVI profiles**
To support the CLC+ training data collection, NDVI profiles were provided in HDF format and visualization was only possible through Jupyter notebook. Hira developed Python scripts enabling the visualization of the NDVI profiles in QGIS. This allowed a more efficient interpretation.
- **Land Cover classification**
Hira tested and compared different machine learning algorithms for land cover classification using SAGA GIS. They included among others Decision Tree, Random Forest, Support Vector Machine. The results were compared with a K-Nearest Neighbour as well as an Object-Based classification. The classification quality was assessed using the Austrian Land Use and Land cover survey (LISA) as reference dataset.
- **Urban Heat Vulnerability Index**
The objective of this task was to develop an urban heat vulnerability map. Exposure, sensitivity, and adaptive capacity were derived from Landsat satellite imagery (NDVI, NDWI) and population statistics. The three independent indices were fused into the final heat vulnerability index.
- **Drought Indices Calculation**
Goal of this task was to calculate, visualize and compare Earth observation based drought indices. Vegetation condition index and Global vegetation moisture index were tested using Sentinel-2 data.

Hira was very motivated and accomplished all works assigned to her to our complete satisfaction. She proved to be a very committed and flexible employee, who developed the right pathways to her solutions independently. Hira was an enrichment for our team, and we wish her all the best for her further studies and her future path in the geospatial industry.

A handwritten signature in black ink, appearing to read "Gunter Zeug".

Gunter Zeug
Managing Director