

Header: Emanuel Goulart Farias,
Matrikelnummer: 12413874
Title: 24S651031:



Copernicus Hubs and Institutions – Excursion Report

The excursion took place on the 10th of June where the entire student intake had the possibility to visit and get to know better the Earth Observation Data Centre (EODC) and the Umweltbundesamt (BEV/UBA), both located in Vienna, Austria.

EARTH OBSERVATION DATA CENTRE - EODC

The first stop of the excursion was at the Earth Observation Data Centre (EODC), which main buildings are in Vienna. The EODC is a foundation created on 15 of May of 2014 with a public-private-partnership (PPP). It is one of the most recognized institutions of Austria for Earth Observation and they are allocated on the same building of the Vienna Scientific Cluster, a project that holds the most powerful super computer of Austria. EODC aims to be a collaboration between public and private sector; to setup the operation of joint IT infrastructure and bridge a gap between science and applications. In partnership with the Vienna Scientific Cluster, the EODC has IT services tailored to earth observation (EO). Therefore, one of the strong partners are focused on mission-critical and science-friendly needs. EODC provides a variety of compute options in partnership with universities. For instance, the Austrian Data Cube is linked with EODC and is hosted in partnership with it.

The IT infrastructure of EODC is very impressive, with massive computer capacities of processing and data handling. Hearing from the CEO about how the IT centre is structured. It was interesting to see a profound concern about splitting the backup, so one data centre is hosted on the same place we visit, however the backup is hosted somewhere else in a different location in order to have double safety in case of any burning or any other danger.

As part of the visit, the IT Senior of the centre brought us to see how the Super Computer are allocated and installed over the space. The Vienna Scientific Cluster has the VSC 4 and the VSC 5, with probably a new rearrangement for developing the VSC 6 soon. We are able to see and understand the structure of the VSC 4 and VSC 5. Also, in parallel, the VSC holds a super computer with a lot of video cards graphs to provide a way of Universities and Research centres focus on the AI development.

Another interesting aspect of the visit was looking at Disk Storage, this Disk Storage as a efficient and affordable method to handle and save large number of data. All the EODC backup and data is stored by using the Disk Storage that works as old disk tapes but contemporary using magnets disk storages.

We also had opportunity to understand about how water is used to cool down the system and how massive these structures are in comparison with the Super Computer by itself. Part of the discussion was on the hypothesis of the spatial placement of the Super Computer. For instance, if the VSC were hosted on the alps the energy spent to cool down the system would be significant lower due to lower climate temperatures. The VSC is facing a challenge regarding climate change cause the supercomputer has a limit of temperature, which is able to run, the hot temperature on the summer increase a lot the demand of cooling down the system and even may cause a shut down on the clusters. The EODC comment that they have been studying to shut down a few

cluster on high hot days during summer period to: save energy OR reduce the number of clusters available in order to increase efficiency of the cooling down process.

BEV/UBA

Moving forward with the excursion, during the afternoon period we have visit the Umweltbundesamt team. The Umweltbundesamt is the Austrian Environmental Agency so we are able to get to know better their work, especially the Fernerkundung & Raumanalyse Remote Sensing and Spatial Analysis Team.

They gave us a briefly overview of their project. Their main focus are with Landcover, Biodiversity, Climate, and Lebensraumvernetzung.

One of the themes, which got my attention, was on the project of Soil Sealing. The BEV/UBA has develop in partnership with other institutes a to develop a spatial data that contains with a spatial resolution of 1 meter the soil sealing for whole Austria. This research highlights the importance of understanding and mostly, classifying soil sealing in order to be able of drive with better accuracy decision-making centred on data analysis. The innovative scope of the project shows up that on a short future we should be able to model for subjects as hydrology using these soils sealing rasters data. In addition, it highlights again the importance of cities and countries to regulate about soil sealing areas or minimum percentage areas over buildings that should be not sealed with concrete. This data opened up myself to research more about this soil sealing data and the forward application due to that.

Another interest project showed up by the BEV/UBA was over the nature restoration and regulation of green areas and tree in urbans ecosystems. We understand that demands high resolution to map and classify all tree in urbans ecosystem and its importance of urban planning. Getting to know hotspots of urban trees facilitate the identification of urban heat island and foster the implementation of green spaces and new trees on zones without it, in order to increase human-comfortably under heat island. Again, spatial data plays a crucial role for planning resilient cities over climate change conditions.

The third topic presented to us was regarding the Earth Observation for drought vegetation. The BEV/UBA has combine various data sources such as in-situ, laser scanning and optical & microwave remote sensing to derive innovative vegetation indices. With this approach, the BEV was able to assess temporal dynamics across various spatial and temporal scales. Therefore, they develop a use-case on drought monitoring. This indicator became an official EEA indicator at the EU agenda for environmental policy. Nowadays, the indicator is updated annually and allows the monitoring of drought impacts and weather events. The core work of BEV/UBA was by calculating the soil moisture deficit during growing season and assessment of vegetation productivity anomalies.

At the end, they showed up another interesting project that is about biotope network and habitat connectivity. The importance of understand spatially about how habitats are fragmented and even, how is it possible to connect these habitat against to foster non-recessivity of DNA of interspecies. The role of BEV/UVA was designating and visualizing of habitat corridors in Austria. Guidance on the installation of crossing on the major transport network. Maintaining and providing the integral dataset of habitat corridors for Austria as a basis for spatial planning.

The visit was very welcome and important for all the students.

EU Inspire & EU Copernicus Data Space Ecosystem

Inspire is an acronym for: Infrastructure for Spatial Information in the European Community (INSPIRE) and is an initiative of the European Commission with the aim of creating a common environmental policy by using spatial data infrastructure. The INSPIRE project is based on the FAIR principles: Findable, Accessible, Interoperable, And Reusable. These principles aim to improve the way the research data is managed and shared, making it easier for both human and machines to discover, understand and utilize data. So we receive a brief of main recommendations for spatial data infrastructure regarding the INSPIRE project. One point discussed was using the ISO/OGC/W3C standards for data specifications. The metadata should follow ISO/DCAT-AP/GeoDCAT, which are again standards for data required on INSPIRE project. Due this project, not only the Austrian Environmental Agency but all Environmental Agencies part of EU are now able to prepare their geodata compatible with the INSPIRE standards that follow even higher lever standards. This convention, allows the data to be used and shared beyond administrative borders. A uniform design European geodata infrastructure can reduce barriers by preparing and unify policies of the EU.

The EU Copernicus Data Space Ecosystem is a multiple partnership of ESA, Copernicus and the EU program. The main goal is to provide an ecosystem ready, with end-to-end data for users. The Data Space is an umbrella scope, which hosts different projects underway. As a good example of the EU Copernicus Data Space is the EO data browser that allows users with the bare minimum of effort to retrieve satellite images from Sentinel campaigns for date and time arbitrary chosen. In addition, it allows the creation of different index and is very user driven. Therefore, it does not demand code to achieve nice results. The ecosystem offer a broad range of infrastructure, services and tools designed to unlock the full potential of Earth Observation data. By fostering an open, dynamic and ever-expanding ecosystem, the EU Copernicus data space foster innovation.

Over the future, the data system will be the main distributor platform from the EU Copernicus missions. Instant access to full and always up-to-date Earth Observation data archives is supported by a new more intuitive interface. The Copernicus Data Space relates with EODC on a lower level due the EODC collaborates with data and infrastructure. The relation of CDSE with Austrian Environmental Agency is on a higher level comparing to the EODC, being more as a user of the data provided by Copernicus missions.

The Copernicus services transform the wealth of satellite image and in situ data into timely and actionable information by processing and analysing it. The services deliver datasets and time series that are comparable, searchable, ensuring that trends and changes are monitored.