**Daily Log Project M.Sc. ECMM510**

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**Project Name: Change Detection for protecting UNESCO World Heritage**

**Internal Supervisor: Dr. Milto Miltiadou**

**External Supervisor: Athos Agapiou**

**Daily Log of Activity**

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| Date | Activity | Outcomes | Comments |
| 14/01/2025 | MSc Research Project Introduction | N/A – Introduction to main project deliverables and deadlines | N/A |
| 16/01/2025 | Project Inquiry and Supervisor Approval Meeting | Approval to be on the project | N/A |
| 03/03/2025 -13/03/2025 (Week 1-2) | - | Explored random related literature to get a general understanding of the potential direction of the project.   Divided UNESO sites into approximately 3 categories: Natural, Cultural within Urban Area, and Cultural sites outside Urban hubs | Cultural sites outside urban hubs were identified as the most promising focus, allowing for both change detection and predictive analysis of endangerment.   This is due to changes being visible within a timeframe before that would allow the project to be more proactive rather than reactive to changes. (Within urban hubs this was found to likely best addressed in a more administrative way. – as changes were closer to taller buildings changing the landscape what potentially could be more difficult to detect via satellites) |
| 06/03/2025 (Week 1) | Initial Group Meeting (Weekly Meeting) | Initial Meeting officially kickstarting the project and started project proposal. | N/A |
| 13/03/2025 (Week 2) | Initial Meeting with Athos | Further introduction to project, incredibly useful as this opened the direction the project can take. | Incredibly useful meeting for my understanding of the importance of project like this one – one key takeaway was the mention of how remote sensing for monitoring inaccessible sites such as those within warzones/similar. |
| 13/03/2025 | Meeting for Project Proposal | Project Proposal rough section outline. | N/A |
| 18/03/2025 (Week 3) | Google Earth Engine Lecture | Further introduction to Google Earth Engine (GEE). | Very useful to understand the kind of that that I will be dealing with. |
| 21/03/2025 (Week 3) | (Weekly Meeting) | Discussion on site selection, and polygon selection around sites for PlotToSat and then ML (for project pipeline). | No site was selected at this point- some exploration had been done before on google maps but that was limited and found no results. |
| 24/03/2025 (Week 4) | Site Exploration | Attempted to select a site by looking around on google maps – this was tedious so moved onto using GEE | Moved onto GEE using python API |
| Site Exploration with GEE and GEEMAP tools | Created a tool to aid in site exploration where I would take the site locations from the UNESCO  Explored sites initially around the Levant, 1 site in Crete and looked at pins within Romania, the UK and little bit within Spain – mainly stuck to looking at the Levant at first though however a site with large scale changes (excluding Palestine) were not really spotted.   Further exploration into the neighbouring countries – Egypt (briefly) and Iraq (heavily) identified a site in Smarra containing what I can assume to be older parts of the city and palaces from the Abbasid Caliphates (from approx. ~800s). | This tool was created as using google maps for this was tedious and slow – all this code is reusable within the actual project later.   Would personally like to look more into the ancient cities within the area however, those appear to mostly be out of the way of Uran Areas or only have minor activity around them (excluding Ur. Where there is an airport right next to it. A day to perform further exploration would be nice – but might not be possible until the 7th of April as the project needs to move on)   Tiling was achieved but more as a coincidence while trying to load the images faster- was achieved by creating multiple tasks for GEE by tiling then requesting those segments as separate tasks then collating the image – no further exploration has been done as it was not useful to the aim of site exploration.   Initial exploration on ‘S2’ but moved to ‘S2\_HARMONIZED’ as there was less variety in image intensity (brightness) – used B4, B3 and B2 bands (RGB) |
| 27/03/2025 (Week 4) | Group Meeting (Ethics and Risk Assessment) (Weekly Meeting) | Discussion on Risk assessments within the Project Proposal. A need for feasibility for parts of the project and where to move onto (contingencies) if parts do not work out as planned. | “FAIR” – Findable Accessible, Interoperable and Reusable.  Deliverables – actual deadlines for this project + parts of the project (that will be made open source)  Risk for project being noise in the data causing potential misclassification – contingency is to increase the resolution (larger polygon) so that the classifier becomes more accurate. |
| 27/03/2025 | Code Expanded | Added ability to select time-span and date for selected polygons on `geemap` to collect and view for comparisons. | Very useful as now I understand how to access and further manipulate polygons within the gee data structures (python). |
| 28/03/2025 | Meeting for findings | Site at Smarra selected as primary site of interest.   Project pipeline for the project proposal is now the next area the needs to be progressed. | N/A – Ditto left box |
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| PHASE 1: Data Collection and Labelling. | | | |
|  | Labelling site boundaries … |  | TODO: copy down labels from calendar for this missing section \* |
|  | Tiling … |  |  |
| 12-06-25 | Created `[pts\_samarra.ipynb](https://github.com/JamesChamberlainw/COMM514/blob/main/PlotToSat/pts_samarra.ipynb)` and `[pts\_runner.py](https://github.com/JamesChamberlainw/COMM514/blob/main/PlotToSat/pts_runner.py)` | Attempted to loop through all years and chunks. Both work but are unstable and the old method for checking if GEE is active is way too slow – so would make downloading this data take ages. | N/A – Ditto left box |
| 17/06/2025 | Created `[pts\_check4usage.py](https://github.com/JamesChamberlainw/COMM514/blob/main/PlotToSat/pts_check4usage.py)` | Util functions for checking if GEE is actively computing anything | Designed and tested however did not have time to start using it so was left till the next day. |
| 19/06/2025 | Stablised `[pts\_runner.py](https://github.com/JamesChamberlainw/COMM514/blob/main/PlotToSat/pts_runner.py)`, and `[pts\_samarra.ipynb](https://github.com/JamesChamberlainw/COMM514/blob/main/PlotToSat/pts_samarra.ipynb)` for dataset download | Minor changes to last 3 files and added to the `[pts\_runner.py](https://github.com/JamesChamberlainw/COMM514/blob/main/PlotToSat/pts_runner.py)` | Data downloads now in a stable manor, have as of committing this file (19/06/2025 2:57) have not had any failures on GEE. |
| Attended Day 1 of ML4EO | Machine Learning for Earth Observation conference | Got to meet some wonderful people and attending has aided with my terminology understanding towards EO. |
| 19/06/2025 | Attended Day 2 of ML4EO | Dito | Generally incredibly useful through all 3 days – commenting in the middle here to state how useful it was to meet and discuss with people – as these discussions have been invaluable towards my understanding of earth observation – this I know is a very generalist comment, but it can’t be understated. |
| 20/06/2025 | Attended Day 3 of ML4EO | Introduction into foundation models (IBM session) | Incredibly useful, as these are models that can be adapted through transfer learning to a new site without as much pressure to find, create and source as much training data manually, meaning that way less time would need to be spent on compute and other pre-and subsequent steps. |
| 22/06/2025-23/06/2025 | Continued Data Collection | As of this point an approximated 72 hours of time remains with training. | Had to keep pausing data collection and had a few minor issues |
| 24/06/2025 | Data collection taking too long | This day only collection 4 tiles of about 180 highlights an issue with data collection, forced to look into alternative approaches. |
| 25/06/2025-26/06/2025 | Data Collection via just monthly median raster’s | Data Collection via just monthly median raster | This is likely not that big of an issue as there is a 5 day revisit cycle for the s2 satellite, so the median should remove some of the noise, and this means that the data is going to be at a 10m resolution (going back to the original plan) however, this loses the consistency, noise reduction and easy of use that comes with using data collected using PlotToSat, and means that the files contain a lot more data   (as seen its rounds out to about 300GBs of data) |
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| 11/06/2025 |  |  |  |
| 13/06/2025 - 17/06/2025 | Implemented clip function and completed visualisation functionality for summaries of bands.   creating the report structure. | Implemented a function that creates a 3d plane plot, and separate graphics for visualising the summary mean statistics across a year for a given data frame (so that I can compare clusters later on)  Started laying out the final report, and moved re-useable text from the project proposal over. This is very much in a notes stage now, where the document is being planned out. | N/A – Same as left no additional comments needed. |

Materials and Study Area go together – map of the area, what data you are using, what data you are using, and what types of data that you use (inputs)   
Methods – experiments, designs, (this is the approach you take- ie. How you solve the problem) – creating the datasets – in my case – in the methods in classification creating algorithms, evaluating results – how you did this how you got your data (observing you distributions) what algorithms you tested, why you chose those ones, etc. diagram to explain these things.

Presentation is very important – make things stand out – SO USE GRAPHICS!!!! Its an easy way to maek your reader understand what you are doing.

In your results you amy only state your results – discussion is whereas for stating why you think algorithms behaved differently

Results -> Discussion -> Conclusions at the end of the report (and presentation – can be merged in presentation)

Try to keep presentation and report with the same format if possible.

Ensure you discuss everything in logical order – so in order – tell a story (this is for the background technical points)   
Clarity – make good diagrams. – make complex concepts accessible!!! Have good technical depth but make it understandable – good diagrams can help with this, and wording what you state clearly will make this easier.

Results, interpretation & reflection – ensure you go back and discuss your aims objectives – and when you have findings explain why you think this may be happening!

<https://www.panopto.com/>

# FINAL REPORT

You can have an appendix

e.g., a user guide can go into the appendix – e.g., explaining any opensource code you publish.

Same as presentation but in larger scope. Most of the stuff form the project proposal goes into here – very similar but expanded. Structure should follow the same as the presentation.

A white paper with black text

AI-generated content may be incorrect.

^ taken from the presentation file. But structure is the same bar changes discussed below:

Structure -  
Introduction (background, context),   
Dataset, Methods…

Contribution – reflect back to this in the end!!!!!! Make sure you do this (even if its not its own section) and discuss how this is innovative according to the literature!   
Results, Discussion, Conclusion then end on next steps

In discussion – make sure to link back to other studies and HOW this differs.  
  
**CONCLUSION: NEVER INCLUDE EBRIVATIONS** + MAKE SURE TO KEY OUTCOMES + THEN GO INTO FUTURE STEPS IN A PARAGRPAH!

Compare algorithms and why do you get the specific results and make sure to reflect back to the literature – and acknowledge the limitations (WHY do you think this is happening)   
DISCUSSION: MUST REFERENCE BACK TO THE ETHICS

Carbon footprint of the data   
new system in EU – report where you are importing stuff from (food) – e.g., if its form areas that have been deforested

**Make sure not to take the side   
can state there is a pressure between agricultural expansion (need for the local people depends on if they export) and site preservation pressure.**

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| Date | Activity | Outcomes | Comments |
| Data | What you aim to achieve: e.g., creating a 3d plot to visualise the temporal frequency of the region | What you achieve: visualisation of the 3d signature of the site. | Comments then allow me to further explore the site region   in the case of clipping this allows me to then clip out the region so I do not contaminate the clustering.  This allows me to to x  This failed meaning I have to  Failed |

**Write a short paragraph about meetings**