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

**Student Name: James William Chamberlain**

**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. | | | |
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| 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. |