Overview

***This is some useful project information / overview that might be nice to display on the Framework (at least as an example of displaying text etc.***

***I think the following would be nice functionality to be able to test / demonstrate …***

* ***HYPERLINKS – For some of the text it might be useful to make them into links to useful sites (which could in future be other pages on the framework but for now are external sites). The main examples of this is the list of instruments onboard the aircraft – it would be good if each of the instrument names (highlighted in orange) could be clicked on to take you to the site (given in green after the instrument name). Anywhere that the font is orange is text that I think would be useful to make into a hyperlink and the text following this in the green is the path of the link.***
* ***BOLD – Might be good to have some of the keywords in bold, or in a different colour, or both. I have coloured in blue any words which might be good to make stand out. Some of these are headings for sections which would be good to make stand out.***

# # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

**Project Overview**

Whilst aerosol and gaseous pollutants in the UK are generally well observed at the surface, and column averaged information is increasingly available from satellite observations, there remains limited data on the vertical distribution of key pollutants in the UK boundary layer. This information is needed to support air quality model development and evaluation.

The Met Office Clean Air project aims to address this gap by collecting regular airborne measurements over the Southern UK for a period of 1 to 2 years using the **Met Office Civil Contingencies Aircraft (MOCCA)**. MOCCA is an instrumented Cessna-421 and is on 24/7 standby to respond to a volcanic ash related civil contingencies event. The aircraft is operated by the Met Office Observational Based Research (OBR) group on behalf of the Civil Aviation Authority (CAA).

As well as an existing suite of aerosol/ash detecting instruments, the MOCCA has now also been instrumented to allow additional measurements of aerosol and gaseous pollutants for the Met Office Clean Air Project, part of the wider Met Office Air Quality programme. Airborne observations will take place approximately every 3 in 4 weeks, weather permitting, over the duration of the project, culminating at approximately 15 hours per month.

The key pollutants for observation are **PM2.5**, **PM10**, **NO2**, **SO2** and **O3**, which will be measured using the following instrumentation:

* **Cavity Attenuated Phase Shift (CAPS) NO2 Monitor [https://metoffice.sharepoint.com/sites/moobrcleanairprojext/SitePages/Cavity-Attenuated-Phase-Shift-NO2-Monitor-(CAPS-NO2).aspx]**
* **Portable Optical Particle Spectrometer (POPS)** **[https://metoffice.sharepoint.com/sites/moobrcleanairprojext/SitePages/Portable-Optical-Particle-Counter.aspx]**
* **Tricolour Absorption Photometer (TAP) [https://metoffice.sharepoint.com/sites/moobrcleanairprojext/SitePages/Tricolor-Absorption-Photometer.aspx]**
* **Nephelometer [https://metoffice.sharepoint.com/sites/moobrcleanairprojext/SitePages/Nephelometer.aspx]**
* **Droplet Measurement Technologies Cloud and Aerosol Particle Spectrometer (DMT CAPS) [https://metoffice.sharepoint.com/sites/moobrcleanairprojext/SitePages/Cloud,-Aerosol-and-Precipitation-Spectrometer.aspx]**
* **2B Technologies Ozone Monitor [https://metoffice.sharepoint.com/sites/moobrcleanairprojext/SitePages/2B-Tech-Ozone.aspx]**
* **SO2 analyser [https://metoffice.sharepoint.com/sites/moobrcleanairprojext/SitePages/SO2.aspx]**
* **Position data and basic meteorology [https://metoffice.sharepoint.com/sites/moobrcleanairprojext/SitePages/AIMMS.aspx]**

**Flight Planning**

The flight planning process involves considering a number of different **sortie options [link to the “Flight Sorties” heading on the page]** as well as a number of **flight pattern techniques** **[link to the “Flight Techniques” heading on the page]**.

Flight Sorties

Ground Network Survey

|  |  |  |
| --- | --- | --- |
|  | What | Survey flight in coordination with ground based monitoring sites which could also include missed approaches to sample the full boundary layer. |
| Why | Coordination with ground based sites provides both surface measurements and higher altitude measurements for evaluating the model. |
| When | Under any conditions. |

South Coast Survey

|  |  |  |
| --- | --- | --- |
|  | What | Route along the south coast between Exeter and Eastbourne, coordinated with overpassing ground based monitoring sites. |
| Why | Enables the contribution of continental pollution to UK air quality to be assessed. |
| When | Under background conditions and when southerly winds bring polluted air from the continent. |

City Scale Flux

|  |  |  |
| --- | --- | --- |
|  | What | Circular flights around large cities or urban areas. |
| Why | To measure the conditions upwind and downwind of a city to identify the flux of emissions from the city. |
| When | Under background conditions and under settled conditions when dispersion of pollution is minimised, and concentrations are allowed to accumulate. |

High Density Spatial Mapping

|  |  |  |
| --- | --- | --- |
|  | What | Intensive grid box scale sampling over urban areas. |
| Why | To assess the spatial variability of concentrations in high pollution conditions. |
| When | Under background conditions and under settled conditions when dispersion of pollution is minimised, and concentrations are allowed to accumulate. |

Targeted Events

|  |  |  |
| --- | --- | --- |
|  | What | Route targeting areas experiencing specific air quality episodes, coordinated with overpassing ground based monitoring sites. |
| Why | Enables measurements of concentrations during specific episodes to be recorded. |
| When | Under episode conditions such as continental plumes or dust events. |

Flight Techniques

Level Flying

|  |  |  |
| --- | --- | --- |
|  | Benefits  Provides information about the spatial changes in concentrations across large areas at a given altitude, unlike ground based monitoring which only provides surface level information. | Challenges  Airspace limitations may prevent a constant altitude being maintained and may limit the altitude range in which the aircraft may fly. |

Stacked Profiles

|  |  |  |
| --- | --- | --- |
|  | Benefits  Enables vertical changes in concentrations to be measured across a given sector, such as the downwind sector of a plume from a city. | Challenges  Airspace limitations may restrict the range of altitudes which the profiling legs can be flown at. |

Saw Tooth

|  |  |  |
| --- | --- | --- |
|  | Benefits  Enables vertical changes in concentrations to be measured. | Challenges  The rate of ascent and descent may be too fast for enough measurements to be made at each altitude in order to get a sufficient signal to noise ratio. |

Missed Approach

|  |  |  |
| --- | --- | --- |
|  | Benefits  Enables the aircraft to descend below the Civil Aviation Authority standard minimum altitude of 1000ft and obtain vertical profile information about concentrations below this altitude. | Challenges  Emissions from the airfield or from other aircraft taking off or landing could interfere with the concentrations recorded, making the measurements unrepresentative of typical background concentrations at these altitudes. |

Grid Box

|  |  |  |
| --- | --- | --- |
|  | Benefits  Provides information on how concentrations change spatially across a relatively small area (a city) with many different sources of emissions. | Challenges  Airspace restrictions prevent low level grid flying over some of the large urban areas, such as London. |