

The Eyjafjallajökull Volcanic Ash Cloud and its Effects on UK Air Quality. Update 06 May 2010

The volcanic ash cloud from the Eyjafjallajökull volcano once again grounded flights from some UK airports on May 4th and 5th. Figure 1 shows a graphic issued by the Volcanic Ash Advisory Centre at midday on 5th May showing the predicted extent of the ash cloud.

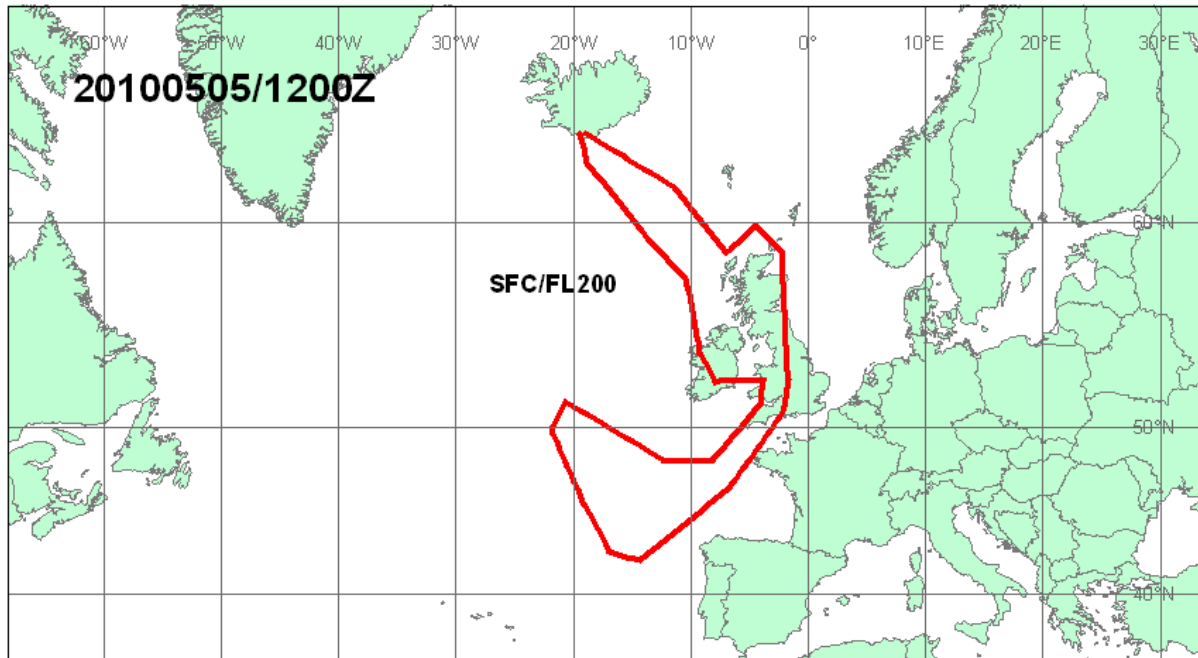


Figure 1. VAAC graphic showing the extent of the Volcanic Ash Cloud as of 12:00Z 5th May 2010.

The volcano has continued to erupt with varying degrees of ash release since 20th March 2010. Airspace over the UK receives the ash intermittently depending upon meteorological conditions and the extent of ash released by the volcano. On May 4th the Icelandic Metrological Office (IMO) released an update stating that the eruption had become more explosive and was producing more ash. This coupled with the metrological conditions at the time were responsible for transporting the ash cloud over the UK. Figure 2 shows an area of high pressure situated to the south of Iceland on May 5th which created an anti-cyclonic effect. Areas of high pressure in the Northern Hemisphere create clockwise wind patterns and this is exactly what occurred during 4th and 5th May transporting the cloud of ash over the UK. Corresponding airmass back trajectories from May 5th, Figure 3, support this. Figure 4 shows the volcanic ash plume as captured by NASA's Earth Observing-1 satellite on May 2nd 2010.

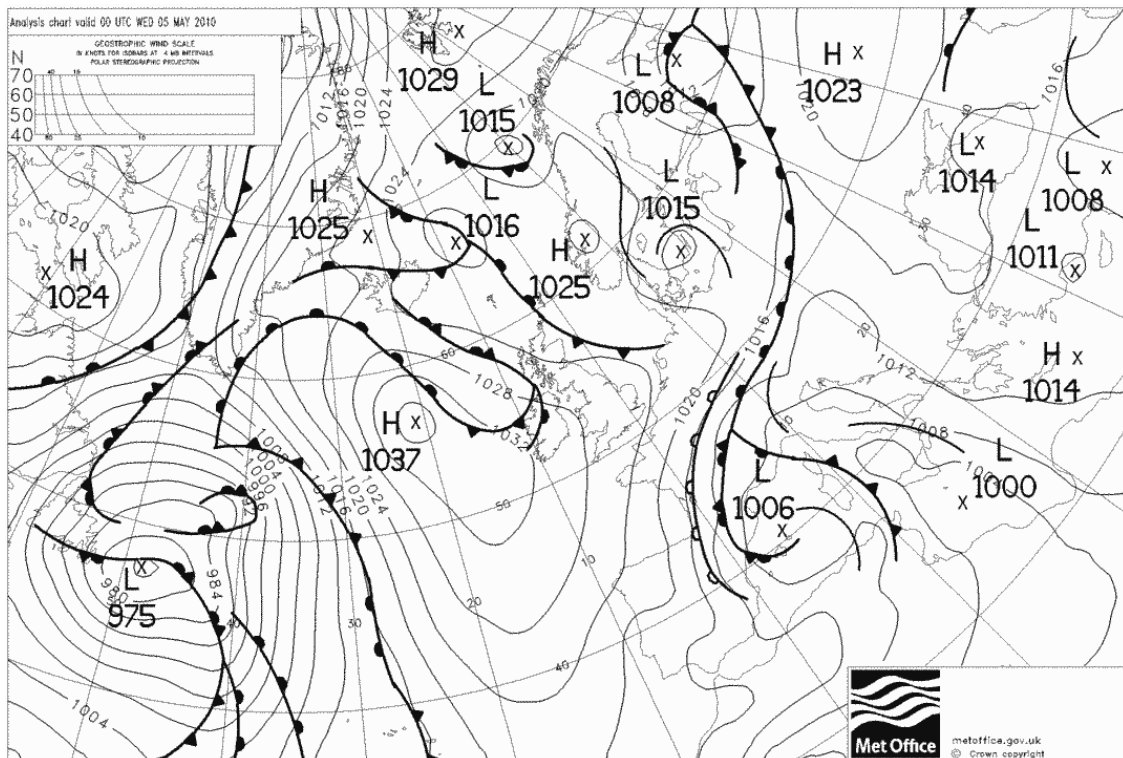


Figure 2. Synoptic Chart showing the area of high pressure south of Iceland on 5th May 00:00

Airmass back trajectories for 96 hours
upto 12:00 Wednesday 05-05-2010

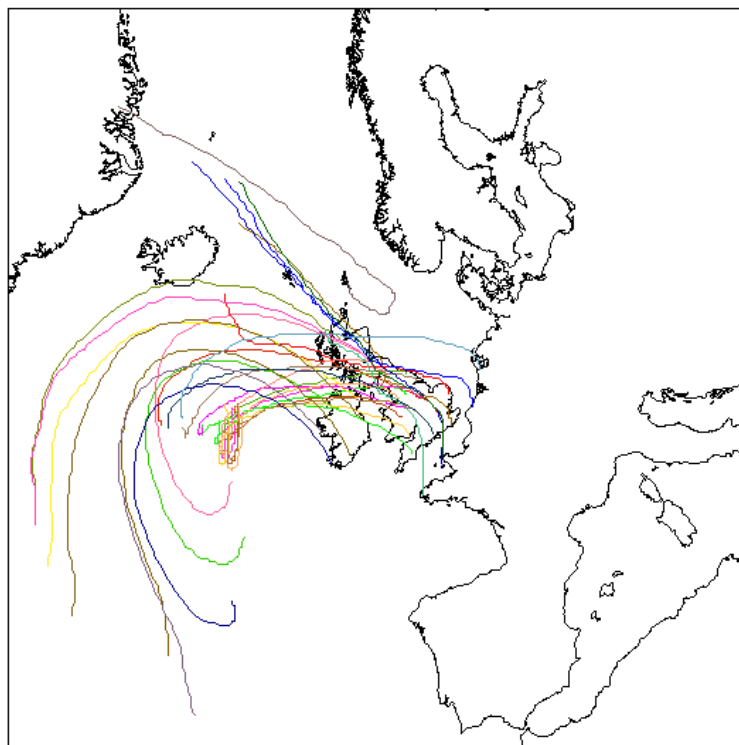


Figure 3. Airmass back trajectories for 5th May 2010

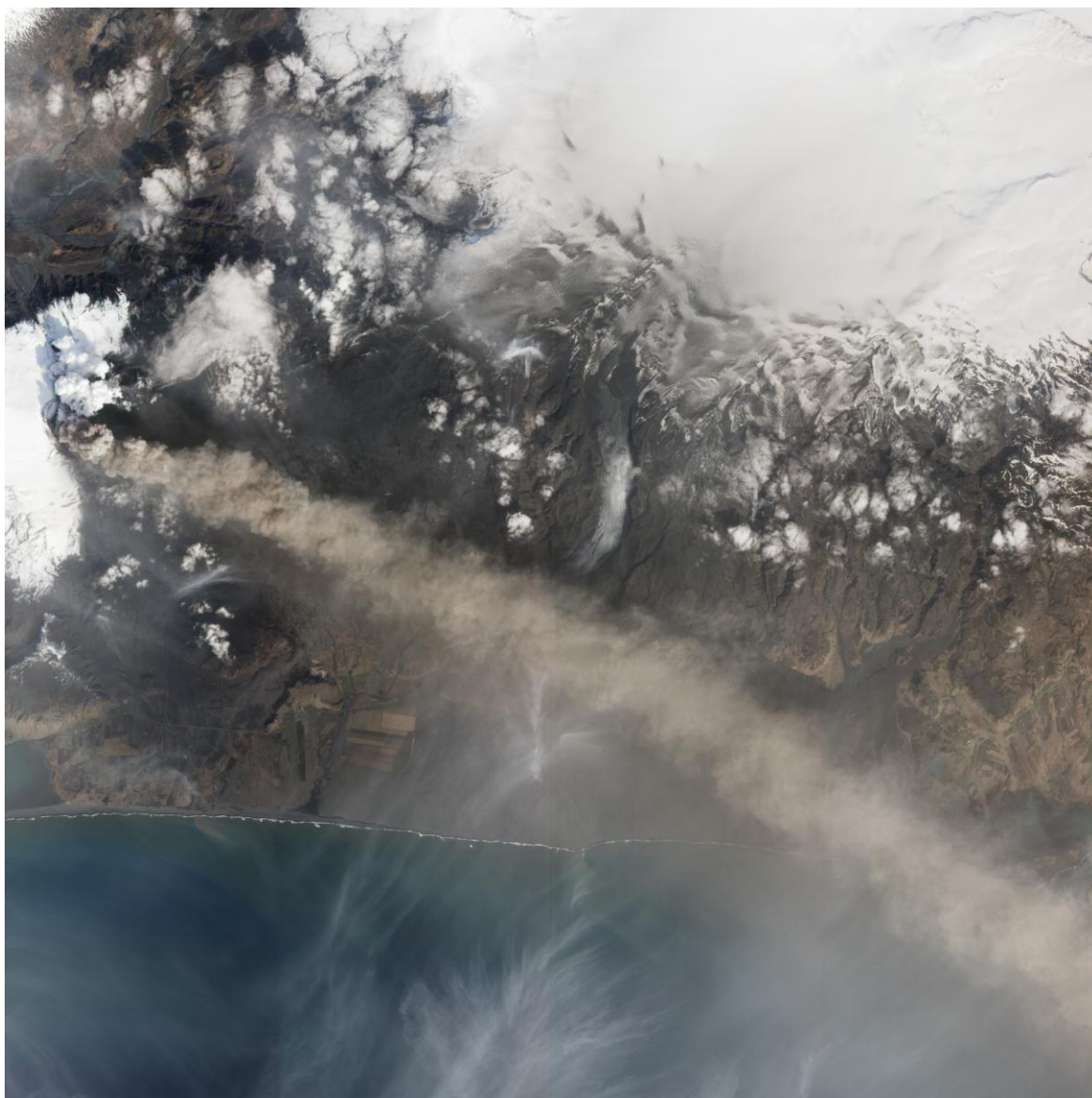


Figure 4. Satellite image of the volcanic ash plume taken on May 2nd.

At the time of writing air pollution levels for PM₁₀ continue to remain low everywhere across the UK (Figure 5) with little evidence of any plume grounding in the monitoring data. The PM₁₀ graphs for Northern Ireland, Figure 6, show some increase in background hourly concentrations across all sites on May 4th, although within “normal” variation of low pollution. The increase was $\sim 20 \mu\text{g}/\text{m}^3$ in the PM₁₀ non-volatile fraction and also seen in PM_{2.5}. Since other pollutants showed no increases at the same time the volcanic ash could be the cause of this increase in the background levels. The thick red line in both graphs represents the average concentration across all sites. There were also no increases in concentrations of SO₂, a gaseous pollutant expected to be found in volcanic plumes, throughout the AURN (Figure 7)

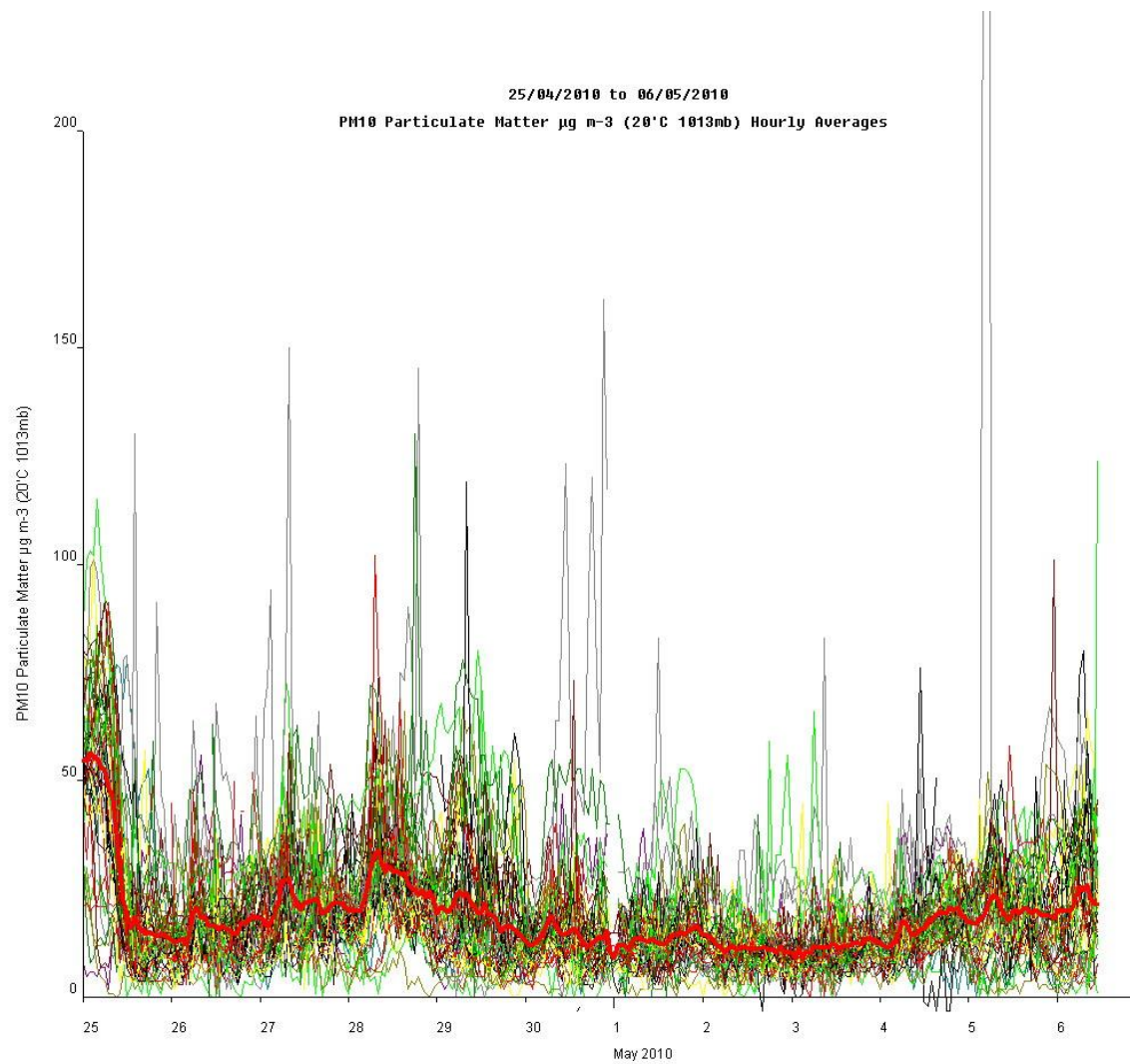


Figure 5. PM₁₀ concentrations as measured by the AURN between 25th April – May 6th 2010

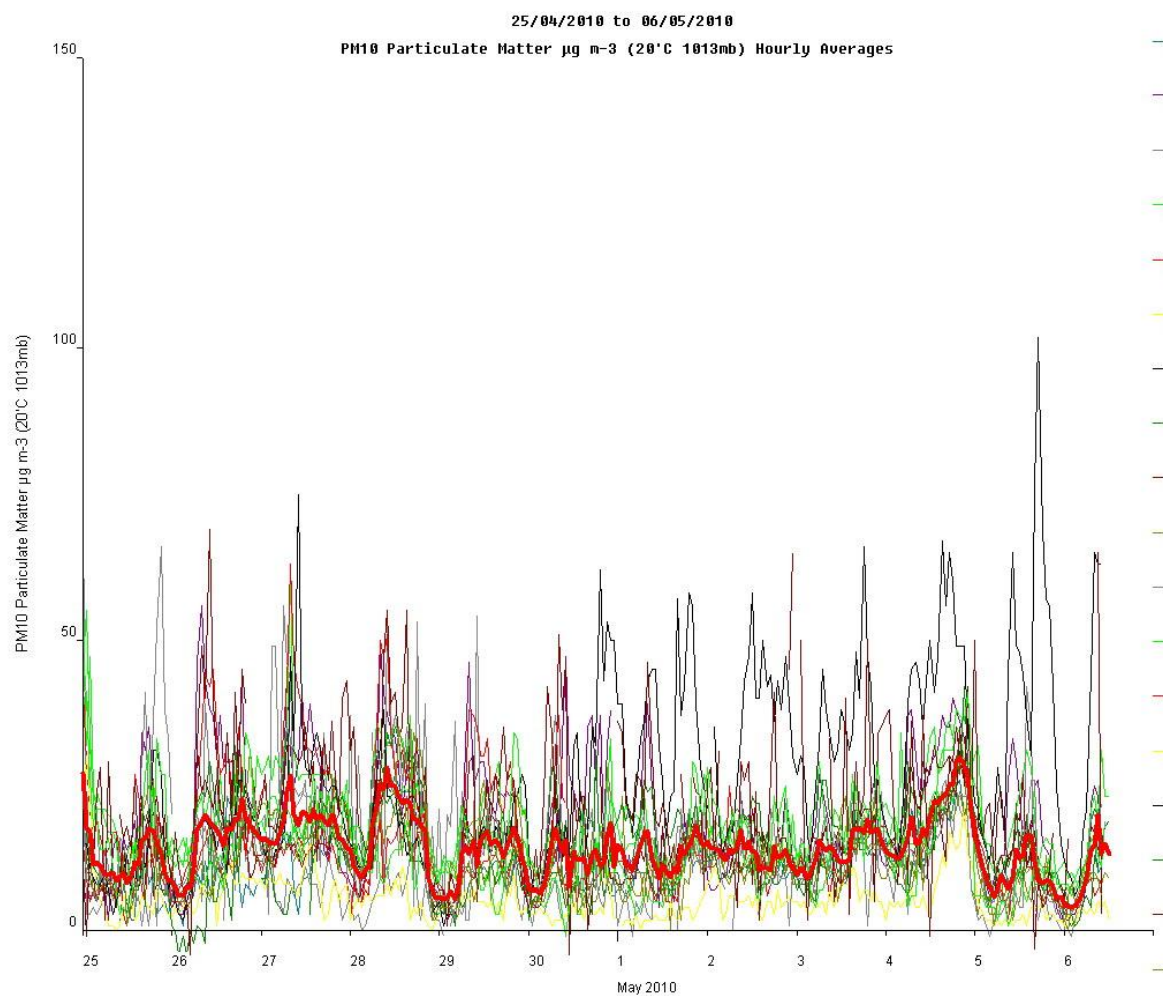


Figure 6. Northern Irish PM₁₀ concentrations as measured by analysers in the AURN and Northern Ireland's Network between 25th April – May 6th 2010.

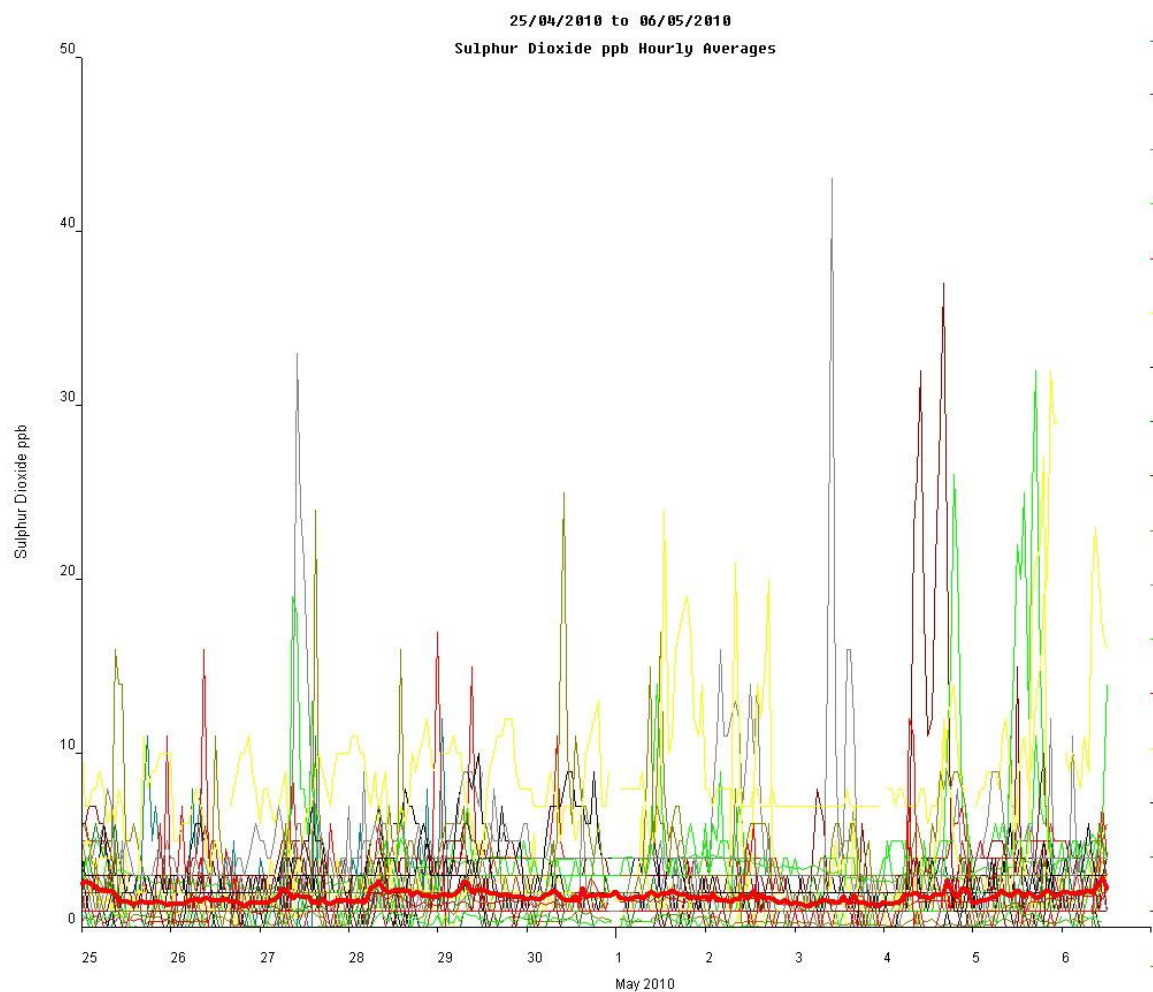


Figure 7. SO₂ concentrations as measured in ppb between 25th April – May 6th 2010

Ongoing impact on UK Air Quality?

Figure 8 shows forecasted airmass forward trajectories showing the predicted path of the ash released at midnight each day until May 9th.

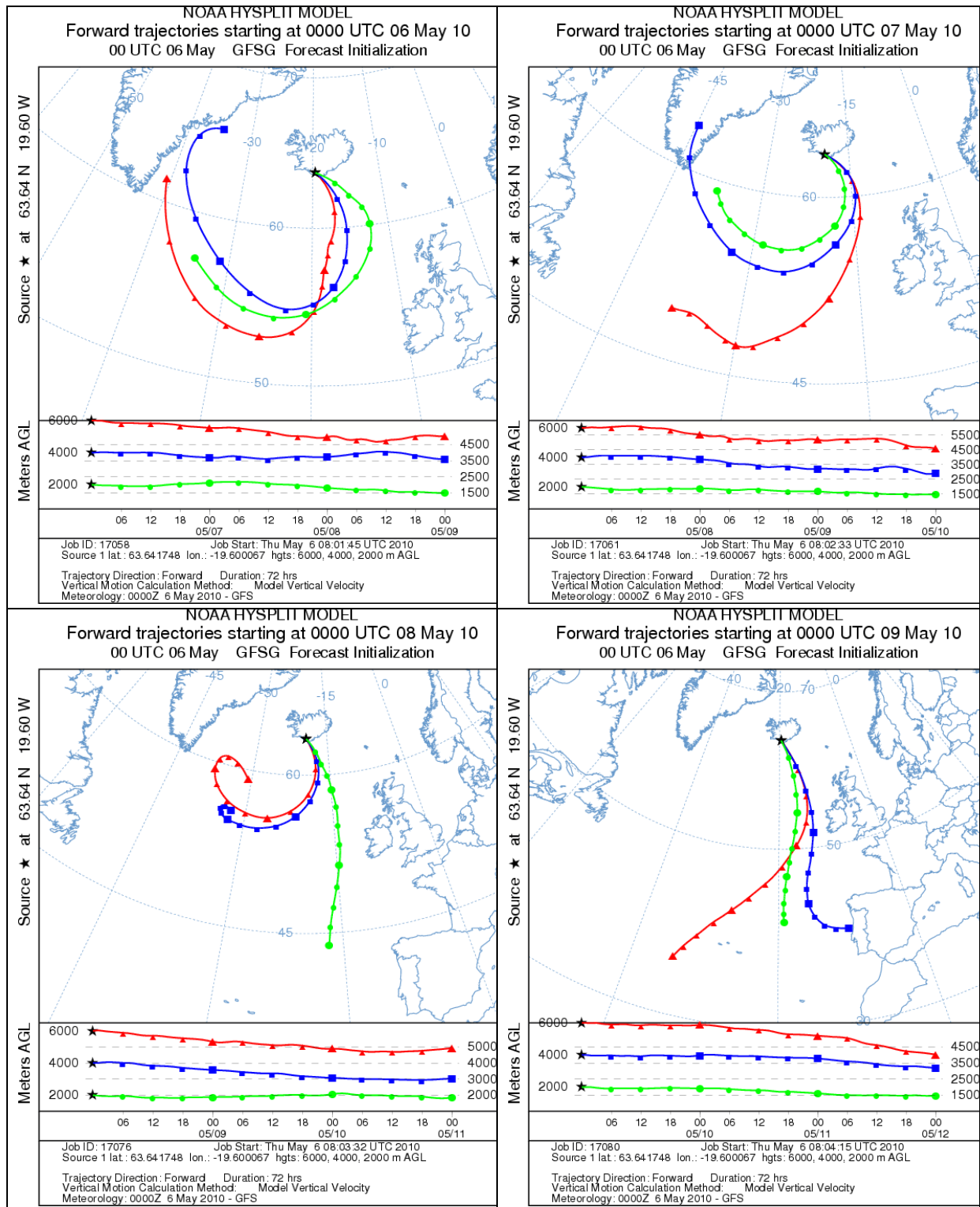


Figure 8. Forecasted air mass forward projections for ash released by the Eyjafjallajökull Volcano between 6th – 10th May.

Figure 8 shows that ash released by the volcano between 6th and 8th May 8th will circulate eastwards of the volcano and will not significantly enter UK airspace. On May 9th trajectories start to begin edging back towards the UK but Figure 8 shows that the plume is very unlikely to ground over the UK.

Conclusions

There continues to be no significant effects on UK air quality due to the volcanic ash cloud.

Airmass back trajectories suggest that any new ash released from the volcano up until May 9th will not enter UK airspace and thus is unlikely to have an adverse effect on UK Air Quality.

AEA will continue to monitor the situation.