AQI: air quality confusion (3)

This is part 3.
Click on the links below for the other parts.

Part 1, 2, 4, 5.

6. The UK revised DAQI

In the UK the Department Environment, Food and Rural Affairs (DEFRA) publishes since 2013 the revised **Daily Air Quality Index** (DAQI); the first DAQI was introduced in 2012. The DAQI has 4 quality levels (from best to worst: LOW, MODERATE, HIGH, VERY HIGH) and the index runs from 1 to 10. It is based on concentrations of O3, NO2, SO2 and PM's (PM10 and PM2.5) measured in ug/m3 (CO has been removed in the revised DAQI).

The following table gives the break-points (link):

Table 1: The revised Daily Air Quality Index.

Band	DAQI Index	Ozone Running 8 hourly mean μgm^{-3}	Nitrogen Dioxide hourly mean μgm^{-3}	Sulphur Dioxide 15 minute mean μgm^{-3}	$PM_{2.5}$ Particles (EU Reference Equivalent) 24 hour mean μgm^{-3}	PM_{10} Particles (EU Reference Equivalent) 24 hour mean μgm^{-3}
Low	1	0-33	0-67	0-88	0-11	0-16
	2	34-66	68-134	89-177	12-23	17-33
	3	67-100	135-200	178-266	24-35	34-50
Moderate	4	101-120	201-267	267-354	36-41	51-58
	5	121-140	268-334	355-443	42-47	59-66
	6	141-160	335-400	444-532	48-53	67-75
High	7	161-187	401-467	533-710	54-58	76-83
	8	188-213	468-534	711-887	59-64	84-91
	9	214-240	535-600	888-1064	65-70	92-100
Very High	10	241 or more	601 or more	1065 or more	71 or more	101 or more

The first comment should be that the "band" qualifiers correspond to the numerical index, and that "Low" means low index = good air quality conditions. The break-points are not proportional to the concentration: note that for O3 index 2 spans over 33 ug/m3, whereas that index 4 extends over 20 ug/m3. The pollutant with the highest index defines the published DAQI.

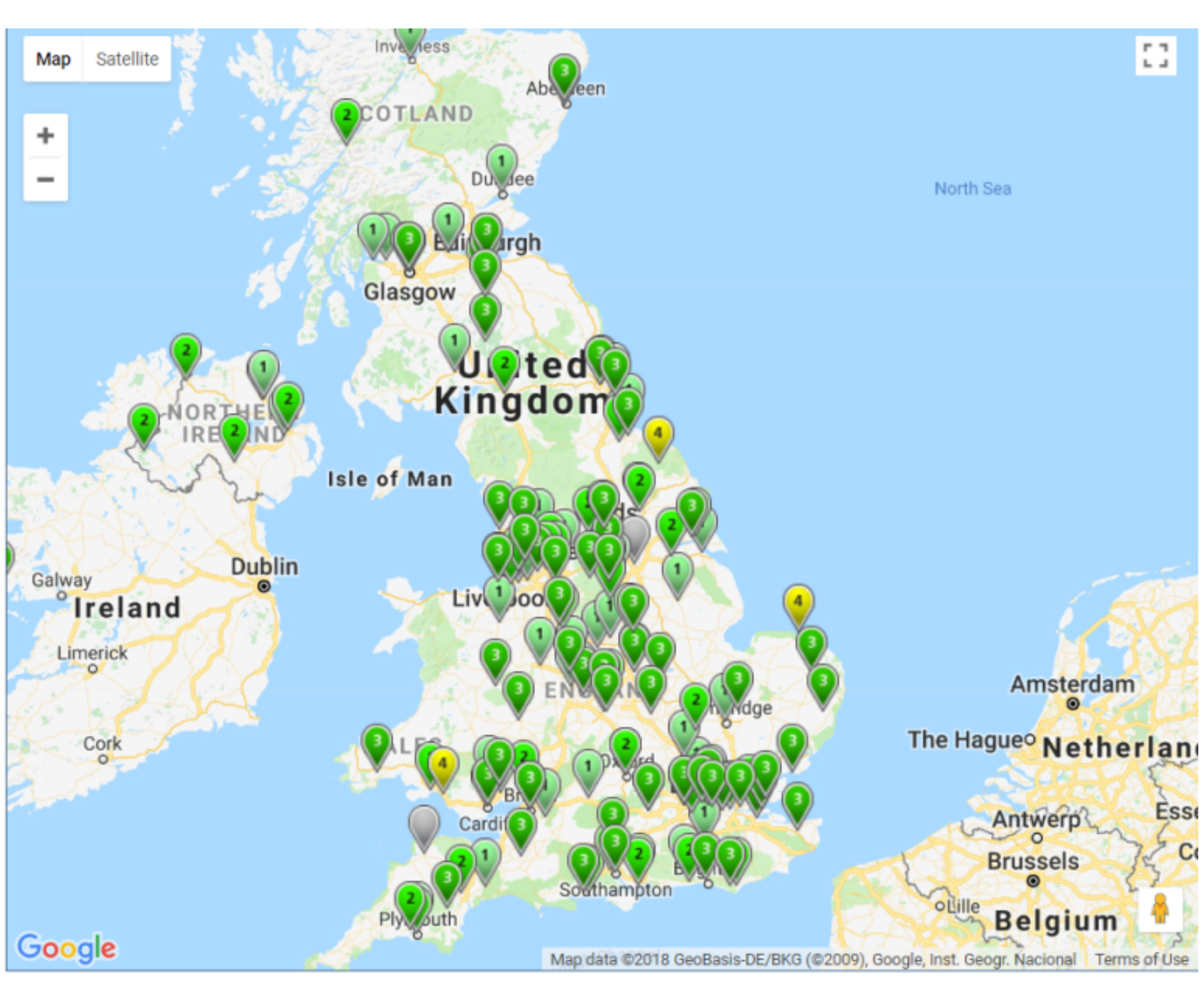
Ozone concentrations are only taken as 8h running mean. The color levels used for the different bands and subdivisions are different from those of EPA and China, and the health messages attached reflect the differences between individuals at risk and the general population:

Band	Index	Health Message: Individuals at risk*	Health Message: General Population
Low	1, 2, 3	Enjoy your usual outdoor activities.	Enjoy your usual outdoor activities.
Moderate	4, 5, 6	Adults and children with lung problems, and adults with heart problems, should reduce strenuous physical exertion, particularly outdoors, and particularly if they experience symptoms. People with asthma may find they need to use their reliever inhaler more often. Older people should also **reduce** physical exertion.	Enjoy your usual outdoor activities.
High	7, 8, 9	Adults and children with lung problems, adults with heart problems, and older people, should avoid strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	Anyone experiencing discomfort such as sore eyes, cough or sore throat should consider reducing activity, particularly outdoors.
Very High	10	Adults and children with lung problems, adults with heart problems, and older people, should **avoid** strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	**Reduce** physical exertion, particularly outdoors, especially if you experience symptoms such as cough or sore throat.

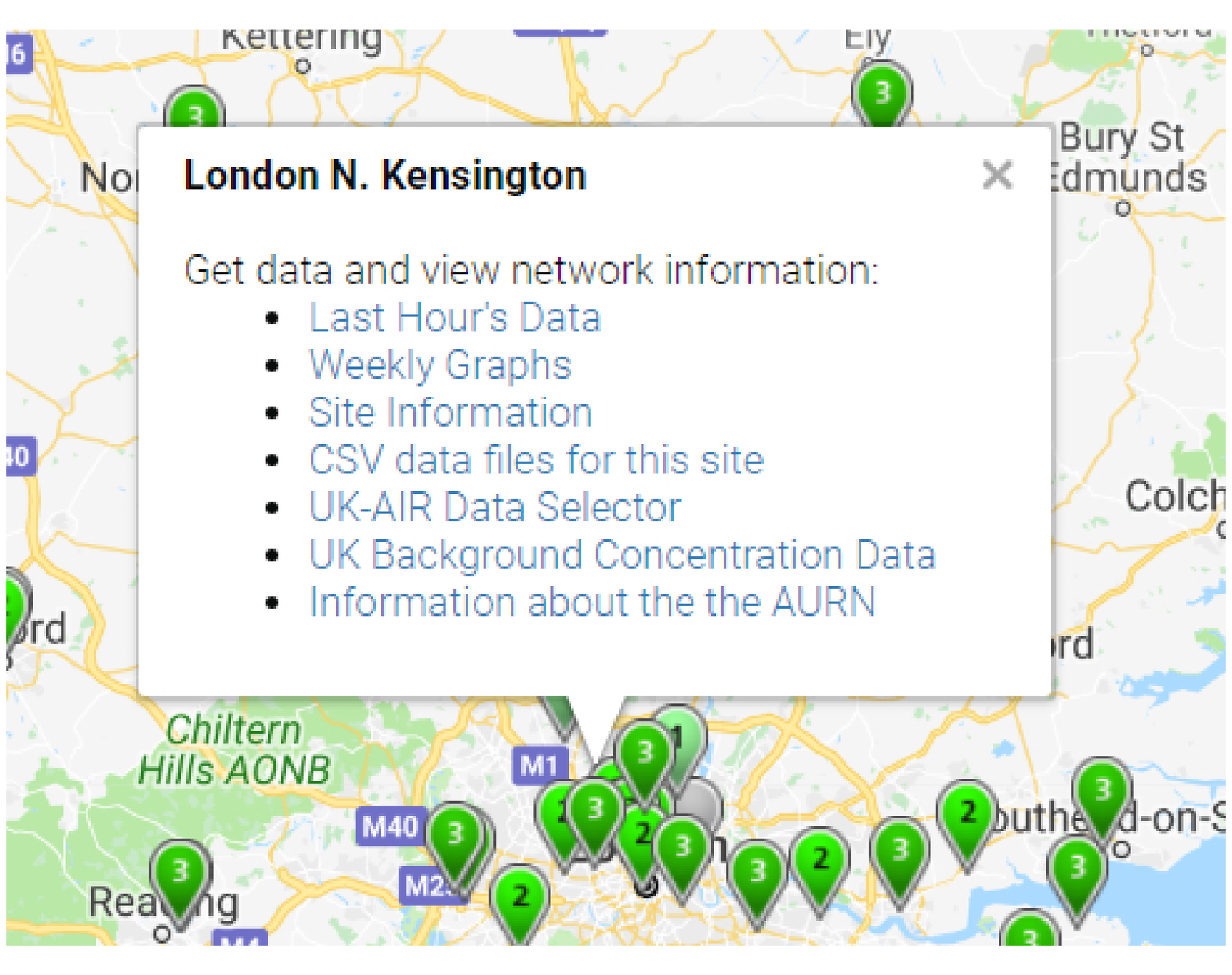
There are at least two methods to view live DAQI data:

1. use a Google Earth KMZ file (link)

2. go to the interactive map (link):



Clicking on a station gives very detailed information, a shown below (all lines are active links):



Conclusion:

» Care should be taken to not confuse a "LOW" index with "low air quality".

» Not further subdividing the "Very high" category is a good decision.

» 10 different color-shades are in my opinion way too many: it is difficult to distinguish neighboring colors when the map is shown in a poorer resolution.

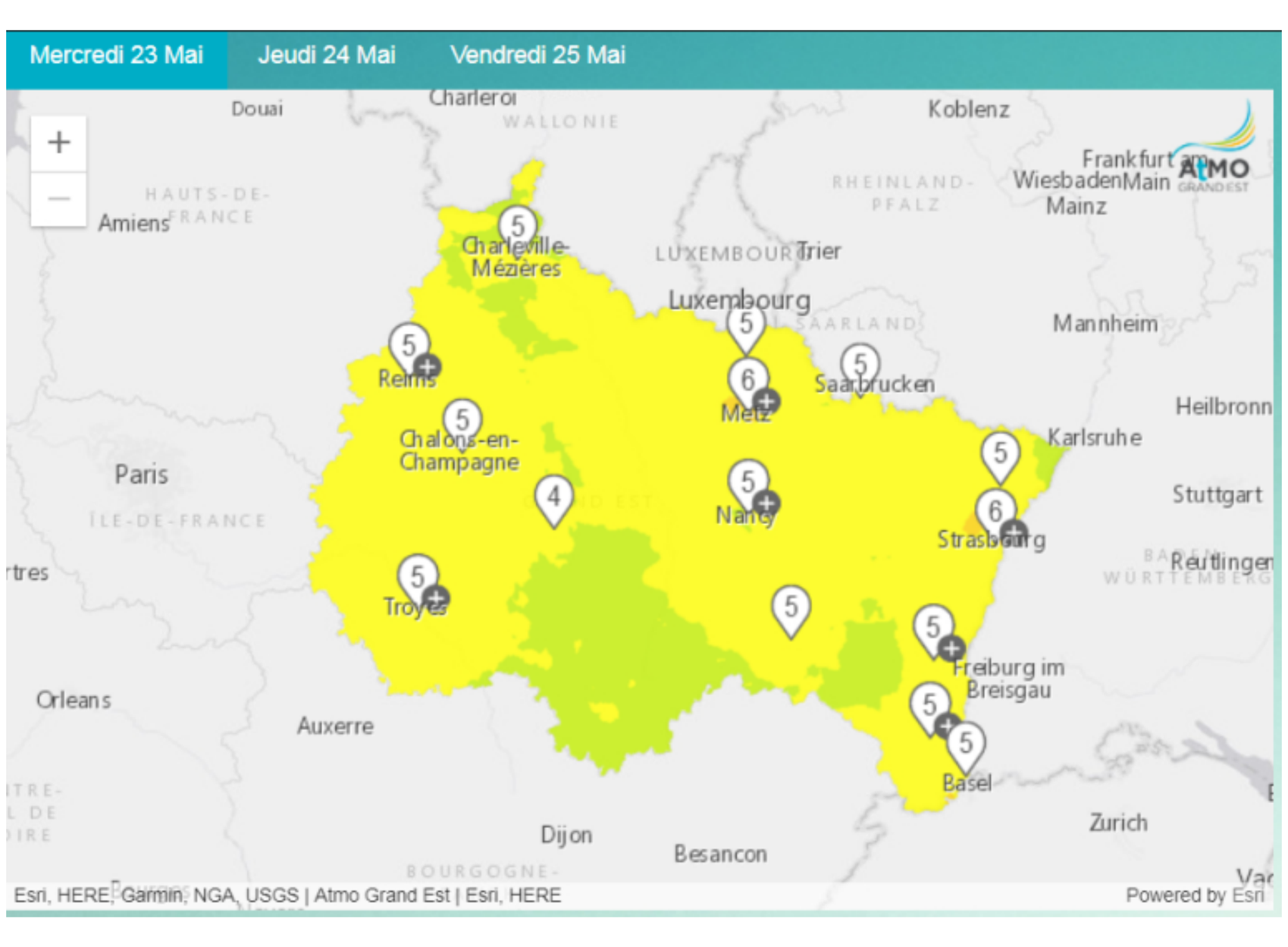
7. The French ATMO index

The "Fédération des Associations de la Surveillance de la Qualité de l'Air" (link) defines two indices:
– the **ATMO** is based on 4 pollutants (O3, NO2, SO2, PM10) and applicable for cities of more than 100000 inhabitants
– the **IQA** (Indice de Qualité de l'Air simplifié) is based on a subset of these 4 pollutants and used for cities with less than 100000 inhabitants

In the following, I will consider only the ATMO which extends from 1 to 10, uses 6 quality levels and only 3 different colors (GREEN, ORANGE, RED) as defined in the relevant "arrêté" (link). The break-points are based on 1h concentrations measured in ug/m3 (except PM10 given as the 24h mean); if several stations cover a geographic zone, the average is used. As for all previous indices, the highest sub-index defines the ATMO (link):

Indices	Echelle PM10 (µg/m³) Moyenne journalière	Echelle SO_2 (µg/m³) Moyenne horaire	Echelle NO_2 (µg/m³) Moyenne horaire	Echelle O_3 (µg/m³) Moyenne horaire
1	0 à 6	0 à 39	0 à 29	0 à 29
2	7 à 13	40 à 79	30 à 54	30 à 54
3	14 à 20	80 à 119	55 à 84	55 à 79
4	21 à 27	120 à 159	85 à 109	80 à 104
5	28 à 34	160 à 199	110 à 134	105 à 129
6	35 à 41	200 à 249	135 à 164	130 à 149
7	42 à 49	250 à 299	165 à 199	150 à 179
8	50 à 64	300 à 399	200 à 274	180 à 209
9	65 à 79	400 à 499	275 à 399	210 à 239
10	sup. à 80	sup. à 500	sup. à 400	sup. à 240

I did not find an interactive map covering France, but you may start here with the map of the regions (link) and click on a region to get more details, as shown for the Eastern Region of France (link):



The details in the regional maps vary from region to region; in the sub-map above clicking on a station gives further specific indices for the individual pollutants.

Conclusion:

» using only 3 colors makes an overall view easier

» the format for the individual regions is not exactly the same, which is slightly annoying. Besides the ATMO France often uses an AQI called CiteAir, which is based on a EU convention. The EU AQI's will be discussed in the upcoming part 4.

(go to part 4)

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