

UV Index: Public Forecast, Personal Health

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- What is the UV Index?
- How is it forecast?
- What does it mean to me?



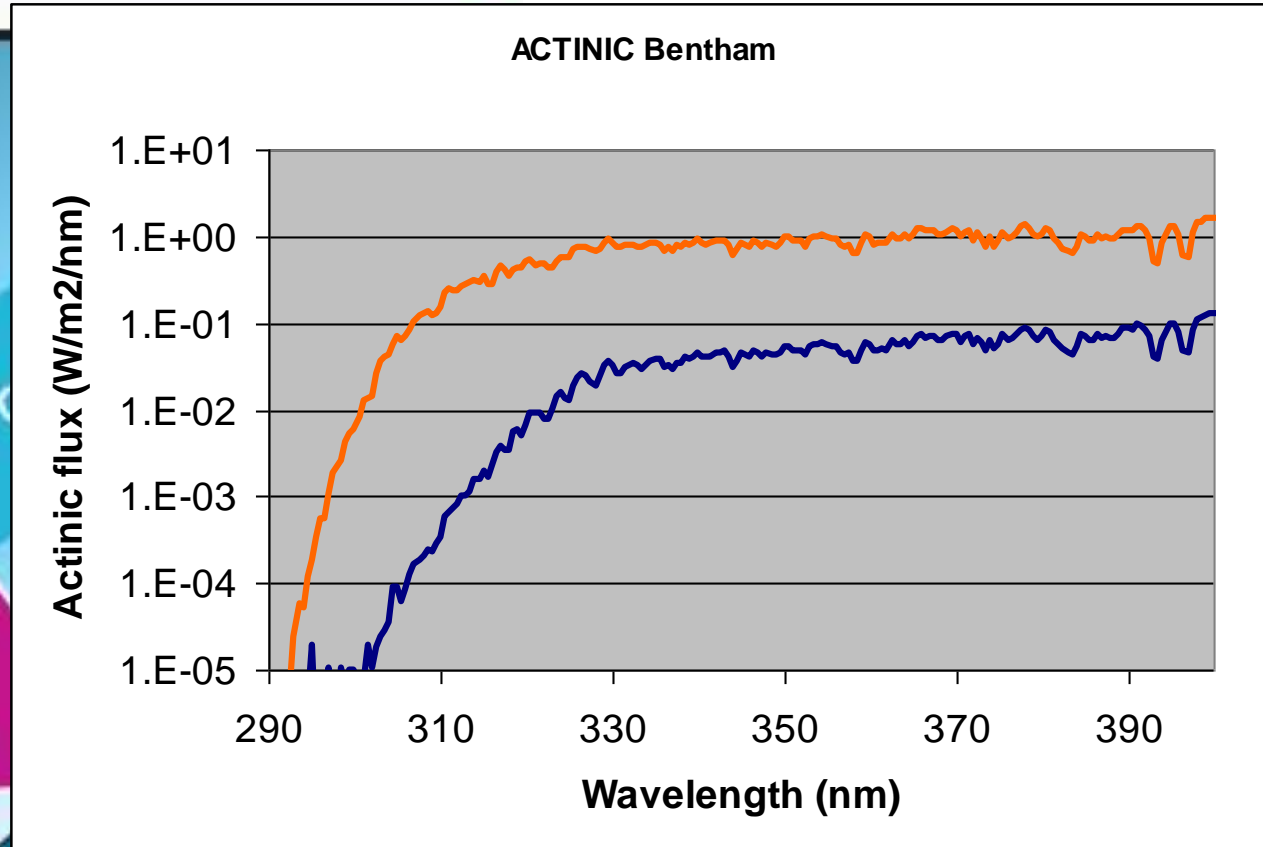
What is the UV Index?

- A number in the range 1-12+ that represents the sun-burning power of the sun, or erythemal irradiance (erythema = sunburn).
- Specifically it is the measured / modelled / forecast solar radiation, weighted by the erythemal action spectrum, and scaled to a simple number range.
- In the UK the UVI rarely exceeds 7.

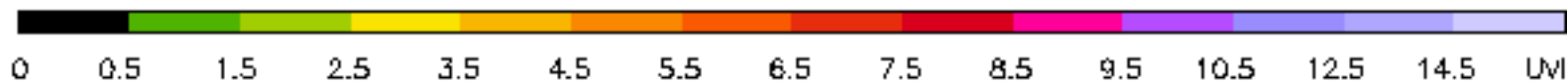
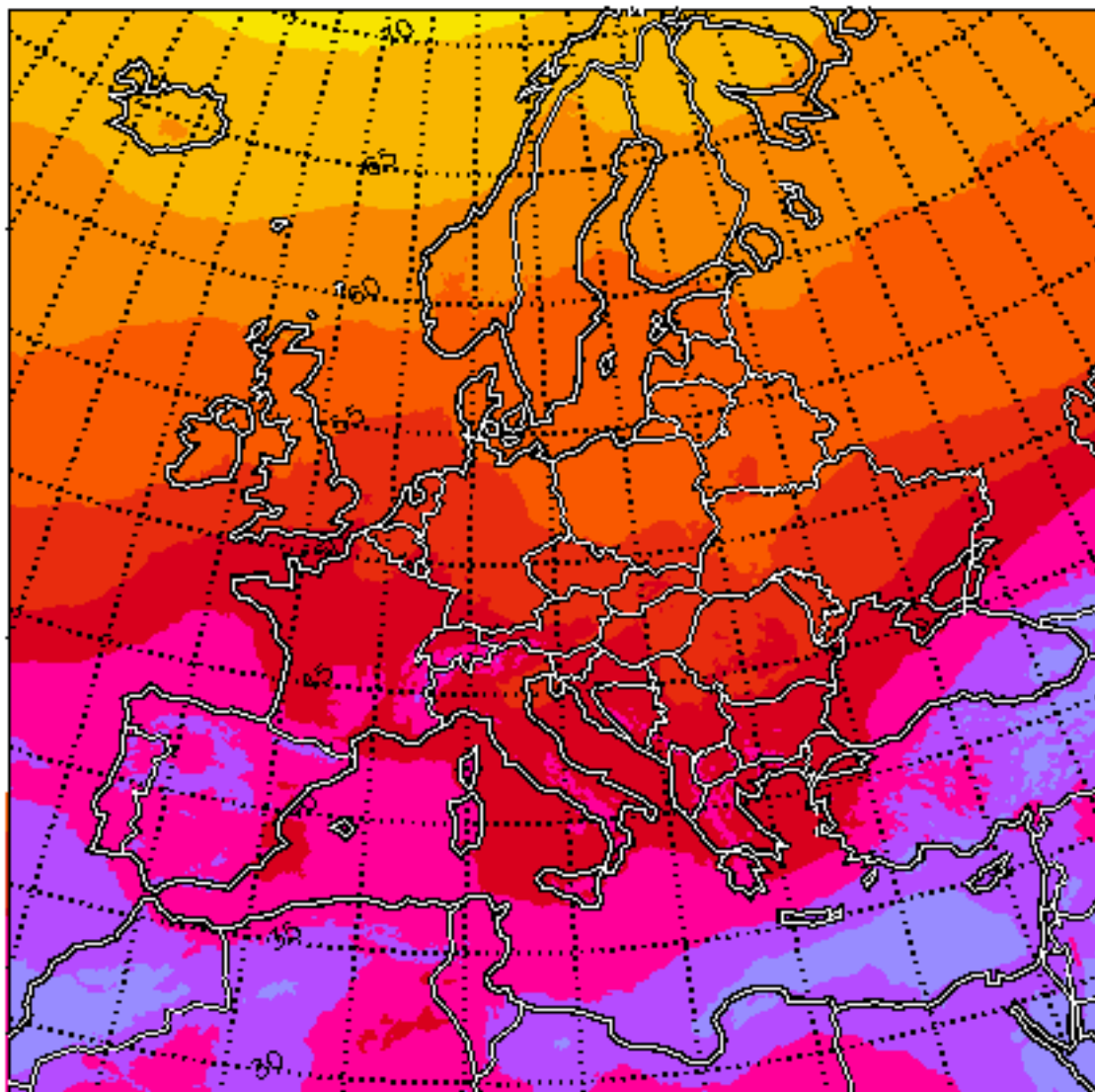
How is it forecast?

- Determinants of UV at the surface:
 - Latitude (and time, i.e. solar elevation)
 - Altitude
 - Ozone
 - Cloud
 - Aerosol
 - Albedo

Stratospheric ozone absorbs UV radiation



Based on latitude and altitude. Forecast ozone (from dynamics). Radiative transfer model, or parameterisation. Maximum that could be expected. Main driver is time of year, then ozone



Daily maximum of UV Index clear sky, 09.07.10 00:00 UTC period= +36 h

UKMO model

- The UK UVI forecast is based on a parameterisation that relates the UVI to the solar elevation and the total column ozone.
- The ozone is forecast from the 1000 – 250 hPa thickness field (approx. the height of the tropopause) and temperatures at 150 and 30 hPa (in the stratosphere).
- The clear sky forecasts have been validated against UV measurements made at Reading for DEFRA.

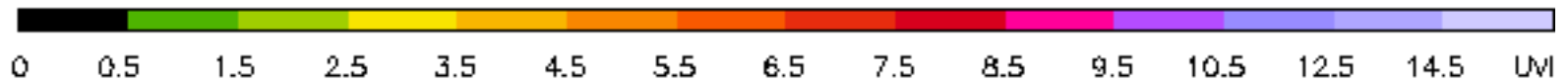
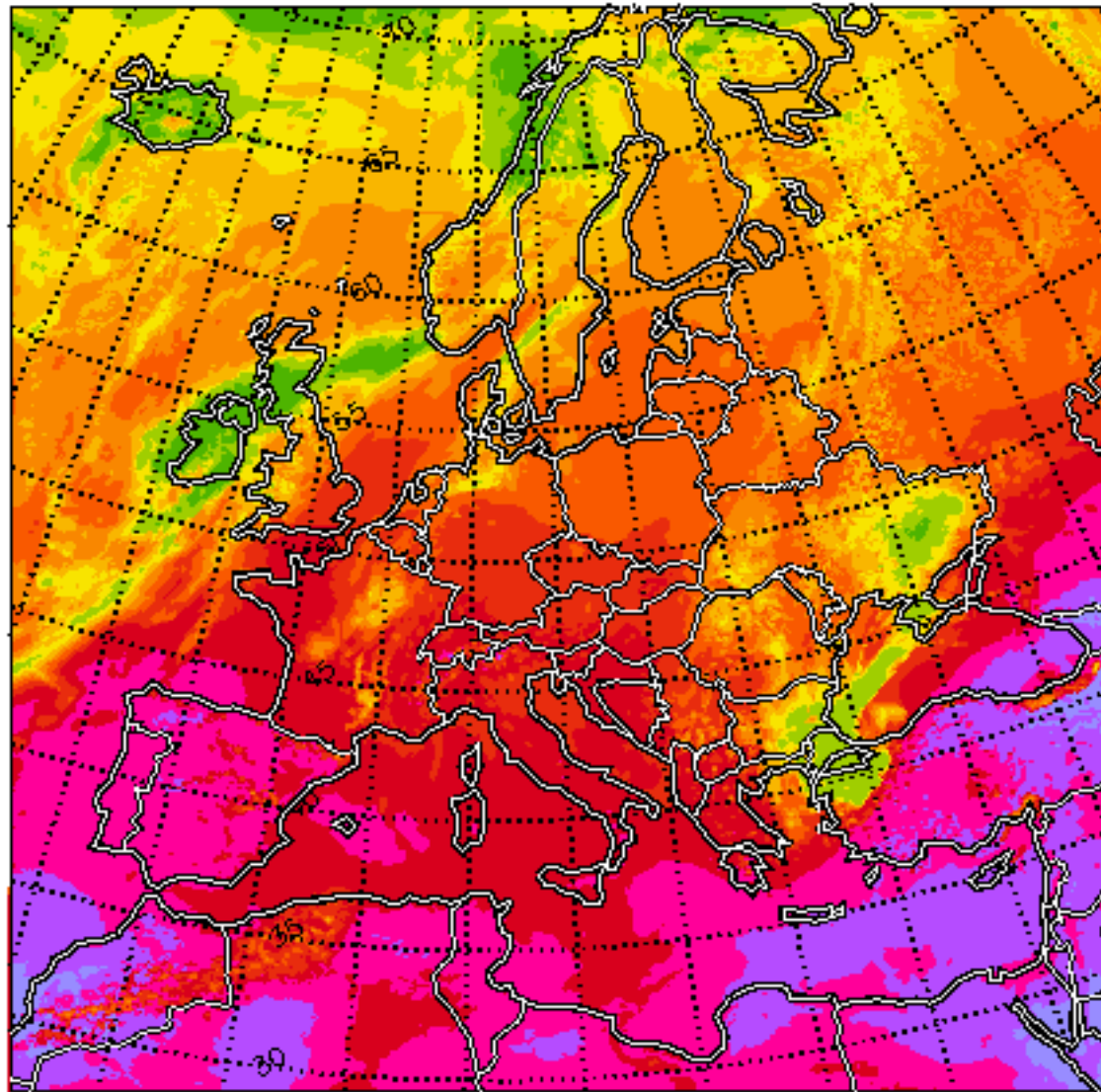


But ozone is not the only atmospheric determinant of surface UV

Add cloud forecast.

Extent and thickness of clouds.

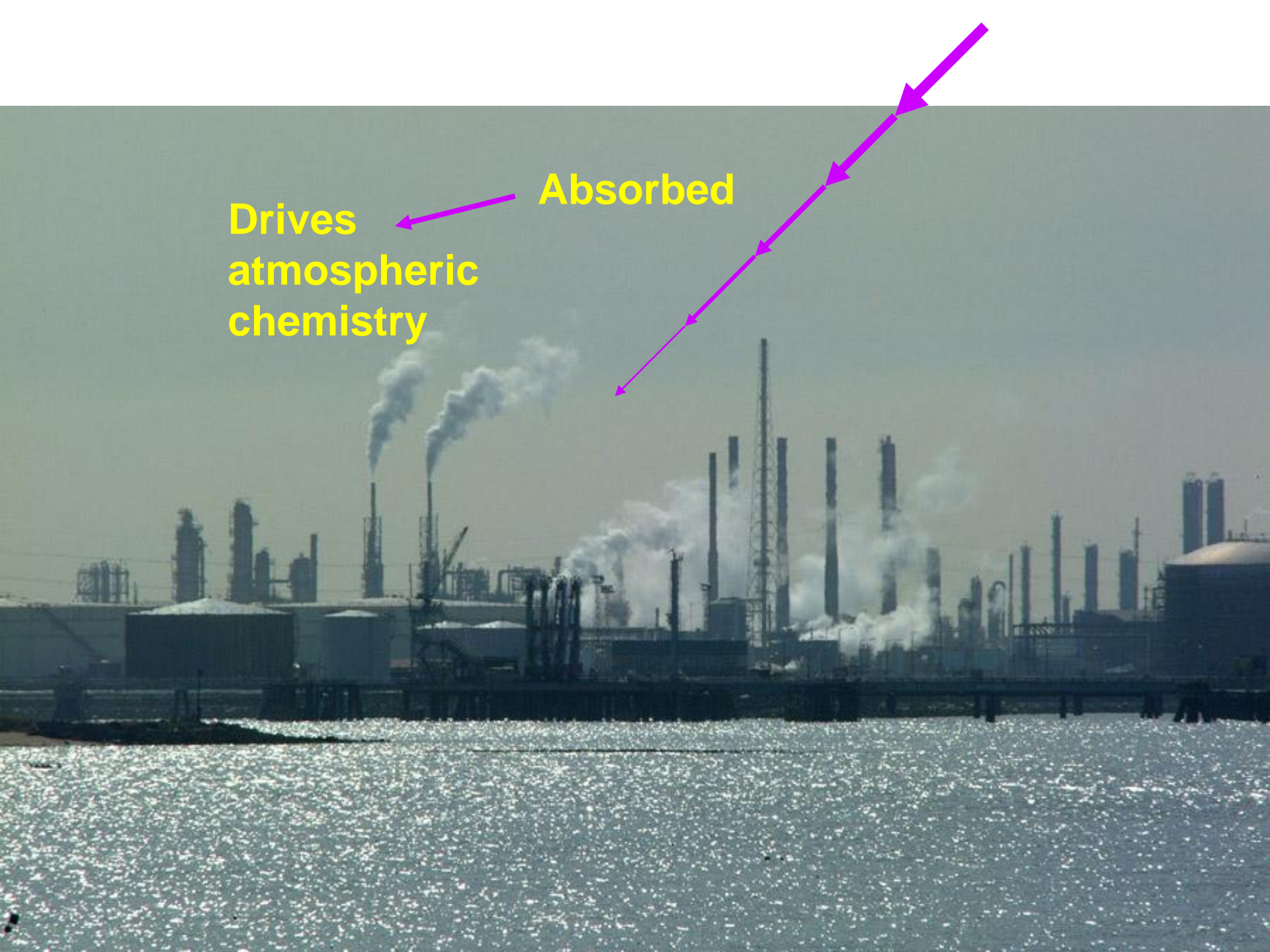
Reduce UV reaching the surface



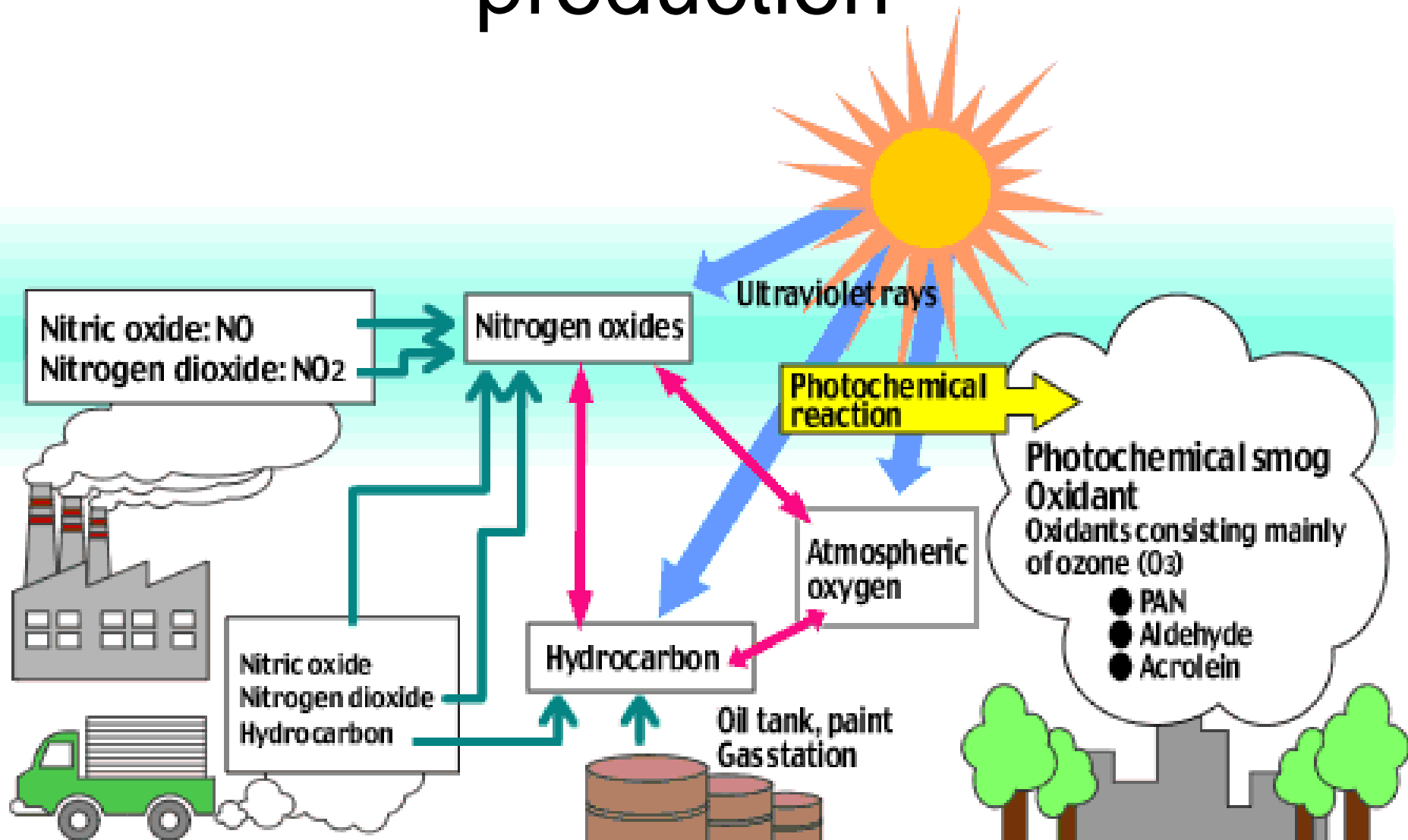
Daily maximum of UV Index cloudy, 09.07.10 00:00 UTC period= +36 h

**Drives
atmospheric
chemistry**

Absorbed



Photochemical smog production



- Aerosol is not included in the UVI in the same way as cloud – climatological values might be used (or intrinsic to parameterisation).
- In the UK, cloud is by far the dominant variable, and part of the forecast anyway.
- In extreme circumstances aerosol can have a large effect e.g. up to 40% on bad days in Tokyo.

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Skin colour is a significant determinant of response to UV

- The advice that is given in relation to each UVI value is determined for a fair skinned person (Skin type I/II), and aims to avoid any risk of sunburn.
- People who tan easily (Skin type III/IV) or are naturally pigmented (Skin Type V / VI) will not burn as easily



↑
UK Limit

UV is not all bad!

- UV radiation initiates production of vitamin D in the skin, and is our main source of vitamin D.
- It is important that unprotected skin gets enough UV(B) radiation to provide for our vitamin D needs.
- Pigmentation is a natural sunscreen, so dark skinned people need more UV radiation to make sufficient vitamin D (and also have a higher sunburn threshold)



Personal interpretation required

- The UVI is a simple way of expressing the UV at the surface – or the sunburning power of the sun.
- How it relates to you (eg in terms of how long it takes to get a sunburn) depends on your skin type.
- If you have very fair skin, follow the published advice. If you have dark skin you need some exposure in the midday hours to provide for your vitamin D needs.

Summary

- The UVI provides a physical measure (number) to indicate the sunburning power of the sun.
- It is a preventative tool: NEVER sunburn
- Learn to interpret the UVI with respect to your own skin type, and use it to understand when you need to restrict your skin exposure.
- Vitamin D will be synthesised well before you approach a sunburn!
- Like all forecasts, the UVI is not completely correct all the time, but the clear sky forecast will give the maximum that can be expected.