Re: Global dimming masking greenhouse effect

Source: http://sci.tech−archive.net/Archive/sci.physics/2005−01/7209.html

---

From: Edward Green (*spamspamspam3_at_netzero.com*)
Date: 01/19/05

Date: 18 Jan 2005 19:35:41 −0800

jimp@specsol−spam−sux.com wrote:

> *Waffle?*

Sorry. Overly harsh. Perhaps "light crispy wafer". :−)

> *OK, how's this?*

<see previous post for details>

Experiment? Whoa. Heavy!

I have a few problems with your proposal: for one thing, I don't see how we are to control for variations in relative humidity and air speed in the oven vs. outside; for another, it will be difficult to regulate the temperature of a household oven that finely; and for yet another, I'm not sure I see the point of including the semi−closed bottle: yes, trapping of air and increased humidity over the water will slow evaporation, and I'd then expect net evaporation to be rate−limited by diffusion or mixing at the bottle mouth. In other words, I'm fairly sure you are right a priori about the insigificance of illumination in this case (and while removing the over light was a nice touch, I wouldn't expect that little bulb to do jack).

Ok.

Let me make a counter−proposal which seems to me to answer my own objections: I take two 2L soda bottles, cut the bottoms off to make two identical saucers, and set them outside in the noonday sun. One, however, I cover with a sun screen at a height of about 1 foot, on four slender sticks.

Now, it seems to me, we've automatically controlled for equality of temperature, humidity and wind conditions: well, ideally the object casting the shadow on saucer two might be even farther away in case it modifies wind patterns. Or we could have two identical canopies, one clear, the other reflective... but now we've failed to control for heating of the blocked sunlight! We want to isolate the

photoevaporative effect alleged.

You know, this is actually somewhat ticklish...

Also, I've thought of a simple consistency check: If N moles of water are directly "photoevaporated", then this would still require absorption of N times the molar heat of evaporation directly by light absorption at the surface. I don't know ... water looks kind of transparent to me. And the adsorption had better be right at the surface, not a um down, or that kicked molecule is going to thermally equilibrate before it escapes so we're back to simple heating. Is water more strongly absorptive in wavelengths other than the visual and the interface? UV?

You know what? I think this rules the proposed effect out. To the extent classical electrodynamics is adequate to describe the passage of light between two different media, there is, AFAIK, surface reflectance and transmittance, and bulk absorbance, but no specific "surface absorbance": we don't deposite energy at the interface. Since classical electrodyamics is known to be adequate to treatement of interfaces (?), I deduce that any special photoevaporative effect must be insignicant.

Satisfied?

There are however intermediate kinds of effects possible: say some wavelength range is absorbed strongly in the first few mm or even cm of water, not right at the interface. Now that looks like simple heating, but it might be again that the surface temperature of the water is higher than ambient under these conditions: e.g., if a thermometer in air reads 30C 1 m about the surface in the dark, and also in the sunlight, it might be that the surface temperature of water is really *> 30C in the latter case. That looks like "photoevaporation", but is* really a more macroscopic non−equilibration. There are also the possibility of confounding variables galor: the air may simply be more active, on average, at given local average temperature and humidity, in brighter light.

Hmm... I beginning to tend to the idea that the effect Franz mentions is real, but maybe mainly of academic significance, whereas there may be many other effects related to the level of irradiation which are really mediated by the local water temperature and air temperature and relative humidity at the surface layer, but which may be confounded with a true photoevaporative effect, since we can't measure these mesoscopic variables.