

## ***Interactive comment on “Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming is highly dangerous” by J. Hansen et al.***

**C. Holley**

charlesholley@gmail.com

Received and published: 28 August 2015

Swedan continues with his nonsense.

Swedan states: “Infrared astronomers do not detect infrared radiation (backradiation) from the atmosphere because it does not exist, this is reality not theory.”

This is patently false, as multiple studies have measured “back-radiation” via both satellites and surface measurements.

C6330

The first such study of several utilizing satellite data was:

John E. Harries, Helen E. Brindley, Pretty J. Sagoo & Richard J. Bantges, Space and Atmospheric Physics Group, Blackett Laboratory, Imperial College, London SW7 2BW, UK “Increases in greenhouse forcing inferred from the outgoing longwave radiation spectra of the Earth in 1970 and 1997” Nature 410, 355-357 (15 March 2001)

Abstract from that paper:

“The evolution of the Earth’s climate has been extensively studied and a strong link between increases in surface temperatures and greenhouse gases has been established. But this relationship is complicated by several feedback processes – most importantly the hydrological cycle – that are not well understood. Changes in the Earth’s greenhouse effect can be detected from variations in the spectrum of outgoing longwave radiation which is a measure of how the Earth cools to space and carries the imprint of the gases that are responsible for the greenhouse effect. Here we analyze the difference between the spectra of the outgoing longwave radiation of the Earth as measured by orbiting spacecraft in 1970 and 1997. We find differences in the spectra that point to long-term changes in atmospheric CH<sub>4</sub>, CO<sub>2</sub> and O<sub>3</sub> as well as CFC-11 and CFC-12. Our results provide direct experimental evidence for a significant increase in the Earth’s greenhouse effect that is consistent with concerns over radiative forcing of climate.”

Another paper of several describing the observation of “back-radiation” of green-house gases at the surface was:

W. J. Ecans, North West Research Associates, WA and E. Pulerin, “Measurements of Radiative Forcing of Climate” 2006.

Abstract from that paper:

“The earth’s climate system is warmed by 35 C due to the emission of downward infrared radiation by greenhouse gases in the atmosphere (surface radiative forcing) or by the absorption of upward infrared radiation (radiative trapping). Increases in this

C6331

emission/absorption are the driving force behind global warming. Climate models predict that the release of greenhouse gases into the atmosphere has altered the radiative energy balance at the earth's surface by several percent by increasing the greenhouse radiation from the atmosphere. With measurements at high spectral resolution, this increase can be quantitatively attributed to each of several anthropogenic gases. Radiance spectra of the greenhouse radiation from the atmosphere have been measured at ground level from several Canadian sites using FTIR spectroscopy at high resolution. The forcing radiative fluxes from CFC11, CFC12, CCl<sub>4</sub>, HNO<sub>3</sub>, O<sub>3</sub>, N<sub>2</sub>O, CH<sub>4</sub>, CO and CO<sub>2</sub> have been quantitatively determined over a range of seasons. The contributions from stratospheric ozone and tropospheric ozone are separated by our measurement techniques. A comparison between our measurements of surface forcing emission and measurements of radiative trapping absorption from the IMG satellite instrument shows reasonable agreement. The experimental fluxes are simulated well by the FAS-COD3 radiation code. This code has been used to calculate the model predicted increase in surface radiative forcing since 1850 to be 2.55 W/m<sup>2</sup>. In comparison, an ensemble summary of our measurements indicates that an energy flux imbalance of 3.5 W/m<sup>2</sup> has been created by anthropogenic emissions of greenhouse gases since 1850. This experimental data should effectively end the argument by skeptics that no experimental evidence exists for the connection between greenhouse gas increases in the atmosphere and global warming."

Furthermore, Swedan states: "Backradiation (infrared radiation) from cold object to warm object implies radiation of cold, and the cold cannot be radiated. These are basic and primitive laws of nature."

This is an absurd statement. Radiation from a cold object to warm object does not imply radiation of cold. In kinetic theory, heat is simply explained in terms of the microscopic motions and interactions of basic particles such as electrons, atoms, and molecules. Above absolute zero these constituent particles of matter have kinetic energy and therefore all matter above absolute zero contains "heat". While heat is a form

C6332

of energy, cold is not. Cold is simply a relative term indicating a low or lower amount of heat in a substance relative to something else. A cold object (whatever that is), if above absolute zero temperature, contains heat and that heat is radiated per Planck's Law. The "cold" object is simply radiating its minimal heat content albeit at a low rate per the Stefan-Boltzmann law. It is clearly not radiating cold and to say that such is implied by back-radiation is inane.

Sweden: "Only by turning the fan and expenditure of external energy will the cold be transported, by convection and not radiation, from the colder coil to the warmer room."

Cold is never transported; it is the heat that is transported from the room via the air conditioner thus making the room colder i.e. the removal of heat makes the room colder not the removal of cold. This is a basic principal or should I say: a basic and primitive law of nature.

Hopefully, Sweden holds to his word and discontinues to add comments to this discussion for which he has no expertise. He has clearly abused the review process.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 20059, 2015.

C6333