

Dyson - Fighting climate 'fluff'

Physicist Freeman Dyson knows from long experience that models containing numerous fudge factors are worthless

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As a mathematician and physicist, Freeman Dyson is known for the unification of three versions of quantum electrodynamics, for his work on the Orion Project, which proposed space flight using nuclear pulse propulsion, and for developing the TRIGA, a small, inherently safe nuclear reactor used by hospitals and universities worldwide for the production of isotopes.

As a theoretician, he is known for the Dyson sphere (an inspiration for science fiction such as Star Trek, as well as scientific works), the Dyson transform (which led to the discovery that every even integer is a sum of at most six primes) and the Dyson tree (a genetically engineered plant capable of growing on a comet). In his book *The Sun, the Genome, and the Internet*, he proposed engineering "trees that convert sunlight to liquid fuel and deliver the fuel directly ? to underground pipelines."

As an activist and visionary, he is known for his concern for global poverty, for his promotion of international co-operation and for his work in furtherance of nuclear disarmament. He is a member of the board of sponsors of the *Bulletin of the Atomic Scientists*, and the subject of numerous writings by environmental pioneers, such as Stewart Brand.

And this Renaissance Man, who has been prescient in many spheres, among them space travel and genetic diversity, who has written nine provocative books of his own and inspired dozens by others, is today known, too, as a scientific heretic, chiefly for disagreeing with the conventional wisdom on global warming. Or, as he puts it, "all the fluff about global warming."

The "fluff," Prof. Dyson explains, comes from climate-change models that predict all manner of catastrophe. The models count for naught as predictive tools.

"I have studied their climate models and know what they can do," Prof. Dyson says. "The models solve the equations of fluid dynamics and do a very good job of describing the fluid motions of the atmosphere and the oceans. They do a very poor job of describing the clouds, the dust, the chemistry and the biology of fields, farms and forests. They do not begin to describe the real world that we live in."

Prof. Dyson explains that the many components of climate models are divorced from first principles and are "parameterized" -- incorporated by reference to their measured effects.

"They are full of fudge factors that are fitted to the existing climate, so the models more or less agree with the observed data. But there is no reason to believe that the same fudge factors would give the right behaviour in a world with different chemistry, for example in a world with increased CO₂ in the atmosphere," he states.

Prof. Dyson learned about the pitfalls of modelling early in his career, in 1953, and from good authority: physicist Enrico Fermi, who had built the first nuclear reactor in 1942. The young Prof. Dyson and his team of graduate students and post-docs had proudly developed what seemed like a remarkably reliable model of subatomic behaviour that corresponded with Fermi's actual

measurements. To Prof. Dyson's dismay, Fermi quickly dismissed his model.

"In desperation, I asked Fermi whether he was not impressed by the agreement between our calculated numbers and his measured numbers. He replied, 'How many arbitrary parameters did you use for your calculations?' I thought for a moment about our cut-off procedures and said, 'Four.' He said, 'I remember my friend Johnny von Neumann [the co-creator of game theory] used to say, with four parameters I can fit an elephant, and with five I can make him wiggle his trunk.' With that, the conversation was over."

Prof. Dyson soon abandoned this line of inquiry. Only years later, after Fermi's death, did new developments in science confirm that the impressive agreement between Prof. Dyson's model and Fermi's measurements was bogus, and that Prof. Dyson and his students had been spared years of grief by Fermi's wise dismissal of his speculative model. Although it seemed elegant, it was no foundation upon which to base sound science.

Unlike many scientists today, who seek the comfort of consensus as opposed to thinking for themselves, Prof. Dyson has always been happy to be in the minority. He tells the story of his stint as an analyst during the Second World War in the U.K.'s Bomber Command, when he proposed ripping out two gun turrets from R.A.F. Lancaster bombers. Without the turrets, they could fly 50 miles per hour faster, be much more manoeuvrable and cut the U.K.'s catastrophic losses to German fighters. Those at the top preferred to delude themselves: "To push the idea of ripping out gun turrets, against the official mythology of the gallant gunner defending his crewmates ? was not the kind of suggestion the commander in chief liked to hear."

Today's official mythology involves global warming, in a societal mobilization of another kind. The allure of the conventional wisdom has not changed. "Here I am opposing the holy brotherhood of twilight model experts and the crowd of deluded citizens that believe the numbers predicted by their models." A heretic he remains, and, as history has shown, much more often right than not.

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CV OF A DENIER:

Freeman Dyson, a graduate of Cambridge University in 1945 with a BA degree in mathematics, has been for most of his life a professor of physics at the Institute for Advanced Study in Princeton. He is a fellow of the American Physical Society, a member of the U.S. National Academy of Sciences and a fellow of the Royal Society of London. In 2000, he was awarded the Templeton Prize for Progress in Religion.

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