Identification of Side Effects of Cloud Albedo Control Using Pseudo-Random Perturbations of Climate Models

Stephen H. Salter

Institute for Energy systems, School of Engineering, University of Edinburgh, Scotland.
S.Salter@ed.ac.uk

Several independent climate models [1] [2] show that Latham's proposal for increasing cloud albedo by spraying submicron drops of sea water below marine stratocumulus clouds can offset the thermal effects of double preindustrial CO_2. Hardware design is progressing [3]. It is important to understand all possible side-effects. Climate models which use widespread spraying suggest a recovery of Arctic ice and a slight increase in river run-off [4]. However if spray is confined to smaller areas there can be changes to precipitation in both directions in places far from the spray source. For example spraying off California produces nearly double precipitation in central Australia and a small increase in Brazil whereas spraying off Namibia gives a 15% reduction of precipitation in Brazil [5].

If we could produce a world-wide, everywhere-to-everywhere transfer function of the effects of increased cloud reflectivity we will know which seasons and places should not be used. We might even be able to get an all-winner-no-loser result. It may be possible to do this with quite a small computing effort. The values of concentration of cloud condensation nuclei in about eighty regions of the oceans would be either multiplied or divided by a chosen constant at different random intervals during a run of about 20 years. The resulting records of important meteorological parameters such as temperature, precipitation and ice extent would be recorded for all the regions of the world. For each point of interest the climate records will be correlated for each different source region to give a world map of the influence of each spray region at that point. This might be positive, negative or neutral. Tests on artificial changes to a real temperature record show that, over a 20 year run, the scatter of results of the change is about 1% of the natural variation.

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