Greenhouse Effect, Sea Level and Drought

Proceedings of the NATO Advanced Research Workshop on
Geohydrological Management of Sea Level and Mitigation of Drought
Fuerteventura, Canary Islands, Spain, March 1–7, 1989

Kluwer Academic Publishers Dordrecht, The Netherlands. 1990

PART V: PANEL DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

B. Denness: The imminent submergence of the Maldives has been mentioned earlier: an excellent challenge to the planning of land-use in a coastal environment. Failure to solve it will result in the demise of a nation, or at least its homelands and it should not be expected to face that fate alone.

However, man must be realistic. Economic factors cannot be ignored on the scale that will be involved in the event that sea level rises worldwide (for greenhouse or natural reasons, or both). Sacrifices will have to be made; consciences will have to be addressed. Compensation planning should be commenced now in parallel with barricade planning around areas of heavier economic investment in nations with more muscle.

The world can no longer accommodate easily the traditional reaction of man to sea level rise, i.e. migration. Now we have national boundaries and sovereign states that did not exist at the time of the migrations that must have taken place when sea level rose about 100 metres some 17,000-12,000 years BP at the end of the last ice age.

One thinks, for example, of the many seamounts in Polynesia that are now within 100 metres of sea level. Thor Heyerdahl demonstrated that South American indians could have travelled by raft from Chile to Easter Island (westwards) and on to Polynesia on a raft like the Kontiki. Had he continued he would have demonstrated that Polynesians could equally well have travelled to South America on the return part of the South Pacific gyre (eastwards). That leg of the journey makes more sense: Polynesians had more reason to make the trip - their homelands were drowning. Surely it is no coincidence that the earliest settlements in South America are dated at about 17,000 B.P. Should this hypothesis be correct it must be acknowledged that it is a tribute to the power of alcohol and a consequent perception shared with my friend Tomás Shuk in Colombia.

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B. Denness: George Kukla has pointed out various deficiencies of current GCM's with regard to forecasting climate patterns in a CO_2-rich world; Rhodes Fairbridge has admitted to being controversial in claiming that the climate will ultimately be predictable.

The writer would like to suggest that until GCM's build in an element for consideration of the possibility that Gravity (G) may be a variable instead of the constant (Universal Gravitational "Constant") that it normally thought to be they cannot take account of such changes should they be occurring as Dirac postulated some 50 years ago. The consequence would be that, no matter how otherwise all-embracing the models they could never predict accurately the climate at different levels of G.

Kukla gave an example of a failed hindcast for the onset of the late Pleistocene glaciation, when G was -according to the writer's deterministic geophysical model, expanded in this volume and elsewhere- considerably different from that today. It may not be the fault of the GCM's or even the modellers that failure is so common but rather that the input data is incomplete in more ways than currently considered. Perhaps thought should be given not only to air/sea interaction, cloud cover, etc., but also to a time dependent G variation.

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B. Denness: In response to the question whether there has been a sea level rise over the last century, Klige and Pirazzoli have demonstrated that overall there has been a rise but during the last 50 years there have merely been fluctuations about a stable mean. As we are concerned with the likelihood that sea level will rise in response to a temperature rise caused by the greenhouse effect this is exactly what we should expect. It is a fact that the global temperature has risen over the last century but has merely fluctuated over the last 50 years - almost exactly in step with sea level change.

I have provided a deterministic model that combines natural and manmade temperature changes and matches very closely the measured global temperature changes during the last century. That model takes into account the steadily rising greenhouse temperature and adds to it the natural change embodied in resonances from the long term Milankovitch cycles and beyond: those natural changes have experienced fluctuations on a decreasing mean over the last 50 years, having increased before that.

Of paramount interest is the future . Both the natural and manmade temperatures from the above model are scheduled to increase during the 1990's and beyond. Evidence for the 1980's (after the model was developed) illustrates that this is already underway, as forecast by the model. It is logical to suppose sea level will respond similarly upwards in the future too.

Most of the discussion session was devoted to the diversion (a complete red herring) that uncertainties of sea level rise over the last 50 years appear to introduce similar uncertainties regarding the validity of the greenhouse effect. The above summary indicates that the introduction of uncertainty is totally unnecessary. If leading scientists allow themselves the luxury of this type of debate it is hardly surprising that it takes so long for politicians and planners to listen to them.

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B. Denness: In response to the quest for a model which covers the geological and historical time scales and yet also enables an interpretation of use to forecasting events over the next few years, it is suggested that the writer's model of G variation (with its various geophysical, climatic and socio-economic spin-offs) can accomplish this. It has been tested for several years with striking results. It is suggested that it would be unjustifiably cynical not to take that model seriously: either we accept the possibility of determinism being real, in which case such a model must exist, or we do not. A deterministic model should convince a politician; a probalistic model is easier to discount.

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B. Denness: Dr. Kukla suggests that climate change, at least the natural element of it, is stochastic. As evidence he cites the droughts in the US mid-west in the 1930's and late 1950's which appear to have no relation to commonly accepted frequencies.

In fact both of the above droughts correspond to high points in the deterministic gravity variation model I have described to this workshop: the model shows no other significant "highs" this century. However, it does forecast another for the early 1990's towards which the model is already accelerating. With this in mind I published the forecast of the US mid-west droughts beginning in the late 1980's. This was reiterated in public in Colombia S.A. in April 1988: during the summer of 1988 the US mid-west experienced a drought that cost $5 billion of Federal relief to resolve. That is evidence of determinism against a stochastic process.

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B. Denness: Ayala-Garcedo quite correctly introduced a range of geophysical phenomena - volcanoes, earthquakes and so on - that may have an influence on climate change: he also pointed out that such change takes place on a variety of scales over all periods of time from the geological timescale to a matter of only a few years.

It is suggested that, while correlations can indeed be shown between volcanic or seismic events and climate change, there is no reason whatsoever to suppose that the correlation represents cause-and-effect. In fact, one might consider that all these geophysical phenomena, including climate change, may be responding to the influence of change in a further more fundamental geophysical phenomenon, the Universal Gravitational "Constant" (G), as proposed by the great theoretical physicist Dirac in 1938 and more recently quantified to some degree by Lyttleton in relation to mountain building.

If G changes so the distance between astronomical bodies changes: as G increases the Earth approaches the sun and becomes hotter and vice versa - hence the relation between G and climate.

Similarly as G changes so the rotational velocity of the Earth changes with the consequence that tectonic plates, under the influence of the changing centrifugal force thus induced, adjust their position with respect to one another and in so doing cause earthquakes and volcanity - hence the relation between G and volcanics and earthquakes.

Therefore, if we have a model to describe the variation of G on all timescales, we can expect it to describer simultaneous changes in climate, earthquakes, etc. That model was prepared by the writer in 1980 and has been tested in forecast since then.

Its origin, construction and explanation have occupied at least 10 substantial publications since that time. It has been used, for example, to forecast successfully dramatically increasing rainfall in Dubai (Middle East) and Colombia (South America) and drought in the USA. It has also successfully forecast a Richter Magnitude 5.9 earthquake in Colombia and matches in hindcast the distribution in time and space of the 200-plus Magnitude 6-plus twentieth century earthquakes in China. Countless other examples both of hindcast matching and of practical forecasting are also available.

The gravity model, with its forecast of natural climate change, has been combined with the greenhouse effect temperature response to match very closely the measured changes in global temperature this century - including the 9 years since the model was developed. Last year's droughts in the USA were correctly forecast in 1983 with the additional advice that they will return frequently and deepen over the next decade.

Repercussions of these droughts (which are essentially the product of natural climate change, merely aggravated by the greenhouse effect) in the main food-producing part of the world (accentuated by parallel drying in other important food-producing parts of the world) for US and hence global economy are clear and were published several years ago. The G-model (via global temperature, regional drought and its economic implications) forecast an intense economic depression for the 1990's. It is suggested that this would already have begun but for the misleading effects of Reaganomics that has allowed the US to build a still-growing national debt of about 3 times its national turnover - a feature that would not be entertained for an individual and whose brittleness will be exposed by further droughts.

In summary, indeed geophysical phenomena are relevant to climate change on all timescales, but please do not let us get unnecessarily confused by the minutiae of their apparent interactions when there is already a model that combines them and leads to a practical (and tested) forecasting procedure.

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B. Denness: Formal contributions under the heading of Engineering Solutions have been concerned with proposals for activities to mitigate climate change *after* it has occurred. We might instead (or as well) address the possibility of circumventing at l st the greenhouse component of potential climate change.

The point has already been raised that emphasis on nuclear power in favour of fossil fuel consumption could help avert greenhouse problems: I would prefer to consider the full range of non-fossil fuels instead of nuclear alone. Among other options are some already available and completely tested. We need not think only of hydro-electric power, biomass conversion, wind energy and so on - all of which exhibit various temporal or geographic limitations: there is also endothermic energy, requiring only a heat pump to convert atmospheric (or other) heat into useful energy for internal space heating and hot water, i.e. the main domestic and commercial requirement in the energy-wasteful temperate zones. This technology is in effect an inside-out refrigerator.

A coefficient of performance (the ratio of energy recovered to energy input) of more than 4 has already been achieved in long-term prototypes of whole buildings on the Isle of Wight in the UK by Alan Ridett. Converted into the large scale this could be sufficient, or example, to provide (via the consequent saving in input electricity and hence reduction in current fossil fuel burning for energy generation) all the reduction of CO_2 emissions stipulated for the UK by the EEC up to the year 2005 - applied only to domestic housing at no significant cost beyond normal installations in new housing or repair of older buildings and by applying no restraints at all on industry. An additional benefit arises with respect to the greenhouse inasmuch as endothermic buildings act directly on the atmosphere and the greenhouse by *reducing* air temperature. They also operate in the dark (at night) and even at sub-zero temperatures - additional advantages, in temperate zones, beyond purely solar systems.

One might also think of applying this internationally patented technology to desalination plants. In that case it should be possible to collect the energy required to drive the heat pumps from solar power: after all, the problem of drought in populated areas is generally closely associated with interminable sunshine. The cost of desalinated water should drop considerably. The designer of the original space and water heating endothermic system (Alan Ridett) would doubtless advise on such an application if required.

An alternative means of achieving increased energy efficiency is through better insulation to prevent energy loss. Unfortunately this normally also prevents moisture dissipation and causes condensation, thereby discouraging its use. However, this problem has been solved by Professor Alex Hardy of Newcastle University, UK who has invented a cheap, non-energy-consuming dehumidifier.