The inquiry recently launched by the House of Commons Energy and Climate Change Committee was brought to my attention by colleagues of mine who encouraged me to make my views known to the Committee.

I am a physicist who contributed mostly to particle physics (from 1965 to 1995, at CERN where I served for seven years as Director of Research) but also to nuclear physics (1960 to 1964), condensed matter physics and material sciences (1996 to 1999) and astrophysics (2000 to present). A brief CV follows.

I submit for the Committee a text summarizing my views on the latest conclusions of the IPCC and answering explicitly the questions being asked in the inquiry. I am not a climate scientist and my interest in climate science is only ten years old. My only motivation is to serve science in general, and British science in particular, with a sense of my responsibility as a scientist and of the ethic that it implies. It goes without saying that the views expressed in the text are mine and do not commit anyone else. It would be an honour for me if they could be of help to the Committee and a pleasure to have been of some help to my many friends and colleagues in the physics community of the United Kingdom.
CV for Pierre DARRIULAT

I was born in 1938, I entered Ecole Polytechnique when I was 18 and, after two years of military service in the French Navy, I studied at Orsay where I obtained my PhD when I was 27. The first six years of my research life were in the field of nuclear physics and shared between France (Saclay) and the US (Berkeley). I then moved to elementary particle physics and settled at CERN, Geneva, where I spent most of my life as a scientist. There I conducted several experiments, some of which are recognized as important steps in the progress of particle physics during the last third of the past century. In particular, I was spokesman of experiment UA2, one of the two experiments that simultaneously discovered the weak bosons and gave evidence for quarks and gluons being produced in the form of hadronic jets. This won me the award of Grand Prix of the French Academy where I was elected as corresponding member. For seven successive years, 1987 to 1994, I took the administrative load of CERN Director of Research. I then turned to condensed matter physics and studied RF superconductivity in niobium thin films. For thirteen years I have been living in Hanoi, Vietnam, where I have been teaching quantum physics and particle physics at the National University of Education and where I am presently teaching, as an invited professor, astrophysics at the National University of Sciences. In Hanoi, I have created a laboratory - called VATLY - for the study of astrophysics: first cosmic rays, in association with the Pierre Auger Observatory in Argentina, thanks in part to scientific material which I had been able to collect in Europe and in the States and later in radio astronomy, in collaboration with Observatoire de Paris and other laboratories abroad. I am doing my best to establish in VATLY a research team of international stature. In Vietnam, I became known for my action in favour of improving the level of higher education and of scientific research.

My scientific work is recognized by the international community. I have been invited to lecture in prestigious universities, such as Harvard and Cambridge; on two occasions (Leipzig 1984 and Glasgow 1994) I was asked to give the summary talk of the main conference in our field (so called Rochester conferences); I have been often asked to take part in, or chair, various committees dealing with scientific policy. I have been awarded a Honoris causa doctorate from Pavia University and was made Chevalier de la Legion d'Honneur in 1997 in recognition of my scientific work. I have been awarded several prizes such as the Prix Joliot Curie in 1973, the Prix du Commissariat à l'Energie atomique in 1987 and the Prix Andre Lagarrigue in 2008. I was awarded two medals in recognition of my efforts in helping Vietnamese science, one from the Minister of Sciences and Technology, the other from the Vietnamese Physical Society. In 2007, I published a book (EDP Sciences) on the relations between science and philosophy, Reflexions sur la Science contemporaine.

Pierre Darriulat, 2013
A submission "The views of an independent physicist" by Professor Pierre DARRIULAT 1 to the Energy and Climate Change Committee's inquiry about the latest conclusions of the IPCC's Fifth Assessment Review (AR5)

Summary

The AR5/WG1 IPCC report, and particularly the Summary for Policy Makers (SPM), conveys an alarmist evaluation of the influence on the climate of anthropogenic CO2 emissions that does not properly reflect current scientific knowledge. This results in part from the ambiguity inherent with asking scientists to express themselves consensually on what they think is the best message. There is a need to produce a scientific summary addressed to scientists and giving an objective picture of our knowledge and ignorance in climate science, with emphasis on the issues that are less well understood and what it implies to clarify them. Such a summary should pay particular attention to a number of contentious issues that have been identified by a number of climate scientists who do not share the alarmist interpretation of the science. In the short term, the IPCC report weakens the case for taking urgent action. In the long term, it supports the importance of taking global warming as an important factor in decisions affecting the future of the planet, together with energy policy, management of natural resources, social, financial, economic and geopolitical considerations.

1. Late September the IPCC published Climate Change 2013: the Physical Science Basis, a document of over 2200 pages, which will be read by very few people, and an accompanying "Summary for Policymakers" (SPM) of 36 pages, which will be the document that is generally read by politicians, officials and the media. In my opinion the main point to appreciate is that as it has the purpose of addressing policy makers, the SPM can not be a scientific document. When writing the SPM, the authors are facing a dilemma: either they speak as scientists and must therefore recognize that there are too many unknowns to make reliable predictions, both in the mechanisms at play and in the available data; or they try to convey what they "consensually" think is the right message but at the price of giving up scientific rigour. They deliberately chose the latter option. The result is they have distorted the scientific message into an alarmist message asking for urgent reaction, which is quite contrary to what the scientific message conveys.

2. Most scientists who contribute to the IPCC work enjoy the intellectual integrity that is supposed to be inherent to scientific ethic. They are well aware of the high degree of uncertainty that is attached to their predictions. However, one should not have asked them to state what they think is the right message; or at least, one should not have asked them, as scientists, to do so. Doing so is a highly subjective exercise that depends heavily on the weight

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1 From 1965 to 1999 a physicist at the CERN laboratory in Geneva including from 1987 to 1994 Director of Research From 2000 Professor of Physics at the Hanoi University of Sciences and the VATLY Astrophysics Laboratory.
that one is prepared to give to the principle of precaution. Anyone who has responsibility understands that the principle of precaution is a good thing if it is used wisely. It is not surprising that most IPCC contributors prefer to stay away from the political debate, with which they do not feel at ease; it is natural that they think "I have done my job as a scientist, it is not up to me to take political decisions, but if you really insist, I prefer to be on the safe side because I do not think that it can harm to reduce our CO2 emissions, while I cannot exclude that it may harm to increase them to some high level". Of course, they think as scientists and are miles away from realizing that in fact it does harm when it leads to wasting enormous amounts of resources by taking wrong decisions, such as investing billions of dollar in electric cars or in large windmill farms, to quote just two examples. But these are problems of economics, which they consider not to be their business. Professor Judith Curry is rightly critical of the misleading impact of the concept of consensus the way it has been used by the SPM.

3. What we are witnessing are successive distortions of the scientific message of the AR5 report on the Physical Science Basis: first from the report to the SPM by those who wrote and/or amended the SPM, then from the SPM to the press by those who speak in the name of the IPCC (including the IPCC chairman) then from the press to the general public by green activists who too often behave irresponsibly in misrepresenting the findings of the work.

4. It is wise to pay attention to the possible damage that anthropogenic CO2 emissions may imply for humanity. We have become conscious over half a century of the fragility of the planetary equilibrium that is necessary for our survival. Actions that may be necessary cannot be decided in an atmosphere of panic and under the pressure of urgency. They require deep thinking and take time. In particular, they are strongly interconnected with other important issues of relevance, such as energy policy at the planetary scale and economic, financial, social and geopolitical considerations that are in constant evolution.

5. It is sensible to ask for a scientific summary of the IPCC work, not addressing policy makers but as objective as possible a summary of the present status of our knowledge and ignorance about climate science. Such a report must refrain from ignoring basic scientific practices, as the SPM authors blatantly do when claiming to be able to quantify with high precision their confidence in the impact of anthropogenic CO2 emissions on global warming. Statistical uncertainties, inasmuch as they are normally distributed, can be quantified with precision and it can make sense to distinguish between a 90% and a 95% probability, for example in calculating the probability of getting more than ten aces when throwing a die more

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2 Professor Judith Curry is Head of the Department of Earth and Atmospheric Sciences at Georgia Tech. The article is "Consensus Distorts The Climate Picture", The Australian, 21 September 2013.
than 10 times. In most physical problems, however, and particularly in climate science, statistical uncertainties are largely irrelevant. What matters are systematic uncertainties that result in a large part from our lack of understanding of the mechanisms at play, and also in part from the lack of relevant data. In quantifying such ignorance the way they have done it, the SPM authors have lost credibility with many scientists. *Such behaviour is unacceptable. A proper scientific summary must rephrase the main SPM conclusions in a way that describes properly the factors that contribute to the uncertainties attached to such conclusions.*

6. The issue of the 15 or so year pause in global temperature has not been properly addressed. Even if it is true that we are experiencing a simple hiatus, that more heat has been stored in the oceans than expected but will some day be released, that on a long time scale this will only be seen as a fluctuation, we have no serious basis for the argument. It is undeniable that the pause has come as a surprise in a context where anthropogenic CO2 emissions keep increasing. It has obvious implications on factors that are not properly taken into account in the climate models. As such, it deserves a very critical study aiming at a proper evaluation of the uncertainties attached to predictions. This is what should be expected from a serious scientific approach. An indirect consequence may be that the warming which occurred in the latter part of the twentieth century is only partly the result of anthropogenic CO2 emissions. If such were the case, it would affect the models in a way that has not been properly taken into account by the IPCC report. Moreover, the pause indicates that one should take one's time before deciding on irreversible actions; should keep one's head cool rather than panicking; and use the time efficiently to improve the models that are not consistent with observations.

7. As a neutral scientist observing the climate debate, I regret the harm that it does to the image of science with the general public. I recognise the existence of a significant number of competent and knowledgeable climate scientists, who refuse to have their results misused by irrational propaganda. I note that they mostly express themselves with integrity and have to face unacceptable aggressiveness, including insults and ad hominem attacks, by those who consider that they know better than them what the right message should be. While being by conviction a supporter of the precautionary principle and a defender of the preservation of the environment of the planet, I am shocked by the unscientific attitude that prevails in green interpretations of the IPCC work. In such a context, I consider that the IPCC scientists should feel morally compelled to produce a scientific summary of their work while refraining from giving the world a message. They should feel morally compelled to answer the legitimate objections that have been voiced by people such as Professor Curry, in particular in her April
2013 testimony to the US House of Representatives, or Professor Richard Lindzen of MIT, to quote only two of the most emblematic figures. Specifically, the 2013 Report of the Nongovernmental International Panel on Climate Change: Climate Change Reconsidered II: Physical Science, while intentionally written as a provocation, lists a number of questions, which IPCC should consider it a duty to answer scientifically, without using arguments of authority. The main points of contention might be, for example:

- that climate models predict warming that has not occurred at all: atmospheric (>0.3°C over the past 15 years), oceanic (>0.2°C since 2000), tropospheric (hot spot) and south-polar in the late twentieth century
- that they assume a sensitivity of 3°C for a doubling of CO₂, above pre-industrial values while at most 1°C is observed
- that they underestimate by a factor of 3 surface evaporation caused by increased temperature
- that they wrongly assume the whole temperature rise since the beginning of the industrial revolution to have resulted from human CO₂ emissions
- that they ignore internal oceanic climate oscillations such as the Atlantic Multi-decadal Oscillation and Pacific Decadal Oscillation (El Niño/La Nina)
- that they ignore the incidence of the solar cycle on the cosmic ray flux and the resulting formation of clouds
- that they inadequately model cloud formation and aerosol induced changes. Now to answer specifically the questions the Committee: -

How robust are the conclusions in the AR5 Physical Science Basis report?

Have the IPCC adequately addressed criticisms of previous reports? How much scope is there to question of the report's conclusions?

The AR5 report reviews a large amount of valuable work, including a significant part of which has been produced after the publication of the 2007 AR4 report. Its conclusions, as expressed in the Summary for Policy Makers (SPM), are far from robust; address only partly criticisms of previous reports; and give a distorted view of the full report itself.
http://lheac1.Land.org/media-librar_ipdfsiCCR-IICCR-II_Fllldf
To what extent does AR5 reflect the range of views among climate scientists? While it is easy to find a vast majority of scientists who consider that evaluating the potential danger of an excessive (whatever it means) emission of CO2 is of utmost importance, they will usually recognize that our current knowledge prevents making reliable predictions and they will not see it as urgent to take decisions. However, in most cases, on the basis of their relying on the precautionary principle, they would mostly be for considering seriously ways to limit in the long term, our CO2 emissions. They will agree that no decision should be taken under pressure, but should take due consideration for economic, financial, social and geopolitical considerations for which they do not claim particular competence (other than as ordinary citizens).

Can any of the areas of the science now be considered settled as a result of AR5's publication, if so which? What areas need further effort to reduce the levels of uncertainty? A scientist will never claim that issues are definitely settled. However, it seems that issues concerning the dynamics of oceans and the complex roles of clouds are in the forefront of matters that need to be researched. Understanding better the north-south asymmetry or the so-called hot spot seem also issues requiring much immediate attention. Not being a climate scientist, however, I cannot give much weight to my assessment of the situation in this respect.

How effective is AR5 and the summary for policymakers in conveying what is meant by uncertainty in scientific terms? Would a focus on risk rather than uncertainty be useful? The way the SPM deals with uncertainties (e.g. claiming something is 95% certain) is shocking and deeply unscientific. For a scientist, this simple fact is sufficient to throw discredit on the whole summary. The SPM gives the wrong idea that one can quantify precisely our confidence in the model predictions, which is far from being the case.

Does the AR5 address the reliability of climate models? Even if it does it in several places in the report, it lacks too often the critical attitude that should be expected, sometimes eluding rather than facing embarrassing questions. The SPM does not address in a proper way the issue of the reliability of the climate models.

Has AR5 sufficiently explained the reasons behind the widely reported hiatus in the global surface temperature record? Of course not, how could it? One can only suggest hypotheses. The coming decade should help us with understanding much better what is most relevant.

Do the AR5 Physical Science Basis report's conclusions strengthen or weaken the economic case for action to prevent dangerous climate change?
In the short term, it weakens the case for taking urgent action. In the long term, it supports the
importance of taking global warming as an important factor in decisions affecting the future
of the planet, together with energy policy, management of natural resources, social, financial,
economic and geopolitical considerations.

*What implications do the IPCC's conclusions in the AR5 Physical Science Basis report have
for policy making both nationally and internationally? I am not competent to answer this
question (other than repeating what I have already said).*

*Is the IPCC process an effective mechanism for assessing scientific knowledge? Or has it
focused on providing a justification for political commitment? The mission given to the
IPCC of addressing policy makers rather than scientists has contributed to the deterioration of
the quality of the climate debate up to a point that may well now be no return. One may
claim today that it was predictable, but I do not think that one could have predicted that it
could reach such a depressingly aggressive and irrational level.*

*To what extent did political intervention influence the final conclusions of the AR5 Physical
Science Basis summary? I have no competence to comment on this point.*

*Is the rate at which the UK Government intends to cut CO2 emissions appropriate in light of
the findings of the IPCC AR5 Physical Science Basis report? I have no competence to comment
on this point.*

*What relevance do the IPCC's conclusions have in respect of the review of the fourth Carbon
Budget? I have no competence to comment on that point.*

*December 2013*