

## **A Response to a post “Qing-Bin Lu revives debunked claims about cosmic rays and CFCs” by Climate Nexus in Climate Science Watch on May 31, 2013**

My new paper recently published in the *International Journal of Modern Physics B (IJMPB)* draws some public attention. In a recent post by Climate Nexus in *Climate Science Watch*, entitled “Qing-Bin Lu revives debunked claims about cosmic rays and CFCs”, the anonymous author lists several “facts” to criticize my paper. Before I give my response to the criticisms, I will first give a summary of the review process and the main content of my paper.

### **Peer-review processes**

The original version of my manuscript was submitted to the IJMPB on October 15, 2012, which was also simultaneously submitted to the well-known electronic preprint archive (arXiv) for physics, cross-listed in the categories of *Atmospheric and Oceanic Physics*, *Atomic and Molecular Clusters*, and *Chemical Physics* [<http://arxiv.org/abs/1210.6844v1>].

1) Although the arXiv is not peer reviewed, the arXiv moderators, who are experts in their fields, make the evaluation based on the content of each submission and the policies of arXiv. For my submission, **the arXiv moderators** approved the publication of my manuscript on October 25, 2012, about 10 days after the submission of my manuscript, which was then made available to the public. My preprint immediately generated some interest to the readers and I received very positive feedbacks even before I received the reports of the reviewers from the IJMPB.

2) However, the peer-reviewing process of my manuscript in IJMPB went slow, far slower than I expected. At one point in January 2013, I sent an email to the Publisher to express my complaint. But the review process did not go faster. Finally, I received **the reports of two reviewers** from the journal in the middle February 2012 (four months after my first submission). Both reviewers commented that my paper is “interesting”, “convincing”, “solid” and “valuable”, but they also raised some major concerns. I found the reviewers’ comments critical but very helpful, which significantly improved my writing of the revised manuscript in many places. The main comments included the suggestions to make the discussion of the CO<sub>2</sub> warming models more quantitatively, to present the differences between the present paper and my earlier publications more clearly, and also particularly, to include a discussion on the 2011 *Atmospheric Environment* paper by Grooß and Müller, which criticized my work. I took the comments seriously and made the corresponding revisions. The revised manuscript was resubmitted to the journal on Feb 27, 2013, and **went through the second-run review process**. The Editor and reviewers found my responses satisfactory and my revised manuscript suitable for publication in IJMPB. It was finally accepted on March 12, 2013, and published in IJMPB on May 30, 2013.

3) For another purpose, in fact, the first version of my manuscript posted at arXiv was also sent to **other three independent peer reviewers** by another source. And I was provided with the reviewers’ reports even before I received the reviewers’ reports from IJMPB. I was encouraged that all the reviewers’ reports are very positive!

## **Main content of my IJMPB paper**

Firstly, my paper gives brief reviews on the CRE theory for O<sub>3</sub> depletion and the warming theory of halogenated molecules for climate change. Secondly, natural and anthropogenic contributions to these phenomena are examined in detail and separated well through in-depth statistical analyses of comprehensive measured datasets of quantities, including cosmic rays (CRs), total solar irradiance, sunspot number, halogenated gases (CFCs, CCl<sub>4</sub> and HCFCs), CO<sub>2</sub>, total O<sub>3</sub>, lower stratospheric temperatures and global surface temperatures.

It is shown that an analytical equation derived from the CRE theory reproduces well 11-year cyclic variations of polar O<sub>3</sub> loss and stratospheric cooling, and new statistical analyses of the CRE equation with observed data of total O<sub>3</sub> and stratospheric temperature give high linear correlation coefficients  $\geq 0.92$ . After the removal of the CR effect, a pronounced recovery by 20~25% of the Antarctic O<sub>3</sub> hole is found, while no recovery of O<sub>3</sub> loss in mid-latitudes has been observed. These results show both the correctness and dominance of the CRE mechanism and the success of the Montreal Protocol.

In-depth analyses of the observed data clearly show that the solar effect and human-made halogenated gases played the dominant role in Earth's climate change prior to and after 1970, respectively. Remarkably, a statistical analysis gives a nearly zero correlation coefficient ( $R=-0.05$ ) between corrected global surface temperature data by removing the solar effect and CO<sub>2</sub> concentration during 1850-1970. In striking contrast, a nearly perfect linear correlation with coefficients as high as 0.96-0.97 is found between corrected or uncorrected global surface temperature and total amount of stratospheric halogenated gases during 1970-2012. **Furthermore, a new theoretical calculation on the greenhouse effect of halogenated gases shows that they (mainly CFCs) could alone result in the global surface temperature rise of ~0.6 °C in 1970-2002.** These results provide solid evidence that recent global warming was indeed caused by the greenhouse effect of anthropogenic halogenated gases. Thus, a slow reversal of global temperature to the 1950 value is predicted for coming 5~7 decades if there is no emission of new greenhouse species into the atmosphere.

All the observed, analytical and theoretical results presented lead to a convincing conclusion that both the CRE mechanism and the CFC-warming mechanism not only provide new fundamental understandings of the O<sub>3</sub> hole and global climate change but have superior predictive capabilities, compared with the conventional models.

## **Responses to “the facts” in the post by Climate Nexus in Climate Science Watch**

1) “This theory has been considered and dismissed before. A 2010 report by the National Academies of Science was commissioned by Congress to examine all the evidence surrounding global warming including the theory that cosmic rays might influence Earth's climate. It concluded that “a plausible physical mechanism... has not been demonstrated” and “cosmic rays are not regarded as an important climate forcing.”

**Response:** This criticism is irrelevant because it does not disagree with one of the conclusions in my paper: “the natural factors have played a negligible effect on Earth's climate since 1970”.

2) “In 2011, a peer-reviewed paper [namely the 2011 *Atmos Environ (AE)* paper by Grooß and Müller] found that Lu’s conclusions “are based solely on correlation... do not have a physical basis... and the findings of the IPCC... remain unchallenged.”

**Response:** Prior to the submission of my manuscript to IJMPB, I had already given a detailed response to the AE paper by publishing a preprint at <http://arxiv.org/abs/1210.1498>, in which I showed that the “data” reported in the Grooß and Müller *AE* paper as well as their 2009 *PRL* paper could not be found in the given data source. And one can find the following paragraph in the introduction (pages 6-7) of my published IJMPB paper:

“It should also be noted that Müller and Grooß<sup>87,88</sup> recently criticized the CRE and CFC-warming theories by presenting the so-called “ACE-FTS satellite data”. However, Lu<sup>89</sup> has pointed out that there exist serious problems with their presented data because the Canadian satellite carrying the ACE-FTS instrument has essentially *not* covered the Antarctic vortex in the presented months (especially the *winter* months when the CRE reactions are supposed to be most effective) and that their criticisms cannot stand from the scientific facts in the literature. Most recently, the pair has published a Corrigendum in one of the journals,<sup>90</sup> in which they state “The months for which the data were shown were not correctly indicated. ... the data do not cover this complete latitude range especially they do not extend to the South Pole”. Since they now agree that their presented ACE-FTS data for the *winter* Antarctica cannot be correct, it is surprizing to read their statement that “We note, however, that all conclusions of the paper remain unchanged”. To discern the more data and arguments presented in the papers by Müller and Grooß<sup>87,88</sup>, the readers should refer to the recent publication by Lu<sup>89</sup>.”

3. “Several different scientists interviewed by the *Vancouver Sun* each said that Lu’s conclusions “[go] against 150 years of very fundamental physics.”

**Response:** I do not think this criticism makes sense.

4. “Critics point out that Lu’s paper fails to make the leap from correlation to causation, one of the most basic and most common scientific failings. This error is simply illustrated in the classic fable of the rooster who believes the sun rises because he crows. Two things may happen at the same time, but this does not mean one causes the other. A “physical mechanism” by which the two events are connected must be known, in order to fully understand causation.”

**Response:** The physical mechanisms for the CRE theory of the ozone hole and the CFC warming theory have been given in detail not only in my new *IJMPB* paper but in my 2010 *Physics Reports* and *J of Cosmology* papers [see the main content of my paper in the above].

5. “In contrast, there is strong experimental evidence of the physical mechanism by which CO<sub>2</sub> warms the planet, evidence that (as scientists have mentioned already in response to Lu) dates back 150 years.”

**Response:** I do not know who has done such experiments. However, one can find a discussion on various climate models in Section 11 of my IJMPB paper.