

WEATHER EXTREMES OF SUMMER 2010: GLOBAL WARMING OR NATURAL VARIABILITY?

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1. INTRODUCTION

Among the most frequently reported weather stories of summer 2010 were the *Moscow heat wave and associated forest fires, heavy rainfall and mudslides in northwest China and extensive flooding in Pakistan affecting close to 20 million people*. A few other weather stories which also garnered headline news include:

1. Heat wave in US mid-west and eastern states in early August 2010
2. Heat wave in eastern and central Canada, mid-July and late August,
3. Forest fires and heat wave in parts of Spain & Portugal in mid-August, and
4. Floods in Romania, Mexico and southern US states (Arkansas & Tennessee).

Many newspapers in Canada and US ran stories about ‘*how hot it was*’ in various parts of north America and elsewhere. Several radio and TV stations in eastern & central Canada were bombarding listeners (and viewers) with hourly values of maximum temperature and humidex (a temperature index, adjusted for humidity to convey discomfort due to high humidity) and city officials in Toronto (Canada’s largest city) issued heat alert on a few days in early August as the humidex values reached 40 and above. A major Canadian news paper ran a story “Climate scientists forecast more heat, fires and flood” on August 31 while in the US the *New York Times* ran a story on August 14, entitled “In weather chaos, a case for global warming”. Several prominent climate scientists (many of whom are associated with IPCC-Intergovernmental Panel on Climate Change, a UN Body of climate and environmental scientists) were quoted in these news stories and elsewhere (see EOS, 91, 20 July 2010, p.255) that “*such weather extremes are due to global warming caused by increasing concentration of human-added carbon dioxide in the atmosphere*” and that ‘*such extreme weather events may become more frequent in coming decades*’.

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According to a statement issued in August 2010 by the UN Agency WMO (World Meteorological Organization), *the weather related cataclysms of July and August fit the patterns predicted by climate scientists!* I recalled a similar statement issued by the WMO in June 2003 summer when Western Europe (France in particular) experienced a deadly heat wave and the US mid-west had a rash of tornadoes (Khandekar 2003). What continues to puzzle me is that the WMO did not issue a statement about “extreme cold weather events” that occurred during one of coldest winters of 2002/03 or a similar cold and a long winter in South America this past summer. The 2002/03 winter, one of coldest winters of the new millennium, saw extreme cold spells and record-breaking snowfall in the Canadian Atlantic region and also in the US Atlantic sea-board states. The severity of 2002/03 winter was felt as far south as Vietnam and Bangladesh, where several hundred people died of exposure to cold weather. This past summer (2010), most of South America was significantly colder than normal and there were dozens of deaths in Chile, Paraguay and Bolivia. In Argentina snow fell on several days in July. In South Africa, several hundred penguins died of cold weather in July 2010! The Canadian Prairies (one of the most drought-prone regions) witnessed rainiest summer 2010 in sixty years, while southeastern Australia (another drought-prone region) enjoyed great deal of rain with all inland salt lakes filled with water attracting teeming wildlife! However none of this was in the news, or in the WMO statement, or in any scientific commentary! To be fair, a news item about several million fish, river dolphins, turtles etc dying in Bolivia in July 2010 due to an outbreak of cold Antarctic air mass was indeed reported in early September (Nature online, 1 September 2010, *doi:10.1038/46707a*).

Are extreme cold weather events and stories, and the breaking of droughts, *not newsworthy*? I firmly believe it is important to analyze all weather extremes, cold or warm, before making any *proclamations* about their linkages to climate change or otherwise.

2. WEATHER EXTREMES IDENTIFIED BY THE IPCC:

The IPCC 2001 and also 2007 climate change documents have identified several weather extremes as being linked to the warming of the earth's climate and by extension to the to increasing concentration of human-added carbon dioxide. Among the weather extremes identified by the IPCC are: heat waves, droughts & floods, forest fires, rain-storms etc. According to IPCC 2007, some of the weather extremes like heat waves, droughts, rainstorms etc. are already responding to recent global warming and are occurring with increased frequency. Are weather extremes on the rise? Let us examine closely:

A careful assessment using Canadian data (Khandekar 2002) suggests no increase in extreme weather events like heat waves, droughts, summer rainstorms etc in the last 25 years anywhere in Canada. Elsewhere in US, Europe, Africa and China, available data do not suggest any increasing trend in any of the weather extremes identified by the IPCC. As summarized by Khandekar et al (2005), *the link between extreme weather and global warming is more a perception than reality, this perception being fostered by media coverage of such weather events in recent years*. What is however not reported in the media nor in scientific communications is the fact that some of the

extreme weather events like *intense thunderstorms, severe tornadoes and windstorms* have actually declined in recent 25 years, in the US and in Canada when compared to the frequency of these events in the 1920s and 1930s (Changnon 2001, Hage 2003).

The IPCC climate change documents do not offer a physical mechanism for the alleged warming/extreme weather link, but a plausible (and deceptively simple) explanation is often offered by some of the IPCC scientists that a *warmer climate will hold more atmospheric moisture and hence will lead to more flooding, severe rainstorms etc.* This year's extensive flooding in Pakistan and flooding elsewhere is one such example given by the IPCC scientists as the '*evidence of global warming and its (adverse) impact*'. Such an explanation is simplistic and needs to be carefully assessed. The extensive flooding in Pakistan is now attributed to the active monsoon over India during late July and early August of 2010 (Khandekar 2010). Further it must be noted that the Indian monsoon and by extension the south Asian monsoon (the largest seasonal anomaly in the earth's climate system on an annual basis) has in reality declined in intensity in the last fifty years (Chase et al 2003; Sontakke et al 2008). The findings of Chase et al and Sontakke et al are in striking contrast with climate model simulations which assert an increase in monsoon circulation and intensity in a warmer world. Elsewhere, the flooding reported over northwest China appears to be linked to the developing La Nina, cold phase of the ENSO (El Nino/Southern Oscillation) cycle in the equatorial Pacific. Also this year's flooding in Mexico and parts of southern US can be explained by changes in regional-scale atmosphere-ocean circulation and need not be linked to the warming of the climate in recent years. Finally let us consider some of the drought occurrences in various regions of the world. The IPCC projects '*increasing frequency of drought in mid-continental regions due to present & future global warming*'

Among the most drought-prone regions of the world are; the North American Prairies, the Sahel region of Africa and Australia's southeastern region. As mentioned earlier, the 2010 summer was one of the rainiest on the Canadian Prairies where summer rains have increased in the last few years. A recent modeling study by Hoerling et al (2006) suggests that drying over the Sahel region during boreal summer is shown to be a response to warming of the South Atlantic relative to the North Atlantic and further that *the late twentieth century drying trend over the African Sahel region was likely due to natural causes and not due to human-induced climate change of oceanic origin.* The precipitation and drought patterns in southeast Australia are linked to ENSO phase (e.g., Kane 1997) and not to "*human-induced global warming*" as claimed in scientific commentaries and media.

3. CHRONOLOGY OF RECENT "COLD" WEATHER EXTREMES:

Are cold weather extremes increasing in recent years? The observed changes in the earth's climate seem to suggest that winters have become colder and possibly longer in the last ten years. Since the new millennium, there have been four winter seasons in the northern hemisphere which can be assessed as significantly colder and longer as well. As mentioned earlier, the 2002/03 winter was very severe over eastern Canada, the US eastern sea-board and in parts of Europe. The last three winters (2007-2010) have been significantly colder than normal in Europe, parts of North America and east

Asia. The entire continent of South America witnessed one of the coldest winters during July 2007 and again this past winter in July 2010. A listing of cold weather extremes of the last six years is provided below for ready reference:

1. Winter 2009/10: Scotland suffered some of the coldest winter months in almost one hundred years; cold weather in Germany and eastern Europe caused several deaths and major disruption in transportation system; Bulgaria reported a low temperature of -29C, lowest in fifty years; Siberia suffered perhaps the coldest winter ever, according to Russian scientists.
2. Winter 2007/08: The snowiest winter over northern hemisphere since 1966; severe cold spells in the Middle East, eastern Europe, China and mid-western states in the US; mean temperature between December 2007-February 2008 was coldest over the earth since 2001; Watson Lake, Yukon, Canada had a low temperature of -52C on February 1; sea-ice between Greenland and northeast Canada was highest in 15 years;
3. Winter 2005/06: very cold in parts of Russia with long cold spell in Moscow; Europe had a very cold New Years' Day with temperatures well below normal in many areas; Poland reported 22 deaths from hypothermia in December 2005; parts of China was very cold and Tokyo and other cities in Japan received record-breaking snowfall
4. Winter 2004/05: Long, snowy and much colder in eastern Canada, several blizzards with heavy snow accumulation in central Canada; heavy snow in Himalayan foothills & in Kashmir valley in India. *It should also be noted here that the 2004 summer was one of the coldest summers over US and Canada in almost one hundred years!*
5. Winter 2003/04: Unusually cold and severe in eastern Canada, city of Halifax received close to 100 cm of snow in 24 hours in February 2004; New York city and vicinity received all time record snow, ~50 cm at earliest date, 5 December 2003.
6. Winter 2002/03: severe cold in parts of Europe, over 200 deaths in Poland in January 2003; long cold spells in northern India, Bangladesh & Vietnam with several hundred people dying of exposure to cold in January 2003; temperature in some areas of Mongolia fell to -50C in January 2003; by March 2003, over 90% of the Great Lakes region in US/Canada were frozen and Lake Superior (the largest and deepest of the lakes) was almost 98% covered with ice.

There are numerous other cold weather events of recent years which have been archived by a US-based project ICECAP (International Climate & Environmental Assessment Project: www.icecap.org). What is of interest here is that cold weather extremes seem to be occurring with greater frequency in the last ten years than what has been reported in media or in scientific literature. IPCC climate change documents do not mention anything about cold weather extremes and their trends and/or changes in future climate projections.

4. CONCLUDING REMARKS

There is an urgent need to develop a comprehensive database of all weather extremes (cold or warm, wet and dry) and analyze their mechanics and dynamics in the context of global warming & climate change debate. The undue importance by the IPCC and its adherents to summer weather extremes has distorted the reality of climate change which continues to exhibit a range of weather extremes that cannot be explained by a simple greenhouse gas-induced warming hypothesis. A careful analysis of all weather extremes will allow us to determine if indeed the earth's climate is following a certain "warm" path or otherwise. The IPCC and by extension the climate science community have overemphasized the issue of mean temperature trend and its calculation, while paying little attention to weather extremes and their linkages to climate change. A recent commentary by Prof. Arthur Rorsch (2010) points out a need for a paradigm shift in greenhouse-effect research. A definite need exists today to prioritize research areas in climate science. I would like to see more emphasis on the use of weather & climate data to determine natural limits of climate variability and less emphasis on calculating global temperature trend and its possible linkage to human-added CO₂.

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