

Synoptic Analysis of July 2010 Russian Fires and Pakistan Floods

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Introduction

Abnormality due to the heat flow of summer 2010 impacted on most of Northern Hemisphere including: Russia, Kazakhstan, Iran, Mongolia, China and some parts of European continent. Heat flow and consequently increasing the temperature in Russia began on late June, with the beginning of summer season, the temperature increase was more severe, and has caused devastating effects such as forest fires of Russia from 31 July around Moscow town. Further, at the same month from 24 of July, upon heavy rains and increasing the water level at Sind basin, the provinces of Baluchistan, Sind, Punjab and Kheibar in Pakistan were flooded. So that, about one fifth of the whole of Pakistan was flooded. Based on the reports published by Pakistan state, the life of about 20,000,000 people was affected by the flood.

According to the reports, the total number of people injured in this flood is more than the three events of 2004 Indian Ocean tsunami disaster, 2005 Kashmir earthquake and 2010 Haiti earthquake. Damage to the buildings was estimated about US\$4 billion, and wheat crop damages were estimated to be about US\$500 million. World Meteorological Organization considers the global warming as the main reason for climatic changes and its consequences, such as droughts, floods, fires and heat flows.

Research Methodology

Unprecedented heat of summer months of 2010 in Russia has caused large and extensive fires in the forests of Moscow West suburbs, at the same time, torrential precipitation occurred in Pakistan. Its causes were analyzed by using the data of Russia meteorological stations (Moscow), (Rostov on Don), (Volgograd) and (Kazan), and Pakistan (Risalpur), (Peshawar), (Murree), and synoptic maps of the

ground surface levels of,850,500,250hpa. In this study, the elements of temperature, wind direction and speed, air pressure and geo-potential height at different levels in Russia and Pakistan were studied.

Discussion and Results

Pakistan and Russia are located in different latitudes and climatic conditions, So that their effective and controller climatic systems are quite different. Pakistan is located in lower latitudes and adjacent to torrid area. Its eastern parts are located on Indian plateau and its west and northern part is located on Iran plateau and Eurasia.

It has relatively mild winters and warm summers. Its Northern areas have temperate climates, and southern parts influenced by Southern tropical and Southeast Asia monsoon systems. Central areas have hot summers which their temperature reaches to over 45 °C and Cold winters which the temperature reaches to freezing point.

Russia, with more than 17 million square kilometers of area, is the largest country in the world. It is located at high geographical latitudes and most of the country is cold with low precipitation. Therefore most of the areas of the country (especially the grand country Siberia) are empty and Agriculture is impossible. Effective atmospheric systems includes low and high pressures temperate latitudes and adjacent to polar area. Its temperature conditions is known with low and cold temperatures.

Although the climatic conditions of each region is under the influenced of several factors and is different from its surrounding areas, but some climate phenomena can operate on a larger scale and in different regions have a common origin. In this study, with regard to the simultaneous occurrence of two climatic phenomenon of severe floods in Pakistan and fires in forests in the west of Russia, it is tried to identify and analyze the synoptic relationship between the two events.

Based on time analysis, temperature changes at four considered stations as the West representative stations of Russia's were studied, The annual mean of maximum temperature for June, July, August and September were extracted and calculated from daily data and the required graphs were plotted. Since the fires were started in Russia on late July, the data related to one month prior to the occurrences of this phenomenon were studied. The review of average annual and temperature anomaly of temperature data, the increase of temperature in 2010 is obvious. Based on the calculations, in the study period, temperature increase can be observed in most regions of Russia and Pakistan.

Also the review of rainfall data of Pakistan stations in late July showed an increasing trend, So that during three days(27 to 30 July), 400 mm of precipitation is recorded in Sialkot station. While this volume of rainfall occurs on average during 4 months each year .According to analytical maps of different elements of atmospheric analysis at the ground level and upper levels, a low-pressure Centre with 998 hpa central pressure in Pakistan and a high pressure centre with central pressure 1017hpa or the ground surface in Russian has affected on the atmospheric conditions of these areas. Maps of high levels of atmosphere show the presence of blocking system during July. According to the calculations, the intensity of blocking system was weak (0.76) during the first week of July, but in the next three weeks of July has had a moderate intensity from minimum 2.1 up to maximum 2.85.

Conclusion

Based on the obtained results, it was cleared that location of Blocking system in the upper levels of atmosphere, on one hand caused by the currents emitted from northern latitudes to warm down areas of Russia and the rotation system causing long lasting accumulation of warm and dry air system in the West with sunny and smooth sky which leads to drastic increase of temperature and widespread fires of late July in Russia. Also moving subtropical high pressure system to high latitudes, causing thermal low pressures on Arabian Sea and Persian Gulf. These systems by changing direction and moving toward the North East of its original position, it is extended up to Pakistan. So in contacting with cold air masses which extended under the affection of Blocking system from high latitudes, is strengthened and created the torrential precipitation of Pakistan. Therefore, both of the discussed phenomenon are in relation with each other due to the existing models of atmospheric systems and in particular the occurred blocking phenomenon at high latitudes and show the climatic regional anomalies .

Keywords: Flood, Fire, Temperature and precipitation anomalies, Blocking, Russia and Pakistan.

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