



Alberta Wildfire 2016: Likely contribution from the anomalous large-scale planetary-wave circulation due to quasi-resonant amplification

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In May-June 2016 the Canadian Province of Alberta suffered from the most devastating wildfires in its history. The Fire happened during a very strong El Niño event. Such events are considered among the main drivers of the wildfires in Canada, as they usually bring anomalously warm and tinder-dry conditions there. In view of this, the El Niño event 2015-2016 is widely seen as one of the main factors for the Fire.

Here we show that in mid-April to early May 2016 the large-scale atmospheric circulation in the middle and high troposphere of the mid- and sub-polar latitudes of the northern hemisphere featured a persistent, quasi-stationary high-amplitude pattern of a circum-global planetary wave in the field of the meridional velocity with non-dimensional zonal wave number $m=4$. This pattern was characterized by a chain of high-amplitude anticyclonic swings formed over western Canada, eastern North Atlantic/Scandinavia, Siberia/Mongolia, and the Russian Far East/the Bering Sea. The strongest anticyclonic swing of the circulation was located over western Canada.

We find that the anomalously high amplitude of this wave 4 pattern is due to quasi-resonant amplification (QRA). In combination with the very strong El Niño event this could favor highly abnormal, tinder-dry and hot-temperature conditions at the surface in the above areas, entailing high wildfire danger there. This critically contributed to the Alberta Wildfire 2016, appearing to be the costliest disaster in Canadian history ever.