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Circumpolar greening may amplify the Arctic warming

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Climate model simulation coupled with vegetation dynamics suggested that greening in circumpolar region may amplify the Arctic warming through changes in local heat budget over Arctic and high-latitude landmasses and further reinforced by atmospheric circulation change. A series of climate model simulation with present and doubling carbon dioxide concentration with/without active vegetation feedback were performed to investigate the vegetation feedback effect on Arctic climate under anthropogenic warming. Model predicts that anthropogenic warming promotes circumpolar greening, the northward expansion and enhanced greenness of the Arctic tundra and boreal forest, which induces additional surface warming primarily through more absorption of incoming solar radiation. Furthermore, induced circumpolar warming tends to weaken prevailing tropospheric westerlies in the sub-Arctic latitudes, which resembles the anomalous circulation during the negative phase of Arctic Oscillation. It is suggested that this circulation changes may amplify the Arctic warming whereas contribute to cooling in the mid-latitudes.