

Precipitation trends contribute to streamflow regime shifts in northern Canada

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Abstract Autumn runoff events rivalling the size of the spring freshet peak as well as sustained winter streamflow have become more common in the northwestern Canadian Shield since the mid 1990s. Previous circumpolar and large regional-scale studies have implied these phenomena are due to increased water inputs from thawing permafrost. However, results from an investigation of the precipitation and temperature trends provide an alternate explanation for this region. A shift from a nival to a combined nival/pluvial streamflow regime, particularly in small watersheds, can be attributed to trends in the timing and state of autumn precipitation. Because these trends are subtle, careful consideration of hydrological processes, and the temporal and landscape context in which they operate, is important when attempting to explain the observed shifts in regional streamflow. It is important to correctly explain why streamflow regimes are changing because of close relationships with variations in ground thermal conditions and aquatic chemistry, which are of significance to society. These relationships are discussed.

Key words streamflow; precipitation; trends; shifts; Canadian Shield; permafrost