



PUBLICATION FACTS

JOURNAL

WATER RESOURCES RESEARCH

PUBLICATION DATE

1999

VOLUME/ISSUE

35 (12)

PAGES

3793-3802

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LINKING OBSERVED AND GENERAL CIRCULATION MODEL UPPER AIR CIRCULATION PATTERNS TO CURRENT AND FUTURE SNOW RUNOFF FOR THE ROCKY MOUNTAINS

ABSTRACT

Snowmelt runoff from alpine areas is the primary source of streamflow and water supply in western North America. Increasingly, questions about the impacts of global climate change on watershed yield are being asked. This paper is a forecast of expected changes to runoff for two key rivers in western North America. The paper develops and applies linkages between historical and general circulation model (GCM) upper air circulation patterns deemed to control winter precipitation in the northern Rocky Mountain states and southern Alberta. Historical and 1 x CO₂ GCM upper airflow conditions are quite similar, but there are substantive variations in the GCM 2 x CO₂ upper airflows. Relative occurrence (dominance) of historical synoptic patterns is statistically linked to historical spring runoff for the Oldman and Colorado Rivers. These linkages are used to forecast variation in the future runoff on the basis of variations in synoptic pattern statistics for the 2 x CO₂ GCM upper airflow patterns.

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Times Cited

19

Journal Citation
Indicator

1.20