

# Classification of atmospheric rivers and their impacts in New Zealand

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## Abstract

Atmospheric rivers (ARs) are an important component of the global water cycle, and AR-related hydrological hazards are across the midlatitudes, including New Zealand. The ability to classify the strength and potential impact of ARs has shown benefits to water resource management in western U.S. regions. In New Zealand, the topography means that the impact of ARs may vary significantly on either side of mountainous areas. In this study, we evaluate whether ARs dominate monthly heavy rainfall events and investigate characteristics of AR events that contribute to heavy rainfall as well as the performance of an AR impact ranking scale concerning orientations for these AR events. We found that different geographical regions favour ARs with different orientations for heavy rainfall generation, and northwesterly ARs are more likely to deliver higher rainfall at certain classification levels. Furthermore, we showed cases where ARs classified at the level could result in different benefits and hazards in different locations. Future research should focus on a more descriptive AR ranking scale regarding hydrometeorological benefits and hazards, considering factors such as the correspondence cyclones and topography.

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