



Variation of statistical PMP under climate Change Projections: A first approach using ECHAM 5 GCM model results in two Chilean Regions

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Most of the GCMs models developed in the last decades, project an increase of the mean world temperature and a decrease of the mean precipitation. For different scenarios some of them also project for certain regions a slight increase in extreme events magnitudes and a decrease of the water resources availability. This increase is the main motivation of this study.

Hershfield Probable Maximum Precipitation PMP 24 hours estimation was calculated in Chile for Coquimbo (30.6° S 70.7° W) and Maule (35.6° S 71.5°W) regions, during the base line period (1960-1999) using several meteorological gaging stations.

The utilized ECHAM GCM model (run 1) was spatially disaggregated through NCEP/NCAR reanalysis and temporal downscaling for each station location was utilized. This procedure was applied for A2 and B1 scenarios and results obtained project small variations in the statistics of the annual maximum daily precipitation series (average and standard deviation) but these slight variations can imply significant PMP variations given a high frequency factor, K_m , for each station (Average for Coquimbo Region $K_m = 17.8$ and Maule Region $K_m = 15.8$). In both A2 and B1 scenarios, for almost all the gaging stations locations in the 21th middle century (2046-2065), a Hershfield PMP increase around 5% and 9% was projected for Coquimbo and Maule regions respectively. As a first approach this result allow us to conclude that Hershfield PMP should not be considered as a theoretical estimation of Probable Maximum Precipitation, because it could (and in fact it does) change with different scenarios and with the extension of the registry; this is a consequence of the non consideration of physical processes involved in precipitation production in this statistical PMP estimation.

By other hand, we expect that this theoretical upper precipitation limit augmentation can increase the vulnerability of some hydraulic structures, under A2 and B1 scenarios, a fact that will be studied in future research work.