A remote Swiss valley models global climate

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(Phys.org) —EPFL scientists have developed a new statistical model of extreme rainfall in the Swiss Val Ferret region, which can be used across the globe.

Climate change and the rise in the Earth's temperatures are expected to have a direct impact on weather conditions. Extreme rainfall events are linked to hurricanes and floods, which can threaten human lives, severely damage infrastructure, and affect the economies of afflicted countries. For example, a NASA study published earlier this year estimated that for every 0.56oC increase in global temperature, heavy rainfall will increase by 3.9 per cent. The risk posed by such events makes it necessary to predict their sizes and probabilities more accurately, and this involves creating more accurate models of rainfall. Focusing on extreme rainfall in the Val Ferret valley at the southern border of Switzerland, EPFL scientists have developed a model that could be applied on a global scale.

An EPFL research team led by Anthony Davison has used rainfall data collected from weather stations in the Swiss Val Ferret valley to build a statistical model of extreme rainfall in the region. The team used twenty-four weather stations including data from a MétéoSuisse weather station located at the Great St Bernard Pass (Col du Grand-St-Bernard), which had collected rainfall data over 31 years (1982-2012). The overall tested area was around 20 Km2 and at an elevation ranging from 1800m-3200m above sea level.

The central idea in building the model was to find how the extreme rainfall events were distributed over time and space. Since they were looking at rare events, the researchers employed a statistical method referred to as 'extreme value theory'. This approach focuses on the largest observations, the data falling far from the average. By using this strategy, the researchers fit existing extreme rainfall models to the collected weather station data. By comparing how each model fit the data, the team was able to select the best models and then compare how these models predict future daily rainfall.

The study found that a model based on extreme value theory would be the best to predict rare rainfall events in this region. The authors believe that this method can be generalized and then used to simulate other extreme rainfall events on a global scale, thereby providing risk analyses for use in insurance, flood mitigation, and infrastructure design.

More information: onlinelibrary.wiley.com/doi/10 … 1002/wrcr.20329/full

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