A GIS Tool for Reduction Day Precipitation to Subday

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Intro

Subday design precipitation series are important for hydrological modelling and soil erosion problems in a small catchment scale when designing common measures for promoting water retention, landscape drainage systems, etc.

Project

The project with the name "Variability of Short-term Precipitation and Runoff in Small Czech Drainage Basins and its Influence on Water Resources Management" is based on the precipitation scenarios analysis from observed data of point gauging stations and radar data in terms of events’ return period, rainfall total amount, internal intensity distribution and spatial distribution over the area of the Czech Republic. The project has been launched in April 2015.

Workflow

First automatization has been implemented by well-known method which is based on reduction of 24 hours design precipitation to shorter time. GIS is used for spatial supervised classification of point values of specified repetition periods (2, 10, 20, 50 a 100 years) over the area of the Czech Republic.

Input data

Basins (in orange) with orthophoto on background

Repetition periods (2, 10, 20, 50 years) in the area of the Czech Republic

Output data

<table>
<thead>
<tr>
<th>cat</th>
<th>BASIN</th>
<th>H_002_60 (mm)</th>
<th>H_005_60 (mm)</th>
<th>H_010_60 (mm)</th>
<th>H_020_60 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2-02-01-000</td>
<td>10.8</td>
<td>24.9</td>
<td>33.7</td>
<td>44.3</td>
</tr>
<tr>
<td>4</td>
<td>2-04-02-015</td>
<td>21.4</td>
<td>29.9</td>
<td>30.9</td>
<td>52.6</td>
</tr>
<tr>
<td>5</td>
<td>2-04-04-030</td>
<td>26.3</td>
<td>36.3</td>
<td>51.0</td>
<td>67.0</td>
</tr>
</tbody>
</table>

New GRASS module

The tool for reduction of daily precipitation r.subdayprecip.design has been implemented for GRASS GIS (http://grass.osgeo.org) using PyGRASS and Python Scripting Library. It is available as Addon [4].

Graphical User Interface

r.subdayprecip.design map=basin
raster=H_002,H_005,H_010,H_020
rainlength=60

Command Line Syntax

where rainlength is rain length value in minutes.

Geoprocessing service

The tool is also available as Web Processing Service (WPS). The service is based on r.subdayprecip.design GRASS module and published using PyWPS framework (http://pywps.wald.intevation.org).

References

4. GRASS module r.subdayprecip.design
   http://grass.copens.org/grass70/manuals/addons/r.subdayprecip_design.html

About project

This work has been supported by the research project QJ1520265 - "Variability of Short-term Precipitation and Runoff in Small Czech Drainage Basins and its Influence on Water Resources Management".