"DEM2xyz v.2.0": documentation file

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DEM2xyz should also be cited in all the related publications, reports and dissemination tools and media, by means of the following citation:
"The minor tool "DEM2xyz v.2.0" is realised by RSE SpA thanks to the funding "Fondo di Ricerca per il Sistema Elettrico" within the frame of a Program Agreement between RSE SpA and the Italian Ministry of Economic Development (Ministero dello Sviluppo Economico)."

3. Acknowledgments

The minor tool "DEM2xyz v.2.0" has been financed by the Research Fund for the Italian Electrical System (for "Ricerca di Sistema -RdS-"), at different stages:
- ✓ under the Contract Agreement between RSE SpA and the Italian Ministry of Economic Development for the of RdS period 2012-2014, in compliance with the Decree of November 9, 2012.
- ✓ under the Contract Agreement between RSE SpA and the Italian Ministry of Economic Development for the RdS period 2015-2017, in compliance with the Decree of 21 April 2016. Reference project: 'A.5 - Sicurezza e vulnerabilità del sistema elettrico', Frigerio A. et al., 2015–2018.

4. Description and references

"DEM2xyz v.2.0" (RSE SpA) reads a "DEM" file and writes the associated DEM in a corresponding "xyz" file, possibly changing the spatial resolution (as requested by the user). In case the absolute value of the mean latitude is provided with a non-negative value, the following conversion takes place "(lon,lat) in (°) to (X,Y) in (m)". In this case, an interpolation (weighted on the square of the distance) is carried out to provide a regular Cartesian output grid in (X,Y). The height of the DEM points which belong to the digging/filling regions (provided in input) is modified. After this treatment, each digging/filling region has null slope. Bathymetry is possibly extruded from the heights of the most upstream and downstream coastline points. The bathymetry/reservoir extrusion is corrected in case the volume reservoir is provided as an input parameter. Multiple reservoirs are admitted. Digging regions cannot overlap each other. Reservoir/bathymetry regions cannot overlap each other. In case a digging region overlaps a reservoir region, the latter holds the priority. In the presence of a volume correction, two reference shapes are available: "reservoir" and "volcanic lake". DEM2xyz v.2.0 is compatible with SPHERA v.9.0.0 (RSE SpA).
With Copyright 2016-2018 (RSE SpA), "DEM2xyz v.2.0" is written by Andrea Amicarelli (email address: andrea.amicarelli@rse-web.it).
"DEM2xyz v.2.0" is free software released under the GNU General Public License (Free Software Foundation).

5. Tutorials

DEM2xyz v.2.0 is validated on 3 tutorials (following sub-sections), each one having possible variants. Some of the tutorials are published on International Journals and were also carried out with previous versions of the code. Other minor test cases only represent very simple configurations.

5.1. "edb_ICOLD"

This tutorial is completely described in Amicarelli et al. (2017, [1]). The paper version available on ResearchGate might help in case the published version is unavailable.

5.2. "db_Alpe_Gera"

This tutorial is completely described in Amicarelli & Agate (2017, [2]). This project report is Open-Access and also includes a synthetic English version.

5.3. lon_lat_demo

This is a very simple and very fast tutorial with input data in geographic coordinates.

6. Notes

The output files of DEM2xyz (".txt") can be post-processed by means of Paraview ([3]), by executing the following procedure:

1) open the .txt file; change the "Field Delimiter Character" to a blank space by typing one blank space; choose the option "Merge consecutive limiters";
2) apply the filter "TabletoPoints";
3) apply the filter "Delaunay2D".

7. References

1. Amicarelli A., B. Kocak, S. Sibilla, J. Grabe; 2017; A 3D Smoothed Particle Hydrodynamics model for erosional dam-break floods; International Journal of Computational Fluid Dynamics, 31(10):413-434; DOI 10.1080/10618562.2017.1422731
2. Amicarelli A., G. Agate; 2017; Modellazione fluidodinamica SPH per la propagazione di inondazioni in presenza di opere di protezione; RSE SpA, Ricerca di Sistema, Deliverable 17002102.
3. Paraview (Kitware), https://github.com/Kitware/ParaView