A MATLAB GEODETIC SOFTWARE FOR PROCESSING AIRBORNE LIDAR BATHYMETRY DATA

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INTRODUCTION - The ability to build three-dimensional models through technologies based on satellite navigation systems GNSS and the continuous development of new sensors, as Airborne Laser Scanning Hydrography (ALH) have contributed significantly to the digital 3D documentation, mapping, preservation and representation of landscapes and heritage. However, GNSS systems led to the use of the ellipsoidal height; to transform this height in orthometric is necessary to know a geoid undulation model.

The purpose of this paper is produce a Matlab® geodetic software for processing airborne LIDAR bathymetry data.

In particular we want to focus on the point clouds in ASPRS LAS format and convert the ellipsoidal height in orthometric. The algorithm, valid on the whole globe and operative for all UTM zones, allows the conversion of ellipsoidal heights using the EGM08 model.
STRUCTURE OF ALGORITHM IN MATLAB ENVIRONMENT

1. Import ‘namefile.las’
   \[ Z = h = \text{ellipsoidal height} \]

2. Read ‘geoid undulation’
   EGM2008 Earth Geopotential Model

3. Change \[ Z \]
   \[ H = h - N \]
   - \( H \): orthometric height
   - \( h \): ellipsoidal height
   - \( N \): geoidal undulation

4. Export ‘namefile_o.las’
   \[ Z = H = \text{orthometric height} \]
   Orthometric point clouds
This experiment will be carried out by analysing a LAS APRS file containing topographic and bathymetric data collected with LIDAR systems along the coasts of Oregon and Washington (USA).

**CONCLUSIONS** - The software developed in Matlab® has allowed to transform the point clouds from ellipsoidal to orthometric height. The geoid undulation values were taken from the EGM2008 for its high performance in terms of accuracy. Moreover we hope a greater use of the LAS format 1.4 because still little used. In fact, the most recent US Army Corps of Engineer data (available online) was encoded with LAS 1.2. Lastly, the software developed is useful, not only in bathymetric applications, but in all geomatics applications, which produce point clouds that require the corrections of the ellipsoidal in orthometric height.

THANKS A LOT FOR ANY KIND OF ATTENTION
I am available at the location of the posters for questions and curiosity

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