THE NASCA PROJECT – A GERMAN-CZECH COOPERATION

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Keywords: photogrammetry, remote sensing, surveying, SRTM, GIS

Abstract:

In 1995 a research project about the Nasca Lines in southern Peru was started at the University of Applied Sciences Dresden. One of the main aims of the Nasca project is the digital conservation of this World Cultural Heritage at the Pampa of Nasca and Palpa. Therefore all the relevant data have to be captured and stored in a special GIS application. In 2003 the Czech Technical University Prague joined the Nasca project and at that time a very successful cooperation began. The cooperation works especially in the fields of photogrammetry, surveying and remote sensing. In this poster some of the main objectives of this teamwork are shown.

1. INTRODUCTION

The Nasca project was started at the University of Applied Sciences Dresden, Germany in 1995. One of the major objectives of this project is the digital conservation of the famous Lines and Figures at the Pampa of Nasca and Palpa in the Peruvian dessert. That means the most important task is the vector data acquisition. Therefore the surveying, photogrammetry and remote sensing methods are playing an important role. In 2003 the Czech Technical University of Prague joined the Nasca project and since that time a very successful cooperation in these fields exists.

2. MAJOR OBJECTIVES AND RESULTS OF THE COOPERATION

2.1 Surveying

One of the most important tasks was the determination of Ground Control Points (GCP) as a basis for the rectification of the aerial photos and the satellite images. The most practical and efficient solution to determine these GCP's in this huge area is the GPS method. The very first step was the determination of a precise basic network in the main Pampa of Nasca and Palpa which was done during the GPS field campaign in 2004. A local net of very precise GPS-points was measured and transformed into the Peruvian coordinate system PSAD 56. This GPS-Net is the basis for all the future measurements in that region. During the cooperate GPS campaigns in 2004, 2008 and 2010 about 400 GCP's spread over an area of 60 km x 60 km had been measured.

2.2 Photogrammetry

A very interesting photogrammetric application is the combination of the rectified photogrammetric aerial images (orthophoto mosaic) and many private digital photos, taken independently during touristic flights over the Pampa. By using the orthophoto mosaic as a basic background with natural Ground Control Points (GCP), the digital photos can be computed to a "photo mosaic" with a very high geometric resolution, much better than the orthophoto mosaic. This procedure works of course in a limited area only, but it provides more detailed information about the lines and figures. [1]

Another important photogrammetric task is the digital documentation of petroglyphs (stone paintings) which can be found in different places of that region. Because the petroglyphs are carved into small flat stones, two pictures of the whole stone were taken; one with a sheet of paper (A4) for rectification purposes and the other one without. For the rectification itself simple software like PhotoModeler or Pictran can be used. The results were used for an Internet GIS application. [2]

Besides of these main objectives some historical monuments were measured with terrestrial photogrammetric methods. When the Jesuits arrived in 1568 in Peru they constructed churches and missions throughout the southern coastal region of Peru. Some of the most outstanding examples of baroque architecture are the surviving façades of the two churches of San José and San Javier. Severe earthquakes have left the churches in ruins. During the fieldworks in 2008 and 2010 many pictures had been taken from both churches. A 3D-Animation was created with the software "PhotoModeler". The church of San José was modelized with Google Sketchup and can be seen in Google Earth (Lat.: -14.607°, Long.: -75.128°).

2.3 Remote Sensing

With the availability of high and very high resolution satellite images the possibilities of data capture became more efficient and economic. Between 2004 and 2011 several scenes of the satellites Ikonos, QuickBird, GeoEye-1 and WorldView-2 were bought by both institutions. To rectify these satellite images all the available GCP's and the Digital Terrain Model data of the Shuttle Radar Topography Mission (SRTM) had been used. The orthorectification with SRTM-1 (X-Band) and SRTM-3 (C-Band) data has brought very good results in the main area where the Pampa is predominant plain; in this region sub-pixel accuracy was achieved. [3]

The recently computed satellite image mosaic with a geometric resolution of 50 cm is now the basis to capture the vector data of the entire region but also to produce satellite maps and 3D animations.

2.4 NascaGIS and NascaWebGIS

All the captured vector data are stored in the NascaGIS, which is based on the software Autodesk Topobase with Oracle Spatial. Besides this huge amount of vector data there are also attributive data and many pictures and animations stored. In order to provide the posterity an easy digital access to this famous cultural heritage, a user friendly Internet application (NascaWebGIS) was developed. This application was built with Open Source products like MapGuide, UMN MapServer, Mapbender and PostgreSQL/PostGIS.[4] For further information see: www2.htw-dresden.de/nazca

3. REFERENCES

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