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Documentation and virtual reconstruction of historical buildings in Peru damaged by earthquake

K. Hanzalova and K. Pavelka
Czech Republic (karel.pavelka@gmail.com)

In 1994 the "Maria Reiche" Association was founded in Dresden for extension and continual science workflow in the Nazca region. Within the framework of this association, several expeditions to Peru were realized. In 1995 the Nazca project was initiated at the University of Applied Sciences in Dresden. The Nazca project's goals are: storage and preservation of the world cultural heritage in digital form, presentation of data and resulting information, creating of digital thematic maps. This paper deals with the possibilities of creating a 3D model and visualization technique for presentation of three-dimensional objects in Peru. The project Nazca/Peru documents several historic objects. Around Nazca and Palpa villages, 400km southeast from Lima, there are many interesting historic objects, which are very acceptable for documentation. The objects of interest are churches, haciendas or archeological sites. Among the objects that have been processed and visualized are the San Jose Church, San Xavier Church and the church in Maca in Colca canyon, hacienda de La Pena and archeological site Sechin. Most of these objects were destroyed by earthquake. Data for processing these objects were acquired during expeditions in Peru (in 2004-2009). This paper discusses documentation and visualization of two of them: The Church in San Jose, San Xavier Church. San Jose Church can be found in southwest Peru in San Chose village (geographic coordinates 14° 40′ 15′′ S; 75° 07′ 45′′ W). San Chose lies in the El Ingenio region approximately 30 km northwest of Nazca City. The church was built in 1744 in baroque style. Dominating the church are two towers built of wood and covered by plaster. Under the church are found 12 crypts. The church is written on the list of company World Monuments Fund [http://www.wmf.org/] that is engaged in raising funds for the repair major historical monuments. San Xavier Church is a culture heritage from the period of Spanish colonization. The Church dominated by two cylindrical towers in its front part and two sacristies in the rear. It is located 35 km northwest of Nazca City, in Isidro village. For poor technical condition of the building it is not used for religious ceremonies. Both objects are damaged by earthquake. The San Xavier Church is on the list of company World Monuments Fund, a company which receives funds for the repair of major historic monuments. Processing documentation of these objects is different. Level first, PhotoModeler software was used for photogrammetric data processing of acquired images. The principle of PhotoModeler is based on the intersection photogrammetry method. It combines images and coordinates of points in tree-dimensional space. It can create 3D models and export in another software. Another possibility of creating a 3D model is CADs software Microstation, which was used for the model of San Xavier Church. The 3D model of San Jose Church was created in software Google SketchUp, which is used for creating, editing and sharing three-dimensional models. The model presentation was using the 3D Warehouse models and it can be visualized in application Google Earth. San Jose Church visualization is on this web page:
http://sketchup.google.com/3dwarehouse/details?mid=686f08d983d09eb18d5fe60d2287ac66
The models can be used for reconstruction of these damaged objects.