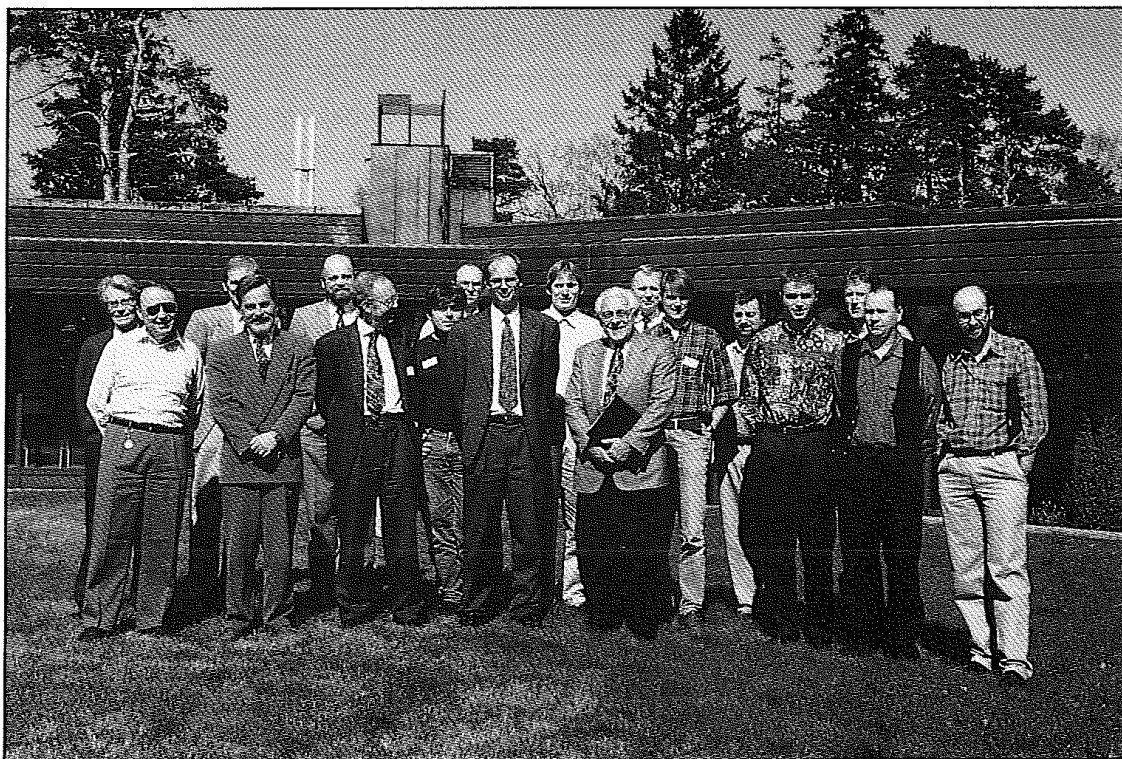


Research on Aerial Triangulation in OEEPE



OEEPE, the European Organization for Experimental Photogrammetric Research, coordinates international research on photogrammetry and related fields. Its work is organized as projects through commissions and working groups. The research dealing with the problems of aerial triangulation is carried out in Commission A.

In May 8-10, 1994, a Workshop on *Digital Methods in Aerial Triangulation* was held at Hanasaari Cultural Centre in Espoo, few kilometers west from Helsinki. The workshop was part of an OEEPE research project *Aerotriangulation Using Digitized Images* that was initiated in the end of 1992 with the goal to acquire experimental results of the accuracy and operational status of aerial triangulation using scanned aerial photographs.

For the project a block of 28 photographs in scale 1:4000 was scanned with a high precision photogrammetric image scanner with 15 μm resolution. This material was distributed to 21 institutes to carry out the aerial triangulation, each using their own systems and methods. The results were collected to the pilot centre, the Finnish Geodetic Institute, for analysis and comparison.

The Hanasaari workshop focused on the preliminary results of the project. The presentations were mainly about the methods and results of participating institutes although some presentations were on a more general level. The preliminary results indicate that a measuring precision in the range of 3-4 μm is achievable using visual approach by moving a cursor manually in the image on a computer display. Methods based on numerical techniques for the final pointing on tie points give usually the most precise results. Works carried out by some of the participants confirmed that high level of automatization can also be achieved. The computer hardware requirements can be kept rather minimal in all the approaches although a large disk space is necessary.

The workshop was perhaps the first occasion for many participants to convince themselves that good results can be achieved using digital methods in aerial triangulation. In general, there is a great potential to improve the operability and efficiency of the systems for digital aerial triangulation. Report of the preliminary results can be found in (Jaakkola and Sarjakoski, 1994) and the final report is planned to be published by OEEPE in 1995.

The work on digital aerial triangulation is planned to be continued in a new project focusing on the problem of block formation without using any signalized targets. This approach is considered as a way to reduce the total cost of aerial photography, especially for multitemporary environmental monitoring or update of geodatabases. The basic methods are available for the approach, including use of linear features as ground control or use of image matching for multitemporary images. The validity of these hypotheses should be tested in the planned project.

In OEEPE there are also other activities related to aerial triangulation. A report on the experiences of GPS-supported block triangulation was compiled recently (Burman and Torlegård, 1994). A new research project on GPS-supported aerial triangulation is planned to be started in 1995. The project on the analysis of the photoscanners studies the quality of commercial image scanners used in photogrammetric work. Preliminary results and further information are available from Professor Otto Kölbl, Ecole Polytechnique Fédérale de Lausanne, Switzerland. In OEEPE there is also a working group on aerial digital camera, lead by Institut Géographique, France, with the task to define specifications for an industrial aerial digital camera.

These kinds of development activities point out the way to the future of fully digital production lines for photogrammetric mapping, including aerial triangulation. Quoting Helava (1991) *digital photogrammetry can establish an accurate and everlasting mathematical relationship between sensor pixels and the ground*. The numerical parameters of this relationship are established in aerial triangulation and will be its primary outcome in most of the cases - the coordinates of triangulation points are usually of secondary importance. The predetermined relationship between image and ground will be utilized in *all*

the subsequent processing phases like data collection on a digital photogrammetric workstation or orthophoto production. Personally I am fully confident that this philosophy should be followed in the coming research projects on aerial triangulation, within OEEPE and also elsewhere.

References

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Tapani Sarjakoski

President of Commission A in OEEPE