



# Workshop report

## *Workshop on Geoprocessing and archiving of historical aerial images*

*IGN-France Paris,  
June 3<sup>rd</sup> and 4<sup>th</sup> 2019*

Prepared by Mallet, C. and Giordano, S. IGN-France,  
Remondino, F. FBK Trento and Trollvik, J. A.  
Norwegian Mapping Authority

Reference Workshop on Geoprocessing and Archiving  
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summary, Paris, June 03<sup>rd</sup> and 4<sup>th</sup> 2019

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# **Workshop on Geoprocessing and Archiving of historical Aerial Images - Workshop summary**

*Clément Mallet, IGN France*

*Sébastien Giordano, IGN France*

*Fabio Remondino, FBK Trento*

*Jon Arne Trollvik, Norwegian Mapping Authority*

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## Introduction

A workshop on Geoprocessing and Archiving of historical aerial images was arranged at the premises of IGN France in Paris June 3<sup>rd</sup> and 4<sup>th</sup> 2019. 57 specialists from 21 countries took part in the event, and the workshop gathered people from both the archiving and the photogrammetry part of the GI business. Presentations were made by representatives from NMCAs, industry and academia.

The initiative for this workshop based on a poll distributed by the French National Institute for Geographic and Forest Information (IGN-France) in 2017 with the help of Swisstopo, regarding archiving and processing of aerial images. The results from the survey ended in a report available from the EuroSDR homepage: <http://www.eurohdr.net/publications/official-publication-no-70-2019>.

From the report: More and more countries have digitized or are currently digitizing their archives of aerial images. They are a unique and relatively unexplored means to chronicle land-cover information over the past 100 years with very high spatial resolution. Such data provide a relatively dense temporal sampling of the territories. 3D information can even be retrieved, since many surveys were performed under photogrammetric conditions. Therefore, both long-term environmental monitoring studies and historical object detection can be based on the analysis of these very rich time series of images.

We have noticed in the last years an increasing number of scientific papers processing historical airborne images in parallel to an increasing effort of local and national mapping authorities for creating the most complete archives. In a timely manner, it appears necessary to evaluate the current status of the archive digitization process in Europe (from geo-referencing to distribution policies) as well as to review current application fields.

The report was a first step towards the identification of the main contributors in the digitization and diffusion process of archival airborne images in Europe. In order to foster the adoption of archival aerial data for the automatic chronicling of territory dynamics at large scales, main effort should now be:

- Making explicit the main common issues towards the definition of an automatic and fast photogrammetric pipeline, and in particular orthoimages;
- Generating in-between first datasets over the largest period of time in order to stimulate first thematic use-cases;
- Organizing workshops in order to gather people interested in methodological and thematic developments;
- Refining such survey with additional institutions and questions dedicated to practitioners.

## Goals and program overview

The goal of this workshop was first of all to gather people interested in both the methodical and thematic sides of historical aerial images. Of course networking, but also to identify possible R&D topics within this field.

The program was partly built up by invited speakers and partly by “call for papers”. There were great interest for giving presentations within this field, and 20 speakers gave their contribution to the comprehensive program. Late applications (5) were unfortunately not considered. We had lively discussions both underway the workshop, but also during the coffee breaks and the social part of the arrangement. Presentations as well as discussions were indeed of good value for the participants.

The 2 days were divided into 5 different sessions:

**1) The process of digitizing and archiving of historical images** – This session focused on the huge number of analogue images available through historical surveys, the process of scanning and the build-up of digital historical archives. Several national institutions explained their motivation, the adopted pipeline and reported the current status of the digitization process.

**2) R&D in geoprocessing historical images, archiving and geoprocessing.** In this session the focus was more in the direction of automated processes on historical images, e.g. automated production of orthophotos and DSM using automatic extraction of Ground Control Points with standard photogrammetric techniques or machine learning. More peculiarly, one study handled directly point clouds from historical images for estimating site index in forestry.

**3) and 4) Geoprocessing and use cases.** Here the focus was directed to the different use cases on historical data – From the digitizing of historical images, through safe storage, different applications like glacier change monitoring, making orthophotos from historical images to different kinds of distribution and geo-visualisation services.

**5) R&D in geoprocessing historical images.** The fifth and last session gathered presentations related to research on historical images; e.g. land-cover mapping using machine learning, object detection in order to find bomb craters in wartime images.

The PDF versions of the presentations are available through the url links provided with the program (Pages 7, 8, 9).

## Invitation & Venue

The workshop took place at IGN in Saint-Mandé, France (closely located to Paris). The room was located in the Georoom, which is the exhibition room and store of IGN.



### Registration

The event had a small **registration fee** of €25 for students (undergraduate, masters and PhDs) / retirees and €50 for full delegates. Registration closed on **24th May 2019**.

### Social event

Refreshments (coffee, lunch) were included in the registration cost. On the evening of Monday 3rd June, all participants were invited to join a **social dinner**.

### Related projects

[VOLTA](#)

### Media partner

[GeoConnexion](#)

## Program



Workshop on

**GEOPROCESSING AND ARCHIVING OF**

**HISTORICAL AERIAL IMAGES**

3-4 June, 2019

IGN headquarters

73 Avenue de Paris, Saint-Mandé, Paris, France

### Program

Day 1 - June 3 <sup>rd</sup> , 2019	
12:00	Lunch and registration
13:00	Welcome address and introduction to EuroSDR
<b>Session 1: The process of digitizing and archiving</b>	
13:10-14:30	<b><i>Archiving of historical aerial images: current status in Europe</i></b> ( <a href="#">PDF</a> ) Sébastien Giordano & Clement Mallet - IGN (France)
	<b><i>The digital transformation of the National Collection of Aerial Photography (NCAP): achievements to-date &amp; next stage</i></b> ( <a href="#">PDF</a> ) Allan Williams - National Collection of Aerial Photography (UK)
	<b><i>Preservation and digitizing of historical aerial images in Norway</i></b> ( <a href="#">PDF</a> ) Hardy Buller - Norwegian Mapping Authority (Norway)
	<b><i>Analog/digital image processing of historical aerial imagery in the Italian National Photographic Aerial Archive (AFN-ICCD)</i></b> ( <a href="#">PDF</a> ) Elizabeth J. Shepherd - AFN (Italy)
14:30-14:45	Coffee/tea break
<b>Session 2: R&amp;D in geoprocessing historical images Archiving and geoprocessing</b>	
14:45-16:15	<b><i>Towards fully automatic orthophoto &amp; DSM generation</i></b> ( <a href="#">PDF</a> ) Arnaud Le Bris & Sébastien Giordano - IGN (France)
	<b><i>Machine learning methods applied to WWII aerial images</i></b> ( <a href="#">PDF</a> ) Emre Ozdemir - FBK Trento (Italy)
	<b><i>Experiences with processing and co-registration of archival image datasets</i></b> ( <a href="#">PDF</a> ) Maria-Valasia Peppas & Lesley Davidson - Newcastle University (UK)
	<b><i>Using point clouds from historical imagery for estimating site index in forestry</i></b> ( <a href="#">PDF</a> ) Inge Myklebust, Floris Groesz - Blom (Norway)

16:15-16:30	Coffee/tea break
<b>Session 3: Geoprocessing and use cases</b>	
16:30-17:30	<b><i>Tracasa feedback on scanning and orthophoto generation</i></b> ( <a href="#">PDF</a> ) Víctor García Morales - Tracasa (Spain)
	<b><i>Making it digital - Processing the aerial image archive of Sweden</i></b> ( <a href="#">PDF</a> ) Anders Bygren & Emma Hedqvist - Swedish Mapping Authority (Sweden)
	<b><i>The digitization of IGN's photo/cartographic archives and the web service "Remonter le temps" ("Go back in time")</i></b> ( <a href="#">PDF</a> ) Philippe Truquin - IGN (France)
	<b><i>Time Machine. Big Data of the Past for the Future of Europe</i></b> Bénédicte Bucher - IGN (France)
17:30	Closure of meeting day 1
20:00	Get-together dinner
<b>Day 2 - June 4<sup>th</sup>, 2019</b>	
<b>Session 4: Geoprocessing and use cases</b>	
08:15-08:30	Coffee/tea
08:30-10:30	<b><i>Historical orthophoto of Prague 1945</i></b> ( <a href="#">PDF</a> ) Patrik Meixner - Primis (Czech Republic)
	<b><i>Historical aerial images of Czechia - archiving and applications in landscape studies</i></b> ( <a href="#">PDF</a> ) Petr Dušánek - Land Survey office (Czech Republic) & Markéta Potůčková, Jindřich Hodač - Charles University, Prague (Czech Republic)
	<b><i>3D Glacier monitoring with historical aerial images - from 1953 to today</i></b> ( <a href="#">PDF</a> ) Daniela Poli, Markus Strudl, Kjersti Moe - AVT (Austria) & Christian Casarotto - MUSE (Italy)
	<b><i>Historical Digital Ortho of entire Lombardia region</i></b> ( <a href="#">PDF</a> ) Patrik Meixner - Primis (Czech Republic)
	<b><i>A journey through time: Digitizing, processing and publishing historical aerial imagery in Switzerland</i></b> ( <a href="#">PDF</a> ) Holger Heisig - Federal Office of Topography swisstopo (Switzerland)
10:30-11:00	Coffee/tea break
<b>Session 5: R&amp;D in geoprocessing historical images</b>	
11:00-12:00	<b><i>Marked point processes for the automatic detection of bomb craters in aerial wartime images</i></b> ( <a href="#">PDF</a> ) Christian Kruse - Hannover University (Germany)
	<b><i>Automatic land cover reconstruction from historical aerial images: an evaluation of features extraction and classification algorithms</i></b> ( <a href="#">PDF</a> ) Rémi Ratajczak - LIRIS (France)
	<b><i>Automatic orientation of terrestrial and aerial archival images</i></b> ( <a href="#">PDF</a> ) Sebastian Flöry - TU Vienna (Austria)



<b>12:00</b>	Wrap up discussions / Recommendations for further work
<b>12:30</b>	End of meeting / Lunch

## Photos



Participants at the workshop. Photo: Ewelina Rupnik IGN-France



Some of the speakers. All photos: Jon Arne Trollvik Norwegian Mapping Authority

## Recommendations for future works

The workshop ended with a break-out session gathering all attendees. The aim was two-fold: i) wrap-up of all main topics that were addressed (or not addresses) during these two days; ii) discussions paving the way for initiatives to be constructed in the forthcoming months.

Here are the main conclusions and actions:

- There is a large range of thematic applications that were ignored in the workshop and are ignored by the end-user community. Both scientific communities and practitioners will be stimulated when automatic algorithms will be set up for orthoimages, DSM generation and also probably land-cover maps. We have to bridge the gap first.
- Many initiatives and people working on this domain did not attend the workshop since they were not aware of it. Thanks to the respective networks of the attendees, next questionnaires and workshop calls for presentation should be released to a larger audience.
- With a better knowledge on the technical bottlenecks and current initiatives in European countries, new questionnaires should be proposed with more accurate questions.
- The 2017 questionnaire was written without any prerequisite on the type of community (NMA, academia, industry). Probably 3 questionnaires on digitization/archiving, geoprocessing, and exploitation should be set up.
- One missing link is setting up international benchmark datasets for specific issues (geo-referencing, radiometric equalization, crater detection, etc.). Depending on the case studies, data will be released with various time ranges, number of dates, size, etc. Attendees will be invited to propose case studies. First initiatives should start in September-October 2019.
- Probably a new workshop around September 2020 would allow to summarize the outputs of the new questionnaires, to gather a larger and more diverse type of people, and discuss current issues.