

AirBase - A database of 160,000 aerial photos of Greenland 1930-1980s

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Beginning in the 1930s Danish survey agencies and US military organizations conducted large-scale aerial photograph surveys of Greenland for mapping purposes (1), eventuating in the recording of more than 160,000 photographs. Glaciological researchers have used this amazing resource of multi-decadal observations of the Greenlandic cryosphere for many decades (e.g. (2), (3), (4)). In recent years this information has been synthesized with modern remote sensing data resulting in a range of published research and data sets ((5), (6), (7), (8)).

Today, the historical aerial photographs are stored at the SDFE (Agency for Data Supply and Efficiency), the successor agency for the institutions doing the surveying and mapping of Greenland where the material is accessible to researchers and general public alike. The digitized flightline maps and databases necessary for the creation of this data for this work was made available by the SDFE, and it the past and present work with this database we present here.

Based on digitized flight line maps, the database contains geocoded metadata such as recording dates, camera and film roll canister, connecting the database with the analog archive material.

Past work concentrated on bulk digitization, while the focus of the current work is to improve positional accuracy, completeness, and refinements for web publication.

(1) Nielsen, A., Olsen, J. & Weng, W. L. Grønlands opmåling og kortlægning. Landinspektøren 37 (1995).

(2) Weidick A. Frontal variations at Upernaviks Isstrøm in the last 100 years. Medd. fra Dansk Geol. Forening. Vol. 14 (1958).

(3) Bauer, A., Baussart, M., Carbone, M., Kasser, P. Perroud, P. & Renaud, A. Missions aériennes de reconnaissance au Groenland 1957–1958. Observations aériennes et terrestres, exploitation des photographies aériennes, détermination des vitesses des glaciers vêtant dans Disko Bugt et Umanak Fjord. Meddelelser om Grønland 173(3) (1968a).

(4) Rignot, E. Box, J.E., Burgess, E. & Hanna, E. Mass balance of the Greenland ice sheet from 1958 to 2007. Geophys. Res. Lett. (2008).

(5) Kjær, K.H., Khan, S.A., Korsgaard, N.J., Wahr, J., Bamber, J.L., Hurkmans, R., van den Broeke, M., Timm, L.H., Kjeldsen, K.K., Bjørk, A.A., Larsen, N.K., Jørgensen, L.T., Færch-Jensen, A. & Willerslev, E. Aerial Photographs Reveal Late-20th-Century Dynamic Ice Loss in Northwestern Greenland. Science 337 (2012).

(6) Bjørk, A.A., Kjær, K.H., Korsgaard, N.J., Khan, S.A., Kjeldsen, K.K., Andresen, C.S., Box, J, Larsen, N.K. & Funder, S.V. An aerial view of 80 years of climate-related glacier fluctuations in southeast Greenland. Nat. Geosci. 5 (2012).

(7) Kjeldsen, K.K., Korsgaard, N.J., Bjørk, A.A., Khan, S.A., Box, J.E., Funder, S., Larsen, N.K., Bamber, J.L., Colgan, W., van den Broeke, M., Siggaard-Andersen, M.-L., Nuth, C., Schomacker, A., Andresen, C.S., Willerslev, E. & Kjær, K.H. Spatial and temporal distribution of mass loss from the Greenland Ice Sheet since AD 1900. Nature 528 (2015).

(8) Korsgaard, N.J., Nuth, C., Khan, S.A., Kjeldsen, K.K., Bjørk, A.A., Schomacker A. & Kjær, K.H. Digital elevation model and orthophotographs of Greenland based on aerial photographs from 1978–1987. Sci. Data

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