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The background of the cover is a vibrant, abstract painting. It depicts a landscape with a church spire on the left, a biplane flying in the upper right, and a patchwork of fields in various colors like red, orange, green, and yellow. The style is expressive and painterly.

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Hommage à Roger AGACHE
pour 35 ans de prospections aériennes dans le Nord de la France

Jimmy
Glibent

THE ROLE OF INTEGRATING AERIAL PROSPECTION INTO THE PRESERVATION OF ANCIENT MONUMENTS IN THE NETHERLANDS

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Résumé

Déjà en 1926 et 1932, des pilotes avaient pris des vues aériennes pour assister les fouilles aux environs de Laren et dans la province de Groningen; juste avant la seconde Guerre mondiale, Von Frijtag Drabbe avait exploité des photographies aériennes verticales pour la recherche archéologique. Les survols continuèrent après la guerre à une échelle modeste à cause des contraintes financières et pratiques. Récemment, l'Université d'Amsterdam s'est donnée les moyens de contribuer à la préservation des sites archéologiques dans un programme de survols aériens en trois points :

- 1°) - contrôler les sites archéologiques sous protection ou non;
- 2°) - identifier et localiser les sites potentiels, comme préliminaire à une protection légale;
- 3°) - assurer une cartographie des sites et monuments.

Abstract

In 1926 and 1932 already shots had been taken from the air to assist excavations near Laren and in the province of Groningen; just before the second World War, Von Frijtag Drabbe had made use of vertical air photographs for archaeological research. Flights continued after the war on a modest scale, owing to financial and practical constraints. Recently, Amsterdam University volunteered to contribute to the conservation of archaeological sites through a programme of aerial survey aimed at :

- 1°) - Overseeing archaeological sites, protected or not;
- 2°) - Identifying and localising potential sites, prior to possible legal protection;
- 3°) - Mapping sites and monuments.

Zusammenfassung

Schon 1926 und 1932 hatten Piloten mit Luftaufnahmen die Ausgrabungen in der Umgebung von Laren und in der Provinz von Groningen unterstützt. Kurz vor dem 2 Weltkrieg benutzte Von Frijtag Drabbe die vertikalen Luftaufnahmen. Danach ging das Überfliegen weiter, wenn auch aus finanziellen und praktischen Gründen in bescheidenerem Masse. Vor kurzem hat die Universität Amsterdam Mittel für ein 3 Punkte Flugprogramm zur Erhaltung archäologischer Stätten zur Verfügung gestellt :

- 1°) - Kontrolle geschützter wie ungeschützter archäologischer Stätten;
- 2°) - Identifizierung und Lokalisierung potentieller Stätten;
- 3°) - Sicherstellung einer kartographischen Erfassung der Stätten und Denkmäler.

The importance of air photography for locating sites of archaeological importance and in supporting effective excavation procedures has long been recognized in the Netherlands. Already before the Second World War C.A.J. von Frijtag Drabbe, a former director of the Land Survey, then based in Delft, exploited his ready access to vertical shots to locate archaeological features and sites. This resul-

ted in several publications (for example VON FRIJTAG DRABBE 1947, 1948) and the tradition was continued on a modest scale by certain archaeologists who drew attention especially to the interpretation of aerial photographs as a valuable addition to archaeological research. Amongst them was A.E. van Giffen (eg. 1939, one of many), H. Halbertsma (1948), P.J.R. Modderman (1948) and, more recently, especially J.A. Brongers, who has demonstrated the potential of this technique in locating Celtic field systems in particular (BRONGERS 1964, 1973, 1976).

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In the Netherlands, the earliest photograph from the air to deliberately select an archaeological subject is one of the barrow group Zeven Bergjes on the Zuiderheide (gem. Laren). This was taken around 1926 by a pilot as a gift for his fiancée. In 1932 the first photo taken for the sole purpose of archaeological research was taken by the "Luchtvaartafdeling Soesterberg" (1) to assist in the excavation of a cemetery of Laudermake in the Prov. of Groningen (VAN GIFFEN 1939), followed in 1934 by a photo of the Noordse Veld near Zijen, gem. Vries (HALBERTSMA 1948).

Financial and practical constraints have meant that in the Netherlands aerial photography has not been regarded as a standard procedure, to be invariably included in archaeological field work. However, recently obtained results have confirmed its position amongst the more important of the non-destructive techniques employed in archaeological prospecting (de Vries-Metz 1982, 1993).

In the Netherlands, the institution which is most actively involved in aerial photography, both in its practical application and in education and research is the Institute of Pre and Protohistorical Archaeology of the University of Amsterdam -IPP- (2). Other institutions occasionally call on the IPP for support, though at present they do not operate independently in this field of research. As a consequence of the tradition of air photo interpretation in the Netherlands, which exploits the archaeological potential of photographs originally taken for other purposes, much of the training and development in this field is also concentrated in Amsterdam.

Besides its role in archaeological field work, aerial photography can also make a major contribution to the care and preservation of the monument record. Various aspect may be considered :

- 1°) - Control of archaeological sites, whether already protected under the Ancient Monuments Law or not.
- 2°) - Identification and location of potential sites, as a preliminary to legal protection.
- 3°) - As a means of precise survey for the cadastral pin-pointing of monuments.

CONTROL OF ARCHAEOLOGICAL SITES, WHETHER ALREADY PROTECTED UNDER THE ANCIENT MONUMENTS LAW OR NOT

At present there are about 1600 legally protected ancient monuments in the Netherlands (fig. 1-5). Of these, approximately half are visible from the ground. Despite protection, they are under continual threat of erosion from human, natural and physical agencies. There are, further-

more, many times this number of unprotected sites : location where archaeologically important remains are known to exist and which are subjected to equal, if not greater threat.

The protection and control of archaeological monuments record in the Netherlands has long been a task of the archaeologists who are responsible for the twelve Dutch provinces. However, because of the increasing pressure of work brought about by the rapid developments taking place in the country -reallotment schemes, construction of industrial estates, urban expansion, extension of the infrastructure- few archaeologists have the time to adequately oversee the compliance with the law.

In 1990, the *Stichting Archeologische Monumentenwacht Nederland* (AMW), a Foundation for Guardianship of Ancient Monuments, was set up, specifically for the maintenance and control of archaeological monuments. Included in the Foundation's remit is the documentation of sites, carrying out minor repairs to visible monuments, maintaining contacts with owners and tenants and the provision of advice and guidance. Incorporated in the AMW are the State Service for Archaeological Investigations in the Netherlands (ROB), the *Stichting Federatie Monumentenwacht Nederland* (Foundation FMN) and the *Stichting Regionaal Archeologisch Archiverings Project* (Foundation RAAP).

One of the tasks of the AMW is the inspection and control of field monuments, and this includes those still buried. In contrast to most historical monuments, protected archaeological sites are all too often located in inaccessible places, such as the middle of agricultural land or in nature reserves, which hampers inspection. It is often not only difficult to even see the sites from the road-side, but closer inspection is frequently impossible on account of standing crops or the soil structure (as, for example, after heavy rain). Furthermore, the sites are scattered throughout the Netherlands (fig. 1), making inspection from the ground an expensive and time consuming task.

Aerial reconnaissance forms an excellent means whereby listed monuments can be checked for compliance with the preservation law, as well as simplifying the regular checking of unscheduled, but important archaeological sites. An additional advantage is preventative : landowners will exercise more restraint if they know there is a spy-in-the-sky. Particularly important is the opportunity offered

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- (1) - The original Royal Netherlands Air Force.
 - (2) - Now called the Amsterdam Archaeological Center.



Fig. 1 : archaeological monuments protected by law in the Netherlands (information, drs. R. Wiemer, ROB-ARCHIS).

red for gathering direct evidence of non-compliance on film. Such evidence is vital should prosecution be considered. A case from England provides a good illustration of the potential of aerial photography in the service of the monuments inspectorate. The medieval earthwork remains of Legbourne Priory, Lincolnshire, legally protected from destruction were bulldozed in 1988 and an ornamental lake was dug through the heart of the site (see the Newsletter of the Royal Commission on the Historical Monuments of England 1990). On

the evidence of aerial photographs taken both before and after the destruction, the land owner was fined £ 15000.

An operation such as this relies on a joint approach from a team active both on the ground and in the air. When irregularities are signalled from the air, the county archaeologist or the staff of the AMW can immediately spring into action. Unfortunately, it is still impossible to inspect every single monument from the air. Some, such as those

in woodland, will remain invisible, and for these we will continue to be dependent on ground inspection.

IDENTIFICATION AND LOCATION OF POTENTIAL SITES, AS A PRELIMINARY TO LEGAL PROTECTION

In addition to the discovery of new sites from the air by means of systematic aerial survey (DE VRIES-METZ 1993), the interpretation of vertical photos made for other purposes can generate a considerable amount of information concerning the distribution and extent of archaeological monuments. Such information can in turn be used when considering extending preservation orders to new monuments. Two categories of photographic information can be used : those photographs taken some time ago, which record the earlier situation of the monument and recent shots revealing the extent of the threat. The first group is especially important in those areas where the landscape has been -or still is- subjected to extensive disturbance, thus rapidly erasing the visible archaeological record. This is the case for much of Second World War were, moreover, taken under unique conditions, so that these negatives reveal traces not recognisable on subsequent films. Recent photographs are of importance in recording the present condition of the archaeological monuments.

Both types of photographs are housed in the archives of the Topographic Survey in Emmen, the Cadaster and Land Register in Apeldoorn, in the archive of the Royal Netherlands Air Force in Soesterberg, the Department of Rivers and Transport (*Rijkswaterstaat*), the National Rail Authority, local authorities and various commercial organisations involved in aerial photography (3).

In order to exploit the full potential of this information for the monuments inspectorate it is essential to compose a register listing the sites photographed, the details recorded, and the location of the original negatives.

(3) - Housed in the IPP is a catalogue containing details of approximately 150 collections of aerial photographs, from both government institutions and private archives. The description of the collections records the type of photograph, the site location and the accessibility. The catalogue was compiled by drs R.-L. Lichtveld for the practical component of the degree course in cultural prehistory.

AS A MEANS OF PRECISE SURVEY FOR THE CADASTRAL PIN-POINTING OF MONUMENTS

In the formulation of an integrated strategy for the preservation of archaeological monuments, it is essential that the locations are registered with the utmost accuracy in cadastral surveys to avoid subsequent dispute on the exact position and extent of the protected monument. Eminently suitable for the purposes of gathering the necessary information are combined oblique and vertical air photographs, since the limits of the site can frequently be established with greater accuracy from the air than from ground observation. This information is easily transferable to cadastral maps. In the past, the translation of oblique photographs has been problematical, but with modern computer techniques this is no longer the case (SCOLLAR *et alii* 1990). Both the hardware and the software necessary to digitally « straighten out » oblique shots for transfer to maps has recently become available at several archaeological institutions in the Netherlands (eg. IPP and ROB-ARCHIS).

Recently a trial project has been initiated to assess the potential of aerial survey in the service of the monuments inspectorate in the Netherlands and to gain some estimate of the relative costs of aerial observation. A single province in the Netherlands has been chosen for this purpose, and the trial is being carried out in the winter of 1993-1994. North Holland was chosen specifically as this province does not harbour an excessive number of protected monuments and because it is one of the provinces most threatened by development. At the present time, the province contains 59 protected archaeological sites, 7 on the island Texel, 6 in eastern West-Friesland, 20 in the rest of West-Friesland, 7 in the former IJ-estuary, 3 on the island Marken and 16 in the area Het Gooi. In favourable weather conditions, a well-prepared flight could cover these monuments in between 6-8 hours work. This represents a vast savings of man power, since land inspection would require at least five times this effort. Analysis of the results (administration of results, writing up, processing the negatives, obtaining clearance from the Ministry of Defence, etc.) would take approximately three work-days. It already looks as though this trial will prove to be successful, and that flights will be extended to cover all the protected archaeological monuments in the Netherlands in the same way.

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Fig. 2 : one of the 1 600 protected archaeological monuments : the Zwartenberg at Hoogeloon. A restored ring-and-bank barrow dating to the middle Bronze Age. Despite the fact that the barrow is situated in the middle of a stand of woodland, it is easily observable from the air.



Fig. 3 : the earliest known prehistoric monuments are the "hunebeds". There are 53 of these monuments in the Netherlands, most of them in the province of Drenthe. As early as the second half of the nineteenth century they were protected by law. This aerial photograph shows the long grave near Havelte (Province of Drenthe).



Fig. 4 : Aartswoud gem. Opmear. A protected late Neolithic settlement (Einzelgrab-culture). The dark spots beside the former creeks are areas with high organic content and the light greyish spots, also along former creeks, are shell middens. The area was originally grassland, but was ploughed to plant tulips, leading to serious degradation of the settlement traces.

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Fig. 5 : prehistoric barrows and settlements threatened by military exercises. Ermelose Heide, gem. Ermelo (Province of Gelderland). Albert Egges van Giffen Instituut voor Prae en Protohistorie, Universiteit van Amsterdam.