Traces of Unidentified Flying Objects on Military Radar Devices over Central Europe

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The speaker is an astrophysicist. He is not a radar specialist or an image analyst. Since the responsible Swiss military employee did not wish to talk about the radar data himself, the speaker will present some of the results of radar records without knowing too much about the confidential military computer-analysis programs and the special equipment used.

Abstract

In Belgium and Switzerland, members of the Society for the Scientific Investigation of Anomalous Atmospheric and Radar Phenomena - MUFON Central European Society, Inc. (MUFON-CES for short), - with tacit permission from their superiors - were able to obtain radar records from radar surveillance systems in some cases to investigate unidentified traces registered by these systems. Unidentified radar traces were observed over Central Europe nearly every fourth day or night. About 200 radar plots from 130 days were investigated by members of the MUFON-CES radar team. The managers of military air surveillance have no orders and no manpower to investigate such "radar-disturbances." In most of the cases, a natural explanation of these "disturbances" seems to have been excluded. A distinction should be made between (a) "accumulations" of radar echoes and (b) traces of navigating objects. Since the investigation into the plots was made 'post-mortem' no visual identification by pilots or radar controllers has been made. Only in two cases could the radar controllers simultaneously observe lights over a nearby mountain (and accumulations on radar) near their working place as well as a silvery disc (and an impossible flight trace on radar). Some of the strange radar echoes were seen near logistic installations (in military radar systems, in nuclear power plants, in a NATO early warning station and in military flight maneuvers). The military airspace surveillance system satisfactorily constitutes a UFO research instrument. Since permission to use that instrument by scientists depends on military orders, research into the behavior and the possible explanation of UFOs depends on political decision only.

1. Introduction

No airspace surveillance system is free from disturbances which appear sometimes and soon vanish again. They may have different origins. In general they are ignored by the flight controllers since they do not essentially disturb the work of surveillance.

Analyses of these "disturbances" were only performed when image analysts with decades of experience finally wanted to know what the suppressed phenomenon was all about, and when in Belgium the pressure of the public on military air defense had grown so strong that the military leadership began to release some of the radar data for scientific analysis by civilian scientists (Meessen 1991). A first analysis resulted in the conclusion that, in addition to the known flying objects and disturbance echoes, there were also protocols of unidentifiable radar echoes originating from physical sources as yet unknown. This material proves that there is a great need for explanation and for research into these flight traces, which up to now have been unidentifiable for specialists.

The "Scientific Study of UFOs" carried out by experts in radar image analysis (Condon 1969) has shown that indeed flying objects of unknown origin were recorded visually and by radar (Utica, N.Y., USA, June 23, 1955; Lakenheath, England, Aug. 13/14, 1956; Chesapeake

Bay, USA, Aug. 30, 1957; Fort Worth, USA, Sep. 19, 1957; Colorado Springs, USA, May 13, 1967). Therefore, it is probable, that some of the unexplained radar traces on the plots were generated by reflections of real physical bodies.

In 1993, the chiefs of Swiss Military Air Traffic Control (ATC) tolerated that radar image analysts give some of the recorded inexplicable flight tracks to civilian researchers for analysis. One of the employees with decades of experience in the analysis of radar images began by taking a closer look at the previously ignored "traces of disturbance." Because of the heavy air traffic during day-time, he restricted his analysis to the plots during night-time. The area scanned by radar covered about 600 km from north to south and about 700 km from east to west, up to an altitude of 100,000 ft. The recording area nearly extended from Paris in the west, down to Genua in the south and up to Munich in the north-east for objects which fly at an altitude of about 30,000 ft.

The synthetic representation of the airspace situation is carried out by 2 civilian (type Hughes-SP52, S-band) and 3 military radar systems as well as by 5 radar stations specializing in the detection of low-flying objects.

Only a few years ago, printouts from the radar computer on the radar traffic situation became possible. The information can be monitored or printed out as plots of a special segment of a region at a certain time with a variable duration of recording showing the altitude and identity of each single flying object designated as civilian, military, or unknown.

The computer programs for obtaining these representations were installed by Hughes Aircraft Corp., and the representation of flight traces on a map was developed by a company from Israel.

The military operation centers of each country receive 2-D primary and secondary information from various civilian radar stations and 3 D-primary information from military radar stations. All these data are used to develop and store a synthetic airspace situation image. This airspace image system can be analyzed later. After 2 or 3 days, all stored data concerning the airspace will be supplanted by newer data. Each week all radar devices are harmonized.

When flying objects without a transponder are tracked, a flight path is calculated from 3 position points. From the flight path, an approximate area of the object's expected future location is extrapolated. If the object is not found there in the next radar scan, the approximate area of expected location is enlarged. If after the new scan the object is again not found within the area of the expected location, possibly located elsewhere and therefore on a flight path which is interpreted as "impossible," tracking is abandoned (for instance, see van Keuk 1971, von Ludwiger 1972). The computer program will not track flight paths that deviate from those of airplanes, which fly in straight lines or smooth curves and do not accelerate abruptly.

The instructions for analyzing computer representations of flight paths explicitly state:

> "Flight paths which do not correspond to expectations are to be removed from the system immediately."

When such "impossible flying objects" do appear in the airspace under surveillance, they are shown in a graphic image as points or a cloud of points plotted versus a flexible period of time,

since recording their flight paths on radar may be intermittently discontinued, depending on the motion of the objects.

During daily operating procedures, such points or short tracks are interpreted as disturbances and ignored. Every employee of military airspace control is familiar with them. But nobody can satisfactorily explain what they are. They are considered to be radar defects or computer program mistakes or some kind of atmospheric phenomenon. They are not reported because of the fear of being reproached by colleagues and superiors for insufficient working knowledge of the radar system.

At present, it is not possible to influence the adjustments of the devices for online investigations. Since an analysis of these unidentified flight traces has not been commissioned, no such analysis exists, and therefore no secrecy attached to such data. The spokesmen of the various military airspace surveillance systems are being absolutely truthful when they assert:

"We have no record of any unidentified flying objects," since such flight tracks are not considered relevant and no such data are preserved.

In Germany, Austria, Belgium, and Switzerland it is not mandatory to notify authorities when unidentified flying objects are observed. They are designated as "disturbances" which threaten neither the safety of civilian nor military air traffic.

In day-time, the density of air traffic over Central Europe is so high that about 400 airplanes have to be handled by the system simultaneously. During night-time, civil air traffic is drastically reduced because of the night-flight prohibition (Figs. 1 and 2).

Because of the heavy traffic during day-time, the image analyst restricted his search for unusual radar traces to the plots made during night-time.

To keep the screen free from such undesirable echoes (ground clutter, swarms of birds and insects, rain clouds, corner reflections of cars and so on), nowadays all signals from several scans are stored in a computer and filtered by various programs before they are displayed on the screen. Only objects which move at a certain velocity are displayed (Moving Target Indicator, MTI).

Civilian air traffic control works with secondary radar. This type of radar triggers the transmitter or "transponder," carried by airplanes and balloons, to transmit specific (secondary) pulses of the same frequency and pulse duration. Normally, the following data are modulated on the carrier pulse: Individual code = identification of the airplane and altitude information (mode C). Distance and azimuth are registered by radar echoes. The airplanes are displayed as small semicircles with flight vectors. Primary echo symbols projected on the plane show only the location of the echo, with all errors appearing as small squares.

Of course, in case of crisis, military targets do not disclose their identity by transponders. Therefore, the altitude of the targets must be determined by height-finders, in other words altitude radars. The radar system for military air surveillance is 3-dimensional radar, whereas civilian flight radar is only 2-dimensional radar, which requires transponder information from the targets for their complete localization.

Objects without transponders can be tracked only when they are near enough and when they are at such high altitudes that they are above the radar horizon caused by the curvature of the Earth's surface, so that they can be hit by the radar beam. All of these unidentified flying objects will be made available to military air traffic control, when the altitude and identity of the unknown airplanes will be determined, should the occasion arise.

2. Data Acquisition and Selection Criteria

Our experts are quite familiar with disturbances of known origin (for instance, see Skolnik 1970, van Brunt 1978, 1982):

• Interferences which occur when a radar station or a satellite transmitter by chance beam into another one.

• Anomalous propagation (AP) of radar rays can occur during special weather conditions in which the radar ray is deflected by refracting or inversion air layers so that objects on the ground are reflected which normally are invisible on radar (so called "angels").

• Metallic particles in steam at industrial sites where hot slag is periodically dumped into water can produce a radar signal.

• So called "fruits" will be generated if transponders are simultaneously queried by more than one secondary radar system. The transponders will generate false displays due to pulse combinations.

The anomalous flight paths we are considering here are something different.

Through synthetic representation via plots, two of the main recommendations for a future UFO investigation made by Gordon D. Thayer in the Condon Report (Condon 1968, p.175) are fulfilled: (1) "...to determine the correct azimuth and elevation angles of any visual or radar objects, by 'post-mortem' re-creation of sightings, if necessary...(2) Reported speeds and directions of UFOs, especially of radar UFOs, should be carefully checked (again, 'post-mortem' if necessary) and cross-checked for validity..."
Meeting the third recommendation, that "every effort should be made to get the most comprehensive and applicable meteorological data available for an UFO incident as quickly as possible," is a financial question only.

The MUFON-CES radar team obtained about half of the registered plots with strange traces, i.e. 200 plots from 130 days, during the time period November 1992 to September 1996. Analyzing all of the plots with unexplained traces would require a full-time job for a person with military clearance. Therefore, in many cases the analyst wishes to have a more detailed time resolution or different scale of representation, which could not be done for time reasons. In no case has a weather record been commissioned for the relevant time for the

region in which the unusual radar echoes appeared, since such a protocol prepared by a Meteorological Agency would cost nearly 150,- DM = 90 $.

In long-time representations over 6 hours (usually between 11.30 p.m. and 5.30 a.m.), the plots in many cases (73) show "clouds of echo points" in a special location. In some of these cases, shorter time representations (1 hour or 30 minutes) and zoomed regions are also available. In these images, the hits or echo points are joined by a line, providing a trace of an unknown object. In other cases the echo points are not connected. These single elements of a point accumulation may be produced by a ray tracing through atmospheric layers of different temperatures and humidity, which can generate effects of a vertical gradient of refraction. In this case, ground echoes could be reflected ("angels"), which a straight ray would never have reached.

But these accumulations sometimes "jump" suddenly from one region to another; weather conditions are not known to do that.

33 plots show strange traces. Sometimes these traces appear and then vanish suddenly after some minutes. Twice objects appeared from high altitudes and moved to ground level without lowering speed.

3. Characteristics of Unidentifiable Radar Traces and Case Examples

The unidentifiable radar tracks recorded have the following characteristics:

- They are recorded at the same location simultaneously by various radar stations operating with different frequencies;
- they appear suddenly in the area scanned and vanish suddenly;
- they generally remain "visible" on radar for several minutes, sometimes even for hours;
- no regularities of any kind, whether by season of the year or day or by weather conditions or geographical positions, are detectable;
- there are various kinds of unidentifiable tracks:

a) Patterns of flight differing from those of airplanes, airships and balloons (Fig. 3);

b) Massive appearance of many short-lived echoes in geographically limited areas, reappearing repeatedly (Fig. 4);

c) Track showing a jerky movement and then hovering (Fig. 5);

d) Flight paths with very big variations in altitude (Figs. 6 and 7).

(In the representation of the flight paths each cross means a "hit," i.e. a hit during each rotation of the radar antenna. The time between 2 crosses is 10 seconds. Each minute is marked by a little square).

Altitude charts with similar traces were recorded in other countries as well by military radar devices on ground or airborne radars. For example, Jannine and Jacques Vallée mention the tracking of an unknown object by French military radar on December 2, 1954, in Ceuta, Morocco (J. & J. Vallée 1966). A fighter aircraft was in visual contact with the object at the

same time. The flight pattern is that of the patterns registered by Swiss military airspace surveillance (Fig. 8).

Meessen (1994) also shows flight characteristics of objects in 3-dimensional diagrams which follow the same pattern (Fig. 9).

These accumulations in general do not appear in the airspace used by civilian planes, but in regions outside them. These disturbances build up "nests" (Fig. 10).

If unidentified objects are detected in air corridors, civilian air traffic control re-routes civilian airplanes around that region, which has been recorded in two cases.

4. Cases in Which the Flight Traces Show Intelligent Behavior

Occasionally objects approach the earth with 3- to 4-fold supersonic velocity from an altitude of more than 100,000 ft. They do not move in straight lines like meteorites, but change their angle of altitude several times. On March 8th , 1995, a strange object was detected, emerging from a high altitude in the region of Nimes, France, then flying off to the German border at a velocity of 3 Mach (Figs. 12 and 13). We have two of these cases.

During the process of identifying an unknown flying object traveling in a straight line at 210 km/h on June 18th , 1993, the object suddenly made a right-angle turn and accelerated to supersonic velocity. The radar computer eliminates tracks which show a velocity of more than 4 Mach, because no known jet and missile can exceed that velocity today. Therefore, the trace of that unknown object was probably lost (Fig. 14).

Some objects seem to have a distinct affinity for logistic installations. They appear over nuclear power plants, big current transformer stations and transmitter stations (Fig. 15).

Unidentified objects hover in the vicinity of radar installations and participate in air battle maneuvers. Radar plots show that unidentifiable objects flying near radar stations keep to a distance of about 10 km. On January 24th, 1995, at least three objects flew around the radar station situated on 3,700-m high Mount Balmhorn, dancing up and down in strange patterns (Fig. 16).

The movements of the single objects can be seen on a 3-dimensional computer animation. In this computer animation one can see how their movements differ from those of common airplanes. These objects flew at altitudes from 3,700 m up to 10,000 m on a circle around the top of Balmhorn (Figs. 17 and 18)..

Radar stations are also situated on top of 2,100-m high Mount Pilatus. They, too, were surrounded by strange flying objects on May 18th and Dec 21st , 1995, again at a radius of about 10 km.

During the night of May 29th to 30th , 1996, strange echoes slowly moved over one of the 4 NATO airspace early warning systems in Europe at the NATO base in Messtetten (Wuerttemberg) for 7 hours (Fig. 20).

Since the unknown disturbance occurred not only over Messtetten but also at other locations to the east, this echo could not have originated from any experiments conducted by the NATO base itself. Furthermore, it was not the first time that a strange radar signal had been registered over Messtetten (March 11 and Oct. 24/25, 1995). Pilots from the military air bases in Manching (Bavaria) and Messtetten told us that over the last 10 or 15 years they no longer pursued unidentified flying objects because of the frustrating fact that these objects always moved away and could never be reached by their jets.

Several visual observations confirm that unidentified radar disturbances, at least in these cases, are solid physical objects. Unfortunately, the probability of visual confirmation is inversely proportional to the probability of good radar observations. For a good visual sighting, flying objects must have an altitude of less than 300 m. But at theses altitudes the objects which are in some distance of a radar are below the radar horizon. Therefore, very few good radar-plus-visual reports of unidentified flying objects exist.

It would be ideal if an unknown object were to come so close to a radar station that operators of military radar monitoring could see it from their workplace during working time.

This actually happened on June 5th , 1996, to the radar operators in Dubendorf, Switzerland. Around 2:30 p.m., 6 employees with Swiss Military Air Surveillance (controllers and image analysts) observed from the building of the military ATC at Klothen, at a distance of only about 1700 m, a big silvery disk rotating and wobbling in the air at an altitude of 2,200 to 1,300 m. It moved from east to west and back and eventually shot away with high acceleration (Fig. 21).

This radar track, provided by 3 radar devices, confirms the statements of the witnesses. In this case a class-A object (classification by Rutledge, 1981) was observed, i.e. a structured metallic apparatus. Class-B objects, manifesting themselves as balls of light, were observed as well, both visually and by radar. On October 2nd , 1995, at 7:30 a.m., a radar operator with the Swiss ACC observed some strange lights on the way to his office in Dubendorf over Mount Saentis which could not have been airplane lights. The analysis of radar images of this region showed that from 4 a.m. on many unidentified echoes were registered, which vanished at about 8 a.m. (Fig. 22).

5. Data Analysis

Statistical analysis of the data shows that during the period from 1994 to 1966 unidentifiable tracks appear on military radar screens in the Central European surveillance space nearly every fourth night (Fig. 11). No day of the week is special. In any one year there are as many unidentifiable echoes as in any other year. (The records during the period from 1992 to 1994 are not listed, because the radar system was being installed and for many days no normal work was possible). *The average recording time for the 200 plots with strange radar echoes was 2 hours. The duration of the traces found in 33 plots is in the time period of minutes. Accumulations appear for hours. Only in a few cases a time resolution of these accumulations has been tried. In some of theses plots were traces displayed.*

Not all of the accumulations of short traces seem to have a meteorological origin since the appearance in some cases will remain stationary for a long time. The area of radar echoes on September 5 and 6, 1996, at Swiss-Italian border which had a length of about 50 km remained relatively stationary for 26,5 hours (Figs. 23 to 26).

From points of coordinates for the traces of unknown echeos which circulated the Balmhorn we calculated the flight parameters, drew spline curves and came to the conclusion that during these flights there were lateral accelerations of up to 12 g lasting several seconds (Figs. 19a and 19b). Therefore these objects could not have been manned airplanes. The use of any new unmanned aircraft, however, has to be announced to the military ATC, especially when air battle maneuvers are carried out at the same time. Whether the military pilots have seen something unusual during these maneuvers is not known.

As in other situations (Mount Pilatus) the strange echoes also held a distance from nearly 10 km from the radar device positioned on the mountain top. There is no reason, why.

There are some locations were the unidentified echoes appear most frequently. These are mountain tops with logistical installations (for instance Mount Saentis in Switzerland and, Mountain Feldberg in Germany). A coordinated two-days field investigation near Feldberg mountain in August 1995 with different optical instruments remained without results. The radar plots displayed no unusual echoes. Further trials have been canceled because of the the starting rain-period.

6. Discussion

These are some examples of why it is imperative for experimental UFO research to utilize radar installations. Thoroughly scientific experimental UFO research should be in a position to carry out online analyses. But the military is not commissioned to do this, and interested civilian scientists get no permission to look into military protocols or, even better, to use the air surveillance system. Since October 1996 - when the fact was made public, by indiscretion, that there are unidentified traces on radar plots - it is no longer possible for national security reasons, to get any radar plots of the kind mentioned from the Swiss Military ATC.

Whatever the traces of these unidentified flying objects may be, in some cases these objects are real, and there is an urgent need for research and for achieving clarity. Unfortunately, politics and science so far lack the courage and the will to seriously tackle the UFO phenomenon, which has been so ignominiously discredited by the news media. Opening up the possibility of solid scientific investigation is clearly not a scientific problem but primarily a purely political issue.

Some conclusions derived from results of the analyses of radar traces by the MUFON-CES radar team are that there are strong indications that the irregular traces on the plots are radar echoes of class-B UFOs (structureless spheres of light if seen visually). Traces which show a distinct flight path seem to be echoes of class-A UFOs (i.e. metallic objects). An accurate study of these different phenomena and their possible interconnection could possibly lead to a solution of the enigma as to whether the light balls have an existence of their own or whether they are sensors of some kind emitted by the class-A UFOs. In any case, only from the study of the behavior of the UFOs can one learn something about their origin (extraterrestrial or from

the future), since beings of a different origin would show other intents, which could be read from radar plots.

Since there is no hope that members of military air surveillance will investigate these peculiarities, civilian radar specialists in Germany are planning to operate their own private radar devices if permission from the German administrative body can be obtained.

There have been other private projects which used radar devices.

A full-time UFO monitoring facility was set up near Austin, Texas in 1978 called *Project Starlight International* (Stanford 1978). In the Hessdalen Valley near Trondheim, Norway, a short-term monitoring project was undertaken in January and February 1984 following a dramatic increase in the incidence of reports from this area. *Project Hesdalen* was set up in cooperation between "UFO Norge", "UFO Sveringe" and Finnish researchers. They were able to borrow technical equipment from the Universities of Oslo and Bergen, including an Atlas 2000 radar, a seismograph, a fluxgate magnetometer, a spectrum analyzer, infrared viewers, Geiger counters, and different kinds of cameras. The investigation attracted the cooperation of the Norwegian Defense Research Establishment.

36 radar tracking incidents were recorded over a five-week period. One target, which was simultaneously observed visually and filmed as a continuous light source, reportedly gave points on the radar only on alternate sweeps, an oddity for which no immediate explanation suggests itself. The data have yet to be fully understood (Strand 1984).

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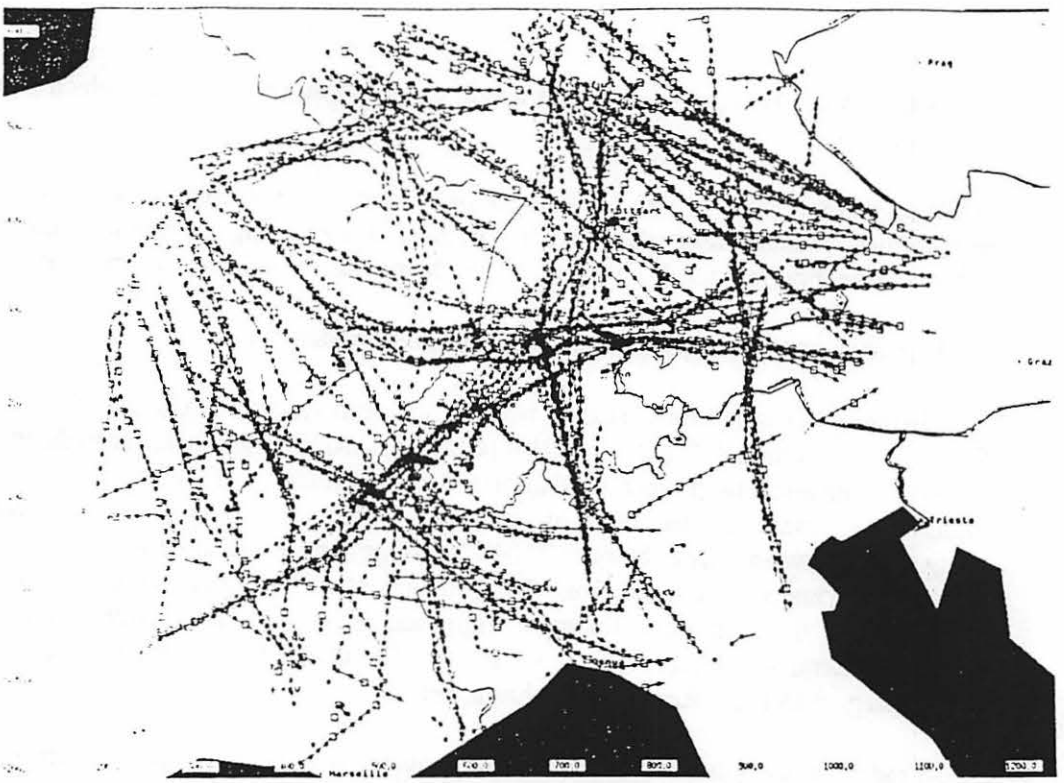

Fig. 1 Density of day-time civilian air traffic over Central Europe
Example: Nov. 11st , 1995, 11:30 to 12:00 a.m.

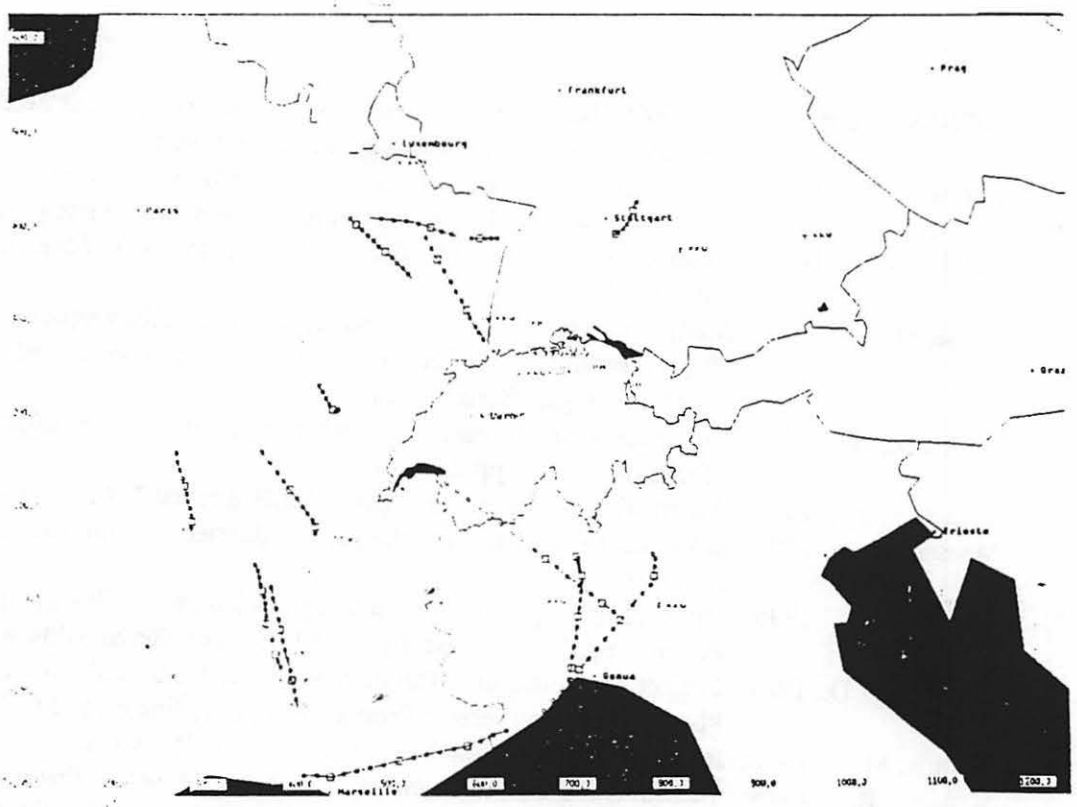

Fig. 2 Density of night-time civilian air traffic
Example: Nov. 8th , 1995, 2:00 to 3:00 a.m.

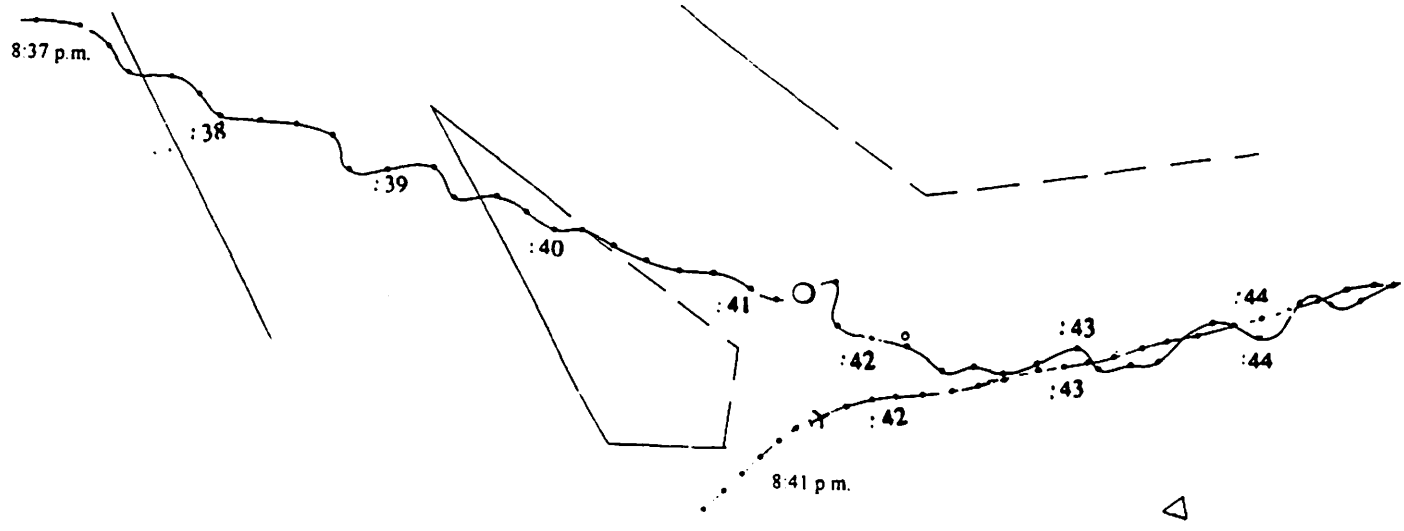

Fig. 3 Traces of an unknown object, flying around an airplane, observed on radar on March 18th, 1990, near Charleroi, Belgium (Meessen 1995)

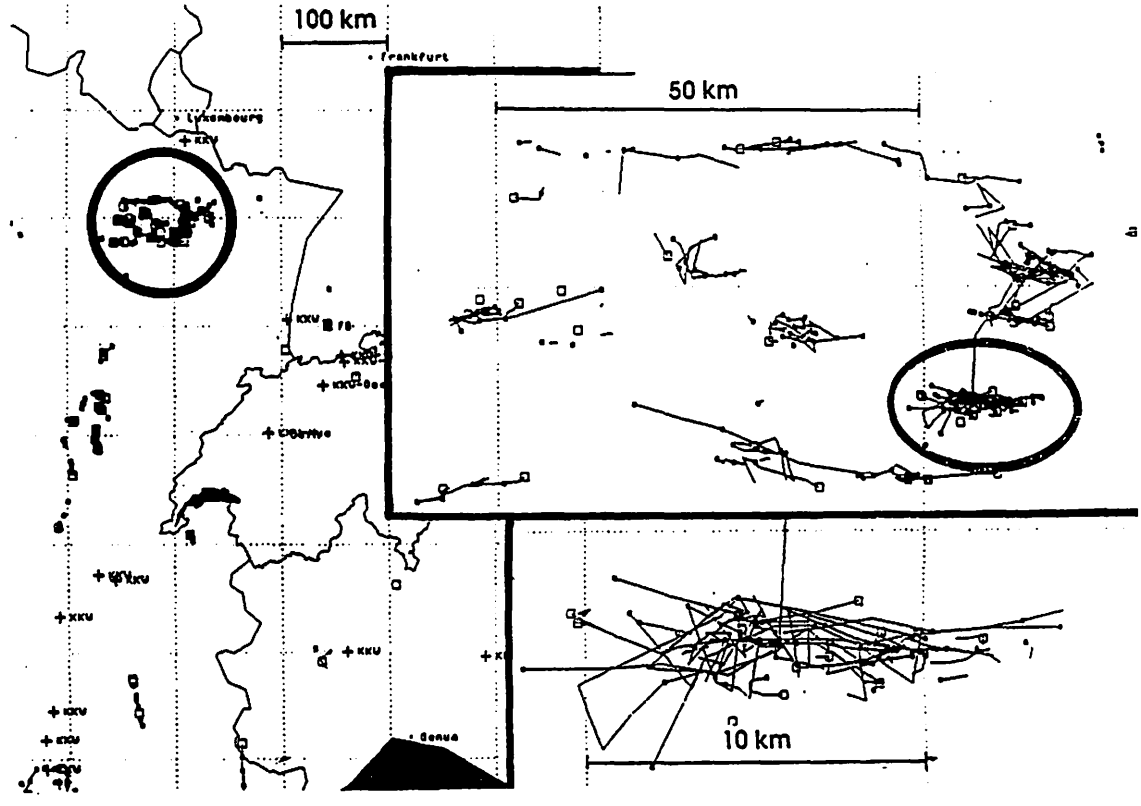

Fig. 4 Accumulations of echoes during the night of February 3rd to 4th, 1995, from 10:30 p.m. to 5:45 a.m.

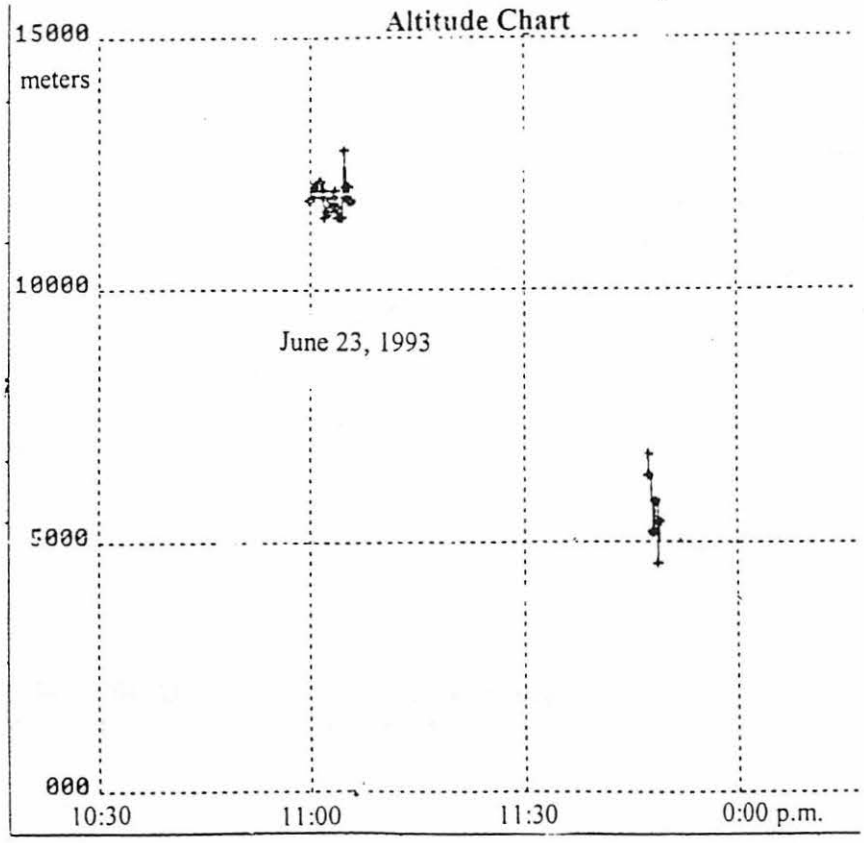

Fig. 5 Unknown object hovers 5 minutes at one spot, then vanishes and appears again 35 minutes later at a lower altitude, on June 6th , 1993.

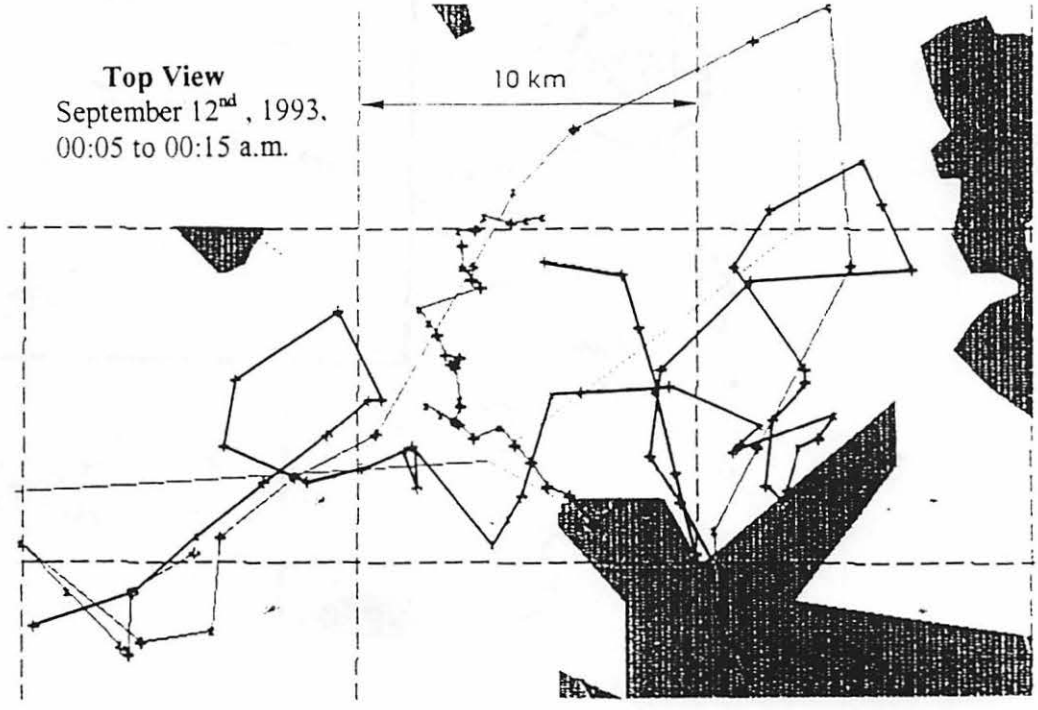

Fig. 6 Anormal traces of three unidentified flying objects, on Sept. 12nd , 1993, between 00:05 and 00:15 p.m.

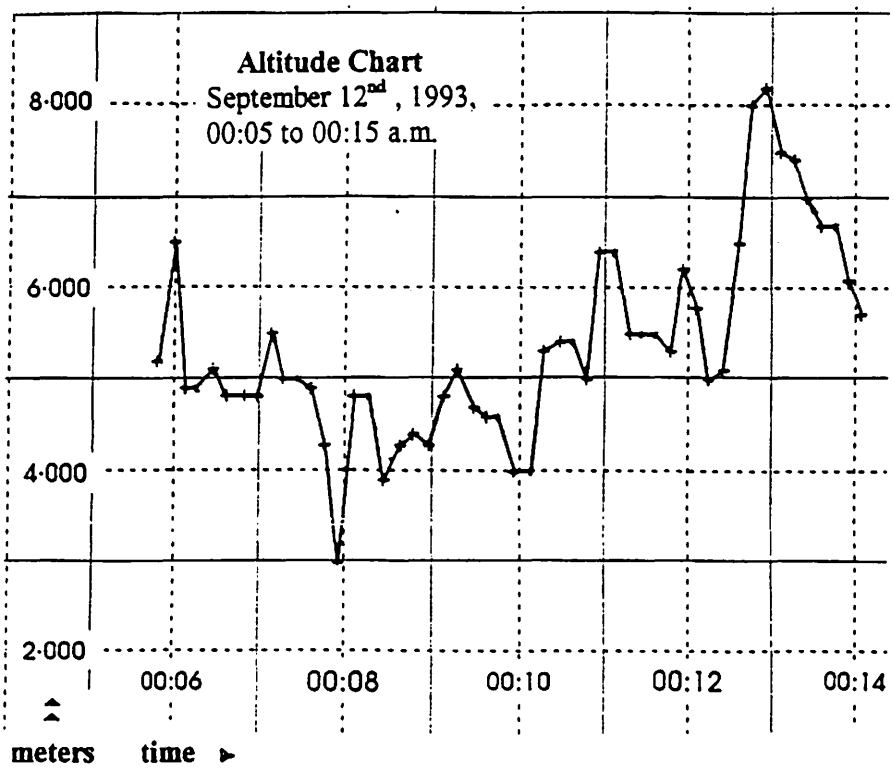

Fig. 7 Extreme altitude changes of a strange object, on Sept. 12nd , 1993, 00:05 to 00:15 p.m.

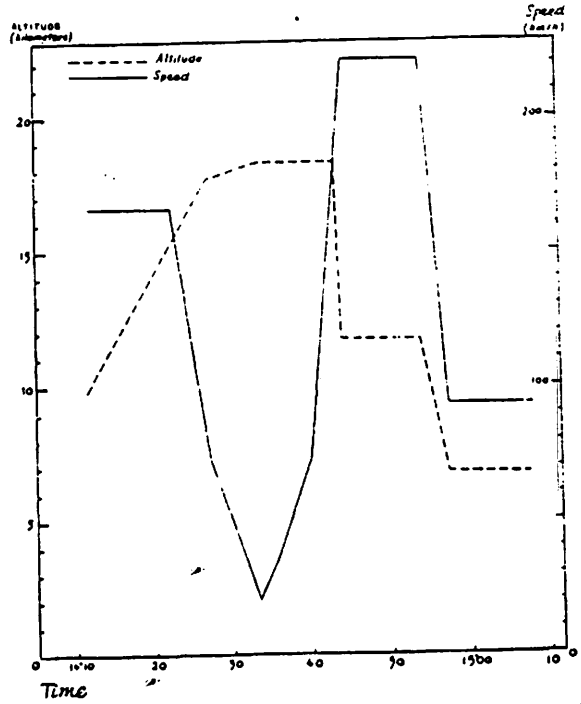

Fig. 8 Altitude and speed record of an unknown object tracked by radar and observed by French military pilots on December 2, 1954, in Ceuta, Morocco (Vallée 1966. p. 187)

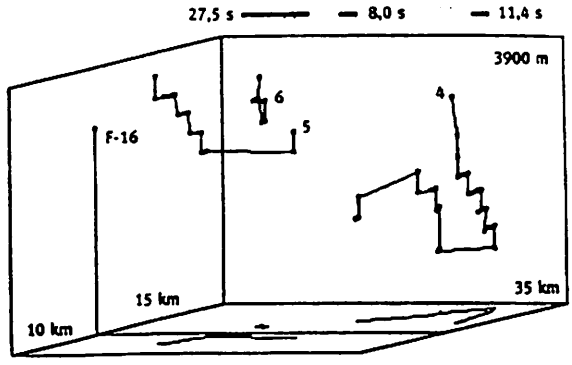

Fig. 9 3-dimensional representation of traces of three unidentified objects tracked by the onboard radar of a Belgian F-16 fighter on March 31, 1990 at 0:29 a.m. near Brussels. Object (4) changed its speed from 370 to 570 to 25 km/h (duration of lock-on: 11.4 s), object (5) changed its speed from 760 to 1,150 km/h, and object (6) changed its speed from 740 to 670 km/h (time between lock-on and break-lock: 8 s) (Meessen 1994, p. 537).

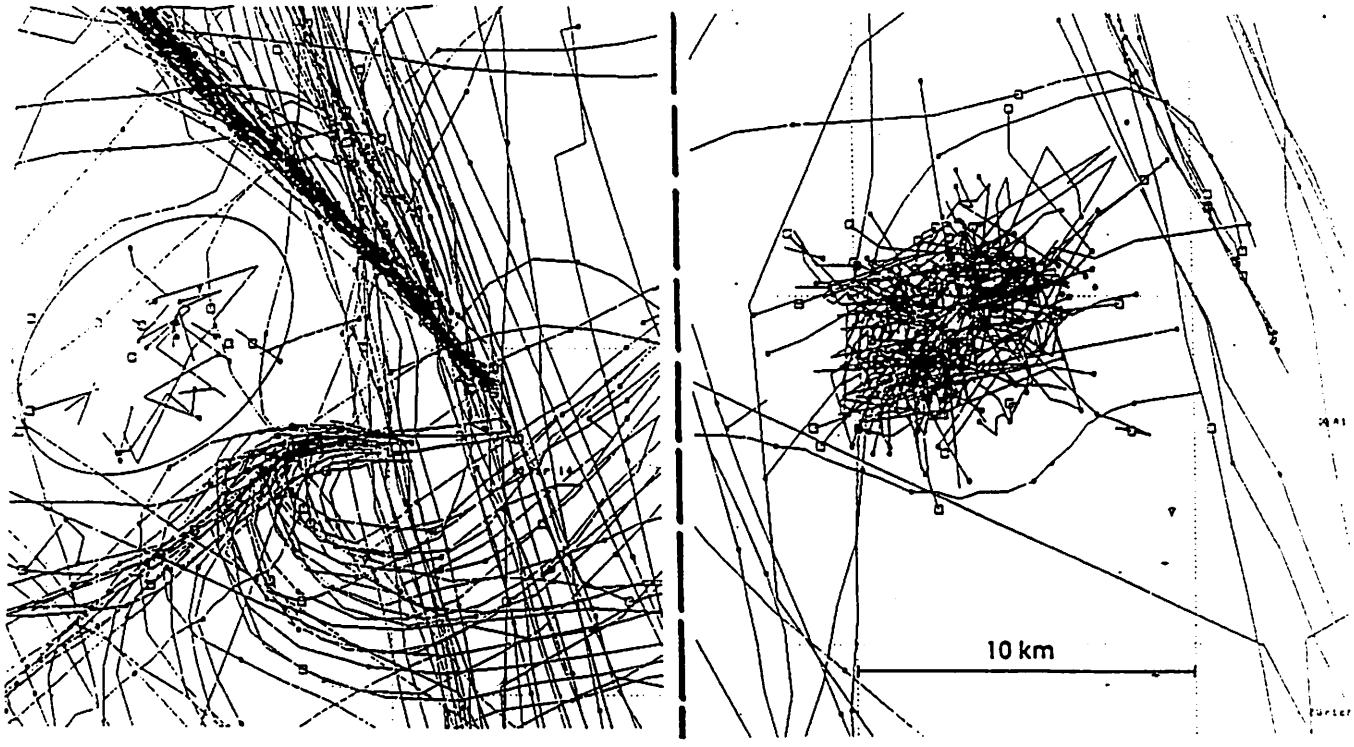

Fig. 10 Accumulations near Zurich Airport, on April 17th, 1995, from 7:00 to 10:30 p.m. and from 10:30 p.m. to 5:45 a.m. (All flight patterns displayed).

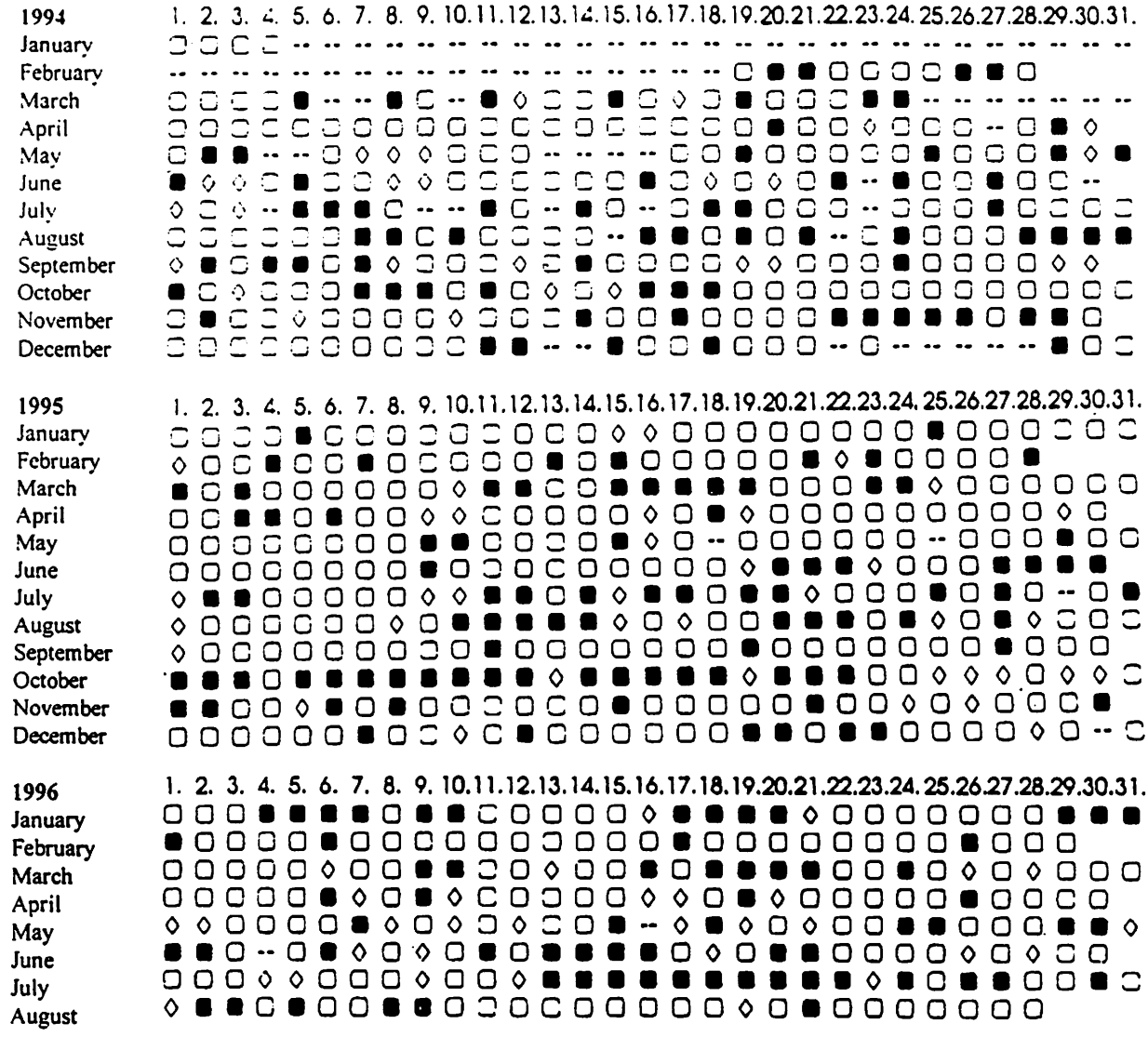

Fig. 11 Frequency of occurrence of unidentified echoes in the Central European surveillance area. In this representation, a black square means an anomalous phenomenon, a lozenge means questionable recording, and the white square describes a normal day without irregularities.

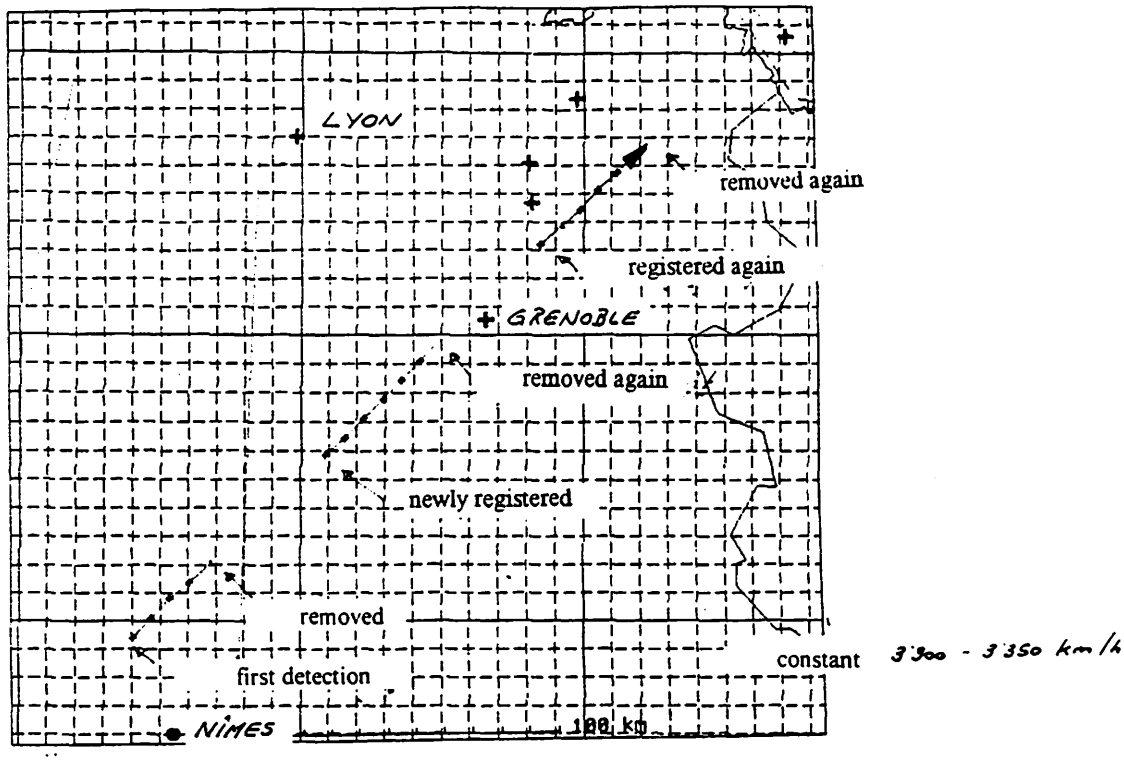

Fig. 12 Supersonic flight from a high altitude, on March 8th, 1995, from 10:25:20 to 10:29:30 a.m.,over France (top view)

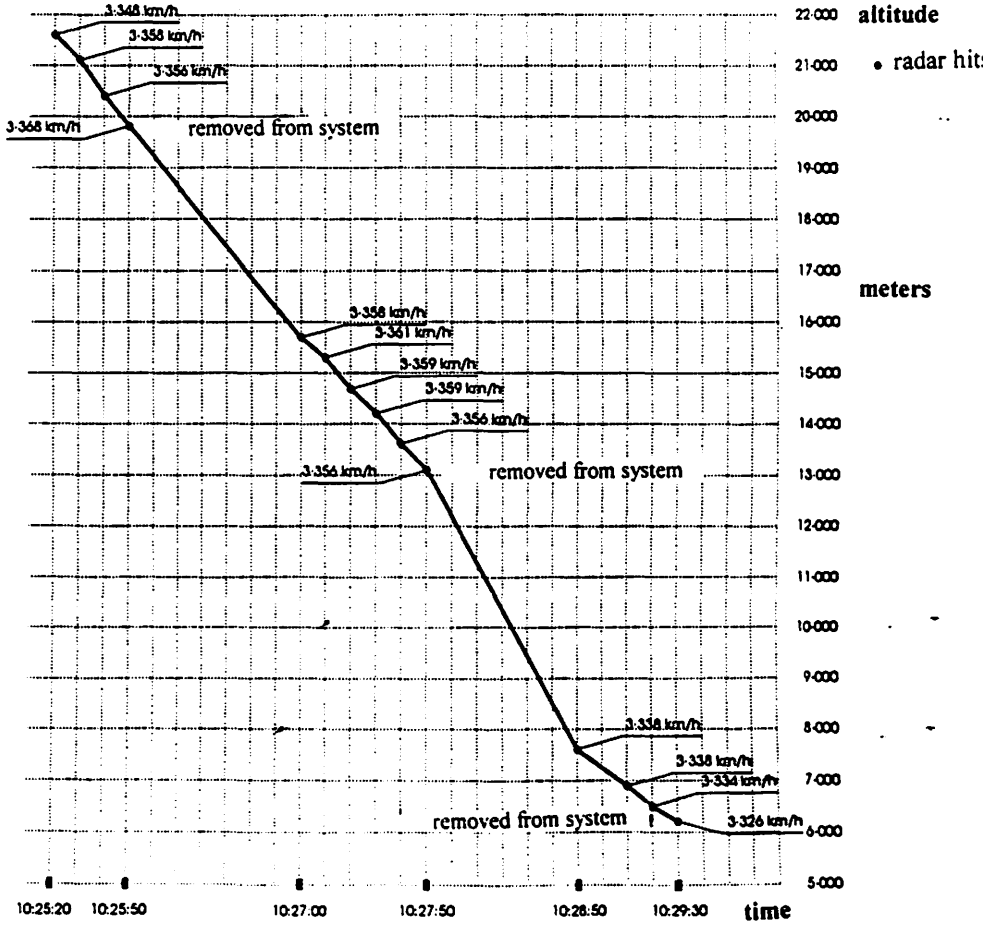

Fig. 13 Altitude chart of the supersonic flight, on March 8th, 1995, from 10:25 to 10:29 a.m.

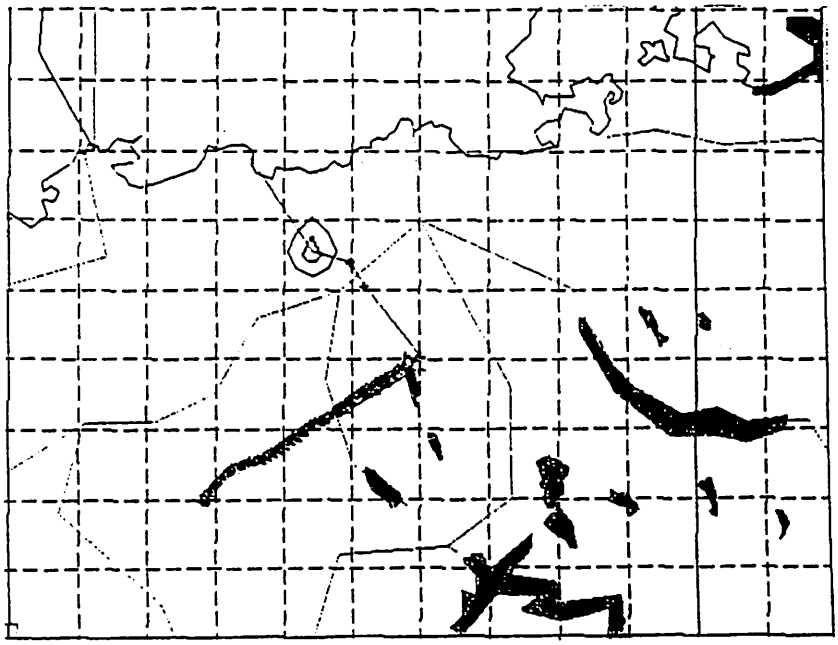

Fig. 14 Anomalous change of heading with extreme acceleration. Acceleration within 30 seconds from 210 km/h to supersonic speed, simultaneous change of heading by 90°, on June 18th, 1993, at 2:00 a.m.

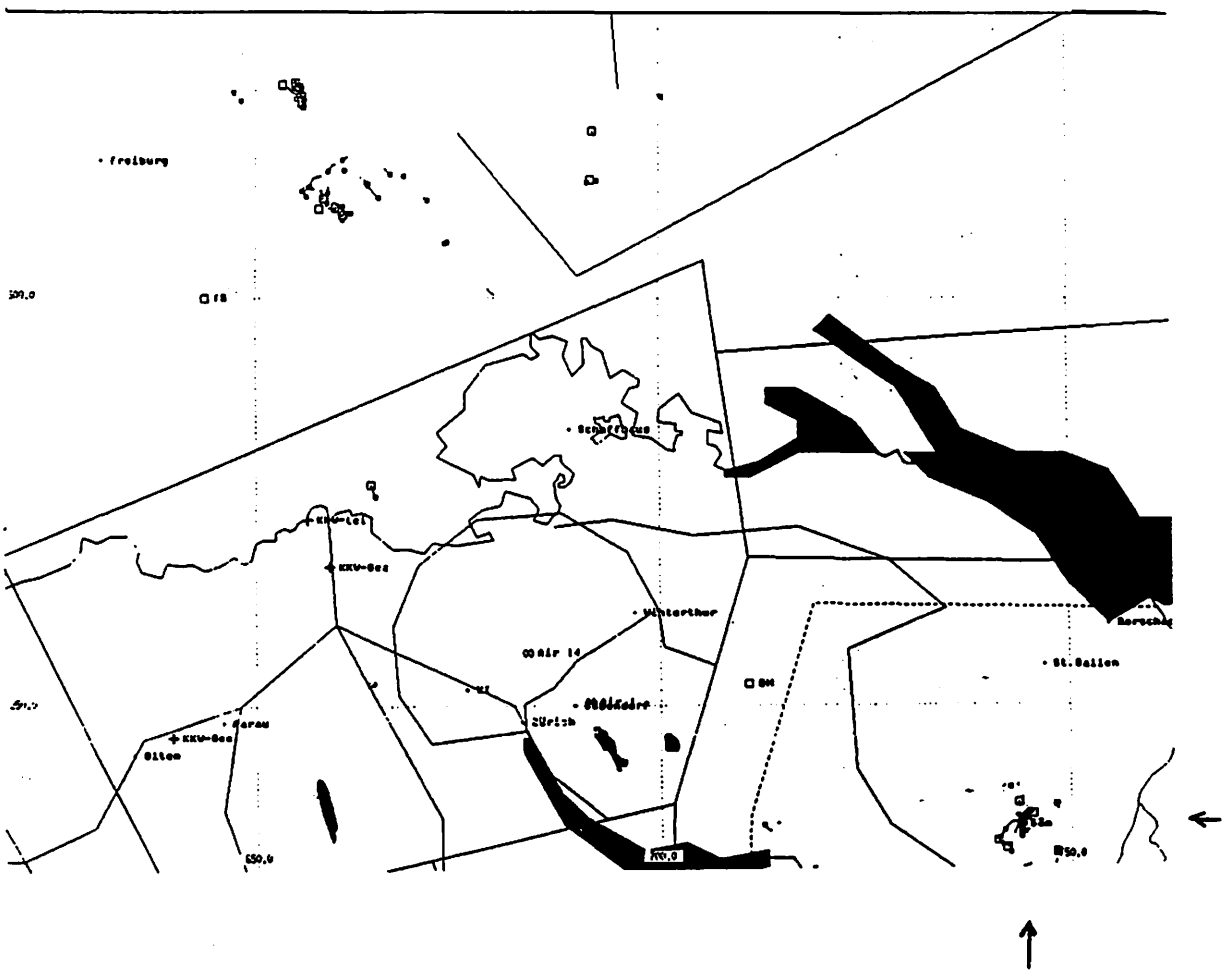

Fig. 15 Accumulation of strange objects near Mount Saentis in the vicinity of military installations (on the bottom right).

Fig. 16 Unknown objects (black) involved in a military maneuver (red and green paths) on Jan. 24th , 1995, around Mount Balmhorn. Civilian air traffic: blue, (Displayed: 6:20 to 8:45 pm.)

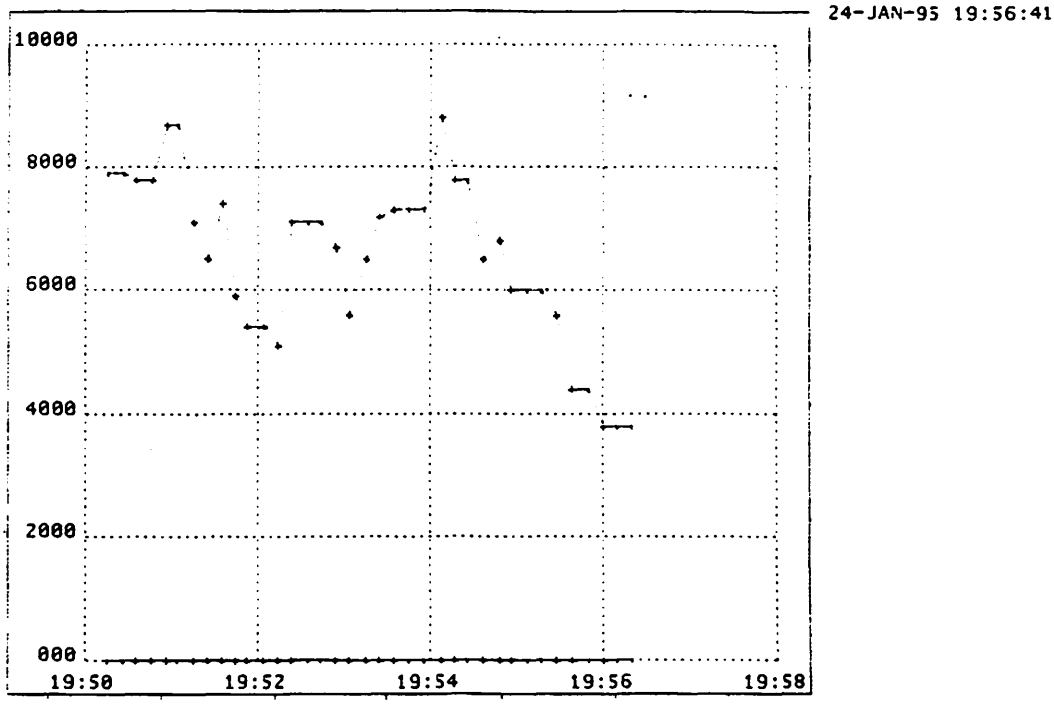

Fig. 17 Altitude chart of one of the unidentified objects (No. 503) on Jan. 24th, 1995, near Mount Balmhorn.

Unknown Radar Echoes

on January 24, 1995, Balmhorn (3700 m) MontBlanc

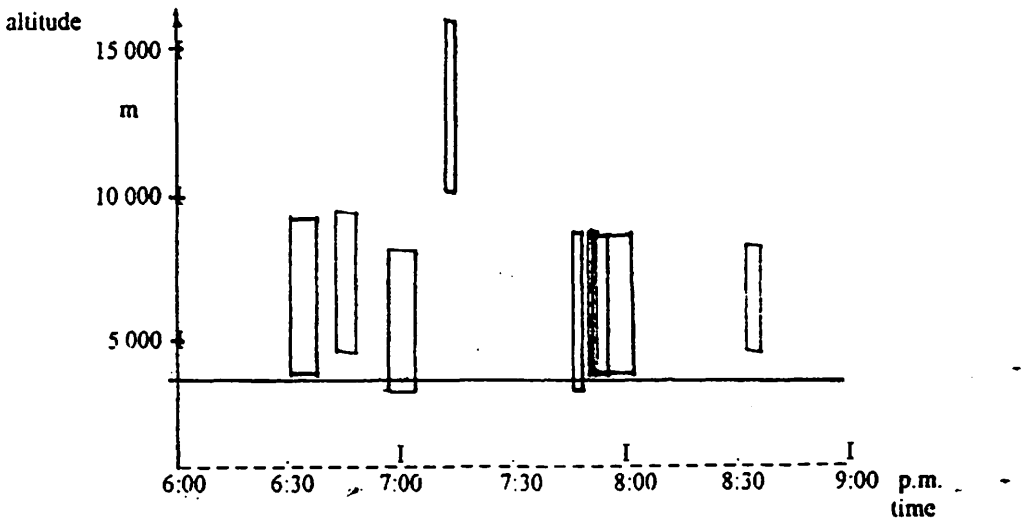

Fig. 18 Duration of occurrence and area of altitude of the three unknown objects, on Jan. 24th, 1995, from 6 to 8:40 p.m.

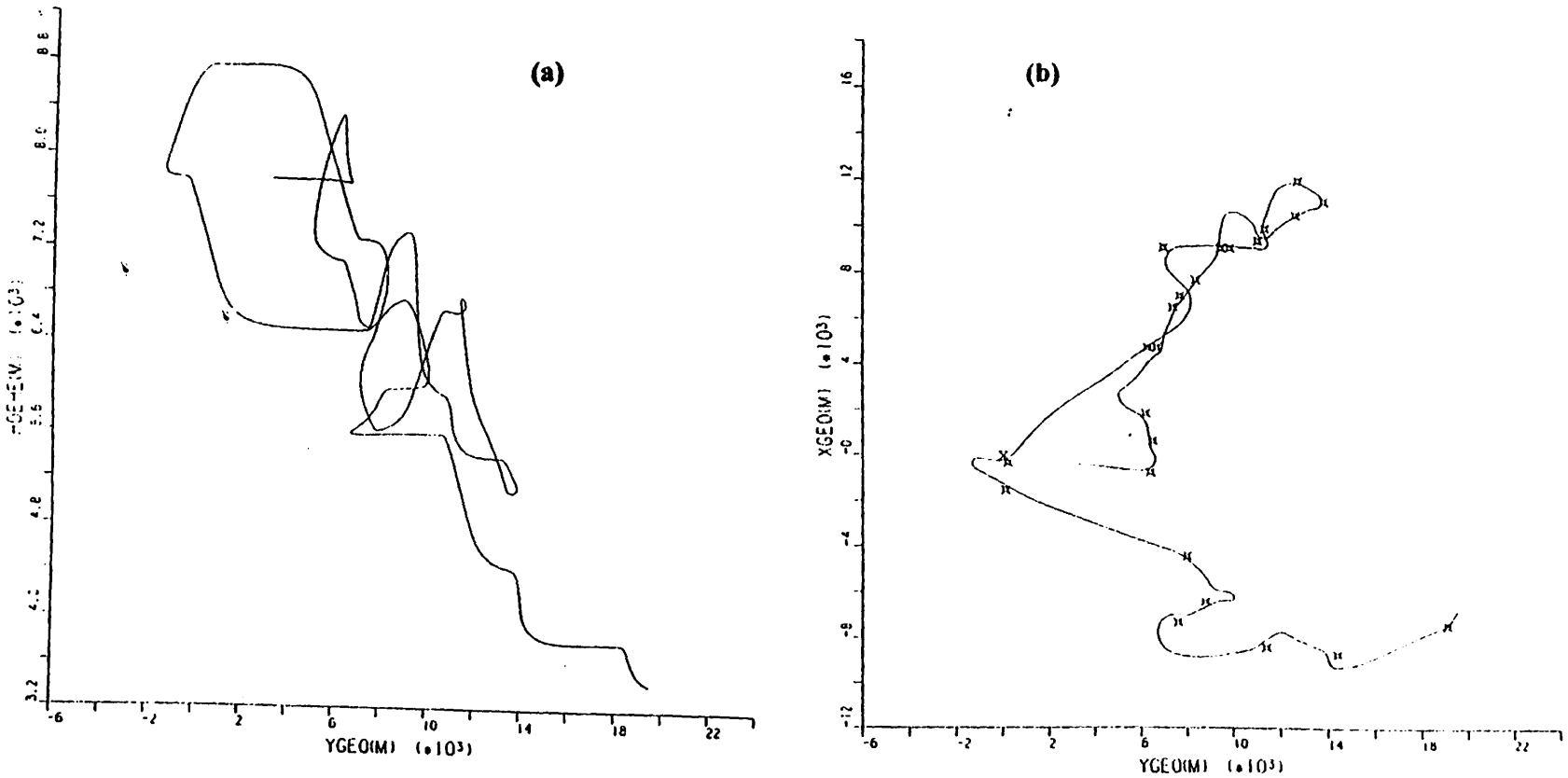

Fig. 19 Spline curves laid through the position points measured by radar
a) altitude versus length Y
b) projected in the X-Y plane.

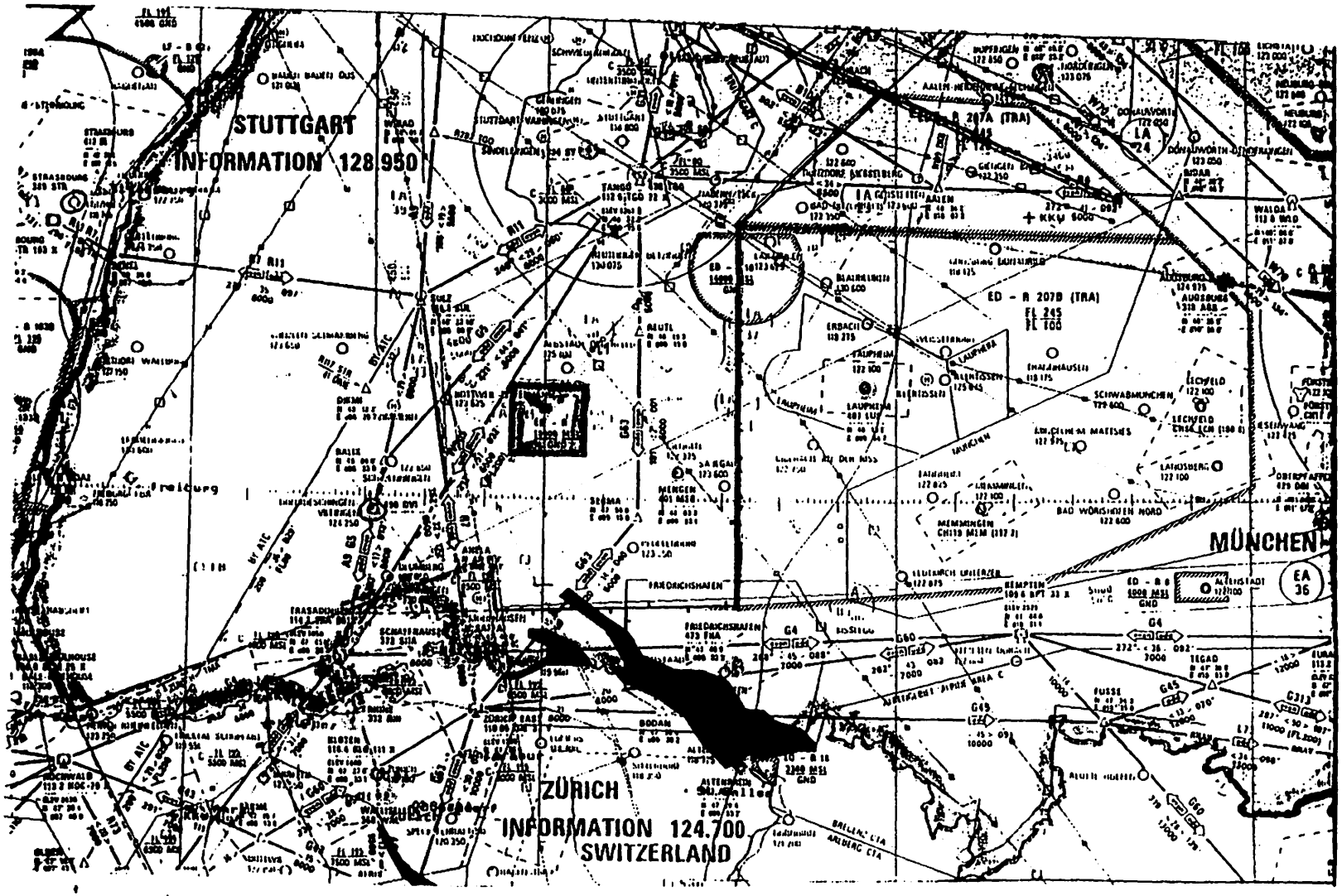

Fig. 20 Unusual echoes over the restricted area: NATO Early Warning Station Messtetten (red), on May 5th, 1996, displayed on a flight information map. Registered from 00:00 to 02:00 a.m. (border line: green)

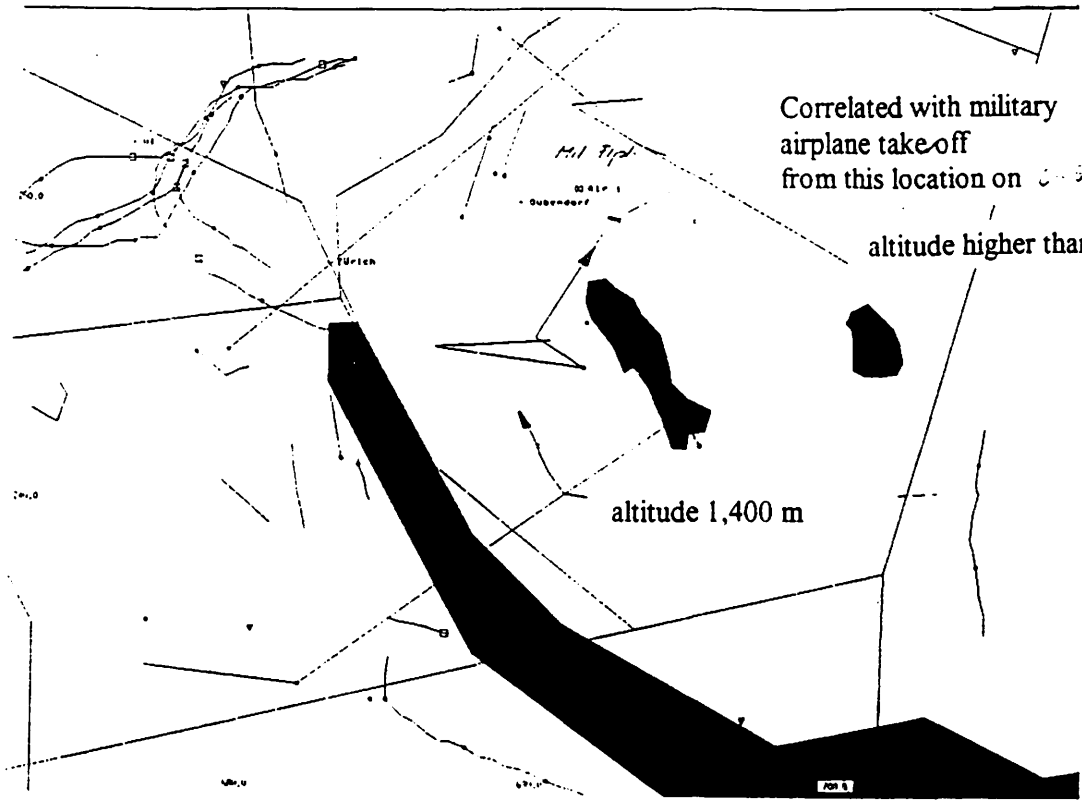

Fig. 21 Radar confirmation of visual observations of a silver disk by six radar controllers at Dubendorf, Switzerland, on June 5th , 1996. (displayed: 2:00 to 3:00 p.m.).

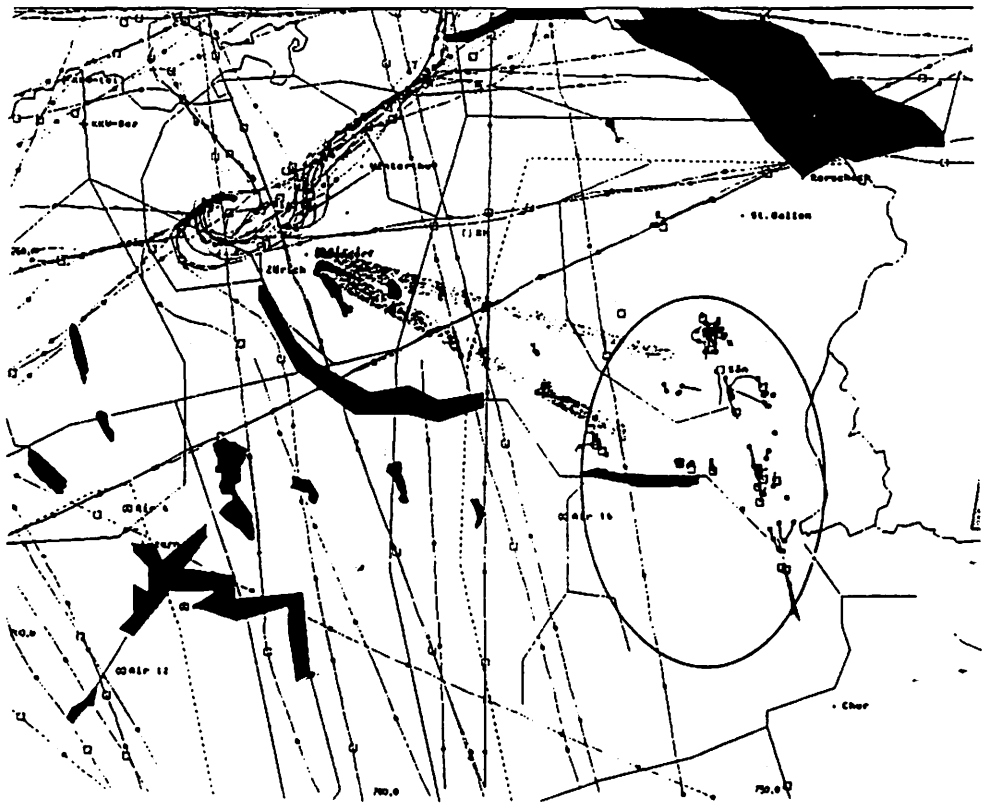

Fig. 22 Radar confirmation of visual observation of luminous balls by one radar controller, on Oct. 2nd , 1995, from about 4 to 8:30 a.m. (displayed: 7:00 to 8:00 a.m.).

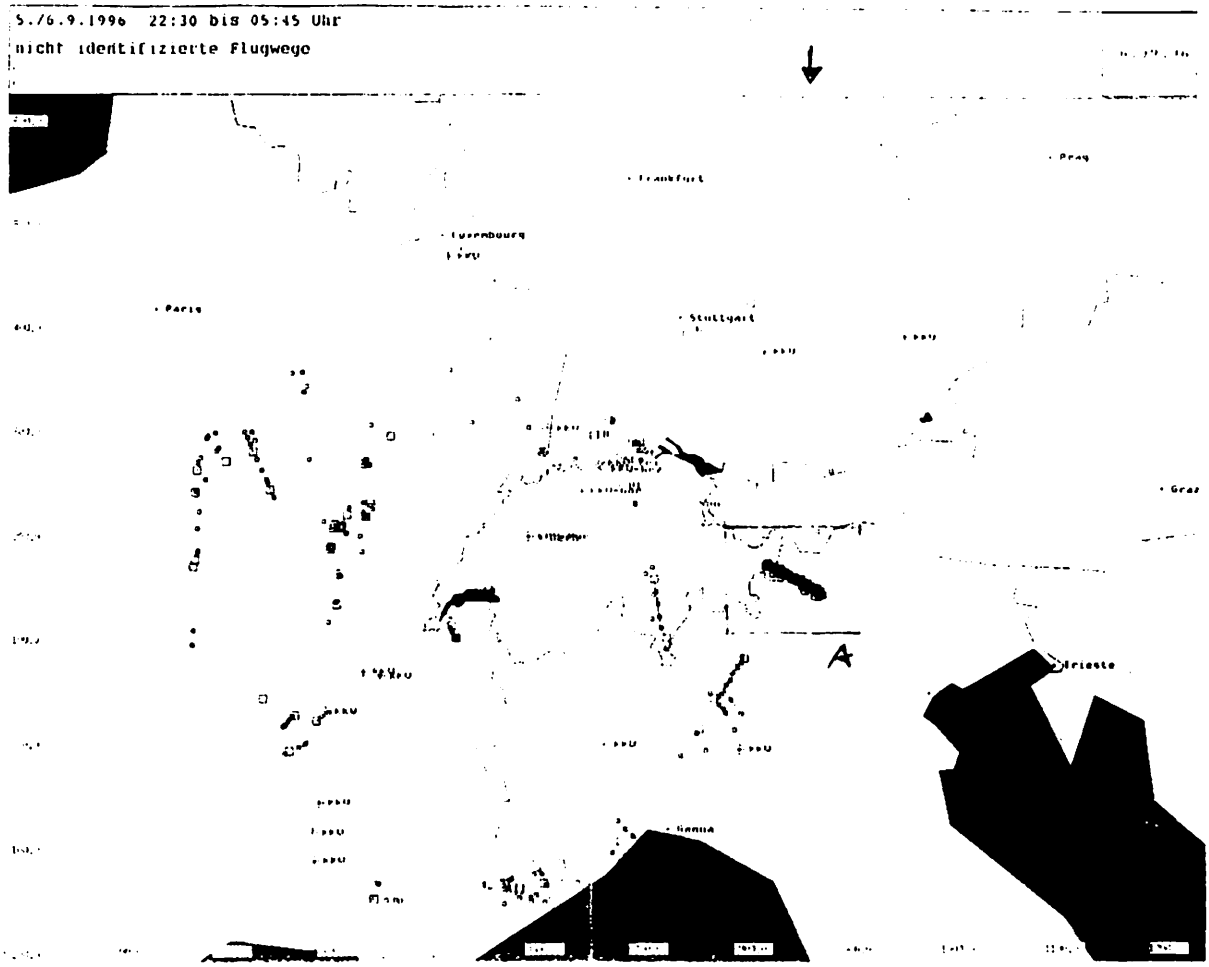

Fig. 23: Sept. 5/6, 1996, 10.30 p.m to 5.45 a.m

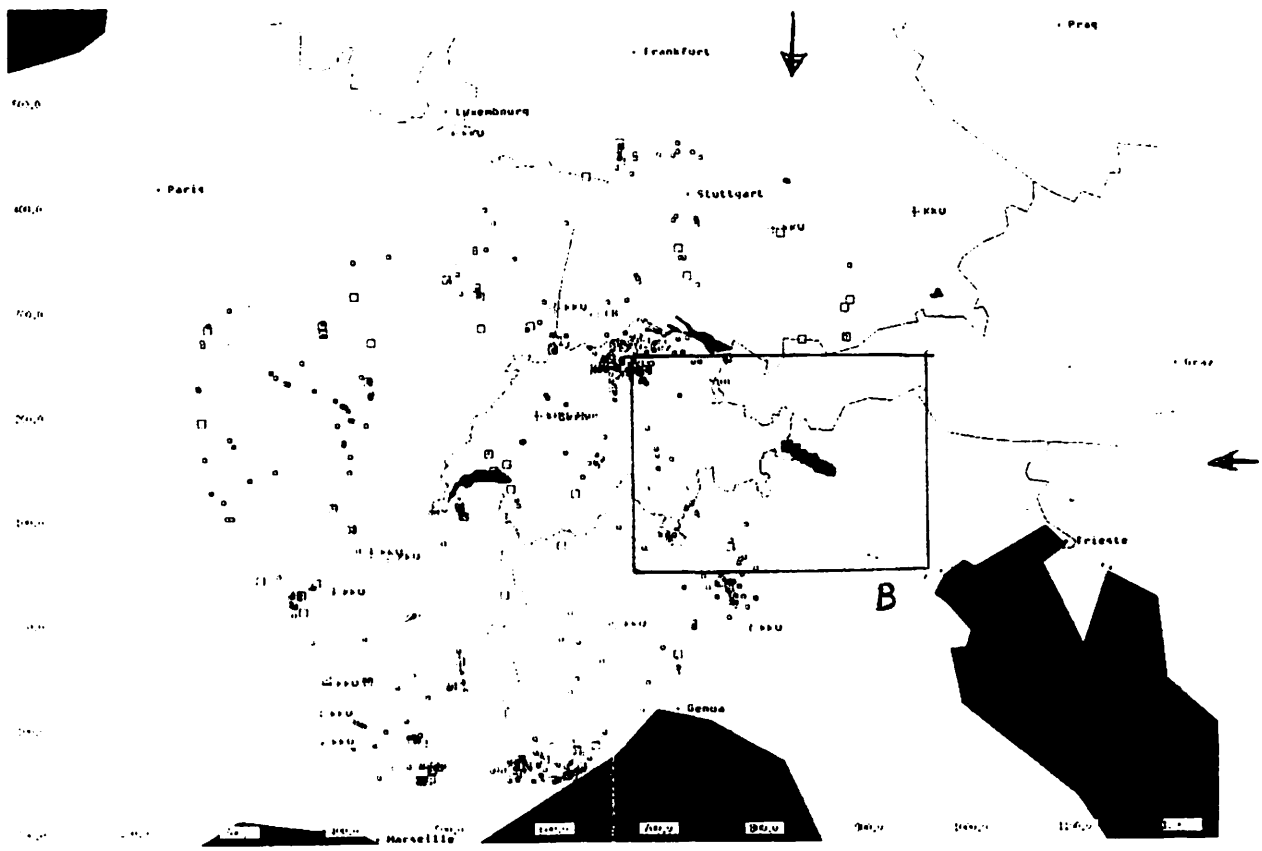

Fig. 24: Sept. 6, 1996, 7.00 p.m. to 10.30 p.m.

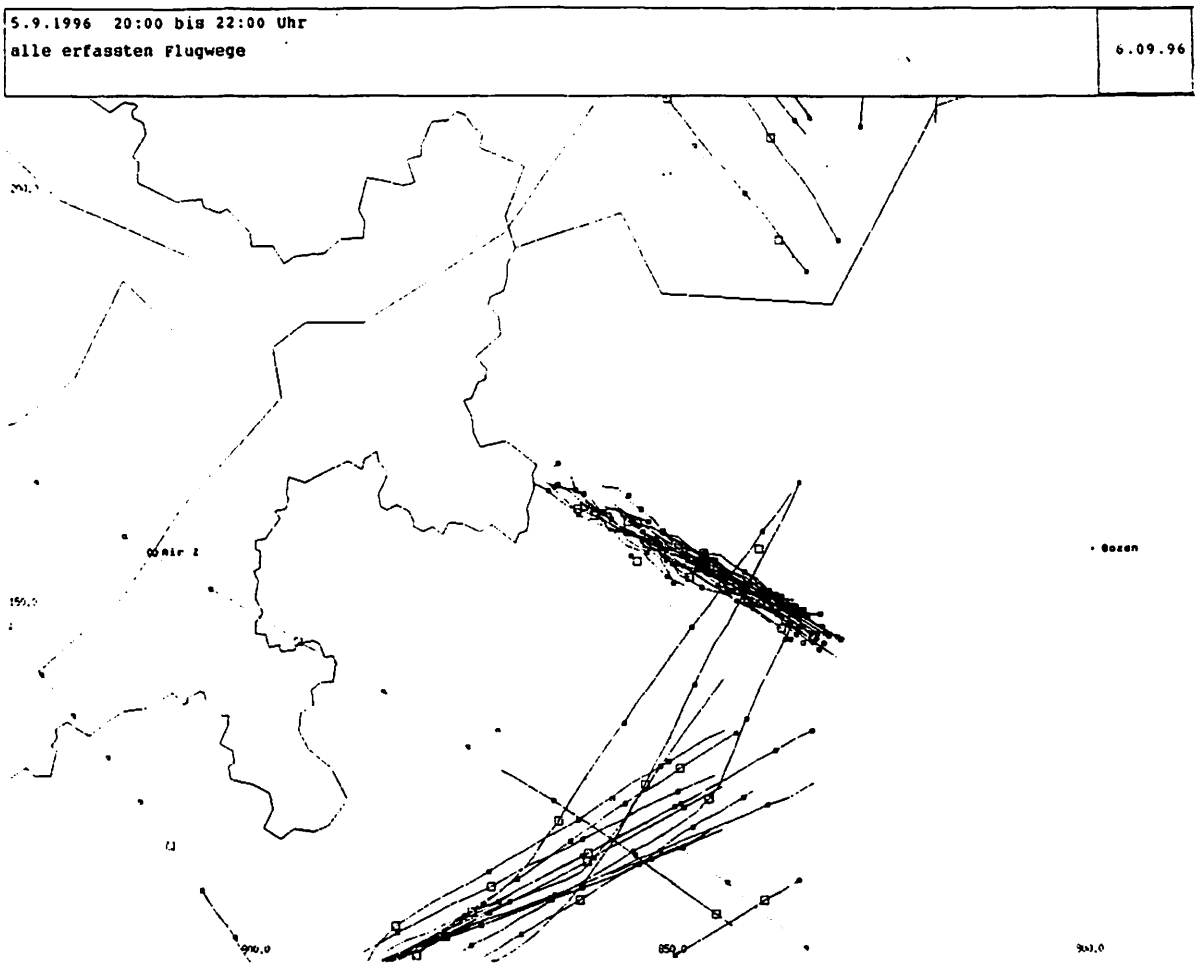

Fig. 25: Enlargement of region A, Sept. 5, 1996, 8pm to 10p.m

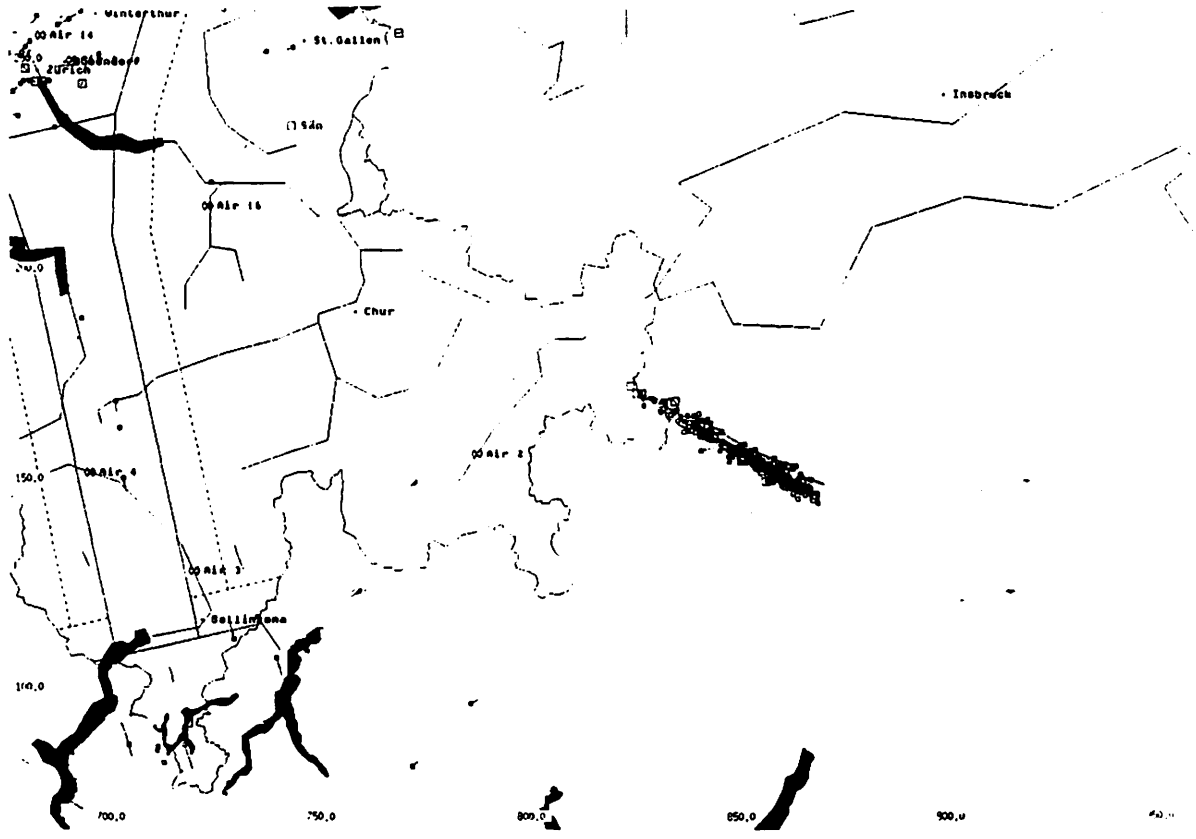

Fig. 26: Enlargement of region B; Sept 6, 1996, 7am to 10am