

CHAPTER 3

STATISTICAL ANALYSIS OF THE UAP DATABASE

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CHAPTER 3

STATISTICAL ANALYSIS OF THE UAP DATABASE

"Prejudice will take you further from the truth than ignorance"

Bang Weng Gwang. Chinese Journal of UFO Research

INTRODUCTION

1. The attributes described at Chapter 2 and at Volume 2 in more detail were structured into database tables, in the UAP ACCESS format which is described at Annex D. Some of the **possibilities** for statistical analysis are shown at Annex E. The principle analysis **categories**, considered significant are:

- (a) The overall annual monthly and daily frequency of UAP sightings.
- (b) The overall frequency of UAP sightings of particular types in particular geographical locations, and from specific platforms e.g. from the air, ground, sea (or over the sea from land), Events with and without sound, with more than one 'light' or 'beam' and especially those described at close range.
- (c) The possible correlation of sightings with specific weather patterns, solar/geomagnetic conditions, local geo-magnetic phenomena, earthquake or tremor events, and weather (electrical storms).
- (d) Correlation with other known positions or routes of expected aerial platforms (e.g. proximity to low flying areas or routes, air lanes, airports, military airfields and exercise areas, balloon-launching sites, displays etc). The possibility of obtaining meaningful correlation is influenced by other events which raise public awareness and can lead to gross distortions of the facts. The most obvious candidates are:
 - Media hype, which waxes and wanes and may re-occur at any time, given an approximate 'trigger'. Examples are 'Close Encounter' type films, 'X' Files, 'UFO' revelations on TV, and the periodic re-awakening of the 'Roswell' or 'Bentwater' incidents in peoples minds.
 - Publication of new books on the topic- of which there were no less than 30 in 1997/8!
 - Reports of unexpected or unexplained extreme effects on humans (eg 'abductions').

- An identification of those sighting events which have resulted in specific human reactions, including health aspects.

2. Clearly a full statistical examination embracing all possibilities is a major task and beyond the study TORs. However, some of the material to carry out correlations is readily available. Hence, some researched analysis was made, taking into account the possibility that a higher confidence of explanations of UAP events might enable the department to dispense with the task of monitoring UAP events in the future. This proved to be the case when all of the results were finally considered. It is emphasised however that those conclusions drawn can only be as good as the reported data. Further, many **credible** researchers have unsuccessfully attempted to find the cause of 'UFOs' in the past. If a positive UAP link and credible explanation could be found with some natural physical conditions this could end the 'UFO' controversy. However, any such result within the study could only come about as a by-product of the basic investigation to determine the value, or otherwise, to Defence Intelligence.

STATISTICAL ANALYSIS -LIMITATIONS

3. Statistics deals with uncertainty. The UAP problem cannot be analysed as one would wish because:

- Some aspects of data are missing from every event, due to the limitations of the MOD reporting form, the elapsed time, the inevitable variability of the quality of the witnesses (as surprised observers of an unfamiliar event) and the incomplete nature of the reports.
- The natural (meteorological) conditions at the time are only barely known. For example, nothing is known of the pressure, temperature or humidity all of which significantly affect both visual and radar detection.
- It is difficult, if not impossible, to make scientific statements about phenomena which are not fully understood. However it is possible, with scientific knowledge and other data, to eliminate the majority of UAP sightings by correlation with known natural phenomena or manned vehicle activity (or satellites), or man-made artefacts.

4. It is possible, for example, to identify patterns of attributes which are repeated. Brief cross-references with other sources have shown that the reported UK UAP characteristics are remarkably similar to those noted from open sources world-wide. Location and population distribution might be expected to affect the frequency of reporting but the significance must not be distorted by the fact that more reports, although confirmatory, are not necessarily more authoritative in nature.

5. No attempt can be made to consider specific human mental conditions which may have given rise to a UAP report; although attention is drawn to the psychological and temporal lobe effects UAP sightings have on some witnesses, described at Working Papers Nos 1, 2 and 10. Speculation as to extra-terrestrial causes is not entered into. All analysis is made on cold facts.

GENERAL DEDUCTIONS FROM REPORTS

6. For those objects which are not recognisable and therefore unexplained, given a shape, often without range and very rarely with imagery, the immediate deductions must be based on:

- Shape - likelihood of accuracy of description
- Ratio of lengths/widths/heights
- Angles subtended by the object (if reported)
- Colours

7. Although some measure of size is obtainable from angle subtended, mass is never obtainable. The method of motion of UAPs is not obvious and there is much inconsistency in the reporting, due to a variety of mainly human factors. A brief examination of the options, in the absence of sound (thrust), is that the UAP must move by some sort of field-reaction. Intuitively one might propose that this might be with the earth's field or the electrical and magnetic fields present continuously in the atmosphere. Unless there are undiscovered force fields, magnetic/electrical propulsion seems to be the only option. It is noted that the field forces generated on-board a vehicle would have to be significantly high ($\sim 10^9$ Ampere Turns), but unpredictable because of the variation of the earth's own field.

8. From the written descriptive evidence there appeared to be the possibility, excluding those events that could be attributed to a known cause, that UAP, despite often appearing to be so, are not solid objects. Also, conventional science suggests that the energy required to support a solid object would be excessive (within our earthbound understanding of the problem). This, together with other evidence from the reports leads to the supposition that the objects might have little or no mass. One might further surmise that if the object had little or negligible mass, it could be buoyant or semi-buoyant and, importantly, that if it had electrical charge or magnetic properties it might be propelled by interaction with other charges present on the surface or in the atmosphere. Because of the absence of actual UAP field measurements the potential of these possibilities have been examined using the available theory.

DATE-CLUSTERED EVENTS

9. Although it is recognised that a well-described single sighting can provide valuable information, an attempt was made to identify firstly months and then days where an unusual number of events were reported. This was done on the assumption that if a large number were reported on the same day there may be some correlation between them, either geographically, in physical description, in motion, or in other attributes described in the individual reports. Further, there might be conducive atmospheric conditions (e.g. weather conditions) for UAP formation which might be identifiable. There was also the possibility that such an approach may expose a means of calculating the velocity of an object (assuming the multiple reports were from the same object and had different times and geographical witness locations). However, the possibility of **more than one such object** seen over the same time bracket cannot be ruled out, as reports are sometimes received of objects breaking into several parts, or of several merging into one. As an initial approach, clustered events were examined for two sample one year periods, separated by a suitable period so as to make them independent (for example) of the same sunspot cycle, of potential environmental changes and of public perceptions due to immediate media effects. For the purposes of the analysis it was necessary to use the data entered to-date (1987-1990 and 1995-1997). During the analysis durations are the period of time the observer (or more than one observer at the same spot) watched the object before it either disappeared suddenly or moved away at low or high speed. Hence, widely dispersed reports are not likely to relate to the same object, unless there is a time-difference which is longer than the expected life of the object and a velocity could be reached which would allow the transit between locations to occur. This is more likely to be possible at higher altitudes. Both event duration and apparent velocity are important parameters. A Volume 2 Working Paper has details of possible upper plasma speeds (e.g. 15km per second) and their duration. The statistical spread of UAP duration is considered below.

ANALYSIS 1987/89

10. Figure 3-3 summarises the days when three or more events were reported on the same day. Of these, seven days saw three or more reports during 1987 (of 121 reports in the year). Of the 366 reported events in 1988 there were 42 days when the number of events exceeded three per day, while 1989, which recorded an overall total of 226 events, had 16 occasions with three or more reports of UAP on a single day. Plots showing typical UAP activity with the time of day, month and year are at Figures 3-10, 3-11 and 3-12.

11. Specifically, it seemed important to determine that if large numbers of events occurred on consecutive days, this may indicate, exceptionally, that, the same objects were seen in more than one geographical area as well as into the next day's reports. This is assuming that the UAP(s) reported were due to highly charged masses which

had not dissipated as quickly as some others reported and may have persisted overnight.

12. In 1988, the most important daily UAP event dates were:

1988	Jan 17	8 Events
	Feb 12	6 Events
	Feb 17	7 Events
	Jun 18	12 Events
	Nov 14	7 Events
	Dec 20	13 Events
1989	Nov 16	7 Events

13. **Jan 17 1988.** All eight events were reported over 30 minute period (1700 - 1730 hrs) starting North of London and moving into Surrey. It seems likely that these were all from the same object.

14. **Feb 12 1988.** The six events on this day were spread in time from approx 1900 to 2200 hours. The earliest was in Northants, then again in Northants 90 mins later. However, an overlap of time occurred (i.e. an object was still being watched in Northants when a UAP was reported in Farnham, Surrey, hence these were clearly separate objects. Another was seen at Ellesmere Port at the same time as another at the Isle of Wight. Hence, there is nothing to be gained in analysing data from this set, from the correlation viewpoint or from attempting to extract a velocity profile. It clearly shows that more than one object is active at the same time at diverse locations within the UKADR. This suggests that, if there is a strong likelihood of many UAP sightings being due to plasmas (such a postulation could only be made **after positively eliminating mis-reports of other causes**) then it also seems likely that conditions can be favourable to form or sustain plasmas in different locations at the same time.

15. **Feb 17 1988.** The seven sightings on this date commenced at 0515hrs and ended at 1245. The 0515 sighting in Yorkshire was followed an hour later by another Yorkshire report, respectively Barnsley and Huddersfield. It seems likely that these were the same object. Nothing was reported during daylight until 1600 hrs in Northants, then later at 2030hrs in London and 2145 hrs in Oxford. But reports at 2130 from Birmingham and Barrow-in Furness were clearly unconnected with the southerly result, as their report times overlapped. It is, of course, possible that the early morning Barnsley and Huddersfield ones were connected and that, with the large

time elapsed, the latter sightings were also connected apart from those with time coincidence in widely different parts of the country.

16. **June 18 1988.** No less than 12 events were reported on this day. All were in Essex and the London suburbs, Surrey, and Herts. In general, around the periphery of GREATER LONDON. Although one report was at 17 30 hrs, all the rest were between 2015 and 2115. These seem to be connected/correlated both in time sequence and location:

20.15 hrs	Hayes Middlesex
20.20 hrs	London(NFI)
20.25 hrs	Godalming (Surrey)
21.00 hrs	Rochford (Essex)
21.07 hrs	Danbury (Essex)
21.10 hrs	Hemel Hempstead (Herts)
21.10 hrs	Norwood (Middlesex)
21.12 hrs	Highgate Hill (Middlesex)
21.15 hrs	Brentwood (Essex)
21.15 hrs	Danbury (Essex)
21.15 hrs	Brentwood (Essex)

17. A track of these events is at Figure 3-1, from which several options can be derived. This cluster could either be connected or comprise separate events. The earliest event, which appeared to move along a track from Hayes to Godalming covered about 19nm in ten minutes. This represents a mean ground velocity of about 116kts (just less than 60 metres per second). This object may have slowed and even reversed its track so as to form the series of reports either which commenced at Rochford at 2100hrs, and travelled NW to Danbury by 2107, or that at Hemel Hempstead, which apparently, from 2110, commenced the NSE sequence Hemel Hempstead-Highgate-Brentwood-Danbury. If it is assumed that this was a straight leg which was close enough to be reported by witnesses at Highgate and Brentwood, as it progressed, the distance of 39nm(72km) was covered at a ground speed of about 465kts (240 metres per second). It is, of course, possible that the object at Godalming at 2025hrs changed direction and moved towards Southend and formed the Rochford sighting at 2100hrs, but was unreported for 35mins. The reader is reminded that the

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calculated velocities rule out any wind-borne motion and re-enforce the postulation elsewhere in the report that these objects are most probably moving under the influence of electrical or magnetic attractive or repulsive fields.

18. **Nov 14 1988.** Seven events occurred. Coincidental reports at 00.45 hrs were received from the diverse locations of:

Washington, Tyne and Wear,
Leavesden, Herts
At 0050 Boroughbridge, Yorkshire, then 05.15 from Southend and two reports at 06.15 from Sheffield.
The remaining report was not until 1700 hrs from Nantwich.

The implication is that these were probably independent UAP events.

19. **Dec 20 1988.** Of 13 events the longest, was viewed for ~ 15 minutes and the shortest for ~ 15 seconds. In time sequence they commenced at 1115 hrs (two reports in Co. Durham). The rest were **all** in the evening:

20.05 hrs	Birdlip (Glouc)
23.30 hrs	RAF Leeming (N. Yorks)
23.30 hrs	Dewchurch
23.45 hrs	RAF Leeming (N. Yorks)
23.50 hrs	Richmond (N. Yorks)
23.50 hrs	Richmond (N. Yorks)
23.50 hrs	Scotch Corner
23.50 hrs	Scotch Corner
23.55 hrs	Cheltenham (Glouc)
23.55 hrs	Richmond (N. Yorks)
23.58 hrs	Harrogate (Yorks)

20. A ground track plot of the northernmost events is at Figure 3-2. The evidence suggests that the two Gloucestershire sightings are separate events, as they occurred at the same time and a great distance away from the northern events. Further, if it was a single object it either persisted for almost four hours, or, more likely, represents two

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separate objects. If it is assumed that an UAP on a southerly track from Scotch Corner to Harrogate was observed as it passed Leeming and Richmond, it covered some 55km(30nm) in 8 mins, which represents a ground speed of about 223kts (~115 metres per second or ~6km per min.) The UAP may have varied in speed, which explains why it was reported twice within 15minutes at each of two locations. Allowance must also be made for time inaccuracies in public reports.

21. **Nov 16 1989.** All seven reports, with the exception of one from Wales were in the London/SW Essex area and involved both daylight and night events. They were typical of those reported above.

ANALYSIS - 1996

22 During 1996 an unusually high number of reports were received, making this a significant year for UAP since, for example, there is no reason to suppose that mis-reported man-made objects should have been more in evidence to cause 'false alarms' in 1996, than in previous years. In fact, due to the continuing impact of the end of the Cold War, if anything, there was less military flying. Hence, there is no reason why man-made objects should cause an increase, compared with the years preceding or following. It is noted, however, that 1996 was reported as a year with a much larger incidence of meteors approaching Earth and therefore a high probability of these entering the atmosphere. [Although the potential meteor connection with UAP events and, in turn, the potential connection with plasma formation, is discussed elsewhere in the report and specifically below at para 53, where some positive statistical correlation results are reported].

23. **Peak Numbers of UAP** The peak number of reported sightings was 14 on 18th August. Twelve were reported from the evening of 25 February into 26 February and 12 on 1 May 1996. Seven events were logged on each of three other days, six on each of seven other days and five on each of 13 other days. On 21 days there were four reports and on 22 other days there were three reports each day. Of the remaining days in 1996, very few passed during the year without one or two reports. The peak events are discussed below.

24. **25/26 February 1996** The eight sightings reported on 26th were preceded by four logged on the evening of 25th and are therefore treated as a continuous sighting period. A distinguishing feature was the long duration of the majority of these sightings. Long duration always adds to the credibility from the point of view of having time to watch the object for an adequate period to allow a good description. Nevertheless, the event durations exceed what would be expected to be a credible time for a degrading natural event and there is clear evidence that many of the longer events (e.g. sometimes hours in duration) are, for example, caused by visual satellite sightings reported as UAPs. The events of 25/26 February were unusual, in that several occurred in daylight:

	Date	Time	Location	Duration
1	25 Feb.96	1740	Edinburgh	13min
2		1900	Persley	30min
3		1930	Redditch	30min
4		2030	Leith	4min
5	26 Feb.96	0001	Hereford	-
6		0610	Ardmair Bay	3min
7		0732	Birmingham	-
8		1530	Inverness	15sec
9		1530	Inverness	10sec
10		1845	Taunton	25min
11		1945	Inverness	75min
12		2000	Clacton	40min

25. **1 May 1996** All 12 events were over Scotland. Two very late evening events in England on the previous day were well-separated in geographical distance (York and Bedford). However, in view of the high speed attributed to some events, a connection cannot be ruled out, even though the first **reported** event on 1 May did not occur until midday. On the following day the only reported event was 24hrs removed from the Scottish cluster on 1 May:

	Date	Time	Location	Duration
1	1 May 96	1220	Loch Sunart	10sec
2		2119	Edinburgh	2sec
3		2215	Alness	5sec
4		2215	Greenock	-
5		2216	Lossiemouth(ATC)	2min
6		2218	Uddington	6sec
7		2220	Fort William	-
8		2220	Inverness	5sec
9		2220	Lanark	3sec
10		2224	Ayr	-
11		2230	Erskine Bridge	3sec
12		2300	Garve, Lochalsh	1min

26. **18 August 1996** Fourteen reports on this date were preceded by just three on the previous day, two well-separated in time with one on the evening of 17th and one on the following day. This analysis concentrates, therefore, on those on 18th, which commenced at 0120hrs and spread throughout the day to 2350hrs. Three were in daylight, seven in dusk and the rest in darkness:

Date	Time	Location	Duration	
1	17 Aug. 96	2200	Edinburgh	15sec
2	18 Aug. 96	0120	Swindon	2min
3		0130	Dagenham	8min
4		1240	Southgate, London	5min
5		1400	Newton Flotman (Norfolk)	1min
6		1800	Kidderminster	3min
7		2000	Bordon, Hants	30min
8		2000	Birmingham	2min
9		2015	Leytonstone E11	2min
10		2028	Liversedge, Yorks	5min
11		2030	Birmingham	2min
12		2035	London W12	10sec
13		2128	Bramhall, Manchester	3min
14		2200	Belfast	3min
15		2250	S.Normanton	-
16	19 Aug. 96	0230	Long Buckby	1hr

27. **17, & 21 July and 21 August 1996** Seven reports were received each day. On 17 July five of the seven reports were in daylight, with locations varying from, Scotland to Plymouth, N Wales and Northern England. On 21 July three of the reports were in daylight, and covered locations from Tayside to Southampton, Manchester and the London Area. On 21 August reports came in from Yorkshire, Lancashire, Wales and the London Area. From experience those events which last for more than an hour are probably planets.[See item 16 at para. 26 above, for 19 August].

UAP EVENT REPORTS BY UK MAIN REGIONS

28. Table 3-1 shows the event reports by UK main region. This is of limited interest, apart from the variations in population density, which is a key factor in witness opportunities. Further, during the Summer, Scotland has longer periods of daylight than either England or Wales and much lighter nights. If one ignores the possibility of Earthlights (which are near the surface in rocky regions) this, intuitively, suggests a lower number of sightings if dusk or darkness are a pre-requisite for higher elevation sightings. The occurrence of Earthlight activity (as both Wales and Scotland are predominantly mountainous) might have been expected to have shown some statistical evidence of reports which could be attributed to this cause but did not do so. In Scotland the bright phenomenon of the Northern Lights (Aurora Borealis), can itself not only affect visibility (reducing the probability of seeing light coloured objects in the sky) but can, conversely, also lead to spurious UAP reports. Therefore, for several justifiable reasons, any lack of numbers of sighting reports are not necessarily an indication that UAPs were **not** present - as most of Scotland is sparsely populated and many of the mountainous, forested and hilly areas away from the coast, and at lower altitudes, are often screened from both radar and human coverage. In

summary, lower UAP event numbers reported are therefore not necessarily evidence of UAP inactivity. Clearly, those events close to borders (eg Scotland/England and Wales/England) can be reports of the same objects but reported separately on some occasions from both areas.

GEOGRAPHICAL LOCATION ANALYSIS

29. Because of claims that UAPs, allegedly, have an 'interest in strategic sites' the frequency of reports originating from important geographical locations was examined. This could be a onerous task, since the obvious initial filter (postcodes) is missing from most of the reports and the attachment of a code to the thousands of reports, from an often approximate address, would be a considerable manual task. To avoid this an automated approach was taken using repeat place names, to determine whether they formed geographic clusters in areas of particular strategic interest. This method is not exhaustive in its basic form, since reports could come from a main location on one occasion (e.g the main town) and then from its suburbs (i.e with a different name) on another occasion - thus appearing to be from the different district names and not to be repeat visits. To obtain a good spread this investigation was over a four year period, for ~850 events and included the latter part of the Cold War.

30. The results for specific location repeated reports are plotted at Figure 3-3, and expressed as a percentage because of the wide variation in the number of locations. From this it is noted that, while hundreds of locations were 'visited' only once, between 60 and 70 locations were 'visited' twice (that is, two UAP reports were received during the four year period with the same place name), while at the other end of the spectrum the London area as a whole (taken as a single location), produced 43 reports in the same period. In considering any reports, clustered or not, it must be noted that a proportion could be due to misreporting of man-made objects and thus unless positively separated by analysis, are irrelevant as part of any investigation into the repeat appearances of genuine **unidentified** phenomena.

31. Any analysis must clearly be interpreted with care if meaningful results are to be obtained. For example, reasonable and credible account must be taken of increased population and aircraft density (leading inevitably to false reports) in some areas and the presence of likely places 'of interest' to (in the extreme) 'terrestrial entities', as is claimed in some quarters. It is instructive, for example to examine the scatter plot at Figure 3-4, where a random sample of UAP events over several months are shown as dots. Note the significantly higher densities near to towns and in the air corridors and ATC Control Zones. The solid lines on the map indicate the approximate centres of the civil air traffic corridors. It should be noted that an increase in density in the areas shown could be due to:

- Increased population density

- The fact that UAP, (if they are charged buoyant bodies), are likely to be attracted to airspace which contains a regular passage of aircraft. There seems to be a possibility that either the initial formation (or the subsequent life of a plasma UAP) may be affected by the presence of larger amounts of charged particles in the air over large cities and the airspace where large numbers of aircraft are flying.
- Distractors in the form of aircraft by day or night which are misreported as UAP.

32. Locations where a presence of trained observers - for example, where trained observers such as personnel interested in spotting aircraft might be present and distort the number of sightings (as they might be expected to be scanning the sky more often), should also be considered. UAP events reported from RAF Stations were examined, for example, for a four year period for a repeated UAP presence. Only six widely-dispersed RAF Stations reported one event each. These locations were found to operate in a variety of roles, rather than together representing a group with specific strategic (for example, nuclear) importance, which some have suggested attract higher than expected UAP activity. The RAF Stations which reported were Valley(Advanced Flying Training), Swinderby(Non-flying recruit training), Waddington (V-Bombers at the time), Leeming(AD), Dishforth(Flying Training) and Newton(Ground Training). It is probably the case, because of the radar and visual look out maintained, as part of the normal role of the station, that in most cases if any UAP is present near a RAF Station, it is quite likely to be seen and reported. From the information examined:

- Contrary to certain media suggestions that there is some sinister UAP agenda that there are repeated UAP visits to locations of national importance, no evidence has been found that RAF strategic sites are some sort of target at which UAP appear more often than over certain other areas (e.g. over highly populated areas or along air corridors)
- There is no evidence that regular or irregular repeat visits occur at any RAF site, strategic in nature or otherwise.

33. Alternatively, each of the 66 locations found during the analysis which provided even just two reports were examined to see whether they were (or still are) of particular importance and might even warrant, for some special reason, more than one occurrence by a UAP. Further, whether any of these locations could possibly have any local characteristics which might be connected to either the initial formation or the 'attraction' a UAP (due to some local characteristic, e.g. dust plasma, electrical power lines, earthlights etc). [Notwithstanding the fact that the place where a UAP is formed might not be the place where it is seen]. An examination of the 66 place-names where UAP have appeared twice, does not appear to focus on any of special strategic military interest. **There is, therefore, no firm evidence which points to the repeated presence of UAP at, for example, US or RAF strategic or tactical Bases**

(airfields), Army assets or RAF or Naval HQ or special assets (in particular, at nuclear assets, such as Faslane, Aldermaston, Capenhurst, etc). A UAP at Devonport was reported twice, but no particular significance can be attributed to this. The fact that UAP are seen at all, at some Service locations, is undoubtedly because they are manned 24hrs a day with staff who are likely to be observant by virtue of their normal tasks.

34. Events Several Times at the Same Location Although three reports came from each of 26 different locations, none appear to have any particular Defence significance. Of those (nine) locations, which each reported four times, it is noted that these are either actually at, or quite near to airports (Glasgow, Edinburgh, Gatwick, Slough, Hayes, Bridgend (Cardiff)). It is suggested that this increased frequency of reports could well be attributed to a number of causes:

- The presence of aircraft (possibly attracting plasmas)
- The increased presence of aircraft leading to the misreporting of aircraft as UAP.
- The attraction of UAP (as plasmas) to attracting electrical items on the surface or in the air. (These might comprise enhanced charged air-particles in the vicinity, large metallic structures such as hangars or electrical facilities on the ground).
- The likelihood of regular observers of aircraft to notice 'unusual aircraft', the presence of aircrew and air traffic control staff.

35. Higher Numbers of Reports. Similarly, those locations from where five to eight reports were received over the four year period do not show any specific strategic military or civil significance. The seven events from Rotherham and (as in May 1998), as well as reports from Sheffield might indicate at least some 'earthlights' (near Moors earth-faultlines) but neither locations have any nationally strategic sites nearby. Only five locations reported nine or more events, respectively, Birmingham (nine), Manchester (ten), Hull (12), Sheffield (15) and, already mentioned, the Greater London Area, 43. It is again noted, that being high density population centres, these will inevitably generate more sighting and reporting opportunities, airports and overhead air corridors feature strongly in all locations. None of these locations are of nuclear strategic significance. Although they are of major civil importance as centres of national or regional government there is no evidence to locate the UAP reports as being specifically close to any buildings or infrastructures of any particular significance, rather, as can be seen at Figure 3-4 the scatter of locations seems to be more or less random within these areas.

NUMBERS OF OBJECTS PRESENT PER EVENT

36. Frequently, more than one object is present at the same time at one event. For example, in a 1987/91 sample of over 850 events, two objects (lights) were reported together on about 8% of occasions. The distribution is plotted at Figure 3-5. In 1996/97 the number of objects at any single sighting was smaller overall. However, two were seen on 13.5% of events and as many as eight objects in total were viewed at once on each of four occasions. Often a witness is uncertain of the number of objects, especially if they are 'manoeuvring'.

UAP LIGHT & COLOUR ANALYSIS

37. It should first be noted that colour may be seen alone, with its own inherent overall shape, or as a colour which is (or appears to be on) on a larger body. Often reports state that the object is exhibiting two or more colours, or as a colour apparently being 'carried' on (the surface of) an apparently 'solid' entity. Reference is made to Figure 3-6, where a colour analysis was made of over 700 events during 1996/97. On 47 occasions (6.6%) no lights were reported - that is, the UAP were perceived and reported as solid entities in the atmosphere. Of these events, 33% were reported as 'white'. The implication is that what is seen either represents a genuine white source, (for example, a white 'lamp'), a reflected source, (for example, of white light from another source, eg. from the sun) or finally, an object with a colour temperature high enough to produce white light. Many people are colour blind to some extent, hence together blues/greens, blues/blacks, yellow/orange/amber, grey/black, and silver/white can easily be misreported.

38. Grey or black indicates opaqueness or solidity to most observers, although it is shown in Volume 2 that the prevention of the reflection or passage of light can also occur for a gaseous/plasma entity, which would then give the **appearance** of a solid object when there is no such solid object is present. The other colours are less consistent with the idea of reflection. What, for example, is the source of a green beam which could reflect from an airborne body and be seen omni-directionally by several witnesses? Hence, it is clear that the red, yellow, orange, blue and green sources observed, (aircraft navigation lights (lamps) excepted) cannot be simple reflections but are inherent colour temperatures or are the result of colour filtering due to the physical 'construction' of the entity - which, it should be noted are frequently reported as being in motion, such as rotation. It is noted that, in certain conditions, red, yellow, orange and even blue light, can be associated with jet aircraft exhausts. However, these are easily eliminated as UAPs by the concurrent presence of a positively recognised sound.

39. **Visual Beam Emanations from UAPs.** Reports are occasionally made of 'beamed lights' and sparks (of various colours). If the UAP is near to the ground these are invariably described as 'being used to **inspect** objects on the surface' or 'a beam was **used** to shoot at me' - or they 'shot at me with a beam'. An almost

constant factor in these reports is that the human observer is very close to the object and almost certainly simultaneously within the influence of any other (invisible), e.g. magnetic field, which might be present. The potential field effects are explored at Volume 2 Working Papers 1 and 25, with an unexpectedly positive outcome. Characteristics of the 'lights' seen are shown at Figure 3-7.

40. This 'beam effect' is never reported when object's altitudes are higher than about 2,000 feet. When a beam is reported it is often described as a 'searchlight' (on occasions these are shown to be misreported aircraft landing lights). While there is insufficient reported data or indeed imagery for analysis, these 'beams' usually appear to be slightly divergent. It is suggested that where these objects are plasmas the beams described by witnesses could well be the discharge paths taken by charged particles which have found a way to escape from the confining forces within the plasma. Because the objects (i.e. the presumed buoyant mass) do not consistently accelerate away when this occurs, it is surmised that this emanation does not necessarily represent any type of viable thrust, but is most probably what amounts to a charge leakage. On other occasions some sort of internal change seems to occur. The object apparently becomes more buoyant and as its residual charge has probably changed it moves away, sometimes at high speed and climbing. Indeed, in the interim the objects frequently 'hover' when this effect is observed, almost as though tethered while this discharge is going on. It is also likely that the discharge path contains dust particles which reflect any ambient light while this is taking place.

41. Often sooner rather than later, the object fades and disappears from view, sometimes re-appearing briefly. Although UAP motion is sometimes described as an acceleration away, it seems more than an anomaly that the object never seems to accelerate towards the observer - only away. This leads to the suggestion (and strong suspicion) that if an object rapidly diminishes in size (shrinking in diameter), giving the impression that it is fast-receding. This is re-inforced by the suggestion that the discharge has changed the balance of sustaining forces to a point which causes the shape of the object to collapse. Sometimes this is accompanied by a small explosion. This, in turn, gives rise to the supposition by the witness that he/she has heard a sonic boom, or has even been 'shot at' as the object sped away. The former is an obvious illusion - as any accompanying shock wave would be moving away, not towards the observer! It is concluded that there is no doubt that some UAP either emanate a beam of light which comes from an internal source, which, for some reason is not an omni-directional emission, or alternatively emit particles in a beam which, in turn reflect ambient light, thus appearing to form a beam of light. It is strongly suspected that a coincident electrical or magnetic field is emitted at the same time which can adversely affect some electronic and electrical equipment and the neural activity in humans.

UAP SOUND & SMELL ANALYSIS

42. The incidence of sound and smell reports is low. In one sample of events on only 29 occasions out of over 700 (2.8%) were sounds reported. For another sample of 1014 events (1996/7), 46 reported sound (4.5%). For those UAP which are not identified later as aircraft the sound is invariably reported as 'humming', 'whining' or 'crackling', or electrical and these amount to only 1.1% overall. There are various reasons for lack of sound when aircraft are seen. These are considered at Volume 2 Working Paper No 8. The presence of odours (usually an obnoxious sulphurous smell) is very rare in UK reports and would only be sensed if the observer is quite close to the explosive demise of a plasma in relatively still air.

UAP SHAPE ANALYSIS

43. Figure 3-8 shows the shape analysis for 1014 reports for the 1996/97 period. Shapes were observed on 67% of occasions. It is noted that the shape may be that of the coloured light itself, where a 'light' is the only item seen. Alternatively, the shape may be on or in a body which also has lights/colours, or the shape may be a silhouette, with or without 'lights'. In combinational reports the object shape is often described as 'bright' (e.g. 'bright red sphere'). The shape may also be defined by an observer from several individual objects which form a shape (formation) but are individually generally round. Hence, three objects which become a triangle when viewed in plan together form a 'line' or 'bar' or even a 'cigar', when viewed sideways-on.

UAP MOTION ANALYSIS

44. Whereas satellites, meteors and manned aircraft exhibit a generally linear or curved flight profile, UAP produce a number of profiles, some of which match those of manned aircraft. These not only include 'hovering', but other motions that no manned vehicle could achieve. Figure 3-9 shows UAP motion analysis for a four year (858 event) series in the period 1987-91, where other than simple linear motion was observed. The following points are relevant:

- None of the events reported UAP **diving** - thus eliminating **diving meteors with visible trails**. (Most of the public know the difference anyway as these are seen nightly if the visibility allows, however see correlation with meteors below)

- Almost 10% of the events **climbed** - indicating negative buoyancy or lift from some force (e.g. due to electrical charge differentials). [Note also the natural affinity, reported in a Russian Open Scientific Paper at Volume 3, for (aerosols) plasmas to take up an 'aerodynamic' shape, possibly producing lift].

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- Almost 22% of the reports (when combining slow, stationary and hovering) were expressly perceived by the witnesses **NOT** to be aircraft.
- About 9% were **moving fast**. [This eliminates satellites, which, when observed from earth, exhibit steady, rather than 'fast' motion.]
- A small percentage (~1.6%), were described as **'bobbing'** (sometimes as **'erratic'**). This condition, which admittedly can be due to optical propagation 'tricks of light', such as 'twinkling', indicated instability and eliminates aircraft. The public are well-aware of aircraft strobe lights. Further, the 'bobbing' motion is usually described as random.
- Some 14% of reports indicate **'spinning'**. This can be confused by some with **'pulsating'** (1.6%), and by others who reporting a stationary light **flashing on and off regularly as 'rotation'**. Taking these factors together, this indicates some sort of turmoil/turbulence within the object which is often consistent with the variability which might be expected in gaseous formations in motion, due to internal changes caused by both internal and external forces. It is also noted that the general public, in context, are more likely to **expect** any object seen to be 'spinning' rather than any other motion because of the widespread 'spinning-top', flying saucer analogy used by the media

45. In a proportion of the UAP events a combination of motion characteristics reportedly occurs. This often depends upon how long a UAP is observed by a single observer before it passes out of sight. For example, initial deceleration, followed by slow movement, 'hovering' (or the appearance of doing so), followed sometimes by either acceleration, disappearance or even explosion. During the phases of observation colour mixtures are often seen and colour changes occur during the period of observation. This indicates that the objects nature is in constant agitation. Indeed as many are reported to rotate the UAP is being viewed from all aspects, repeatedly showing all it's variations in colour.

CORRELATION STUDIES

46. **With Time of Day** As events are almost always first detected visually, it is no surprise that the greater proportion are sighted after dark. For example, of the 1014 events from 1996/7, 94% of events were seen first as lights and, as can be seen from Figure 3-10, a very high proportion are seen in the hours of dusk and darkness. One breakdown is shown at Table 3-2, taken as a sample of some 850 reports, between January 1987 and July 1991. Approximately 64% were reported during the hours of darkness, 19% in daylight 10% at dusk. About 6% were seen at dawn. These figures do not necessarily mean that UAP activity is influenced by the presence of darkness and that they are not present through a full 24 hour period. Sightings are also heavily dependent on viewing conditions:

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- Visibility
- Contrast in daylight
- Luminosity of the object, compared with other lighted objects in the sky.
- The presence of motion.
- Availability of witnesses - This is dependent, not only on the prevailing weather conditions but also on population distribution.

47. The second sample was taken over ~700 event reports in 1996/7. In this example, perhaps predictably, almost 80% occurred during the hours 1800-0600. It seems that, for a maximum probability of being reported, either dusk and darkness is required. While there are not necessarily large numbers of people outdoors at any given time in the evening, (in fact there may be far less than in the daytime in most places), those present are more likely to see UAP because the sighting conditions exist. However, there is no evidence that UAP form at any particular time of day. Because of the wide range of UAP durations reported, it is possible that the life-span of some extends from daylight into dusk and darkness and vice-versa. Whatever their origins the statistics show that the number of UAP reports increase as dusk progresses into darkness, peaking at the time people are returning home after an evening out, walking the dog, etc., between 2200 and 2300hrs. Thereafter, with most people in bed the levels fall. This does not necessarily mean that there are less UAP about. Although there is no absolute evidence that this is the case, it seems most likely that UAP distribution occurs more or less throughout each 24 hours period, notwithstanding any peaks and troughs if the cause of UAP is due either to meteors or electrical conditions; both of which are variables (see Working Papers Nos. 2, 13, 17 at Volume 2). It is a fact, taking all known characteristics into account, that:

- Most of the 33% 'white' objects reported would not be seen in bright daylight, unless they were close to the observer.
- Only those objects attracting the eye's attention with adequate contrast with the viewing background are likely to be seen. [Pink/silver (against a bright sky), blue (against a blue sky), or yellow/orange (in a sunny sky) would be less likely to attract the eye's peripheral vision.
- Although motion attracts the eye, unless a visible, contrasting colour, is also present, any motion will be irrelevant.
- Aircraft lights- even if operating in daylight- will not attract attention by themselves. Their contrast will be much less than in darkness, coupled with the fact that an observer in the open will only be attracted if aircraft sound acts

as the additional cue. [Hence, aircraft lights as a cause of UAP mis-reports are eliminated in daylight].

- A large percentage of UAP reports at any time - day or night, are fleeting, often less than 5 seconds. The certainty of a witness is higher at night, than in daylight, because of the colour/darkness contrast. In daylight, even a second glance may not confirm the presence of anything unfamiliar, the object may have disappeared, dissipated or just moved quickly away.

- It is noted that the large triangular, oblong and diamond shapes reported at dusk or in the night do not appear in daytime reports.

48. The statistical distribution values obtained do not therefore necessarily mean that UAP presence is not evenly distributed through the full 24 hour period - or at least more evenly distributed than the probable skew caused by the contrast in the marked difference in visual detection conditions occurring between day and night. As a comparison with the earlier analysis, the 1996/97 analysis breakdown is: Daylight (0600-1700) ~17%, Midnight to 0600, also 17%, with over 56% between the hours of 1800 and midnight. Seasonal time variations have not been investigated but monthly values are considered below. Irrespective of these factors it is clear that sightings are a function of:

- Visibility at all times of day or night.
- Contrast in daylight.
- Luminosity of the object to attract attention.
- Presence of motion.
- Availability of witnesses - a function of population distribution and presence in a viewing position.

49. **With Month of Year** Figure 3-11 and Table 3-3 show the distribution of UAP reported sightings by month of the year, taken over a ten year period. The pattern is consistently clear that the number of reported events peaks during February and in the autumn and falls for about two months in April/May. Until the Meteor statistics were developed there was no apparent or obvious reason for this, apart from the fact that, from the visibility aspect, fewer UAP sightings would, as explained elsewhere, be expected when the weather is very bright, or when the evenings become lighter. However, more opportunities are available when the weather is warmer than in the spring and more of the population is likely to be outside in the evening/dusk, for example, in the autumn. This did not explain the peak UAP reporting, centred on February for most of the years plotted, until the results at para. 53(Figure 3-18),

below, were obtained. Table 3-4 shows the distribution of days per year with no reports.

50. **With Weather.** Weather statistics for the whole of the UK have been briefly analysed against UAP sightings, with the specific intention of searching for correlation between atmospheric conditions and days on which UAP events occurred. The information available from 23 weather stations included temperature, precipitation, sunshine, fog, snow, thunder, frost, dew point and pressure. Although the work involved to make a complete analysis (and the possibility of identifying conditions for the formation and sustaining of a UAP) is beyond the scope of this study, an initial analysis was made of the most obvious factor - that of the potential of enhanced electrical conditions in the atmosphere. A correlation was therefore sought between the incidence of thunder recorded in the weather statistics (and dependent on lightning) and UAP events. As these could not be done locally for every event, they were normalised as the numbers of days per month of thunder against UAP report frequency. Conversely, an analysis was made of days when UAP events occurred when there was no thunder. The results are plotted at Figures 3-13 and 3-14 for the years 1988 and 1996. They show that **UAP can occur when there is no thunder (lightning)**, for example, in November 1988. December similarly shows a large number of UAP with a very low, negligible thunder rate. However, for the overall year the correlation co-efficient was -0.43 which shows that very small values of one set of data are connected with large values of the other set. When this was repeated for 1996, which was a year with more sightings and a preferable statistical situation, the correlation was positive (+0.62) showing correlation between thundery days and UAP reports. Finally, the sequence was repeated for 1988 for days of thunder against days when **no UAP reports were received**. This showed only a very weakly positive (0.19) correlation, meaning that the large values in one set are associated with the large values in the other set. In basic terms this shows that a large number of days can occur with no UAP even though it is thundery. The conditions for lightning occurred on those days but ball/bead lightning was not formed - or at least was not reported! **In summary it seems likely therefore that while a number of UAP reports are a result of misreported ball lightning (which is a rare phenomenon for most of the population), there are many occasions when UAP reports are received when there is no recorded thunder conditions and hence no enhanced electrical activity in the form of lightning. On these occasions (other man-made objects excepted) UAP must be caused by something else.**

51. **With Solar Activity** Because solar activity affects the earth's atmosphere and electromagnetic propagation conditions it was investigated to ascertain whether the frequency of UAP reports could be correlated to solar flux, sunspot number or geomagnetic conditions. Some example plots are shown at Figures 3-15(a) and (b). It was postulated that some events, possibly many, might be 'plasmas' with their associated electrical fields, (and charged particles), so an examination was made of the UK daily Sun-Spot Numbers (SSN) and the geomagnetic flux (FLUX), compared with the daily number of UAP events. For convenience of the presentations of results,