Are UFO Events related to Sidereal Time?
Arguments against a proposed correlation

by Jacques F. Vallee
1550 California Street, no.6L
San Francisco, CA.94109

Abstract

We report here on a study of the hypothesis that UFO events are correlated with local sidereal time, an observation advanced by Dr. Claude Poher, Dr. Donald Johnson and more recently by Dr. Peter Sturrock. Local sidereal time is used by astronomers to keep track of the stars that pass the observer's meridian at a particular instant. A subset of a large catalog for which geographical and temporal data are available was taken as a basis for the study, involving 11,991 events. Local sidereal time was computed for these events. While a frequency distribution indicative of a correlation with star positions was indeed detected, control with a separate catalogue compiled in France discloses an important artefact: multiple entries for a single, particularly remarkable UFO event have resulted in massively duplicated records. This calls into question the significance of the claimed pattern.

Selection of cases

In a recent article Dr. Peter Sturrock has presented an interesting series of analyses of a catalog of UFO sightings (Sturrock 2004), leading to his observation that "the event rate appears to depend upon local sidereal time." Sturrock's work stimulated our interest in expanding the analysis to a second catalog, using a different approach to the calculations while extending it to a critique of the statistical effects present in the data. Indeed, as Sturrock observes, the complexity of the subject is such that multiple approaches to the same problem are warranted.

A correlation between the frequency of reported sightings and some astronomical parameter, such as the periodic approach of certain planets or a particular celestial orientation, would be an important factor in forming hypotheses about the nature of the UFO phenomenon and its possible extraterrestrial origin. Sidereal time is especially interesting in this regard since it provides an indication of which stars or other celestial objects are at the zenith of that location (or along its meridian) at the time of the observation. If UFO sightings tended to occur at a particular value of the local sidereal time this might mean that a specific celestial source was involved in the phenomenon. Therefore searches for extraterrestrial signals (such as SETI) might be conducted in the part of the sky in question.

The first researcher who noticed a potential correlation of this type was Dr. Claude Poher (Poher 1973). More recently Dr. Donald Johnson, a co-author of the UFOCAT catalogue (Johnson & Saunders 2002) conducted a statistical study of the local sidereal time

distribution for the occurrence of CE2 events (close encounters with physical effects). Johnson found the distribution of figure 1, with a peak at 14:00 hours. Johnson also found a similar peak between 13:00 and 16:00 hours for close encounters of the Third Type (CE3 events) with Chi-square significance at the level of p less than .0000001.

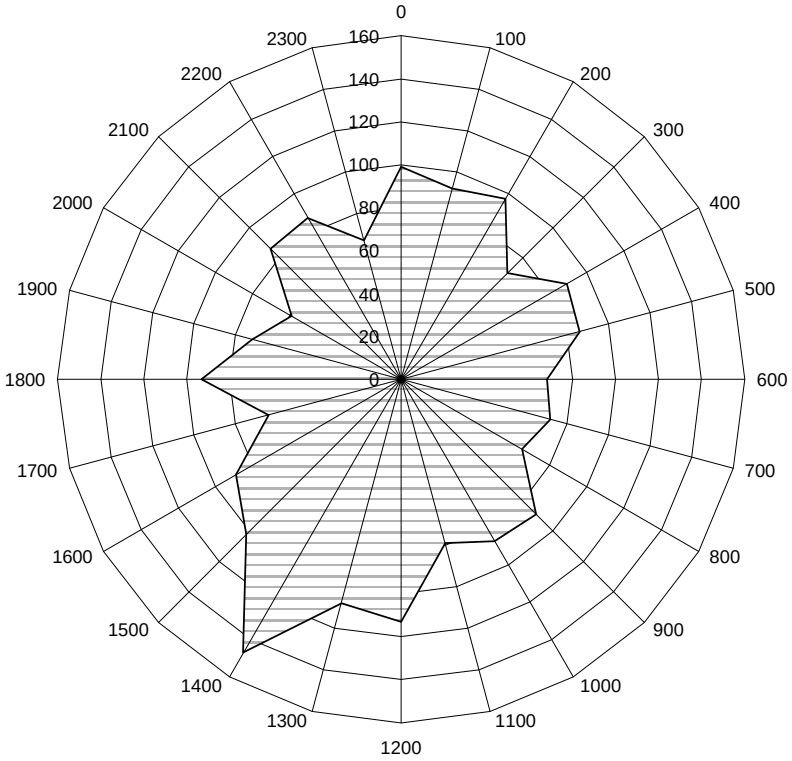

Figure 1. LST distribution of CE2 events from UFOCAT (shown here on a 24-hour clock)

In these studies the peak comes at times that are different from those found by Poher and Sturrock. In order to conduct an independent analysis we started from the same basis as in the Sturrock study and extended it to a catalog of French cases. The Sturrock results are based on a catalog known simply as *U* published by Mr. Larry Hatch (Hatch 2001). The version we used contained 17,757 records and was released on 23 July 2001. The last event recorded in this catalog was dated 20-Jan-2001.

The Hatch catalog runs on any personal computer equipped with DOS and can be readily understood even by the casual user. As the analysis proceeds with increasing sophistication the catalog reveals many layers of useful data, under a consistent coding system. Mr. Hatch has compiled it from the best-available sources in the literature and has refined the list by comparing these sources among them, resolving issues such as date, time and location. Over the years he has continued to add new cases and to remove entries that seemed dubious as new information came to light. Thus, while the Hatch catalog is not homogeneous it is most valuable because it is the result of a systematic process of filtering and data reduction. Furthermore, it is possible to partially minimize

historical and cultural artifacts by narrowing down the scope of the study. If UFO events are correlated with local sidereal time, the effect should be verifiable (and indeed, enhanced) on a subset where these factors have been minimized.

For the purpose of increasing the homogeneity of the data sample we have narrowed down the Hatch catalog to cases recorded between 24 June 1947 (generally considered as the start of the "modern era" of UFO sightings) and 31 December 2000. While the accumulation of observations since January 1, 2001 is continuing, the data has not yet been subjected to the same degree of scrutiny as were the cases of the previous half-century. As for pre-Kenneth Arnold cases, they deserve a separate study. Ongoing research by various groups interested in the history of the field, including the very large "airship wave" of 1896 and 1897, shows that the phenomenon was recorded in a social and journalistic environment very different from what we have experienced since the expression "flying saucers" was launched. Among the 17,070 cases remaining in the list, we found 11,991 entries that contained enough data for a computation of local sidereal time to be carried out. This sample compares with Sturrock's selection of 12,200 cases supplied by Mr. Hatch.

Sidereal time is used by astronomers to keep track of the stars that pass the observer's meridian at a particular instant. Sidereal time runs faster than Greenwich Mean Time (GMT) by about 3 minutes 56 seconds per day, to complete an extra 24 hours in one year. At a given site the local sidereal time has the same value every year at the same date and time. A number of standard algorithms are available on the Internet to conduct this computation, which is straightforward. We applied this analysis to all 11,991 suitable entries in our catalog, leading to the graph of figure 2.

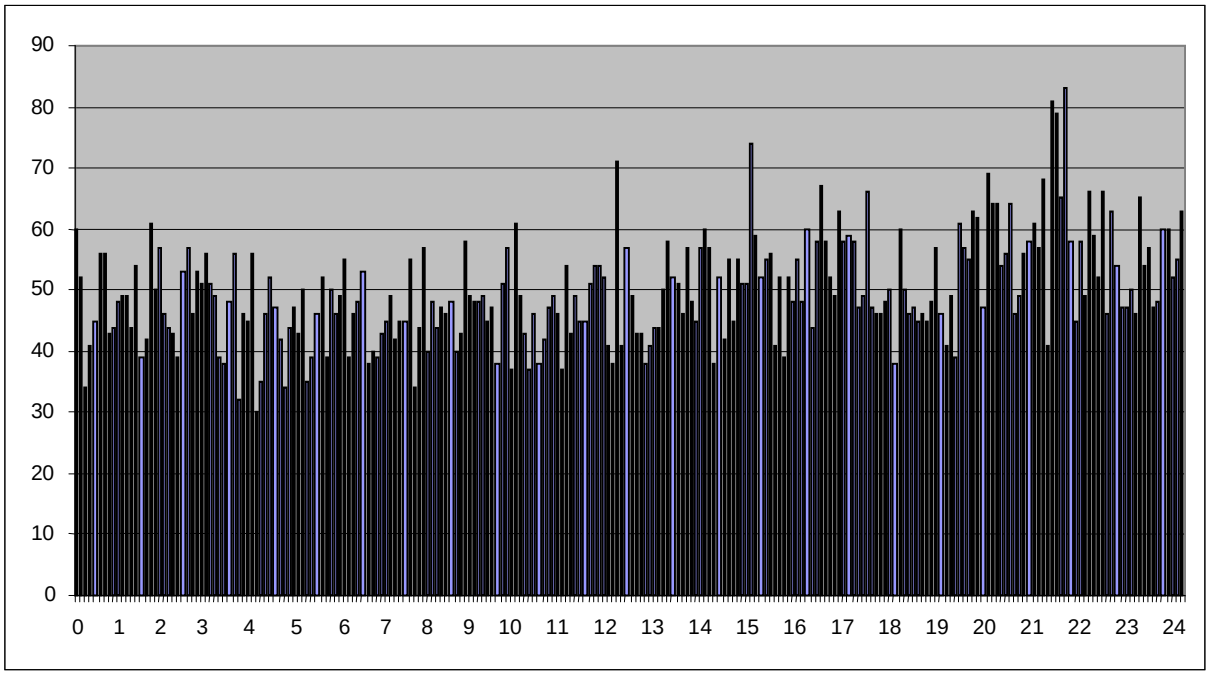

Figure 2: Frequency distribution no.1 as a function of LST in hours (Hatch catalog)

Initial results

The results of our LST computation are displayed on figure 2, showing the number of events we recorded in 240 intervals or "bins" of 0.1 hour, between midnight and 24.00 hours. Although this small interval makes for a noisy plot, it provides the required detail for close comparison with other catalogs, as will be seen below. This graph matches well with Sturrock's published distribution. In particular it exhibits the same increase in the frequency of reported events in the range of 20 hours to 23 hours, with a noticeable peak between 21.1 and 21.5 hours of local sidereal time.

Further analysis

The next step in our analysis was to sort the catalog according to LST value in order to examine the specific events in the range of our observed maximum. In doing so, one remarkable observation "jumps out" of the catalog.

On the evening of November 5th, 1990 thousands of witnesses in France reported either one object, or a series of objects, that appeared to travel relatively slowly along a trajectory that began in the Atlantic shore in the Southwest and ended in the Alsace region to the Northeast. Witnesses ranged from schoolchildren to pensioners and from truck drivers to bank presidents. Numerous official reports were filed by Gendarmes. One witness, who has the rank of Ambassador, made a private report to this author of having observed the phenomenon over several minutes while driving a car for several blocks towards the Arc-de-Triomphe in Paris: "It looked like the Eiffel tower was flying horizontally over Paris," said this witness, who added the object appeared as a single, solid, dark triangle with lights, flying slowly.

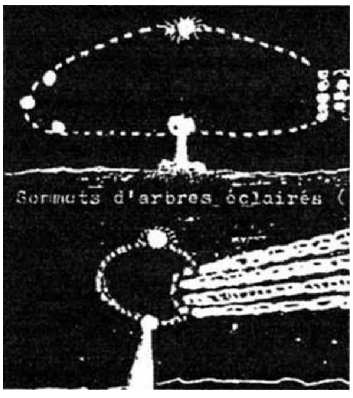

Figure 3: Witness drawing

Figure 3 shows a drawing submitted by a witness in one of the 400 reports recorded on that date by researcher Franck Marie (Marie, 1993). "The time was within 5 minutes of 7:05 P.M.," wrote this person, "I was driving towards Artigny with my wife's mother on road RN 387 when (…) we saw three luminous points forming the shape of a V followed

by a projector with a vertical beam lighting up the ground. It was followed by 5 or 6 luminous points with orange-red trails. All these elements seemed to be part of a single black mass in slow motion, gliding at low altitude. The big searchlight turned towards the ground lit up the tops of trees at an estimated 800 meters (2,500 feet) in extraordinary silence…"

The French Government's UFO study group at the Centre d'Etudes Spatiales in Toulouse (Cnes-Sepra) conducted its own analysis and concluded that the witnesses had probably observed, and misinterpreted, the reentry of a spacecraft that indeed was expected to burn up in the atmosphere on that particular evening. Many reports, however, such as the one quoted above, were so detailed and specific that they have remained unexplained.

Among the UFO events in the Hatch catalog for which a value of LST can be computed there are 56 entries for this single case of November 5, 1990. Such a large block of entries, occurring in such a small interval of LST values, introduces a potential distortion in the statistical correlation. While it is appropriate for the Hatch catalog to list individual reports separately (since they occurred over a wide area), in our own analysis there should be only one entry, given the fact that a single phenomenon, admittedly quite spectacular, occurred on that particular evening. When this duplication is removed the frequency distribution becomes that of figure 4, where the rise in frequency around 21.5 hours is less noticeable, although still present.

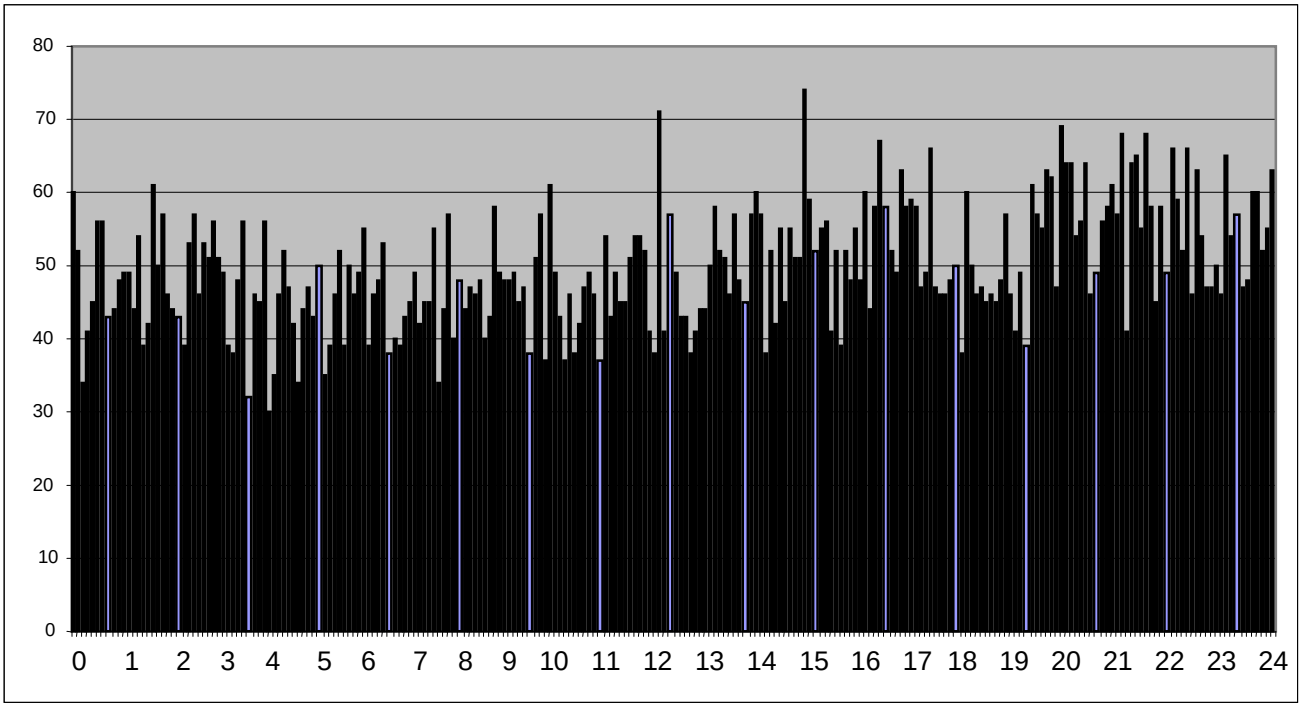

Figure 4: Frequency distribution no.2 after removal of duplicate data (Hatch catalog)

In order to compare the distribution of figure 3 with that of figure 4 (before and after removal of duplicate data for November 5, 1990) we calculated how many "bins" held a particular number of UFO cases. The result is shown in table 1.

	Number of cases:												
Bins containing:	25	30	35	40	45	50	55	60	65	70	75	80	85
Distribution 1	0	7	22	42	66	36	37	13	6	2	1	2	0
Distribution 2	0	7	22	42	66	37	37	14	7	2	0	0	0

Table 1: Comparing frequency distributions

It can be seen, for instance, that in distribution 1 there are two "bins" (intervals of 0.1 hour of LST) that contain more than 80 cases, while in distribution 2 there are none.

Next, we have applied common statistical tests to the two distributions, yielding a p-value representing the probability of observing results as different from the normal distribution as what we have observed in table 1. The most common test is the Kolmogorov-Smirnov test, which gives the same p-value for distribution 1 and distribution 2, namely .15. In other words, the probability of obtaining this distribution by chance is 15 in 100.

A more sensitive test is the Ryan-Joiner test, which gives a p-value of less than 0.01 for distribution 1 (initial data set) and greater than 0.1 for distribution 2 (with duplicate data removed). This could be interpreted by the statement that the initial distribution would be expected only once in 100 trials on the basis of chance. Once the multiple entries of November 5, 1990 are corrected, the resulting distribution would be expected at least once in 10 trials.

Other factors

In any statistical study involving a data-base compiled from multiple sources, detailed discussion of biases and lack of homogeneity in the entries must be taken into account. Before one can draw any firm conclusions, it is important to note certain factors that contribute to the analysis of UFO events. The first factor, as noted by Sturrock and also by Johnson, has become known in the literature as the "Law of the Times": UFO reports are not reported uniformly during the day but they show a sharp peak in the evening (between 6 and 10 P.M.) and a secondary peak before dawn (Vallee & Vallee, 1966).

As noted before, for a given site and date the value of LST repeats every year at the same time of day. Sturrock has developed a sophisticated test that argues against the idea that the LST effect is simply due to the interplay of the Hour-of-day and Hour-of-Year pattern.

Another bias in our data is that of geographical distribution. The vast majority of cases in the catalog originate from two major regions: Western Europe and the Americas. This bias is clearly exhibited on figure 5. For that reason it is difficult to draw firm conclusions from a single catalog. In time, researchers interested in this problem will

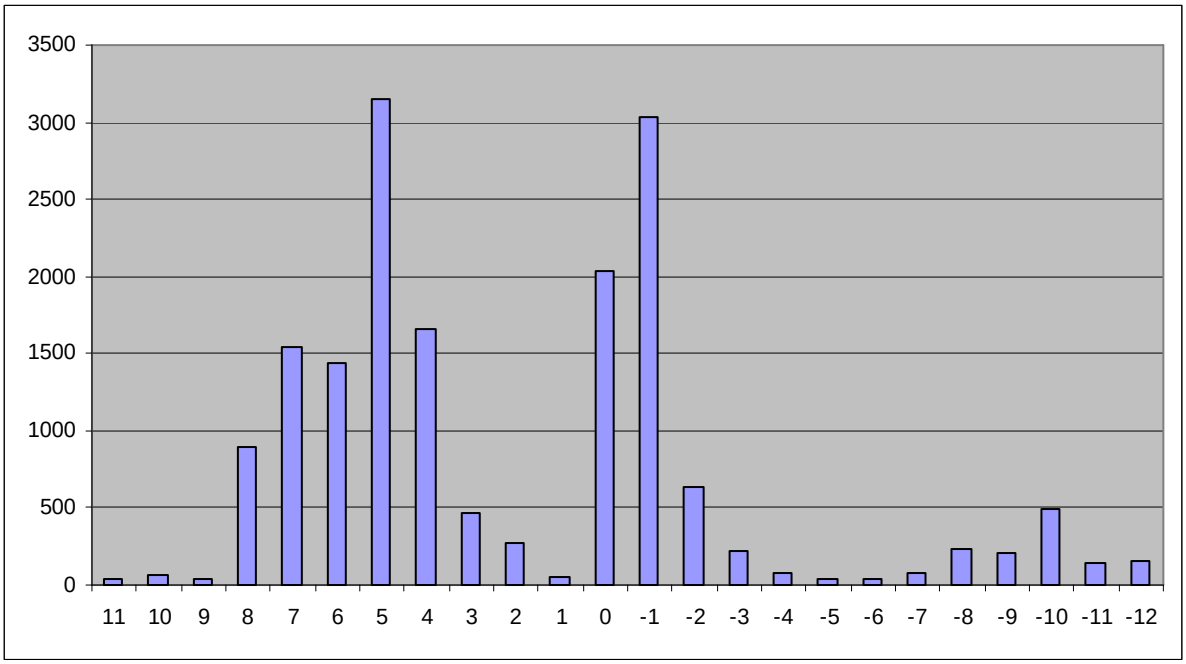

Figure 5. Case frequency by time zone. Note the prevalence of French and British cases (zones –1 and 0) and American cases (+4 to +8). Hatch catalog.

need multiple catalogs drawn from a more varied set of geographic locations, and also specific catalogs addressing a single country. In that regard, we were fortunate to have access to a sizeable list of French cases that could provide a comparison with the Hatch catalog used in the Sturrock study.

The Sepra Database

The author is indebted to Mr. Jean-Jacques Velasco, head of the French SEPRA ("Service d'Etude des Phénomènes de Rentrée Atmosphérique") in Toulouse for permission to study a preliminary version of the CNES computer-based file of unidentified aerial phenomena reports. At the time this version was compiled (Summer of 2002) the file, which is still in process, contained 3903 entries and covered the years from 1978 to 2000, with one additional report from 1975.

It should be noted that each SEPRA entry is an individual report, often evidenced as a declaration before local law enforcement officers (gendarmes). Some sightings have only one witness, while others may generate up dozens of entries in the database. Our preliminary analysis began by the compilation of entries into single-line items. In other words, we grouped the various individual statements for each unique incident into a single entry. As we did this we conducted our own re-evaluation of the case based on the

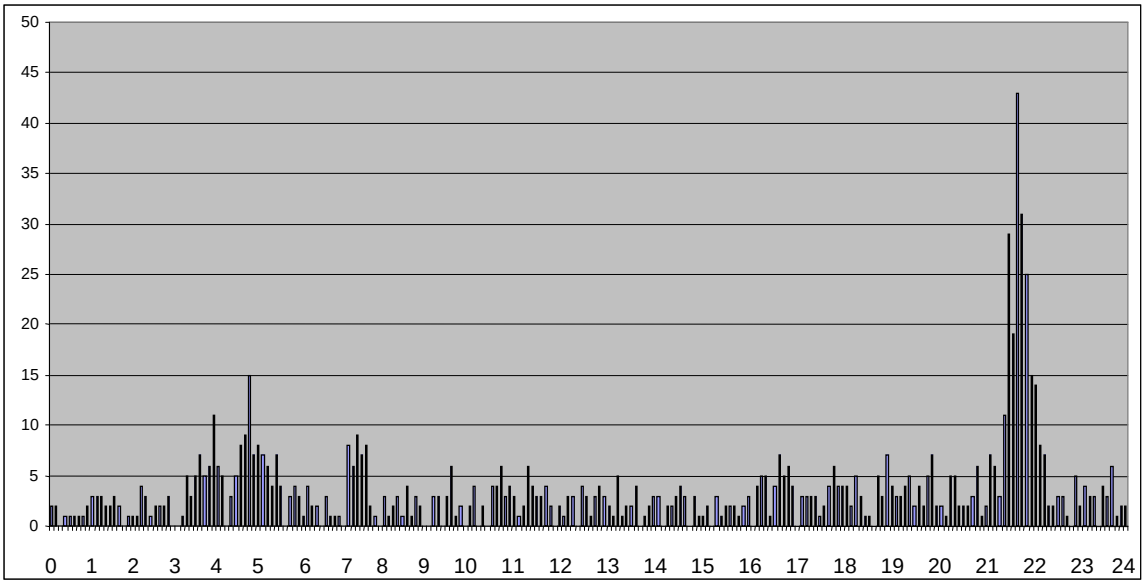

Figure 6. Frequency distribution as a function of LST (Sepra catalog, 881 events)

description given by the witness, resulting in reclassification of borderline reports – most of which had a high probability of describing meteors.

The resulting catalog contains 1,425 events. We computed LST values for 881 cases where date and time was known in addition to geographic coordinates. Among these, 452 were IFOs (identified flying objects) and 429 were unexplained. The corresponding distribution into "bins" of the same size as in the previous study is given on figure 6.

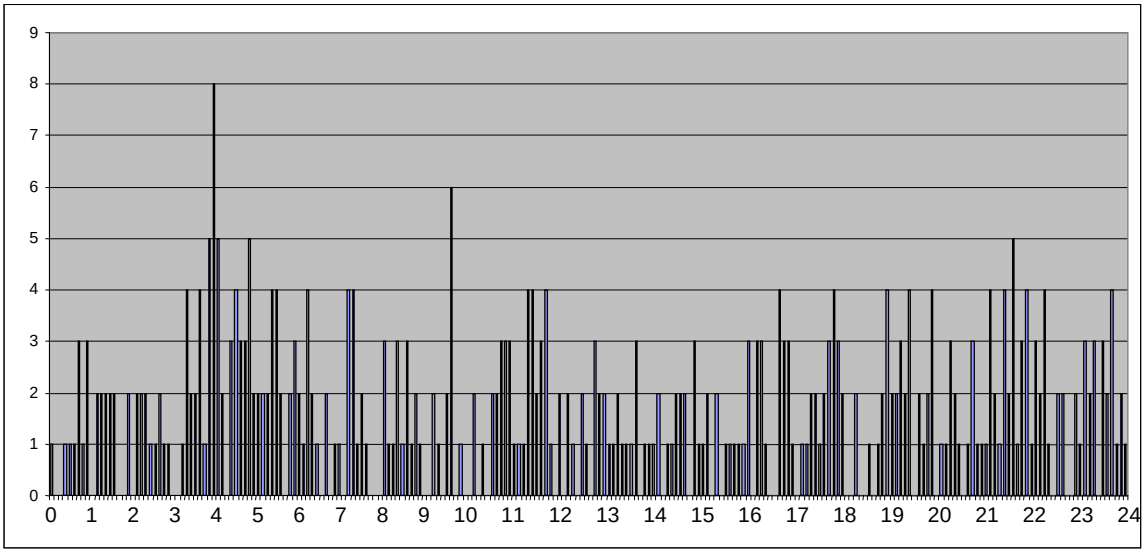

Figure 7. Frequency distribution for unexplained events only (Sepra catalog, 413 events)

On figure 6 the peak between 21.2 and 22.1 hours of LST is extremely sharp. Note that a secondary peak exists between 4.2 and 4.6 hours of LST.

At this point it is convenient to use one of the important characteristics of the Sepra catalog, where identified events have been kept in the list with a special code. These include all the usual mundane explanations, such as meteors, reentry of satellites, searchlights, astronomical objects, etc. Our next task was to restart the distribution study on the basis of the 413 unexplained cases with known date and time only. This led to the chart of figure 7.

It can be seen that the peak at about 21.5 hours disappears when identified cases are removed from the Sepra catalog. In contrast, the secondary peak between 3.2 and 5.2 hours of local sidereal time on figure 6 actually stands out more sharply on figure 7, with a maximum at 3.8 hours. This particular feature in the distribution survives not only the elimination of IFOs from the list but also a review of the individual cases for possible duplication effects or other biases. At this point we have to consider it as unexplained.

Conclusion and recommendations

The present study confirms the existence of an apparent statistical relationship between UFO events and local sidereal time in the Hatch catalog. When the data is further analyzed, however, it is seen to contain no less than 56 entries for one case that actually represents a cluster of observations of a single major event, a fact that was not taken into account in Sturrock's analysis. In a control study using a preliminary version of the French Sepra catalog, we have shown that the peak at 21.5 hours disappears when cases classified as IFOs have been removed. A secondary peak at 3.8 hours remains unexplained.

The discovery and confirmation of a statistical link between the frequency of UFO events and some celestial parameter, such as local sidereal time, would be an important step in the understanding of the very complex UFO phenomenon. Until analysis of other catalogs is carried out, however, it appears wise to maintain a cautious skeptical position with respect to claims of statistical correlation between UFO events and the position of the stars.

References

Hatch, L. (2001). *U* Database (consult www.larryhatch.net for availability of current version).

Johnson, D.A. and Saunders, D.R. (2002). *UFOCAT reference manual*. Sun River Research, Bow, NH.

Marie, Franck (1993). *Ovni Contact*. SRES editions. BP 41, 92224 Bagneux Cedex, France. Personal interview with the author, Paris, 26 June 2004.

Poher, C. (1973). Etudes statistiques portent sur 1000 témoignages d'observations d'UFO. GEPAN report : CNES, Toulouse, France.

Sturrock, P.A. (2004). Time-Series Analysis of a Catalog of UFO Events: Evidence of a Local Sidereal Time Modulation. Journal of Scientific Exploration, 18, 3, 399-419.

Vallee, Jacques F., and Vallee, Janine (1966). *Challenge to Science.* Chicago: Regnery.

The assistance of Dr. Jessica Utts with statistical calculations is gratefully acknowledged.
