PROVERBS HINT AT COUPLED SEATIDES -SPACE DUST HYPOTHESES; EXTREME WEATHER FITS IN SOLILUNAR PAIRS

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Abstract: Coincidences of French proverbial situations with astronomical dates, then extensive local intuitous observation of meteorological patterns, support hypotheses for a new physical interpretation of both meteorological proverbs and events. Two types of phenomena have been identified, and cooperative enhancement is now demonstrated in unambiguous detailed coincidences of major events. Bowen's early statistical results on precipitation anomalies and dust hypotheses confort our findings. Spectroscopist's methodology helps restoring the validity of proverbial information by imaging positively human native intelligence facing structured complex systems. Confrontation to topical issues awaits experimental confirmation and generalization in weather interpretation and prediction and in climate evolution.

Introduction

The idea that some meteorological proverbs could have a clear physical meaning is not commonplace, but we had some hints when discovering, a decade earlier, a date coincidence for traditionally quasi-systematic rainy days in Southern French Alps, a few days after the maximum of the Perseids meteorshower at mid-August, and the existence of similar coincidences along the year. Checking the validity of such an easy explanation, and of another simple hypothesis, for some moon effects, linking atmospheric water and winds to oceanic tides, has been a hobby for a few years. Our model of interpretation has been built in a long process of intricated local observations and questioning of possible physics. Actually, similar relations between meteorshowers and precipitations had been widely studied earlier, as initiated by Bowen [1-6], but failed to be accepted into the general background. We have identified and interpreted two types of effects, and also blended cases, relying on everyday's weather observation guided by proverbial images [7], and introducing empirical connections usually unaccounted between astrophysical and atmospheric meteorological phenomena. A suitable image, namely "the atmospheric « cloud chamber »", in analogy with particle physics instrumentation, has been proposed by Wolfendale [8] as he was calling for more work in a similar direction, in relation with sunflares: water vapour is produced in the atmosphere, then condensed due to impinging particles (cosmic rays). Finally, in 1999, we noticed the existence of spectacular coincidences for major events, adequate for checking these images and for introducing them widely to the scientific community. We consider this kind of proof as preliminary to extensive studies of meteorological datasets, and prefer it in order to emphasize on the delicate but technically unsophisticated process of analysis, as a methodological clue to understanding other knowledges.

Major coincidences supporting preliminary hypotheses

Of course all scientific tools are needed too, and therefore the first need is a convincing presentation so that scientists feel concerned. In its present state, our model includes both an accretion from interplanetary dust clouds into the atmosphere, probably enhanced by passing-by comets with time constants of the order of two years, in relation with proverbs involving fixed dates within a few days delay after meteorshowers, and a system of winds and moisture that depends on moonphases, presumably through oceanic tides and related currents and shore evaporation (at least partially); in addition, effects of moon on dust trajectories are suspected. Two logical consequences were expected: a similarity of new and full moon, which, indeed,

we observed as most common, and a similarity of weather when date and moon phases are identical or similar. Such latter cases involve longer intervals, thus are less accessible to direct observation. Let us now examine two spectacular coincidences of this type, found in a restricted local selection of 12 major events of the 50 last years [9-10], before detailing the origins and a discussion of such an unusual model.

The most spectacular coincidence concerns two local records of coldest temperature, January 18th, in 1966, and January 17th, in 1985, at the Meteorological Center of Essonne at Bretigny. The date difference is 19 years, typical of the solilunar cycle identified by the Greek Meton, twenty five centuries ago, as associated to identical moon phase on the same calender date. Here one day tolerance is needed, but for both dates the preceeding full moon occurred during the Quadrantides meteorshower, on the 7th of January. The date itself effectively corresponds to several adequate proverbs: "between St Antoine (17th) and St Sebastien (20th) the coldest of the whole year". "On St Antoine (17th), great cold, on St Laurent (August 10th), great heat do not last" (there, a typical meteorshower date precedes a meteorological anomaly!), "On St Pierre (18th) winter quits or get tighter". Actually it is no surprise that the coldest days could happen at mid-January, in the middle of winter, and, in the scope of the present study, it could be just one hint more, but certainly not a proof, for a correspondence between the January meteorshower and weather anomalies at mid-January, but the 19 years interval between major events is much more specific.

Another coincidence is found, at the end of May, namely for the 31th in 1992 (new moon next day) and the 30th in 1999 (full moon that day). It concerns more recent events still present in memories of local people, and of the author: in 1999, on a Sunday, market-day in Gif/Yvette, a sudden exceptional storm did blow up, with hail, and with water up to the ankle under shelter in the marketplace, due to overfed waterpipes, whereas, in 1992, cars were pushed down in street repairwork excavations enlarged by stormy waters(figure 1), in the neighbouring village of Gometz (81 mm precipitation within a few hours). This coincidence, too, shows the same type of significant details: here moonphase is not identical, but opposite, which agrees with our observation of an approximate equivalence of new and full moon in many typical circumstances, corresponding to the model of tide induced winds and moisture. Here, too, tolerance is one day. Last detail, but not least, the corresponding proverb, almost ignored nowadays, but still existing in books [7], is strangely meaningful: "If Ste Petronille wets her skirt along the day (May 31th) it will take 40 days drying her rags". Clearly this should be understood not as a prediction of 40 days of rain, but as an image of the dramatic aspects after the storm!

These outstanding facts exemplify unambiguously what has been felt obscurely from the essential preliminary analysis of more complete and complex sets of data, either from personal observation, or from published papers (Bowen [1-6], Arakawa, [11] already studied in [3]). Both coincidences presented are not the results of a wide search on extensive data sets. On the contrary, they are two pairs that did pop up from a small display of 12 major local facts. Dates have been found in a small exhibition devoted to local meteorological observation and to related topics, in the Gometz village, celebrating the 50th year of observation by a senior of the village, in relation with the Departmental Meteorological Center of Essonne at Bretigny. Although noticeable, the date coincidences cannot be considered as definitely significant; probabilities would not be easy to evaluate. Here, additional details, such as moonphase and relevant proverbs have been added as a routine process, because, at that stage of our study, internal consistency was tested whenever possible (as it is done in complex spectra analysis). These details make the difference with fortuitous coincidences.

Actually the latter coincidence was the most immediatly visible to a trained eye, but it could have been missed, because the last event (1999) was omitted in the written abstracts available [9-10]. Illustrating twice the same kind of event was attractive to the public, but this intuitive choice and the coincidences were not explicitly pointed out in the presentation.

Finding such simple proofs, in relations with major events, urges now undertaking an extensive but delicate interpretation of wide sets of data which reflect the whole complexity of the problem, and this needs a pluridisciplinary cooperation.

Modelisation

Let us now review the evolution of our model, together with some elements of discussion found in the literature and/or in comments to the author: our general attitude, still now, corresponds to a preliminary, exploratory, qualitative and extensive observation, in relation with a flexible modelisation stressing on structure recognition, attentive to the consistency of all elements, but definitely not to an exact or numerical description of clouds, winds, or of any meteorological phenomena.

Starting from an intuitive agreement between repeatedly observed features in correspondence with proverbs, our study relies on continuous local observation of weather evolution, technically close to what was available in older times, but analysed with nowadays cultural background, particularly in physics, topical subjects and basic physics as concern the possible interactions and motions, and atomic spectroscopy, as concerns the non probabilistic analysis of complex systems.

Initially, during the purely qualitative phase, the observability of recurrent structures, or scenarios, including an important variability, in the evolution of weather, has been ascertained in favourable conditions, and two different types of effects have been found, independently, namely

a) a systematic delay between meteorshowers and proverbial dates where anomalies have been effectively seen, concerning essentially nebulosity, precipitations and thunderstorms.

b) specific evolution around new moon and full moon, mostly visible during the cold season as clear weather and east wind, followed by rain.

c) then non trivial intermediate and cooperative effects has been observed.

d) Moreover, the idea that comets passing by might enhance dust effects, and could be associated with El Niño events is supported by an intuitive interpretation of the continuous observation performed, in relation with an ancient popular fame of comets, that has been fought by astronomers for a long time, maybe too hastily.

Discussion and related work

From our observations, it became clear that a standardized numerisation of effects would limit the scope of exploration without providing significant results, due to the variability of so many aspects. The advantage of our methodology is in the selection of simpler typical cases and of intermediate cases that help understanding the whole complexity of the evolution in terms of cooperating effects. Actually the qualitative study we have performed is complementary to the extensive numerical studies of Bowen[1-6], Qviz[12], Bradley et al. [13], Adderley and Bowen [14] which were not successful as concerns the inclusion of the hypotheses of dust rainfall anomalies or moonphase effects in current meteorological modelisation, but which remain pertinent numerical data still available. A discussion of Bowen's search concerning an hypothetic periodic enhancement of dust clouds, and of later work on moonphases, led us to the idea that a coincidence with favourable moonphases should be a better explanation.

From the beginning, some proverbs at fixed dates, and corresponding observed situations, have been interpreted as a direct consequence of condensation stimulated by incoming interplanetary dust, but here, for both spectacular coincidences under study, the relation is not clear, it might involve a complex process of evolution (in January), or a minor or unidentified dust cloud (in May). Anyway, both coincidences are related to solilunar aspects which sign a cooperation with effects associated to moonphase, although the methodological approach cannot be reduced to a simple, linear development.

The comparison with extensive work by Rebetez is meaningful. An extensive collection of Swiss proverbs is reported and studied [15]; corresponding or independant studies of meteorological situations in different locations include recorded data and

sophisticated statistics [15,16]. Limited evidences for a reality of some proverbs have been deduced, without concern for the physical causes we have studied. It is noticeable that here again the selection of extreme situations increases significativity. But, in that context, the conclusion insists on the subjective conditions of transmission, because detailed interpretation seems impossible to link to climate evolution. A comparison of the data with our hypotheses is far from straightforward, because it is not clear that the reported features are adequate, and because geographic influence is certainly most complex in Switzerland: whereas we link typical scenarios to moon phase, through tides and related winds, and find easy to identify them near Paris (through non-numerical data), we observed something quite different, and delayed, in the Alps. Prominent similarities between these two approaches are a curiosity towards the intelligence that created and maintained the proverbs, and a need for a precise description of variability. Conclusions agree on the inadequacy of mean values, but here, our originality is in the link to physical causes, which lessens the importance of subjective aspects of the descriptions collected and transmitted in the proverbs, and gives access to a global scheme for a more detailed interpretation.

Methodological aspects: the spectroscopist's standpoint

Now a major pending question is understanding and accepting that popular intelligence that was formerly able to recognize and transmit relevant information with the help of such proverbs. This was, in a sense, an aim of our initial hobby study, and it is important to give of it a first report that respects this qualitative attitude, and stresses on its efficiency, before undertaking extensive numerical validation. We consider that sifting out specific events and coincidences is a noticeable part in the efficiency of human qualitative and intuitive intelligence, that should not be discarded when confronted to probabilistic statistics on standardized data, which do not allow similar freedom.

A representative model for that non probabilistic approach, based on observation of coincidences, and on pattern identification, within a global (semi-)empirical model, although probably more famous from particle physics, does exist in complex atomic spectra classification and theory of complex atomic structure, where we observed it as essential. We find a wide set of methodological analogies to be found at any level of the present analyses, because, actually, the spectroscopist's attitude could be considered as a most general approach of numerous complex structured systems. Implicitely linked to chaos theory, as concerning phenomena depending on non-linear equations, with a sensitivity to borderline conditions, it is not limited to simple systems with known interactions, and takes advantage of reversing the « wing beat effect » (alias « butterfly story »), which often discourages any attempt of interpretation of meteorological details as irrelevant to long range future evolution: an interpretation of a wide number of small details, on the energy scale for spectroscopy, on both space and time scales for meteorology, provides sufficient information for understanding unaccounted interactions, or for specifying general parameters in a global scheme. This kind of studies belong to the paradigm of non-separability of extreme scales.

As a spectroscopic example, very complex spectra of rare earths have been for a long time a playground for complex analysis methodologies. Gratings, then, later, Fourier transform devices, have allowed extensive study of hyperfine structures (corresponding to a relatively small interaction between electrons and nucleus). It was at the origins of the discovery of nuclear spin, and, much later, we used extensively as a help in the description of electronic states [16-18](fig 3). Due to the internal consistancy of the atomic system, the observation of many unperturbed spectral lines with resolved patterns does bring information on some very strong lines where experimental information is missing, and the hyperfine characteristics of atomic states help the parametric representation of the atomic electronic structure, in analogy with extensive study of everyday's weather helping interpretation of major events or global evolution.

Trying to improve the determination of hyperfine characteristics of atoms (Pr and Pa), we have used weighted least mean square procedures, with a small weight on perturbed data

that do not fit well the theoretical Casimir formula for hyperfine structure. On the example of PrII [20], we have demonstrated that precise results are obtained, provided sufficient care is taken, and that the precise interpretation obtained explains what blends occur as a perturbation. This ressembles, and justifies, our selection of meteorological patterns that do fit the proverbs, leaving apart the perturbed situations where interpretation is too difficult in a first attempt, a kind of efficient procedure that could be subject to acerb comments, in the present work or in many other situations. And the next step provides some proofs by understanding the interactions between identified effects.

Questions, and prospective

Some of the pending questions have a possible link with coincidences concerning major events of recent interest:

- the European tempest of December 1999, occurred on one of the few calendar dates where wind is explicitly present in proverbs ("St Etienne's gusts" on the 26th), with a specific moonphase (full moon four days earlier), after a most intense and long El Niño event and the passing by of two spectacular comets.

- a boreal aurora was observed in June 2000, simultaneous to the outburst of the comet Linear, and with a maximum of solar activity. Similarly, an aurora was observed in Paris in 1910, a year known for its floods, same year as Halley's comet, 2 years after the Toungourska explosion. Later, a strong rainfall occurred on the 9th of october 2000, on St Denis day, associated with the proverb « the rivers gets out of its bed nine times » And important floods occurred in France in 2000-2001. This concerns the role of cosmic rays as studied by Marsh and Svensmark [20], but we go much further, proposing that sun flares could be linked to comets or fragments falling on the sun, with a density of passing-by comets in relation with the position of planets in the solar system, in line with periodic components found in the past climatic history (see Thuillier and Nesme-Ribes [21] and references therein).

- lunar conditions at the beginning of January 2001 were close to that of the low temperatures described above(see figure 2 for a typical perturbed sky on the 4th of January 2001). Nothing similar occurred in France, but extreme weather affected Siberia at mid-January 2001.

- two earlier extreme values of northern low temperatures, recalled on that occasion, occurred both around the 6th of February(5 and 7 in 1892, 6 in 1933) a date described as « the stronger frost », « the heaviest snowfall », in our French proverbs, while the most extreme temperature ever measured occurred in Antartic on the 21 th of July 1983, near a proverbial cluster of dates for rain singularities, in France. This suggests that proverbial dates concern the whole world, in agreement with Bowen's studies all around the world.

All this opens a wide new field of research, linking meteorology to astrophysics as in other astronomic objects (other planets or stars), exploring and recovering information that was collected in old times when such a link was accepted, as well as using satellite sophisticated observation. The role of sun as principal source of energy variations has to be completely re-examined, and continuity with meteoritic catastrophes needs consideration. The role of accretion (fall of space dust and of meteorites), needs to be emphasized, at meteorological scales now for earth, and also for the sun where it seems to be currently ignored.

As concern the prospective for climate evolution, our results change the relative importance to be given to major events, upsetting the whole understanding of atmospheric evolution. The way the ecological system reacts to industrial pollution cannot be easily extracted from the natural frame if elements of the system are so strongly dependent on the density and nature of impinging dust. The anthropic action of artificial dust created by satellite destructions might be important as well as effects of telecommunication electromagnetic waves in the high atmosphere region for their impact on ions. Our new

standpoint should elucidate a number of questions, particularly concerning winds, for which the role of charged particles created should be studied, hurricanes included.

Much further work is needed on these subjects, and particularly satellite observation fitted to the hypotheses of interplanetary dust and of its high atmospheric effects, as well as collection of relevant astrophysical and meteorological data of the past. Numerical analysis of existing data is already promising but needs pluridisciplinary cooperation.

Conclusion

After a decade of extensive, unsophisticated and flexible observation of local weather, helped by a systematic confrontation with meteorogical proverbs, we suggest now how even major events can be linked to astrophysical events, and point out coincidences that cannot be fortuitous. Although of independent origin, our conclusions are in logical continuation of earlier numerical extensive studies initiated by Bowen. We consider the quasi-chaotic aspects of the meteorological diversity as corresponding to mixed effects of different causes, winds and cloud formation beeing sensitive to oceanic tide effects, and to the impact of interplanetary dust, with a geographic variability due to the constraints of local morphology and of time constants of evolution. Whereas pure effects have been usefully observed and selected during the whole observation period in order to understand the processes, it comes out that major events correspond to specific conditions of enhancement, where comets probably are involved, too. Systematic studies of extreme weather records are needed, including search for detailed coincidences. Experimental investigations in the atmosphere are also needed in order to understand the role of the astrophysical context in the climate change, and to have a more complete look at the relative importance of anthropic effects, as compared to astronomic variability.

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Figure captions:
Excerps of extensive Fourier Transform recordings of high resolution hyperfine structure spectra of Praseodymium ^{51}Pr and Protactinium ^{92}Pa (recorded at Laboratoire Aimé Cotton by J.Verges (1973) and G. Guelachvili (1971), respectively)
The patterns with 6 or 4 main hyperfine structure components are typical of nuclear spins of 5/2 or 3/2 respectively. These patterns correspond to energy differences less than the energy differences between the electronic levels of the transitions by a factor of several thousands, but provide information on the caracteristics of these levels. This images the variability of meteorological observation, and its role for the understanding of coupled causes of both everyday's weather and major events.

Such patterns in the sky, observed near Orsay in the afternoon of January 4th 2001 are almost typical of perturbations around meteorshowers maxima, with round low and/or feathery clouds. On that same date, a sky irisation was visible in the morning.

When Ste Petronille wets her skirt along the day (31th of May), it will take 40 days drying her rags! For this major storm on that specific date, in 1992, new moon was next day; for a similar one in 1999, on the 30th, full moon that day. A typical coincidence, involving simultaneously calendar date, similar moonphase and proverbial description, with a limited range of tolerance: one day, twice.