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Decision making of autumn migrations of woodpigeons (*Columba palumbus*) in Europe: analysis of the abiotic factors and atmospheric pressure changes .

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ABSTRACT

In this detailed paper we have tried to detect all the possible abiotic data on three areas of transit of woodpigeons (Columba palumbus) on autumn migration (Falsterbo Sweden - French Pyrenees – I Appennine mountains and valleys of Iatly), processing and reporting of their data..
Our focus was to identify the main abiotic factor related to the weather that can be defined as the proximate cause or "finger-pressing-the-button" for the take-off flights of the autumn migration from nesting areas near both transit areas. The analysis was conducted on census data in transit, in the Archives ofvarious institutions. The total quantity of birds counted in migration over 40 years (from 1973 to 2014) was 42,936,667. Over the past 15 years (1999-2013) 47 peak days-of-mgration were identified in Sweden, 42 peaks in the Pyrenees and 12 in Italy, i.e. 101 peaks in total. These peaks were compared with the weather conditions recorded day by day and hour by hour and detailed in the Archives of Weather History. The analysis carried out mainly with data rates of incidence of abiotic factors has revealed that the most likely finger-pressing-the-button can be identified as rising of the atmospheric pressure at all three sits (92.62% Sweden, 92.85% in the Pyrenees and 91,00% in Italy). Variations above 10 hPa in 75.80% of the peaks for the sector "36/24 h" and 76.19% for the sector "18 h" preceding the take-off. The global analysis of all the abiotic factors makes it possible to construct a number of hypotheses for the interpretation of the "why" this happens. The sensory input which detects these variations of atmospheric pressure is identified as the Para-Tympanic Organ of Vitali, a possible “biological” barometer.

Key words : woodpigeons’ migration , atmospheric pressure (AP) , take-off , decision making, weather , abiotic factors

INTRODUCTION

Many factors [51] - biological and abiotic factors affect the decision-making moment for many migratory birds to fly migration in autumn and spring. This moment of decision ("decision making") occurs as the first “take-off” from the areas of breeding (autumn) and from wintering areas (spring) and then always occurs along the migratory route until the arrival in the destination area (wintering areas, breeding areas) [3,25,40,44].

The phenomenon of "I decide to go, at this very moment" occurs in different ways for all species of migratory animals, and to interpret it however we have to remember the complexity of the phenomenon of "Migration" (the mystery of migration) in various species of birds.
The "I decide to start now" is active in all migrating birds -migrants day and night, in the short or medium or long distance , migration alone or in group or mass (gregariousness) - who begin or continue after stop-over migration under the stimuli of different biological and abiotic factors[1,2,3,4,30,57,77].

The ornithological literature is rich in studies of all of these various factors [44,51] and related integrations such as physiological, physical, genetic, ecological, ethological, biochemical etc., notably the work of M.S.Bowlin (2010) [51] "Grand Challenges in Migration Biology However, in spite of the wealth of analysis and specific research on abiotic factors, it does not reveal many references and insights useful to identify the time and the precise motive of the "decision making " for the precise moment of take-off, namely the identification of the "finger pressing the button" to start the migratory flight, if it exists as such.

It is obvious that the biological condition (physiological, hormonal, metabolic, physical) [7,13,36] which has been maturing in the days before the migration ("zughunrue")[85], this is the basis on which the command will act to go . We must always remember that among the abiotic factors, the length of daylight (photo-period) [8,37,40,60,72] is a prominent factor that affects the pineal gland and resulting various neural correlations . It is also obvious that the timing of optimal migration depends on other abiotic factors[2,3,86], just as the environmental conditions and mainly the status of the weather in place or expected. It is imperative – for the birds - to deal with the migratory flight in the best conditions in terms of safety and fatigue, *vis-a-vis* environmental conditions and the status of the real or expected weather .[12]

But the main question for the focus of our research is this: while considering the balance of decision making of all factors - biotic and abiotic - can we identify a factor that most of the other represents "the finger pressing the button" for the take-off of migratory flight ?. [16-34-35-39-45-48-60-67-71]

The ability of migratory birds to predict the weather is well-known and widely studied [38-44-51] and this also applies to the behviour of resident birds about the behavior (especially alimentary) in the area of residence. It is also known that the extemporaneous weather depend on several factors-atmospheric physical and first of all the atmospheric pressure (AP); as well as the climatic conditions of long period, mostly seasonal, depend on the temporal oscillation so-called "North Atlantic Oscillation" (and corresponding El Nino for the Pacific) characterized by cyclic fluctuation (fluctuation) of the differences of atmospheric pressure at sea level between two vast areas of land-ocean hemisphere: climatic condition acts strongly on biotic factors .[6-31-32-67-82-89]
In several scientific papers [38-44-51] aimed at studying the correlation between meteorological

factors and migration, Atmospheric Pressure "lows" are almost always given greater prominence, the arrival of which would be perceived by the migrating birds as a harbinger of bad weather. Not a lot of importance has been given to the study quantitative variations of atmospheric pressure [39-45] that occur just before the arrival of low atmospheric pressure and bad weather.
We should give importance and emphasize the supposed anatomical basis or "biological barometer" which is the Para-Tympanic Organ of Vitali that in addition to barometric functions would also function as altimeter[17-18-20-21-22-23-24-29-80-83]. In previous notes published on the Web [74-79] we had highlighted some important conclusions about the correlations between mass migration and elevations of the atmospheric pressure in the hours before the take-off both for Woodpigeons and for the Woodcock (Scolopax rusticola) [79-74-78].

In this detailed work we have tried to detect all the possible abiotic data (***)on two areas of transit of Woodpigeons (Columba palumbus) on autumn migration (Falsterbo SWEDEN - FRANCE Pyrenees), processing and reporting of them.

The "focus" has been main-for us - to identify, if possible, a set of numerical and statistical data such as to confirm what has already been detected in previous Notice published on the Web (*Aggiornamenti 11/11/2013 www.labeccacciascientifica.it*) [74-75-77-78]: the atmospheric pressure rises significantly in the 48-18 hour period before take-off migration.

We anticipate as discussed later in the analysis and conclusions: among all the factors affecting the determinism of the take-off for migration, higher-mostly sudden – AP seems to represent "the finger pressing the button".

MATERIALS AND METHOD

The global base of study concerns the migration of a multi-year total (Sweden - Pyrenees) of 38,105,479 Woodpigeons (Columba palumbus)[44] surveyed in transit migration in 40 years (1973 to 2013) and 4,831,138 (10 years) in Italy.

The specific basis of retrospective study concerns the migration of 42,936,667 Woodpigeons in the last 15 years (1999-2013) surveyed in transit at Falsterbo-Sweden (10,760,141 with an annual average 341,576) and on the passes of the Pyrenees-France (27,345,338 with annual average 1,823,022) and Appennini mountains-valleys-Italy (4,831,138 with annual average 483,138 in ten years 1998-2007).

The average annual global (Sweden + France) transit's census in 15 years is 2,164,598 birds, which - compared with the census (Birdlife.org 2014) 27,000,000-51,000,000 of woodpigeons breeding in Europe - is respectively 's 8.01% (about 27 million) and 4.24% (about 51 million) of all Woodpigeons in Europe .

It was possible to relate these 15-year period/ 10-year period , corresponding to the period of 15 years for which Weather History provides all the weather data and astronomical day by day and hour by hour since 1998. Realizing in paper some card-models useful to compare the data both ornithological and concerning the weather, we were able to evaluate different abiotic factors that affect the decision-making moment of take-off during the migrations, so we have considered in the autumn-takeoff from nesting areas (Sweden, Scandinavia, North-eastern Russia) and then by the total area of the stop-over prior to transiting the Pyrenees in France. [01-02-03], and the Russia-Central Europe-Balkans total areas (long-medium-short distance) of stop-over prior to transiting in Italy [93]

SWEDEN - nesting area

The population [50] of Woodpigeons nesting in Sweden is estimated at 980,000 pairs (1.960:000 heads) more concentrated in the south of Sweden below the Latitude 60 ° 31 'applied (Falen) to the Latitude 57 ° 65' applied (Falsterbo) 800 km to the south of Falen, and around Latitude 57 ° 43 'applied (Göteborg) about 330 km north of Falsterbo this data being valid reference point to consider - after the take-the transit surveyed in Falsterbo. The area between these last two latitudes should therefore correspond to the area of fledging for the birds nested there and for birds in transit or stop-overs coming more from the north (Scandinavia): Falsterbo over to pick up the transit from Sweden is located on a route in front of the whole migration from Scandinavia and also from East / Northeast on the route Russia-Baltic Countries.

In the period 1973-2013 (40 years) in Falsterbo (Sweden) have passed 10,760,141 Woodpigeons as documented, with an annual average applied (over 40 years) of 262 459 birds.[01]
In the period 1999-2013 applied (last 15 years) have passed 5,123,647 Woodpigeons - which represents 43.01% of the total of 40 years - with an annual average of 15 years of 341 576 birds, as equivalent to an increase of 54 50% compared to the average applied (262 459 birds) of the 40 years in total.

The detailed analysis (1999-2013) of daily transits monitored (last week of September - October - the first 15 days. November) has allowed the identification of 47 peaks of migration in 15 years. Each peak migration had minimum duration of 1 day and a maximum of 5 days. In the 47 peaks identified migratory birds have passed counted 3,972,053, which represented -the peak - the 77,52% of the entire transit of 5,123,647 birds, with an annual average applied (peak 1 x 1 year) 84 511 birds.

In the last 5 years (2009-2013) there has been a significant increase in the transit migration: 2,265,395 birds (44,21% of the total to 15.) and 1.8488 million of these wood pigeons (81.61% of the total 15 ., and 36.08% of the total 47 peaks) have passed in 16 (out of 47) peaks with an average of 115 555 to 1 x 1 peak year with an increase - in the last 5 years - of 36.73% compared to the average value of 84 511 birds on 15 years everyone.

Last year of observation - 2013 - 844 710 woodpigeons have transited and of these 723 490 (86,64% of total / year) divided into 5 peaks: in 2013 compared to the breeding population estimated at 980,000 pairs (1.960:000 birds) [communication personal in 2013 by Anders Wirdheim Comunication Officer SOF BirLife Sweden] the 2013 transit in Falsterbo (844 710 -2013) represents 43.09% of breeding birds in Sweden. It should be emphasized the exceptional transit in 2 days (11-12 October 2013) of 450 800 wood pigeons.

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It is therefore clear that the transit (43.09% of nesting birds) is not the whole breeding population in Sweden that transit likely (about 57%) across the sea to the Baltic coast for migratory routes not monitored. It should also be borne in mind that Falsterbo also welcomes transits from the largest nesting areas in the North and East (the Scandinavian Peninsula, Russia).

The data collected in Falsterbo, however, are extremely important to define the type of take-off time (the time when "the finger presses the button") and relate to abiotic factors-mainly for weather - occurred precisely in the area of takeoff.

We must say that this area - North / Northeast - Falsterbo is to place the cursor over a radius of about 300 km compatible with transits occurring after the take-off at a speed of 50-70 km / h during the day of the flight. [01-02-03- 10]

The analysis of abiotic factors has also been extended in our retrospective study area further north in Sweden (latitude 60 ° 31'-Falen) and also further south in their observation (latitude 57 ° 65 'Falsterbo) without being able to detect by the full-paper cards in comparison - significant elements for further study because the findings are similar or analogous for the weather and no differences with respect to the data collected at Latitude 57 ° 43 ' (Göteborg), and so we decided not to report them in this text.

We therefore considered it is acceptable to report the findings obtained from the historical weather (Weather History - Weatherundergound) for the area of Sweden around and below the Latitude 57 ° 43 '(Göteborg).[03]
On this basis, setting of numerical and statistical analysis, we performed our collection of meteorological data (and astronomical)[03] and ornithological[01-02] to compare - on paper forms (more than 500) - the "peak migration" with the weather conditions 48h/36 / 24/12h and 1 / h before take-off on the day of migration, day by day of migration peaks of 15 years in Falsterbo.
With this method 47 peaks (15 a. - 1999/2013 - min.1g. 5gg-max) were analyzed :the media (1 picco x 1anno) of 84,511 birds and relative maximum increases the average that has reached 115,555 birds (1 to ./15 °.) and then in the last 5 years we see an increase of 36.73%.

The analysis of abiotic factors (weather and astronomical)[5] was similarly in-depth detail 48h/36/24/12h of 1.2 days before the take-off of the first day of the peak recorded in the counts. Unfortunately by the ornithological archives we cannot control the times of counting at Falsterbo, and then the reference is to the raw daily count , which is still highly significant.
For this analysis of abiotic factors, we've compiled all the specific paper-cards useful to collect the temporal changes of such factors and then relate them to the take-off of the peak. In addition, we have analyzed in detail the graphical diagrams (verifiable on archives of Weather History examining the specific date) representing the trend detailed in temperature for 24h, A.P, wind speed, wind direction. Reading on this graph it can also affected by some error in detail, however be overcome by reading the WH tables hour by hour (raw numerical data).
Exactly the analysis is more complete having free access to the tables of Weather History that allows you to read: temperature (mean, maximum and minimum), humidity (average), atmospheric pressure at sea level, wind speed and direction, visibility, conditions weather (overcast, rain, fog, rain, etc..) These figures are verifiable even hour by hour of the day examined in a given location.
We have extrapolated from the twilight hours and at night (7-11 pm) and the hours of the day take-off at 7 am and 11.50 am late in the morning, here also analyzing the parameters of temperature, atmospheric pressure, wind conditions ,weather.
As for the astronomical data cards allow you to detect the Weather History dawn hours, extension of visible light, day length, and more specifically for the lunar phases applied (new moon, growth, full,lowering) the percentage of surface moon lighted .

A clear and comprehensive summary of the sequences and integration of all these data, it is not so simple to implement, but the essential and significant data can be detected analytically and critically on our next show in ***Tables.***

The tables tend to highlight the variations between day / s prior to take-off and the day of its Take-off and transit

THE numeric TABLES are reported also in GRAPHICS (English) following the Tables FALSTERBO – SWEDEN Fig. 1 >> 12 -

TABLE (A) - data collected in Archives of FALSTERBO (Sweden) as by ABIOTIC factors
http://svalan.artdata.slu.se/birds/inventeringar/falsterbo_str.asp?lang=eng (Migration counts)
copyrights permission 3rd September 2014 from Lennart Karlsson lennart@falsterbofagelstation.se

10.760.141 woodpigeons counted 1999-2013 (15 years) – 47 peaks of migration

WEATHER	***Day/s before take-off***	***Day of take-off***	***FIG 1***
cloudy	14 (29,78 %)	8 (17,92%)	
clear	27 (57,44 %)	**35 (74,46 %)**	
fog	2 (4,25 %)	1 (2,12 %)	
light rain	4 (8,51 %)	1 (2,12 %)	
rain	0	0	
light snow	1 (2,12%)	0	

WIND

Wind DIRECTION

		only
NORD	>>	9 (19,14%)
NE		3 (6,38%)
NW		----------
EST		8 (17,02%)
WEST		6 (12,76%)
SOUTH		6 (12,76%)
SE		4 (8,51%)
SW		2 (4,25%)
VARIABLE		3 (6,38%)
NO-WIND		4 (8,51%)

VISIBILITY

O – 5 Km	---------	2 (4, 25 %)
6 - 10 Km >	---------	**45 (95, 75 %**)

LENGTH of the day	Min. November 8 h 45’	Max. September 11h 50’	10-18 Oct. 10h5’-45’
	**********	**********	**********
	Day/s before take-off	***Day of take-off***	

Wind POWER

0 – 5 km/h	2 (4,25 %)	4 (8,51 %)
6 – 10	12 (25,53 %)	8 (17,02 %)
11 – 15	11 (23,40 %)	12 (25,53 %)
16 – 20	9 (19,14 %)	7 (14,89 %)
21 – 25	9 (19,14 %)	7 (19,14 %)
26 – 30	4 (8,51 %)	5 (10,63 %)
NO – wind	----------	4 (8,51 %)

HUMIDITY

	60-80%	17 (36,18%)
	81-90%	13 (27,64%)
100%	91-	17 (36,18%)

MOON

New		3 (6,38%)	----------
Growth	^	24 **(51,6%)**	----------
FULL		4 (**8,51%)**	----------
lowering	**V**	16 (34,04%)	----------

Lighted Moon’s surface %
more than 40 % **29 (61,70 %)** ----------

TEMPERATURE

only day before take-off	**Average**	**MIN.**	**MAX.**
-10° - 0°	----------	5 (10,63 %)	----------
1° - 5°	5 (10,63 %)	16 (34,04 %)	2 (4,25 %)

6° - 10°	25 (53,19 %)	21 (44,68 %)	14 (29,78 %)
11° - 20°	17 (36,17 %)	5 (10,63 %)	**31 (65,95 %)**
MILD temperatures 6°-20°	**89,36 %**		

VARIATIONS up on a virtual basic value “0”	**ATMOSPHERIC PRESSURE (P.A.)** ***Late afternoon –night 48 h / 24 h before take-off***	***Units in hectoPascal : hPa*** ***18h-0h before takeoff h.7 a.m. – night morning DAY of TAKE-OFF***
Lowering / Stable	3 (6,38%)	3 (6,38%)
O – 10 hPa	31 (65,95%)	7 (14,89%)
11 - 20 hPa	9 (19,14 %)	**32 (68,08 %)**
21 – 30 hPa	4 (8,5 %)	5 (10,63 %) ***11-30 hPa : 78,72 % ****** ***0-30 hPa variation up 92,62 %***

BASIC VALUE A.P.		*idem*	*idem*
950 – 999 hPa		7 (14,89 %)	2 (4,25 %)
1000 – 1010		13 (27,65 %)(	10 (21,27 %)
1011 – 1020	**(A)**	17 (36,17 %)	18 (38,29 %)
1021 – 1030	**(B)**	9 (19 ,14 %)	14 (29,78 %)
1031 – 1040	**(C)**	1 (2,12 %)	3 (6,38 %)

A+B+C >> 57,45 % >> **74,45 % *****

The reading on the tables of the main numerical data (raw numbers and percentages of the sector) has been set up to highlight any changes in spreads from a baseline (virtual "zero" to the atmospheric pressure) and to compare the findings with accuracy "day / s prior to take-off "and" day of the take-off and transit observation. "
The analysis is conducted on 47 peaks detected mass-migration at Falsterbo-Sweden in autumn for 15 years (1999-2013). [01-41]
The abiotic factors analyzed and reported in Tables were: general weather conditions, wind (direction and strength), visibility, day length, temperature, humidity, atmospheric pressure at sea level (expressed in "hectopascal " with the symbol hPa - see Wikipedia).
All peaks were identified during migration dated by Ornithological Observatory Falsterbo (Sweden - http://www.falsterbofagelstation.se/arkiv/strack/migr_eram.php) and related to the detailed weather data (and astronomical) drawn from the archives History of Weather[03-7-41] (WeatherUnderground - http://www.wunderground.com/history/).

RESULTS (Sweden)

From reading the tables we can highlight the following prominent or not.

1) Weather conditions: 74.46% of the peaks correspond to slightly cloudy or clear days.
2) Wind - strength - 41 of 47 peaks with winds of force between 6-25 km / h, then mostly moderate and evenly distributed properly in the days of transit in peaks.
3) Wind - direction - 42.55% of the peaks with favorable winds predominantly from the North and East on the day of the passage; 38.29% of the peaks with unfavorable winds predominantly from the south and west; 14.89% of the peaks under conditions of moderate variability and / or calm winds.
4) Visibility: 6-10 km in '89.36% of peak.
5) Length of Day: calculated in mid-October between 10 h and 10h 45 '.
6) Temperature:-average temperature between 6-20 ° on average, mild- 89, 36% of peaks
7) Humidity: prevails in absolute terms between 60 -100%.
8) Moon: percentage of the lunar surface illuminated over 40% in 61,70% of peak
9) Atmospheric pressure: changes in **global growth (1 ° -30 °) in 92.62% of the peaks**, variations in growth of **over 10 hPa** difference in 72,72% (48-24 h prior to take-off) and **78 , 72%** in the 18 hours before, to be regarded as the dawn in the study area occurs at around 7 am and the woodpigeons typically move from the woods about 30'-60 'after sunrise. About the time of the take-off and other environmental factors play important roles and temporal scope of an overnight stop, such as night-time temperature, humidity, clear skies or cloudy, rain, wind, moon phase.
The values of their base at 7-11 pm (Twilight Night) the night before the take-off point to a Atmospheric pressure in hPa between 1011-1040 53.43% of peak.
The same values in the morning of the take-off and transit (7-11 am) show that 75.45% of the peaks with differential values higher than 1010 hPa..

Discussion (Sweden)

The synthesis of this first part of retrospective research - again noting the intellectual property and

copyright of our "sources" of information retrieval (Falsterbo and Weather History) - here below is discussed. [01-02-03-1-67]
In the autumn migration of woodpigeons (Columba palumbus)[47] in Scandinavia (Falsterbo-Sweden) analyzed 15 years (1999-2013) about the abiotic factors that affect in determining the

decision of the migratory flight (instantaneous "decision making" of the take. off) from the nesting area and surrounding areas pertaining to the factor that most nearly-absolute-identifies with "the finger that pushes the button" is certainly the importance of **changes (over 92%) in growth** of the atmospheric pressure which 78.72% occurs in the 18 hours prior to take-off with differential values above 1010 hPa. [30-41-43-47]
However, we must point out that as part of the 47 peaks have been there - though rare 6.38% - situations in which there has been no increase in atmospheric pressure or even reversed for values lower: this means that the increase in Atmospheric pressure can not be considered a factor with absolute value, though extremely significant.[03]

It seems interesting in this regard include a short note regarding what happened in Italy (area of forest stopover Mesola-Ferrara) in October 2012: the collected data are highly significant even if reported as episodic [78-79]

The early peak (2-3 Oct) found in the woods Mesola (Romagna) was preceded by a fall in the ATMOSPHERIC PRESSURE 7-8 mB days 28 to 29 September in the areas (Central Europe - Eastern Europe-Balkans) suppository origin, and then in the afternoon of September 30 (the day before the arrival in Mesola, about Pigeons 30-50000), there was an increase of 10 mB.
No significant changes in TEMPERATURE (Note we are still in September)

As to the second peak (30 to 31 October) as reported on the Adriatic coasts (Delta - Romagna - Marche) with strong continuous input of flocks from the Adriatic (Balkans coast), we considered in anticipation that the Central-Eastern Balkans (Bosnia and Croatia) there would be a fall of ATMOSPHERIC up to 996 mB for 4 to 5 November (and related heavy rainfall) and then in the days before you could provide a migration of people still stop-over in the Balkans.
In fact, the October 27-28-29 in the supposed origin of the ATMOSPHERIC PRESSURE declined modestly but 4-5 mB (then 4 to 5 November has fallen to 992 mB) until 1016, then October 30 is raised in the afternoon of October 30, the day before the peak of October 31 (massive arrival of flocks from the Adriatic
In fact, in the 48 h prior to the peak (300.000 birds in takeoff from the forest between 3am-8am Full Moon) there has been a rush of Pr.Atm. from 990hPa to 1016 hPa (26 hPa well-documented variation in the graphs Weather History of Ferrara) [03-77-78]..

It thus remains to discuss - already before extending the search retroactive on the stop-over area (France) and transit area (Italy) - **"WHY"** the increase in atmospheric pressure should be first in the decision at the earliest fledging migration from nesting area or from the first stop -over from the neighboring areas in North East .[01-02-03-5-7-11-15-25-31-32-33-43-45-48]

It would also be interesting to know - but it is certainly impossible - what are the earliest wood-pigeons that give the "go-on "order , then the migration fly completed by the gregariousness of mass: the young birds or less old, male or female, the birds which have stored more reserves than

others, those born in the proper starting area or those who arrived there just before in stop-over early (Scandinavia, Russia, North) made almost a deferred gregariousness that drags everyone? These are possible questions of difficult or impossible solution. [35-36-51-54-57-64]
We have already pointed out in the introduction to the fact that migration is attributed to the ability to predict the weather (weather front-perturbed corresponding to low atmospheric pressure more or less imminent): it is clear that a baseline of high pressure or low but not always precedes the evolution of perturbed area of low pressure. We need to stress that.
But our analysis shows that the rise of atmospheric pressure temporally often sudden event would be the most crucial for the take-off. It seems to us that this hypothesis has not so far been put into evidence documented in the literature aimed at the study of bird migration. [2-3-16-25-31-32-42-45]

But **"WHY"** ? But "WHY ? " so impressive simultaneous takeoffs .

The fast start up time and a higher atmospheric pressure, consistently higher, creates the physical conditions of the atmosphere facilitating a long flight of migration:
- Absence of turbulence or almost;
- More stable equilibrium of the aerodynamic forces (from below and from above) that regulate the alignment and support of the wings and accordingly the extent of muscular effort useful precisely to sustained flight [10-11-12-13-42-56-62-72]

This interpretation of "physical" seems plausible and prominent because pressure resulting in a "physical" on the liquid content of the PTO (barometer biological) and its sensors (cilia and nerve endings): the bird is aware of this situation that is occurring and decides to leave immediately. [18-19]
Always possible interpretation in terms of "physical" one could assume that the higher atmospheric pressure may in fact press greater pressure in the phenomenon of diffusion of oxygen (O2) from the alveolar tissue of the lung to the circulatory system and then to the tissues.

We emailed the question directly to Prof.G.Scott[27] *expert in respiratory physiology of bird flight at high altitude, and the Expert does not believe that these elevations of atmospheric pressure at sea level can be instrumental in facilitating breathing (personal communication 2014)* .

We want, however, be noted that in some animal species (bees,other) the atmospheric pressure higher facilitate tissue perfusion and muscles' metabolism [58].[46-58]
In other words, the interpretation of "organic" it can be assumed that the increase in atmospheric pressure-especially if sudden-received by the PTO (Biological barometer) to provide more intense stimuli to the ciliated epithelium and to the nerve endings of the PTO tissues relating mainly to the headquarters of the cerebellum which controls muscles (... strong stimulus to the muscles of flight?).[16-22-23]
Another hypothesis "biological" - always in very rough terms - could be: the perception of the pressure jump forward it to the Central Nervous System to verify the order and / or terminate the state of "cancellation of satiety" which allowed in the earlier days fledging condition that overfeeding aimed accumulation of energy reserves . [59-85-86].
Another hypothesis - that the most "physical" - could be that the atmospheric pressure pushes more air to the pneumatic system (air sacs, hollow bones) facilitating the flotation plane.
The various hypotheses - always based on assumptions as those without scientific verification - not necessarily mutually exclusive and can also be integrated with each other. [11-12-44]
The most plausible explanation ("WHY?") remains the "physical" little or no turbulence, the best condition for flying wing aerodynamics, less fatigue and less energy consumption resulting there from. [10-12-27]

FRANCE (Pyrenees)

Everything overexposed (nesting area –Sweden- Falsterbo) may well be worth in the evolution of our research with retroactive now "focus" on the site of stop.over (France - Pireneys).
The method of collecting and analyzing data of "count" remains identical to that used for the analysis of the nesting area (first take-off).

The area of stop-over and subsequent transit now analyzed here is totally in French territory and observers to count steps on the mountains Pyrenees (France-Spain border) are located to the east of Atlantic coastline extending over a total migratory face up to the Mediterranean coast, but most concentrated in the 70-100 km to the east edge of the Atlantic Ocean. [02-03-]
The counts made and stored on the site www.palombe.com and GIFS are all verifiable, and collect complete data from 1999 to 2013: This period of 15 years is therefore speculate the period of which we have reported in Sweden.
It should be borne in mind that the transit migrant populations from the Pyrenees collects more from various areas of origin and migration routes, and with the initial take-off from nesting areas temporally very different from those encountered and documented in Sweden:

- The route Russia Scandinavia-Baltic-Belarus parallel to the coast until Poland, Denmark, Holland, Belgium, Germany and then France;
- The central and northern European route which collects the breeding populations and immigrants from Russia, Poland, Germany and France from the same locations as breeding populations;
- The European central-southern route that on the same East-West-SouthWest spread north of the Alps from Russia, Belarus, Ukraine, countries of Central Europe;
- Also from the routes more in south, always on the main Northeast-Southwest or East-West, some of migratory contingents come from the north of the Balkans, and also from northern Italy;
- Also consisting of direct migrant populations more pronounced north-south come from the British Isles and Scandinavian populations also pointing more the transit of the British Isles rather than directly on the Baltic coast as those transiting in Falsterbo

The catchment area in stop-over of these populations from various sources and from various nesting areas extending over the whole of pre-Pyrenean France characterized by vast areas of forests and agricultural areas with different cultures as optimal for the woodpigeon feeding in stop-over and over-wintering lesser extent in the Mediterranean. [5]
For all the insights of the study on the migration of woodpigeons in France refer to the specific literature and in particular the research with isotopic method published in recent years [76].
We must also take into account that in the areas of stop-over is important to the environmental situation and contingent on other biotic and abiotic factors (forests with ripe berries, availability of agricultural crops)[86]. Environmental conditions may be decisive to extend or not to stop or even to elect the area as a wintering area, thus favoring the tendency for some birds to become sedentary birds or nearly so. [5-7-8-15-54-61-65-69]

Otherwise, the "decision making" refers to "here we start getting hungry (or too cold) and should leave immediately for other areas in our migration route to the south," then here is the need to choose the best time (High Pressure) for take-off.

The area of stop-over and take-offs that we considered in our analysis in terms of retrospective and / or post-dated research - good approximation extends to 300-500 km north of the Pyrenees, and lies between latitude 48 ° 55 'north latitude and 43 ° 18' north, global area on which it was possible to

collect meteorological data for 15 years from Weather History (WeatherUnderground) [03]
In the period 1973-2013 (40 years) in Falsterbo (Sweden) have passed 10,760,141 Woodpigeons as documented, with an annual average applied (over 40 years) of 262 459 birds.[01]
In the period 1999-2013 applied (last 15 years) have passed 5,123,647 Woodpigeons - which represents 43.01% of the total of 40 years - with an annual average of 15 years of 341 576 birds, as equivalent to an increase of 54 50% compared to the average applied (262 459 birds) of the 40 years in total. Difficult to determine retrospectively what are the components of "origin" (the British Isles,

Central and Eastern Europe) that integrate the flow Scandinavian arrived and parked in France.
The area of take-off-after stop.over more or less short or very short - is well defined in the 300-500 km area to the north,from where at speed 50-70 km / h the woodpigeons can reach the Pyrenees .
In the 15 years we have extrapolated 42 peaks (min.1g - max 5 days) migration for a total of 22,444,226 birds (average for peak 1: 534 386 birds) The records of maximum values are in 1999 with 2,374,712 birds, and the negative minimum with 816 101 birds in 2010. The record of the main peak was 26 to 27 October 1999 (2 days) with 1.172 million birds, which accounted for 73.39% of the whole year 1999.
In the 15 years we have also extracted 15 peaks (compared to 42 in total, 35.72%) with a higher amount of birds to the global average (about 42 peaks) of 534 384 birds per spike.
The numerical details of the 42 peaks are shown similarly to what observed in Sweden, tables documenting every day of steps and are available at the end of Bibliography .
The comparison with the meteorological data (and astronomical) derived from Weather History [03]for the French area of stop-over (Limoges, Bergerac) has revealed - with the survey methodology speculate about Sweden - all the figures and percentages in profits assess the impact of abiotic factors (weather and astronomical) at the time instant decision to take-off mass after stop-over.

As with summarized in Table (A) SWEDEN-Falsterbo, below suggest reading all of the details in

PYRENEES – FRANCE - Fig. 13 >> 25

TABLE (B) - PYRENEES (FRANCE data collected in Archives of www.palombe com . as by permission of *Olivier MAURY www.palombe com Email 9th Sept.2014 - Official Migration counts* on PYRENEES (FRANCE)
27.345.388 woodpigeons counted 1999-2013 (15 years) – 42 peaks of migration

WEATHER	***Day/s before take-off***	***Day of take-off***
cloudy	11 (26,19%)	7 (16,66%)
clear	21 (52,38%)	**28 (66,66 %)**
fog	9 (21,42 %)	5 (11,90 %)
light rain	----------	1 (2,38 %)
rain	----------	1 (2,38 &)
light snow	----------	----------

WIND

Wind DIRECTION

NORD	3 (7,14%)	3 (7,14%)	
NE	8 (19,04 %)	5 (11,90%)	
NW	5 (11,90%)	1 (2,38 %)	
EST	1 (2,38%)	14 (**33,33%**)	
WEST	4 (9,52%)	2 (4,76%)	
SOUTH	2 (4,76%)	----------	
SE	7 (16,66%)	6 (14,28 %)	
SW	2 (4,76 %)	2 (4,76 %)	
VARIABLE	3 (7,14 %)	4 (9,52 %)	
NO-WIND	8 (19,04 %)	5 (11,90%)	
		E-SE 47,61 %	

VISIBILITY

O – 5 Km		7 (16,66 %)	
6 - 10 Km >		**35 (83,33 %)**	
LENGTH of the day	9 h 30' / 11 h	Sunrise h. 7,30 – 8 a.m.	
	**********		
	**********	**********	**********
	*	**********	****
	Day/s before take-off	***Day of take-off***	

Wind POWER

0 – 5 km/h	13 (30,95 %)	13 (30,95 %) (A)	
6 – 10	15 (35,71 %)	13 (30,95 %) (B)	
11 – 15	9 (21,42 %)	9 (21,42 %) (C)	**A+B+C : 83,33%**
16 – 20	----------	3 (7,14 %)	
21 – 25	----------	2 (4,76 %)	
26 – 30	1 (2,38 %)	1 (2,38 %)	
NO – wind	3 (7,14 %)	1 (2,38 %)	

HUMIDITY

60-80%	13 (30,95 %)
81-90%	29 (69,04 %)
91-100%	

MOON	
New	2 (4,76 %)
Growth ^	16 (38,09 %)
FULL	4 (9,52 %)
lowering **V**	20 (47,61 %)
Lighted Moon's surface % more than 40 %	23 (54,76 %)

TEMPERATURE ***only day before take-off***	**Average**	**MIN.**	**MAX.**
-10° - 0° 1° - 5°	----------	16 (38,09 %)	----------
6° - 10°	18 (42,85 %)	16 (38,09 %)	(2)*
11° - 20°	24 (57,14 %)	10 (23,80 %)	40 + (2) =42 (100 %)
MILD temperatures 6°-20°	>>	>>	**42 : 100 %**

		ATMOSPHERIC PRESSURE (A.P.)	***Units in hectoPascal : hPa***
VARIATIONS up on a virtual basic value "0"		***Late afternoon –night 48 h / 24 h before take-off***	***18h-0h before takeoff h.7 a.m. – night morning DAY of TAKE-OFF***
Lowering / Stable		3 (7,14 %)	3 (7,14 %)
O – 10 hPa	**(A)**	8 (19,04 %)	7 (16,66 %)
11 - 20 hPa	**(B)**	20 (47,61 %)	19 (45,23 %)
21 – 30 hPa	**(C)**	11 (26,19 %)	13 (30,95 %)

		11-30 hPa 73,80 %	***11-30 hPa 76,19 %***
>>>>>	**B + C + (A)**	***0-30 hPa variation up 92,85 %***	***0-30 hPa variation up 92 ,85 %***
BASIC VALUE A.P.		*idem*	*idem*
950 – 999 hPa		1 (2,38 %)	----------
1000 – 1010		3 (7,14 %)	4 (9,52 %)
1011 – 1020	**(A)**	15 (37,71 %)	10 (23,80 %)
1021 – 1030	**(B)**	22 (**52,38 %**)	23 (**54,76 %**)
1031 – 1040	**(C)**	1 (38 %)	5 (11,90 %)
	A+B+C >>	>> **90.47 %**	>> 90,47 %

DISCUSSION – PYRENEES –FRANCE

Commenting on the reading table of the results, we highlight some aspects –almost specular as for Falsterbo - more related to abiotic factors, analyzed on the two temporal "48h/36/24h" and "18h" prior to take-off.
We note:
- Weather conditions almost never ever disturbed and mostly clear-cloudy;
- Winds of moderate strength with rates prevailing directions from the East to Southeast;
- The maximum visibility always 6-10 km;
- Length of day between 9:30 a.m.-11h 'and dawn hours. 7.30 to 8 am
- Almost always mild temperature
- Humidity greater than 81% in about 70 5 peaks
- Phases of the moon with the illuminated surface of the moon more than 40% in 56,76% of peaks
- ATMOSPHERIC PRESSURE: in 92,85% of the peaks there was increase (1-30 hPa) with variations above 10 hPa in 75.80% of the peaks for the sector "36/24 h" and 76.19% for the sector "18 h" before the take-off. All this confirms the analysis-as "Sweden" - that even in the decision to terminate the stop (stop-over) more or less prolonged the increase in atmospheric pressure event is almost absolute and most important of entities, and what constitutes an acquisition of absolute highlight: the increase of the atmospheric pressure likely identified with "the finger pressing the

button" and ordered to leave the place to stop-over. As well as for analysis "Sweden", is also here be noted that the figure is not absolute because the 7.14% of the peak atmospheric pressure did not increase or even decreased. And possible variables must be considered attributable to the environmental conditions of the parking influential on abiotic and biotic factors.

It should be noted therefore further confirms that the atmospheric pressure is the safety factor for the decision to takeoff to migration and realized more specifically in the afternoon / night before take-off: 90.47% of the peaks in the atmospheric pressure is higher than 1010 hPa and more sectorally in 50.70% (previous day) and 66% (Day of the take-off) is higher than the atmospheric pressure at 1020 hPa. The figure 66% (day of Take.Off) of the stop-over France should be put in comparison with similar 53.43% in Sweden.
Similarly, the investigation of Falsterbo-Sweden, we extrapolated 15 peaks with magnitude of transit above the global average of 42 peaks: in this case we could not detect significant differences with respect to the overall characteristics of all the peaks.

ITALY (10 years – 12 peaks)

UPDATE November 2014
"Spatial and temporal updating"

(Enrico Cavina * - Rinaldo Bucchi* *)
* www.labeccacciascienifica.it
**Club Italiano del Colombaccio –"Progetto Colombaccio" 1998-2007)

Having the opportunity to consider now (November 2014) other information obtained from observers of Ornithological Northern Europe Stations (www.trektellen) and counts of woodpigeon from the Project - Italian Club of WoodPigeon (until 2007), the analysis was extended reaching 112 peaks occured on the basis of global migration in Europe.We excluded 11 peaks from www.trektellen depending on the data often over-reported and not safe .

About the data collected in Italy we can detect important elements as following

In the period 1998-2007 (ten years) with the collaboration of 115 observers of the Club of Woodpigeon , were surveyed in transit 4.83138 million birds (annual average 483 831) and have been identified 12 migratory PEAKS (min.1g. -max.6gg) in October and 10 peaks in November (here used two).
Hours of transit were: rise-9 am (52%), 9-14 h (25%), 14-h night (23%)
Consistency of flights observed: from 1 to 50 birds (82%), from 51 to more than 300 (18%)
Average number of annual observation point: 3,963 birds
Age (only from game bag): 20% young, 28% of young adults 52%
The "waves of step" (fury) account for 15-20% of total migration (as questionable and approximate).
The maximum value (annual) of sightings was in Veneto and Friuli (door Migration Center-East) in 2002: 18,683birds ; and the minimum value in the Basilicata region in 2003: 416 birds
Full details of the survey can be assessed on the two publications of the Project Woodpigeon (2005-2007) see References (Update 01/08/20014 www.labeccacciascientifica.it).

The analysis carried out here has been to relate the history of their peaks (specific dates of the first day of Peak) and the detailed analysis of the weather conditions corresponding to the areas of origin of migration flows (Central and Eastern Europe from "Door Morava "in Latitude 50 ° 15 ', the Balkans up to 43 ° 50'), also taking into account the coastal areas or for fledglings significant

internal mass (Ungheria.Slovenia, Istria, Croatian coast) : four areas as “long-medium-short distance-transit area – A,B,C,D as by Table (C) and GRAPHICS)
All available data were collected over more than 200 cards in paper form, comparable with one another and with ornithological data., similar to the methodology carried out for "Sweden, the Pyrenees" (unpublished data).
The analysis was conducted by various abiotic factors such as general Weather conditions (rain, clouds,fog, etc.), Temperature (Average, MIN.MAX.), Visibility, winds (force, direction), length of daylight, humidity, moon phases and "%" of the Moon illuminated.

Here are the essential details to:

- Changes in atmospheric pressure (AP) 78/ 48/36/24 h prior to takeoff in the areas of origin
- VALUES absolute core of the AP in the 18 h prior to takeoff in those areas.

With the following results:
- CHANGES: -in the long distance remote areas (more than 1500 km) the A.P. increased (78-48 h before transit in Italy) 67 %;
-in the most remote and continental stop-over areas (medium and short distance) in the A.P. 48/36/24 h prior to takeoff and the day of detection of the peak (in ITALIAN sites) rises by more than 10 hPa in 90 % of the Peaks
- The same: in the intermediate areas and closer to the coast (short distance – 24-12 h. before take.off) , the most significant of " takeoff of the day "(latitudes 47 ° 30 ', 46 ° 03', 45 ° 20 ', 41 ° 53'), the increase is more than 90%

-Values Absolute: in the most remote and interior the basic values of AP - 12 hours before - are higher than 1010 hPa in the 75-100%
- The same: in the intermediate areas the basic values greater than 1010 hPa are in the 50% -66% and in the areas closest coastal 83.33%

- Check-in (ITALY) the absolute values of the basis on the first day of the peak are higher than 1010 hPa 50 %

The reading of the data set out above must take into account the paths of flying cruise from Italy and, in particular cruise that the Pigeon is definable by 50-80 km/h wind conditions at the beginning and during the journey.

All of these data elements - found, as mentioned above, with precise details (day by day, hour by hour) taken from the website Weather (historical archives) freely available on the Internet, and transferred to paper ballots useful for comparative examination - there seem to indicate clearly that trust with the abiotic factor most decisive takeoff mass migration (fury) is readily identifiable in the "overhang" - more or less progressive or sudden, but always such - above 10 hPa 48-12h before takeoff.
ITALY

Data collected 1998-2007 (ten years) by *“Progetto Colombaccio – Club Italiano del Colombaccio* – Rinaldo Bucchi *Head of the Team “* *(published – April 2008 – Promo Service Ed. – Forlì IT – www.ilcolombaccio.it).*

In the period 1998-2007 (ten years) with the collaboration of 115 observers of the Italian Club of Woodpigeon , were surveyed in transit 4.83138 million birds (annual average 483 831) and have been identified 10 migratory PEAKS (min.1g. -max.6gg) in October and 10 peaks in November (November : here used 2) - TOTAL analyzed 12 PEAKS

Here the detailed analysis of the weather conditions corresponding to the areas of origin and transit of migration flows (Central and Eastern Europe ***from "Door Morava "in Latitude 50 ° 15 ', the Balkans up to 43 ° 50 "*** *) , also taking into account the coastal areas for significant take-offs (Ungheria.Slovenia, Istria, Croatian coast****).Migration Route check A-B-C-D***

The sequence of Graphics permits to confront the basic conditions and variations of the "abiotic factors" along the MIGRATION ROUTE from the origin's areas ,stop-over areas ,transit area(Italy) , related to the hours before the take-offs and then transit .

All the data were collected transferring and writing the "weather and other data" (Weather History website)in table-papers by pencil and then confronting the data related to the first day of the Migration peaks .

ITALY – Fig. 26 >> 58

TABLE (C) – ITALY data collected in Archives of "Progetto Colombaccio" Club Italiano del Colombaccio (*Head of the Team Rinaldo Bucchi*) - *Official Migration counts* on 4.831.138 woodpigeons counted 1998-2007 (10 years) – 12 peaks of migration

TABLE (C) – ITALY data collected in Archives of "Progetto Colombaccio" Club Italiano del Colombaccio (*Head of the Team Rinaldo Bucchi*) - *Official Migration counts* on 4.831.138 woodpigeons counted 1998-2007 (10 years) – 12 peaks of migration

WEATHER	Long distance 78-48h before	MEDIUM 48-24h	SHORT 24-12h	Transit IT Area-12-0h
Cloudy	33%	25%	33%	25%
Clear	42%	42%	59%	50%
Fog	25%	25%	----	17%
Light rain	-----	8%	----	----
Rain	----	----	8%	8%
Light snow	-----	----	----	----

WIND Direction *	**%**	**%**	**%**	**%**
Nord N	24	---	17	---
NE	17	25	17	43
NW	0	----	8	8
EST	24	----	17	8
WEST	0	----	8	--
SOUTH	25	----	33	--
SE	10	----	--	8
SW	---	----	--	--
Variable	---	75	--	33
NO-wind	---	----	---	--

Statystical analysis very difficult

VISIBILITY	**%**	**%**	**%**	**%**
0-5 Km	10	--	--	25
6-10Km	90	100	100	75
LENGTH of the DAY	10h30'/11h15'			
WIND POWER	**Long %**	**Medium %**	**Short %**	**Transit %**
0-5 Km/h	----	----	---	17
6-10	42	67	15	58
11-15	50	8	54	---
16-20	8	---	8	17
21-25	----	----	8	---
26-30	----	----	---	---
NO Wind	----	25	15	8

HUMIDITY	**%**	**%**	**%**	**%**
60-80%	20	---	---	30
81-90%	80	100	100	70

91-100%	---	----	----	---
MOON	**%**	**%**	**%**	**%**
New	----	----	----	
Growth	50	60	58	25
FULL	----	20	17	17
Lowering	50	20	25	58
Lighted moon surface % more 40%	8/12	8/12	8/12	5/12

ATMOSPHERIC PRESSURE (A.P.)

VARIATIONS up basic value "0"virtual	Long	Medium	Short	Transit
	%	**%**	**%**	**%**
Lowering/Stable	33	9	8	8
0-10 hPa	---	9	59	33
11-20	**67**	**82+**	33	**51**
21-30	---	---	---	**8**

*impressive result

BASIC VALUE A.P.				
950-999 hPa	-----	8	8	----
1000-1010	17	50	33	50
1011-1020	25	25	51	**17**
1021-1030	**41**	17	8	**33**
1031-1040	17	----	-----	---

TEMPERATURE
only DAY before t-off -

	LONG			***MEDIUM***			***SHORT***			***IT***	
Avera	**MIN.**	**M**	**Aver.**	**MIN.**	**M**	**Aver**	**MA**	**Ave**	**MI**	**MAX**	

	ge		AX.			AX		MIN.	X	r	N	
0°-5°	4 peaks	6	1	0	0	0	0	0	0	0	2	0
6°-10°	6	4	8	2	2	2	3	21	3	3	0	0
11°-20°>	2	2	3	10	10	10	10	0	9	9	10	12

Medium- / Short- distance / Transit area : WARM Temperature 9-10/ 12 peaks

Long-distance area / Medium-distance area / Short -distance area / Transit area ITALY
check MAP on the GRAPHICS here

GRAPHICS Available at
https://plus.google.com/photos/103942035281038458760/albums/6086432829554328737

Analysis of "abiotic factors" in ITALY as for FALSTERBO (Sweden) and PYRENEES (France) .
Sequence confronting FOUR AREAS along the MIGRATION ROUTE from "nesting areas " and "stop-over areas" (possibly mixed) on Long – Medium – Short distance (A-B-C) arriving to the "transit area in Italy" (D)

DISCUSSION (ITALY)

WE REPEAT

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The analysis was conducted by various abiotic factors such as general Weather conditions (rain, clouds,fog, etc.), Temperature (Average, MIN.MAX.), Visibility, winds (force, direction), length of daylight, humidity, moon phases and "%" of the Moon illuminated.

Here are the essential details to:

- Changes in atmospheric pressure (AP) 48/36/24 h prior to takeoff in the areas of origin
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With the following results:
- CHANGES: -in the long distance remote areas (more than 1500 km) he A.P. increased (78-48 h before transit in Italy) 67 %;
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-Values Absolute: in the most remote and interior the basic values of PA - 12 hours before - are higher than 1010 hPa in the 75-100%
- The same: in the intermediate areas the basic values greater than 1010 hPa are in the 50% -66% and in the areas closest coastal 83.33%

- Check-in (ITALY) the absolute values of the basis on the first day of the peak are higher than 1010 hPa 50 %

The reading of the data set out above must take into account the paths of flying cruise from Italy and, in particular cruise that the Pigeon is definable by 50-80 km/h wind conditions at the beginning and during the journey.

All of these data elements - found, as mentioned above, with precise detail (day by day, hour by hour) taken from the website Weather (historical archives) freely available on the Internet, and transferred to paper ballots useful for comparative examination - there seem to indicate clearly that trust with the abiotic factor most decisive fledging mass migration (fury) is readily identifiable in the "overhang" - more or less progressive or sudden, but always such - above 10 hPa 48-12h before takeoff. “

It 'important that this data "ITALY" (4.83138 million census - 1998 to 2007 - 12 Peaks) - particularly for 48-36 h before the start of raising - line up with a similar finding in the Pyrenees (census 27,354,388 Pigeons 1999-2013 - 42 peaks) being the areas of takeoff of the first day of peak, all areas of prevailing stopover more or less prolonged.

More properly in the Nordic nesting area (Sweden) (10,760,141 census Pigeons -1999-2013 - 47 peaks) the "overhang" of PA is steeper and closer to the time of the first takeoff mass migration (12-24 h before).

It should be noted that all data collected are drawn from a global basis (Sweden-Italy-Pyrénées) of

42,945,909 woodpigeons actually surveyed in transit flight in 10-15 years and featuring 101 occasions flying of peak migration (1- 6 days).

The " temporal extension of the Research "(November 2014) has enabled an analysis of both the predictions of both the actual feedback directly in the field (" on the field ") in the migratory season 2014, realizing itself as an analysis of" live ", that can also be critical when viewed in the rigid framework of a scientific research, but in fact collect tangible proofs of the relationship between abiotic factors (including atmospheric pressure) and massive takeoff and mass flows in the migration.
[Evolution are authentic chronological October 2014 following websites, validated themselves as "website-bibliography"
- http://www.ilcolombaccio.it/
- http://www.wunderground.com/history/
- http://www.trektellen.nl/
- Http://svalan.artdata.slu.se/birds/inventeringar/falsterbo_str.asp?lang=eng (FALSTERBO)
- Http://www.palombe.com/ (Pyrenees)
- https://www.metcheck.com/IT/
- http://it.windfinder.com/
- http://www.wunderground.com/
- Www.labeccacciascientifica.it (Updates)]

We divided the analysis of "enlargement of 2014" (November) in

- Data "live" in Europe
- Data "live" in Italy (see box "Performance of step." Forums - http://www.ilcolombaccio.it/)

EUROPE: - the chronological summary of the "counts" official obtained can be verified directly from www.palombe.com, where you can highlight the peak migration documented.
- Comparison with the weather data was based on History Weather, focused in the areas of origin of fly (300-400 km N / NE / E)
- Falsterbo Sweden with peaks in 2014 30Sett. / October 5 to 6/11 to 16 October / October 21 to 23 ** / 26 to 30 October / 7 Nov. 553 920 for woodpigeons in transit
- Pyrenees France with peaks more evident 18 to 20 October / October 21 to 26 / 30-31 Oct: 1417352 for pigeons in transit
- Belgium, Holland, October 18 / October 25 / October 30 to 31 (www.trektellen)

- In all (! 100%) of the 12 dates in 2014 identified as "peaks" in 48-12 h. before the fledglings and mass flows, the atmospheric pressure in the areas of origin of the flies had an increase of more than 10 hPa compared to baseline

ITALY: the performance of the full migration (with "peaks") is characterized by differences in weather conditions between the Tyrrhenian Sea area (cyclonic vortex beginning of October) and the Adriatic Sea area (entrance from the Balkans - High Pressure permanent) with
- Early mass influx of October 7 to 9 on the side of the Adriatic Sea
- More late influx of mass 23 to 24 October on the Tyrrhenian side
Very important were the massive takeoffs observed directly (http://www.ilcolombaccio.it/):
- 19- October 23 from the woods of St. Flushing (Pisa-Livorno) *
- October 20 forests in Adriatic area -PesaroUrbino
- October 25, Mesóla forest (Ferrara) *
- 25 to 27 October Monte Conero (Ancona)
- November 2 (flow) - Grosseto area Tirreno
The phenomena of takeoff "strip" of thousands and thousands of pigeons, at dawn, and S.Rossore

Mesola have been documented with videos and photographs.
All mass migration (2014) - as regards the abiotic factors - were characterized by gradual growth conditions (stability of high atmospheric pressure equal to or greater than 1020 hPa) or rapid increase of 36-12 h. prior to fly both on the Adriatic Sea both on the Tyrrhenian Sea

All mass takeoffs migration from the Italian stop-over areas were characterized by rapid increases in PA with changes (24-12 h) of more than 10 hPa.

It may be significant to note that a forecast "NOT APPLICABLE" because it was based on weather (https://www.metcheck.com/IT) very long-term forecast (60 days) written on September 4th, 2014, it was recognized RELIABLE: the rush of PA provided (4th Sept.) long-term Central and Eastern European areas on the October 3rd to 5th, has occurred and was combined perfectly with the mass migration of trans-Adriatic Sea which took place on the evening of October 7th until 9th October, which peak early migration and in combination with the full moon period.

CONCLUSIONS -

If you want to compare the data obtained in Sweden (area of first take-off) and France (take-off area after stop) and Italy (transit area after stop-over) prevails in a substantially similar effect (numerical and statistical) about the abiotic factors that may have influenced the decision of the take –off : no significant differences between the three areas about almost all factors considered (see Tables A and B and C and GRAPHICS)

As for the raising or "overhang" of the atmospheric pressure in the hours (36h / 24 / 18h) prior to the take-off, this increase is still a constant (Sweden 92.62% - 92.85% France) before a true peak migration and quantification of differences can only detect a higher percentage of increase in the hours further away (48-24 h) prior to take-off in France (73.80%) than in Sweden where at this time the remote 'incidence is only 27.65%, while in the two areas in the "18h" before takeoff , the incidence is 78.72% (Sweden) and 76.19% (France). Always interpreted in absolute terms of hypothesis would be the following : raising stimulates the take-off more powerfully and more quickly acclimated birds in a long time in the nest, while the stimulus is more long-term (1-2 days. before) the birds that have long been in migration and stop-over [86] .A regardless of this interpretation and assumptions, it is important to note that the increase is constant over 90% in the peak mass migration. [7-34-61]

The set of data - here in the form of simple raw numbers and percentages not elaborated in strictly statistical, and then ultimately understandable - suggests the desirability and / or the possibility of in-depth analysis designed to identify integrations (day a day / hour a hour) with other abiotic and biological factors (as algorithms, equations, formulas, statistics, mathematical indices of analysis and / or forecast) [32-51-66].
The extension of this method of analysis (ornithology - meteorology) to other areas of nesting and transit (possibly in the spring) may provide additional contributions to the understanding of the phenomenon of migration, deepening the analysis in climatological terms, so now present seasonal changes in the increasingly looming and influential on the environment. [69]

Verification "live" directly in the field in 2014, about migration in Europe and particularly in Italy - as expressed in the "Updating spatial and temporal Research" - gave full confirmation of the results obtained with the global search retroactive.

Finally, we emphasize that the sensor terminal of the changes in atmospheric pressure
can be easily detected in the organ Para-Tympanic (PTO) Vitali [20-21], which studied for the first

time by Vitali in Italy in the early decades of the last century, still the subject of extensive research morphological and functional [19- 24]: if "the finger pressing" can be discerned in the changes of atmospheric pressure (the "overhang"), "click" on which the press is probably the Paratympanic organ of Vitali, having to consider all the neuro-functional integration with the adjacent structures in the inner ear (Lagena, vestibular apparatus) until the centers of the Brain and Cerebellum.
To explain all that we have shown in this retrospective study is essential that there is a definite anatomical basis barometer understood as "organic". [83-84-87].

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FALSTERBO (Sweden) 1999- 2013 : 47 peaks [01]

-1999 (148.360) two peaks : 6-7-8 Oct. 34.643 / 12-13-14 Oct. 43.885
-2000 (333.125) three peaks : 15-16-17 Oct. 40.540/ 27-28 Oct. 54.300/ 2-3-4 Nov.117.248
-2001 (208.815) three peaks: 6-7 Oct. 37.600/11-12-13 Oct. 38.240/17-18-19 Oct. 79445
-2002 (263.351) four peaks:6-7-8 Oct.46.800/10-11-12 Oct.44.400/20-21 Oct.60.900/29-30-31 Oct. 40.300
-2003 (144.496) one peak : 12-13-14 Oct. 69.800
-2004 (249.560) four peaks: 9-10-11 Oct. 36.350/19-20 Oct. 38.760/27 Oct.43.950/2 Nov. 56800
-2005 (421.710 three peaks:11-12-13 Oct. 106.000/15-16 Oct. 165.900/23-24-25-26 Oct.69.135
-2006 (429.827) three peaks:13-14-15-16 Oct.218.460/25-26 Oct.84.800/2 Nov.31.100
-2007 (254.286)three peaks: 4-5-6 Oct.47.130/13 Oct. 71.360/ 19-20 62.070
-2008 (407.702)four peaks:7-9 Oct.78.030/15-16-17-18 Oct.138.535/24-25 Oct. 70.40 / 29-30 Oct.55.650
-2009 (314.615) three peaks: 9-10 Oct.61.150/13-14-15 Oct.120.650/27-28-29 Oct.44.800
-2010 (258.582) three peaks: 28-29-30 Sept.1 Oct. 67.500/9-10-11 Oct. 79.700/

15-16-17-18 Oct. 59.600

-2011 (355.655) three peaks: 8-9 Oct.156.300/13-14 Oct.105.500/21 Oct.25.600
-2012 (491.833) two peaks : 10-11-12 Oct. 204.600/19-20-21 Oct. 198.990
-2013 (844.710) five peaks : 11-12 Oct. 450.800 * / 15-16-17-18 Oct.103.990 /**
25 Oct. 43.200/31 Oct.30.500/5-6-7 Nov. 95.000

Tot.: 47 peaks 3.972.053 birds – average 84.511

In the period 1973-2013 (40 years) in Falsterbo (Sweden) have passed 10,760,141 Woodpigeons as documented, with an annual average applied (over 40 years) of 262 459 birds.[01]
In the period 1999-2013 applied (last 15 years) have passed 5,123,647 Woodpigeons - which represents 43.01% of the total of 40 years - with an annual average of 15 years of 341 576 birds, as equivalent to an increase of 54 50% compared to the average applied (262 459 birds) of the 40 years in total.

PYRENEES (France) 1999 – 2013 42 peaks [02]

-1999 (2 787 626) three peaks:16 Oct. 108.197/26-27 Oct. 1.907.721 */4 Nov. 358.794**
-2000 (1 556 987) three peaks :18-19-20 Oct. 434.891/ 23-24-25 Oct. 689.783/27-28 Oct.381.373
-2001 (828 783) three peaks : 16 Oct.223.442/24-25-26-27 Oct.675.391/2-3 Nov.300.870
-2002 (2 052 461) three peaks:19-20 Oct. 237.723/27-28-29 Oct.759.472/5-6 Nov.485.769
-2003 (1 624 152) three peaks : 22 Oct.56.050/25 Oct. 274.100/ 3 Nov. 1.009.490
-2004 (1 820 180) three peaks : 22-23 Oct. 353.168/30-31 Oct. 584.070/ 3 Nov. 130.692
-2005 (2 477 468) three peaks: 17 Oct.114.122/24-25-26-27 Oct.1.037.592/30-31 Oct.
1-2-3 Nov. 1.101.595

-2006 (1 520 491) two peaks : 25-26-27-28 Oct. 799.537/2-3 -4 Nov.563.868
-2007 (1 643 274) three peaks:19-20-21-22 Oct. 657.146/27-28 Oct. 416.226/6-7-8 Nov. 242.727
-2008 (2 208 369) three peaks :17-18-19 Oct. 1.439.480/23-24-25-26 Oct.727.626/4 Nov.205.195
-2009 (1 310 538) two peaks : 18-19 Oct.88.479/26-27-28-29-30 Oct 1.108.525
-2010 (1 028 000) two peaks : 21-22 Oct. 508.539 / 26-27 Oct.307.565
-2011 (1 440 469) three peaks:21-22 Oct. 315.616/31 Oct.606.878/9-10-11 Nov. 390.316
-2012 (2 449 624) three peaks :18 Oct. 158.069/28-29-30-31 Oct. 827 050/7-8 Nov.663.115
-2013 (1 596 896) two peaks : 30-31 Oct. 1.367.464 / 7 Nov. 94.832

Tot. 42 peaks 22.444.226 - average 534.386

In the period 1973-2013 (40 years) in Falsterbo (Sweden) have passed 10,760,141 Woodpigeons as documented, with an annual average applied (over 40 years) of 262 459 birds.[01]
In the period 1999-2013 applied (last 15 years) have passed 5,123,647 Woodpigeons - which represents 43.01% of the total of 40 years - with an annual average of 15 years of 341 576 birds, as equivalent to an increase of 54 50% compared to the average applied (262 459 birds) of the 40 years in total.
In the 15 years we have extrapolated 42 peaks (min.1g - max 5 days) migration for a total of 22,444,226 birds (average for peak 1: 534 386 birds) The records of maximum values are in 1999 with 2,374,712 birds, and the negative minimum with 816 101 birds in 2010. The record of the main peak was 26 to 27 October 1999 (2 days) with 1.172 million birds, which accounted for 73.39% of the whole year 1999.

ITALY 1998-2007 12 peaks [93]

-1998 - 15 October (8 days)
-1999 - 27 October (2 days)
- 8 November(4 days)
-2000 - 14 October (8 days)
-2001 - 11 October (5 days)
-2002 - 20 October (2 days)
-2003 - 16 October (2 days)
-2004 - 19 October (2 days)
-2005 - 12 October (6 days)
-2006 - 26 October (3 days)
- 4 November (3 days)
-2007 - 15 October (2 days)

In November the Migration is at the end in Italy : we have considered only two significant peaks over 10 .

ALL THE GRAPHICS available at
https://plus.google.com/photos/103942035281038458760/albums/6086432829554328737

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The data of the research were offered to some Academic Institutions but without success .
*The results of research **in Italy** were depending only by the works and records of Hunters of **CLUB ITALIANO del COLOMBACCIO**** , *directed(1998.2007) by **Rinaldo Bucchi** ** .*
*** * Co-Authors*

The data were extracted from the free consultation to the Web as reported by the web-sites of the institutional Falsterbo Bird Observatory (extreme southern tip of Sweden) and on the mountains Pyrenees (France - www.palombe.com and GIFS), and with respect to meteorological data from the website WeatherUnderground "Weather History", in full respect of intellectual property and copyright, using public data only for scientific study and correlations and non-commercial use, and citing sources as with all scientific bibliographies[01-02-03]. We have received official permissions from the sources (Sweden-France – Italy – USA)

Preliminarily again we reaffirm the respect and the attribution of "intellectual property and copyright" to the institutional websites that have collected the "numerical counts" and made it available for study and research (Falsterbo Bird Observatory SWEDEN - www.palombe.com and www.gifs_france.com . com - FRANCE Pyrenees- ITALY Club Italiano del Colombaccio) and for the weather the classic Historical Archives (WeatherUnderground: Weather History).
The comparative methodology and integrative analysis of meteorological and ornithological data does not appear in the literature or on the web to be published by the websites that we have mentioned. We believe that our research - presented here - has also the intention of giving more value to the work of data collection carried out by these websites, as a basic bibliographic factor. [01-02-03]. **We have received (September 2014) official permissions from the sources (Sweden-France – Italy – USA)**

In detail tables applied at the end of Bibliography , it could be controlled raw numerical data every day of the 47 peaks for each year of the 15 years (1998-2013 Sweden-France-Italy).
All the GRAPHICS are also available on-line at G+ :
https://plus.google.com/photos/103942035281038458760/albums/6086432829554328737