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Updating Woodpigeon(*Columba palumbus*) autumn migration's "peaks/ waves-data" in Europe until 2019 : relationship with a single abiotic factor as Air Pressure's changes.

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SUMMARY

In the present report we udpate 2010-2019 the data of the precedent detailed analysis (2014) http://www.scienceheresy.com/-ornithologyheresy/Cavina2015.pdf , as by precedent 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 Italy), 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 of various 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- migration 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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} Sweden, 92.85{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} in the Pyrenees and 91,00{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} in Italy). Variations above 10 hPa in 75.80{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the peaks for the sector "36/24 h" and 76.19{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} 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>
The actual "evidence based" data cinfirm the result of 2014 http://www.scienceheresy.com/-ornithologyheresy/Cavina2015.pdf

Key words: Woodpigeon,migration,Air Pressure,peaks/waves,takeoff

INTRODUCTION (part as by <http://www.scienceheresy.com/-ornithologyheresy/Cavina2015.pdf>and links/bibliography)

The target of the present report is only the "one " : to put in evidence (data "evidence based") that exploring the "abiotic factors"'s influence on the birds' migration "decision making "(departure,mass take-off and transits) ,the most evident "abiotic factor" influencing the departures is the increasing (usually more than 10 hPa) of the Air Pressure 12-48h (and more) before the migration's departures from breeding,nesting,stop-over areas .It happened in more of 80{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the collected events in more than 20 years for many millions of migrating birds in Western Paleartic (Europe) also by special focus on *Columba palumbus* and Italy.

If the “Air Pressure’s jump” could be considered as the “finger pushing the starting button ” , it seems obvious to consider the importance of the sensitive ecology (inside the complexity of relationships of many “abiotic and biotic factors” with many anatomical structures) by focus on the Para Tympanic Organ of Vitali .
On the basic counts and analysis of peaks/waves (@)as reported in precedent papers (2014) and specifically in <http://www.scienceheresy.com/ornithologyheresy/Cavina2015.-pdf> and in <http://www.wbwp-fund.eu/ring/-pdf/40/1_cavina{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}202018.pdf >we have updated some interesting data and variations (**abiotic factors**) concerning more recent migrations until 2019 (enclosed) in Europe and focusing in Italy .
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 present 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 behavior 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].

MATERIALS and methods – RESULTS (updating data **2019**)

EUROPE

SWEDEN -as by <http://www.scienceheresy.com/-ornithologyheresy/Cavina2015.pdf> detailed data 2014

The present analysis as **preliminary report** is focused only on the changes (single Abiotic factor) of Air Pressure (*) happened 12-48h before mass take-off/ transits (ten years 2010-2019) in **Falsterbo (Sweden)** *(Falsterbofagelstation – Lennart Karlsson permission copyright 3rd sept.2014) .*

– 2010 (2 events) +10,+16 **hPa** growing up 12-48h before the transit

- 2011(2 events) +18 , one negative (no changes)
- 2912(2 events) +17,+10
- 2013(3 events) +29,+18,+15
- 2014(2 events) + 10,one negative
- 2015(2 events) +17,+12
- 2016(3 events) +14,+28,+11
- 2017(4 events) +17,+13,+48,one negative
- 2018(1 event) + 15
- 2019(3 events) +23,+13,+19

Total events 24 (peaks 18 / waves 6)

Air Pressure (*) changes growing up more than 10 hPa (minimum +10 hPa/Max 48 hPa) in 21/24

events **(87,5{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5})**
No changes in 3 events
2010-2019 : 5.495.000 Woodpigeons recorded (average 549.520/one year) and 2.938.300 (average 293.830 /one year) in 24 events and in 64 days (average 45.910 /one day) . The total in 24 events represent 53,47{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the Total recorded,
(*) by Russian Meteo Website (free) https://rp5.ru/ which offers full archives of all meteo data (hourly,daily,yearly) all over the World ,mostly by Meteo-stations of airports.
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http://www.scienceheresy.com/ornithologyheresy/Cavina2016.pdf
Appendix-Collaterally *a similar analysis has been performed on similar peaks/waves for* ***Barnacle Geese*** *in October ,as easily available (Falsterbo website " migration counts") for all the migratory Species (**)in Falsterbo (Sweden) .Meteo data on the Gotland island ,most important stop-over site on the Oriental flyway from North Arctic Russia (Arkangelo area).*

- *2010 : meteo data not available*
- *2011 : meteo data not available*
- *2012(1 event) + 10* ***hPa***
- *2013(2 events) + 15,one negative*
- *2014(1 event) + 10*
- *2015(3 events) +10,+12,one negative*
- *2016(2 events) +15,+12*
- *2017(3 events) +14,+10,one negative*
- *2018(2 events) +10,+10*
- *2019(4 events) +12,+16,+14,+12*

Total events 18
Air Pressure change more than 10 hPa : 15/18 ***(83,3{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5})***
(**)Other Species as in
The selected years –with mostly yearly transit – have been extracted from a list of 43 years recorded on the Falsterbo Archives from **1973 until 2015** . The abiotic factors listed in Weather History web-cards were analyzed in the "origin"

(mostly breeding) areas 0 – 400 km North – North East from Falsterbo, and 2000 Km East (coasts of North Russia) regarding **Barnacle Geese** , considering in this case,supposed long distance flies after takeoff.
We have identified 60 peaks (one peak in one or more per day) summarised as following :
– 5 peaks Eurasian Siskin – Carduelis spinus – transit more than 10.000 x day
– 17 peaks Caffinch –Fringilla coelebs / Brambling –Fringilla montifringilla transit more 40.000 x day
– 8 peaks Common Starling –Sturnus vulgaris – more than 10.000 x day
– 15 peaks Common Woodpigeon Columba palumbus – transit more than 40.000 x day
– 15 peaks Barnacle Goose Branta leucops – transit more than 10.000 x day
RESULTS
The relationships between A.P.jumps (12-24-36-48 h. before takeoff) and the day (mostly first day) of the peak were :
– 6 not significant
– 6 moderately significant (7-10 hPa increases)
– 48 / 60 **(80{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5})** strongly significant (more than 10 hPa differences)
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FRANCE
FRANCE (Pyrenees)
As by <http://www.scienceheresy.com/-ornithologyheresy/Cavina2015.pdf>.detailed data .
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 – Pirenees).
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 (400km – 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.The birds stay in front of very high mountains to be climbed over in a area where the weather and air pressure corridors could be very different , depending on the Atlantic Ocean atmospheric conditions on the West.
The area of stop-over – before the Pyrenees- 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 (mostly Flavignac) 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) and now by https://rp5.ru/.
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 of the report 2014 , 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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the whole year 1999.
In the 15 years we have also extracted 15 peaks (compared to 42 in total, 35.72{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}) with a higher amount of birds to the global average (about 42 peaks) of 534 384 birds per spike.The results 2014 are reported in the Tables – 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.
ATMOSPHERIC PRESSURE: in 92,85{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the peaks there was increase (1-30 hPa) with variations above 10 hPa in 75.80{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the peaks for the sector "36/24 h" and 76.19{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} for the sector "18 h" before the take-off.
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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the peaks in the atmospheric pressure is higher than 1010 hPa and more sectorally in 50.70{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} (previous day) and 66{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} (Day of the take-off) is higher than the atmospheric pressure at 1020 hPa.
At present time all the counts -"1999-2019"- on Pyrenees are available at
https://www.palombe.com/migration/comptages.php
At present updating (2020) as by "Falsterbo" we have investigated the last ten years with the following results considering Air Pressure changing on TWO areas : 1) Pyrenees area – 2) Flavignac continental area .
2010(2 events) negative, negative //(Flavignac) +11,+15 **hPa** growing up 12-48h before the transit
2011(3 events) negative,negative,+18 // negative,negative,+11
2012(3 events) +8,+20,+21 // +10,+20,+28
2013(1 event) +11. // +13
2014(2 events) negative,+7 // +13,+10
2015(4 events) +10,+13,negative,negative//+-10,+10,negat.,negat.
2016(2 events) negative,negative // negative,+20
2017(3 events) negative,negat.negat.//negative,negat.,negat.
2018(2 events) negative,negative// negative,+17

2019(1 event) negative // negative
hPa growing up 12-48h before the transit: 31,82{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} more than 7 (7-10) hPa ,54,55{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} more than 10 hPa in the Pyrenees area.

ITALY

The present analysis as **preliminary report** is focused only on the changes (single Abiotic factor) of Air Pressure (*) happened 12-48h before mass take-off/ transits (ten years 2010-2019) in **Italy** ,updating recorded data as by ". " where from we extract 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, where 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** " ,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 {a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5};
- -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**

{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} 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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}.** *(reference at http://www.scienceheresy.-com/ornithologyheresy/Cavina2015.pdf)*

ITALY
1998-2007 12 peaks
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)
Updating (2019) the precedent results and focus on a single abiotic factor (Air Pressure changes) in transit area (Central Italy) we have collected the following results
-2008(2 events) +10,+11 **hPa** growing up 12-48h before the transit
-2009(2 events)+11,+13
-2010 (1 event) +15
-2011 (2 events) +15,+10
-2012 (1 event) +20
-2013 (2 events) +10,+11
-2014 (*) (1 event) +14
-2015 (1 event) +11
-2016 (2 events) + 11 ,(+7)
-2017(2 events) +11,+12
-2018 (2 events) negative,negative
-2019(2 events) +11,+10
17/19 **(89,47{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a**

88d1abe5}) Air Pressure increasing more than 10 hPa 12/24/48 h before the event
(*) 2014 – special focus – **Mass movements**
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 from the woods of St.Rossore (Pisa-Livorno) – +11 hPa
– October 20 forests in Adriatic area -PesaroUrbino + 8 hPa
– October 25, Mesóla forest (Ferrara) +14 hPa
– 25 to 27 October Monte Conero (Ancona) +10 hPa
– November 2 (flow) – Grosseto area Tirreno
The phenomena of takeoff “strip” of thousands and thousands of pigeons, at dawn, and S.Rossore Park
“Strips”or “Tapes “ are long (more than 500-1000 meters/Kms) groups of Woodpigeons agglomerated in a unique or slightly fragmented mass- as a “cylinder” in the sky- in a long sequence of big flocks or unique flock flittering in a virtual corridor (probably isobaric) of the atmosphere ,usually at quite important altitude (more of 300 m. over the ground) ,always oriented on a well identified migration’line (from north-east to south-west or from east to west) .
To have better reported events of “ strips” we have a special list about the observations on the eastern site of Appenine mountains/hills (Monte della Chioda- by Raffaele Faccin) :

- 17 October 2012 (h.9,28) “Monte della Chioda” (check Googlearth) – 3km in 4 minutes continuing transit –
- 18 October 2012 (h.9,08) as a “target” by continuing transit for 11 minutes on the same valley – +22 hPa increase
- 17 October 2019 (h.9,30) transit 3 minutes – negative for increasing

- 26 October 2019 (h.9,23) large 3/4 km x long 7/8 km , 5 great flocks in sequence + 10 hPa
- 10 November 2019 ,same area Romagna ,sequence of 50 flocks (size 2000-5000)
- 10 November 2019 , in Massa Fiscaglia (FE) a single "cylinder" of flocks in sequence for 30 minutes (from Mesola forest take-off) +10

Many of these events 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 AP 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.
The phenomena of "strips" is well drammatically documented in many video/Youtube by records in the Ornithological Station of Portland (UK)

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DISCUSSION

In the precedent paper 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 "{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}" of the Moon illuminated.
In the present report we have considered only Air Pressure changes.

In the precedent paper we have reported
“Here are the essential details to:
– Changes in atmospheric pressure (AP) 48/36/24 h prior to takeoff in the areas of origin – VALUES absolute core of the PA in the 12 h prior to takeoff in those areas.
In a recent (2019) paper [116] the Authors have commented our results as following ***<Cavina (2015) put an attention to the property of Wood Pigeon migration that the numbers of migrants fluctuate day by day very much. Generally, fluctuations of the passage intensity are commonly known to students of birds migration, but in this spe- cies they are really spectacular, varying from the zero individuals to several hundreds thousand pigeons per day. Cavina (op. cit.) connected this with observed changes of air pressure – the waves of migrants start soon after air pressure drops by around 10 hPa. The problem of waveness of migration was discussed by Cavina (2016) for other spe- cies of diurnal migrants (Siskin, Carduelis spinus, Chaffinch/Brambling, Fringilla sp., Starling, Sturnus vulgaris and Barnacle Goose, Branta leucopsis) in other paper. The air pressure changes seems to be direct stimulus for the starting decision of birds ready to move. From the other side, subsequent waves seems to be fixed to the “time- windows” during the season (e.g. for the Willow Warbler, Pylloscopus trochilus – Piotrkowska 1995, the Blackcap, Sylvia atricapilla – Busse 1996, Kopiec 1997>***
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 {a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5};
-in the most remote and continental stop-over areas (Medium and short distance) in the A.P. 48/36/24 h prior totakeoff and the day of detection of the peak (in ITALIAN) rises by more than 10 hPa in 90 {a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} 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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d

1abe5}
-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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}
– The same: in the intermediate areas the basic values greater than 1010 hPa are in the
50{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}
-66{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} and in the areas closest coastal
83.33{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}
– Check-in (ITALY) the absolute values of the basis on the first day of the peak are higher than 10 hPa "
In the present report , where we have considered only the Air Pressure changes and only on the transit area (excluding Pyrenees) , the analysis could appear superficial , but all the data could be object of future updating and however seem significative . The methods of the present report should be extended for a comparative and statistical(scientifically statistical) analysis between all the main abiotic and biotic factors , considering the origins (we are trying in ITALY to do a radioisotopic research by the cooperation of Hobson [115]) of the various woodpigeons'populations at various longitudes/latitudes territories in various seasonal and migration-timing conditions . The complexity of so many items seems evident :the Research field is open ,and difficult.
The migration's ecology remain a complex phenomena and our results seem offer a little contribute for a better knowledge.
Probably the main interrogative is about the simultaneity of the decision-making : what happens in the sensitive systems and brains, so strong and simultaneous to be able for a mass command to fly to migrate ? How many other biotic and abiotic factors take part – between them well coordinated-
In the event of mass take-off from breeding areas (Sweden-Falsterbo) and/or stop-over sites (France,Italy) ,here where populations by different origins (North-North East- East geographic area) mixed themselves before continuing the Migration ?

We know well the importance of “Zugunrhue” and length of day-light , but what levels of the single abiotic factors are necessary to offer the “body” of birds ready for this mass decision-making and take-off ? How much is important prevalence of genetic command or gregarism or past-experiences of adults or hierarchy in the single families and population or single condition of the habitat’s biodiversity and food-availability ? How much could be important the ability – if yes or not – to forecast the climatologic and habitat conditions of the wintering area as target of the Migration ? How many possibility we have to explore more and more the ultrastructural – molecular – electophisiological status of the barometric sensitive organs , including the mechanoreceptors on the feathers-pluìmes ?
The mistery is ready to be investigated.

CONCLUSION

The conclusions are as by precedent paper

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 .

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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} – 92.85{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} 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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}) than in Sweden where at this time the remote ‘incidence is only 27.65{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}, while in the two areas in the “18h” before takeoff , the incidence is 78.72{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a

88d1abe5} (Sweden) and 76.19{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} (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{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} 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].
As conclusion 2020 we can affirm again that the target of the present report is only the "one " : to put in evidence (data "evidence based") that exploring the "abiotic factors"'s influence on the birds' migration "decision making "(departure,mass take-off and transits) ,the most evident "abiotic factor" influencing the departures is the increasing (usually more than 10 hPa) of the Air Pressure 12-48h (and more) before the migration's departures from breeding,nesting,stop-over areas .It happened in more of 80{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the collected events in more than 20 years for many millions of migrating birds in Western Paleartic (Europe) also by special focus on *Columba palumbus* and Italy.
The data 2020- here reported – are "evidence based" data .
If the "Air Pressure's jump" –as a warranty of no-turbolences and stability in atmospheric isobaric corridors – could be considered as the "finger pushing the starting button " , it seems obvious to consider the importance of the sensitive ecology (inside the complexity of relationships of many "abiotic and biotic factors" with many anatomical structures) by focus on the Para Tympanic Organ of Vitali

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Estimated increasing respect average last 5 years : 300
{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}
https://youtu.be/wG_MT5qvS1A
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(@) ***Peaks and waves*** *definition as by* <http://www.wbwp-fund.eu/ring/-pdf/40/1_cavina{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}202018.pdf>:
*“In this paper, we define the term peak day as a day within which the number of observed birds exceeds 5{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the individuals observed within the season (all birds observed from the beginning to the end of the observation period = 100{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}). This means that if during a period of two, three or more consecutive days the share of birds each day is above 5{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the total number of observed birds, all these days will be called ‘peak days’. For a more precise description, peak days with different values are designated as ‘low peaks’ – 5.1-10.0{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} of the yearly total, ‘moderate peaks’ –

10.1-15.0{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5} and 'high peaks' ->15{a6be835d09a84c463fa955f66368ad74671de57ffb293aa26834595a88d1abe5}. Still the term 'peak' refers to one day. When we use the percentage value of the share of the day in the entire study, calculation of the Similarity Index (SI – discussed below) is natural and easily understandable.

We use the term wave of migration to refer to a period of several days in sequence in which the migration is more intensive than in periods with lower numbers (shares). The wave can contain both peak days and days with very low numbers. Within the entire period of seasonal migration, waves are usually smaller at the be- ginning and at the end of migration period than in the middle period of migration, and of course the probability that real peak days will occur then is lower"

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