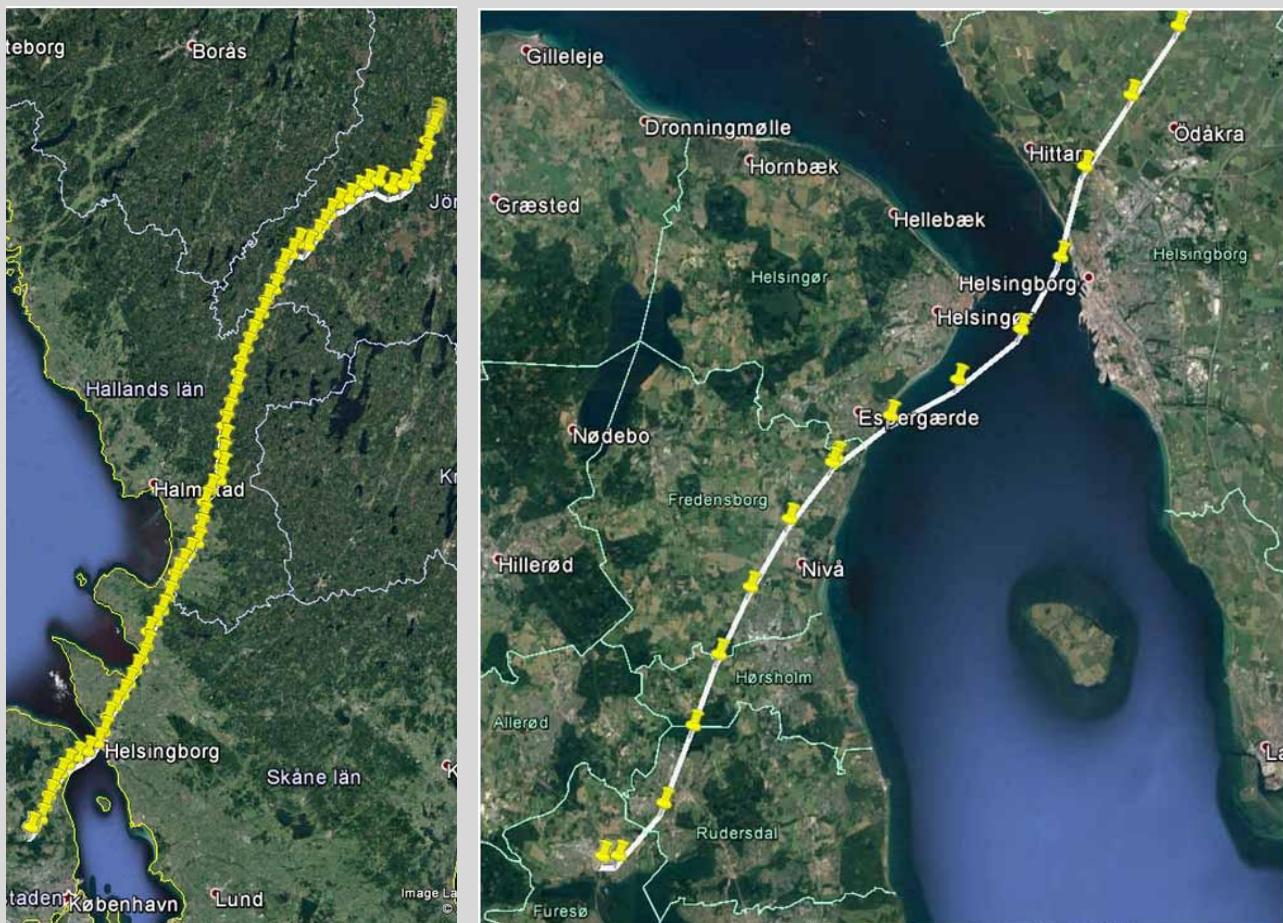


GPS in pigeon racing

Denmark 2017

Kasper Korndal-Henriksen
Ove Fuglsang Jensen ©



The team of GPS

We are two fanciers in the team: Kasper K. Henriksen and Ove F. Jensen. Kasper has bought a set of Skyleader GPS, and has 5 racing pigeons from 2013 - 4 years old, and he run everything with the pigeons and the set up for racing. When the results of the race is downloaded, Kasper sent the file to me, and I make an analyze of the race in Google Earth. In the yellow markings there are information of the time, speed, height and other information. As you can see I mostly use the speed and height of the pigeon to analyze, but also sometimes the time from one marker to another.



Kasper K. Henriksen

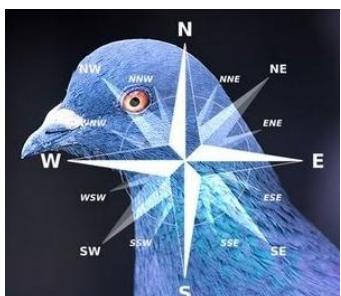


Ove F. Jensen

How the pigeons navigate

In the text under the pictures, I will describe why the pigeons are acting in that way. Instead of making an explanation in the text, it will in a short manner be explained here.

Pigeon navigation



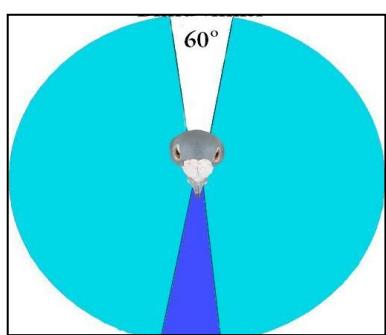
The racing pigeon and other birds have 3 ways of navigation: The sun, the earth magnetic field and landmarks. When the pigeons are in the basket in a lorry, they cannot see anything, but while they are sitting in the basket they already have a bearing to the loft. Many times the GPS shows that the pigeons know the way home at once, and they can in 3 minutes and 5 kilometers reach a speed of 1600 meter per minutes.

It has been proved, that pigeons also navigate after the sun, but this is only the old birds. A young pigeon under 12-14 weeks can only navigate from the

magnetic field of the earth. In the GPS, one cannot directly see if the pigeon use the sun, but the pigeons properly navigate better in a visible sun. A pigeon cannot navigate on a direct route in west/east or east/west.

The pigeons using "The Map"

Pigeons also have an ability to use the landscape and landmarks in navigation, and this is called using "The Map". It is stated by the scientist, that our pigeons have an extraordinary ability to "photograph" the landscape and remember every detail. In one of these routes in the article, one can with the GPS see this is correct! To be able to "scanne" the landscape, the pigeon have some fantastic eyes, and they can see everything in an angle of 300



degree(blind angle on 60 degree), as you can see on the picture. Are the visibility good, the pigeon can see far ahead. In the route of an GPS pigeon, it is very clearly, that the pigeon is using its eyes to "read" the landscape, and in this way the pigeon are making a navigation and act accordingly.

The white flying muscles

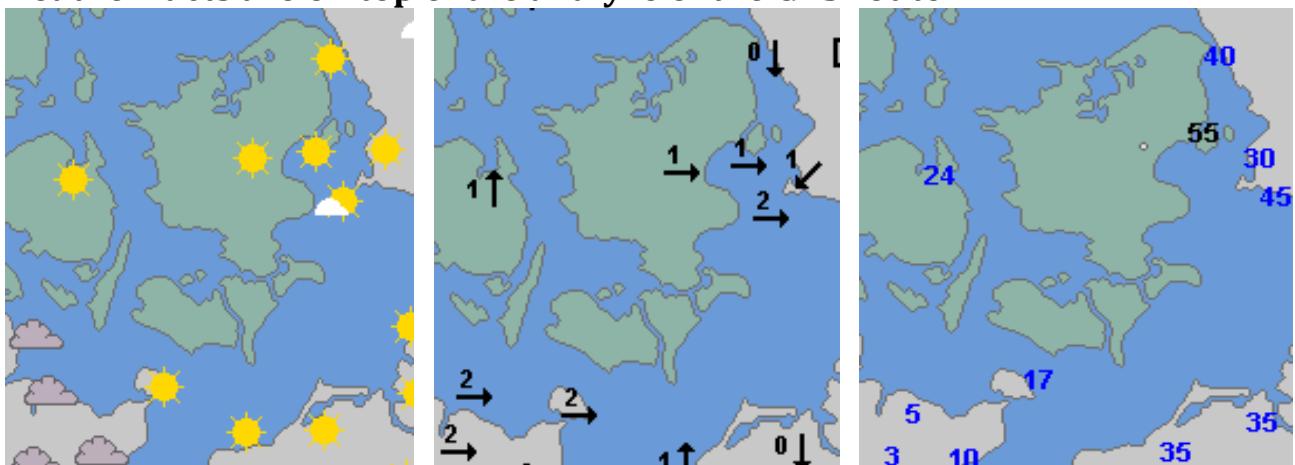
The racing pigeon has powerful flying muscles, and there are two types: The white and the red muscles. The white muscles are used to speed if the pigeon are in danger fx, a hawk, but are also used when the pigeons start up from the baskets in a race. The red flying muscles are for long distance. In GPS from a pigeon starting a race, it is always in great speed to gain height and speed for the trip home. There is often seen a speed of 1500-1600m/minutes (90-98 km/hour), but the record are 2020m/minutes (121 km/hour). After 20-30 minutes, the speed will be more slow depending of wind and weather.

Start	Energi in muscles.	Energy transported from the liver. The lever converts fat to energy which goes to the flying muscles.	No more energy
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Energy to muscles: After 20 minutes white muscles are finished - energy in red muscles going empty after 1-1½ hour - the liver makes energy from fat.

Weather facts

Every pigeon race are under the influence of the weather, and therefore the weather facts are on top of the analyze of the GPS route.



There are 3 graphics: The first with sun/clouds/rain - the next are the wind - and the last are the visibility in kilometers. If necessary height of clouds.

Analyzing a GPS route

Every pigeon race are unique, and that depends of 2 main factors: The geographically factors and the weather. How the pigeons handle these things, we know very little about until now, but with the GPS-ring on a pigeon, we can in a way "go into the head" of the pigeon, and see how it behave in different situations. How are the start of a race? What do the pigeons do when they meet the open sea? Does the pigeons follow significant landmarks on their way - rivers - edge of a forest- highway -coastline?

With the GPS system for pigeons, we will have a chance to learn much more about how the pigeons mange a race. If we analyze a GPS route in details with the speed and height of the pigeon in a special situation, we can learn a lot of how the pigeons react in many situations. It is the aim of this article, to show and analyze a lot of detail, and in this way to show how fantastic a navigator and flyer the racing pigeon are. The scientist state that the racing pigeon are an first class navigator.

If you want to bring pictures and text from this article, please remember to put on the source brevduenord.dk. Kasper and I want a copyright © on our articles.

Rødbyhavn 144 km. 15. July

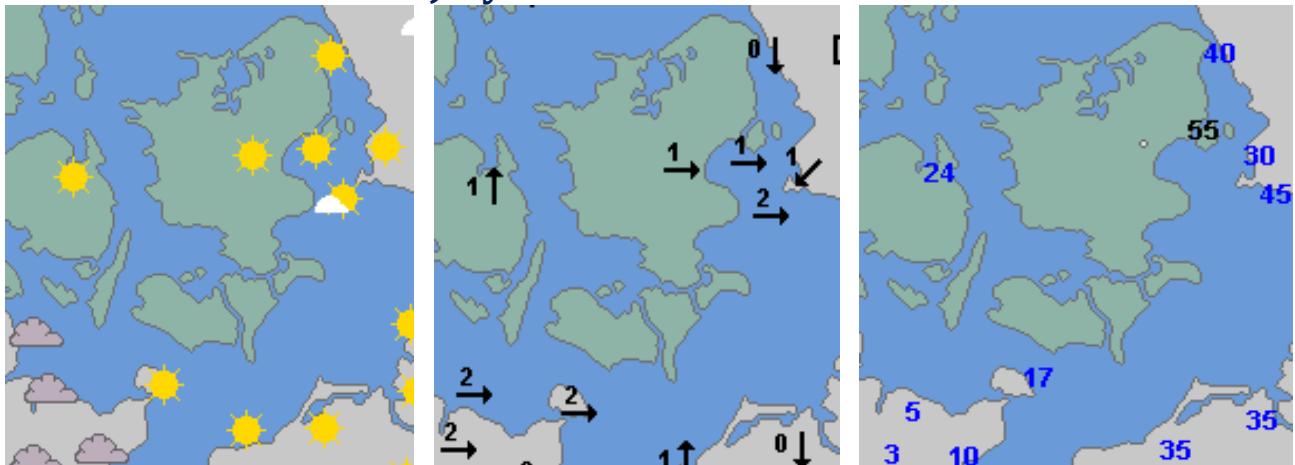


There were two pigeons with GPS in this route. *This is Pigeon no. 1.*

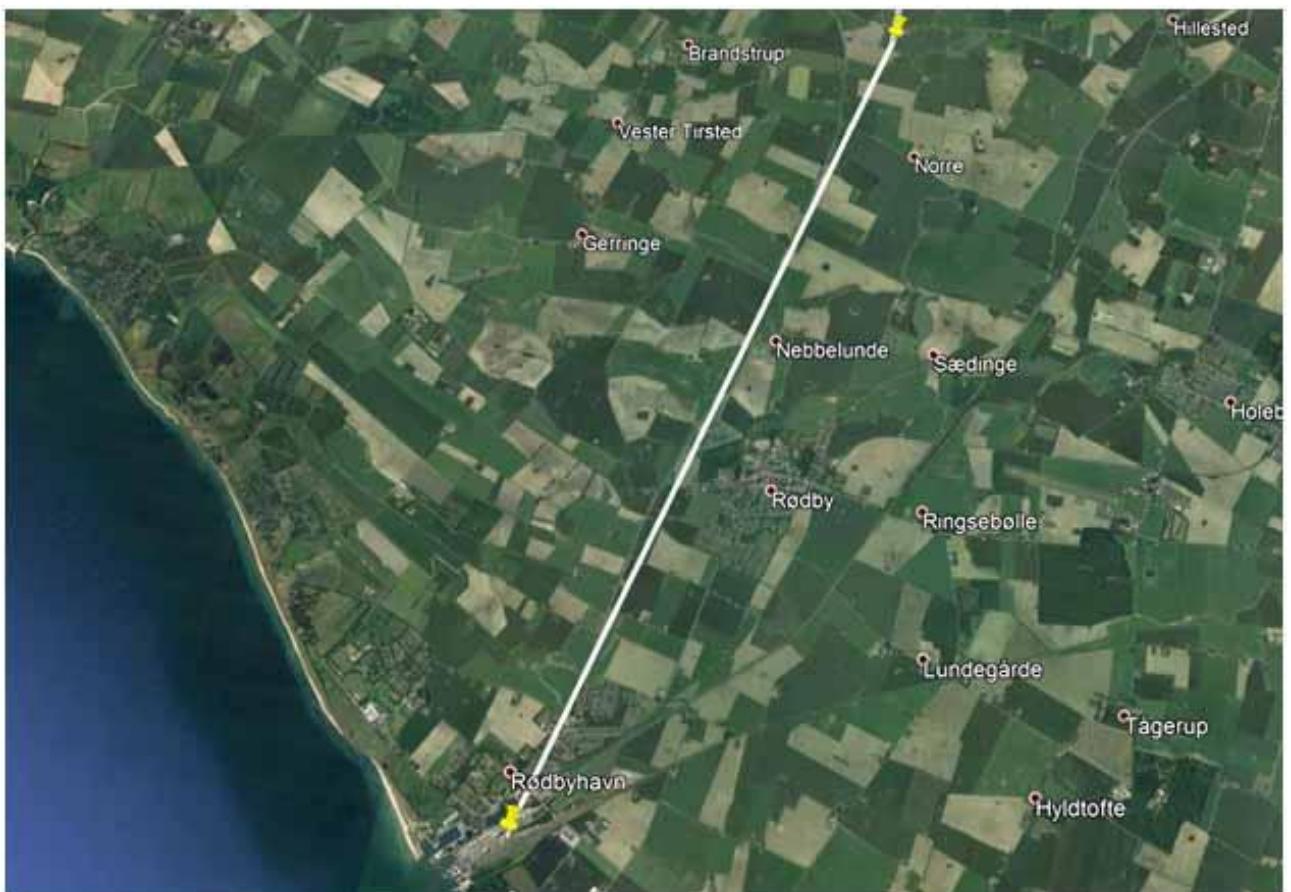


Route for pigeon no. 2. Both pigeon passes west of Femø, but pigeon no. 1 goes west of Næstved, while pigeon no. 2 goes more in a easterly direction.

The weather facts 15. July at 08.00



Bright sunny day - easy wind from west - visibility 17 km. or more.



Release at Rødbyhavn

The pigeon has while sitting in the basket taken a bearing to the north, and at release the pigeon take a single loop, and off it goes at northeast in great speed. From place off release to yellow marker 10 km. away, it takes 8 minutes, and the pigeons at the marker have a speed of 1620m/minutes (97km/hour). Height of flying are 94 meters.



Passing Femø and open water.

After a quick start the pigeons go northeast at a speed of 1500m/minutes (90km/hour), but over the open sea the speed are 1440m/minutes at a height of 240 meter from before 90 meter. Arriving on the other site of the sea, the height are 46 meter at a speed of 1380m/minutes (82km/hour). It is very common that the pigeons seek the height when they approach open water, and arriving on the other site seek lower down.



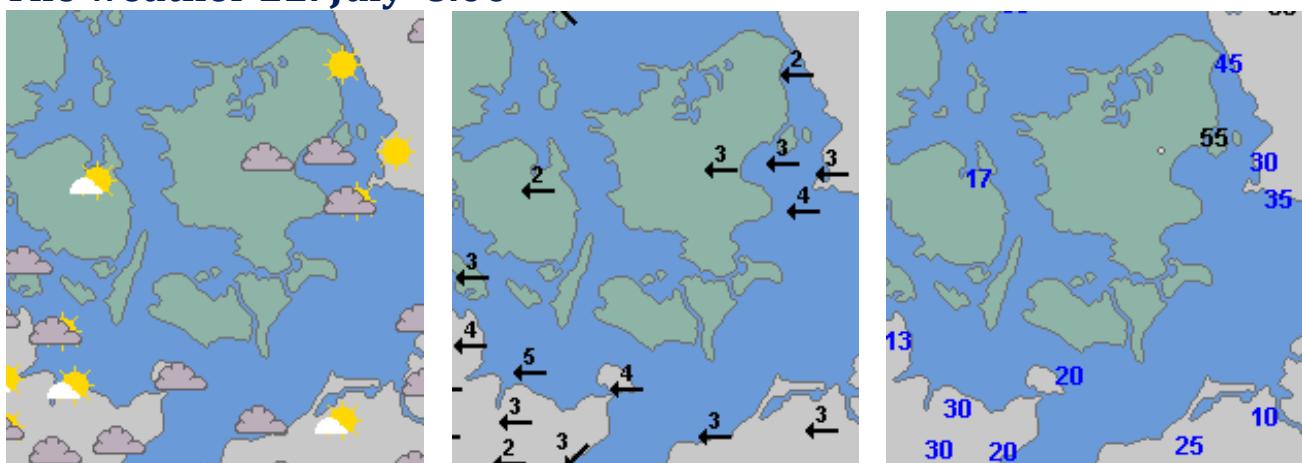
Pigeon no. 1 and pigeon no. 2 are in two flocks of pigeons, flying 1380-1440 on their way to the northeast. Pigeon no. 1 are at Borum west of Køge at 09.11, but pigeon no. 2 are at Køge 09.18 which is 7 minutes later. When pigeon no. 1 arrives to Roskilde, it turns turn to the east, and at the same time slow down in speed to 1080m/minutes. Pigeon no. 2 goes direct to the loft in a greater speed 1380m/minutes. Pigeon no. 2 makes a better effort at the last part of the route, and just south of the loft there are only 1 minute between the two pigeon, and they arrive at the same time! In a short pigeon race the minutes and seconds are vital if a pigeon win or lose!

Rødbyhavn 144 km. 22. July

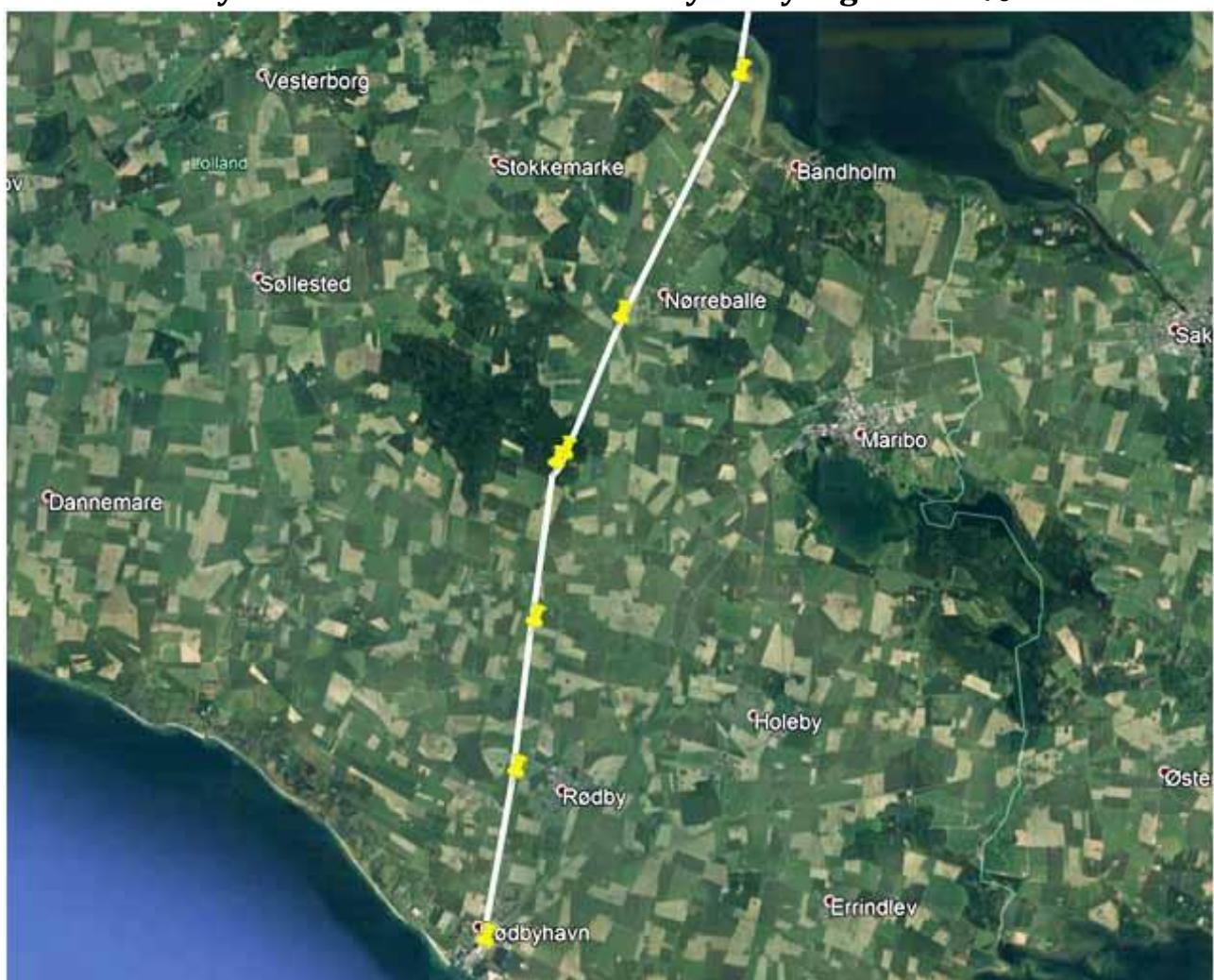


At the 22. July the weather was very different from 15. July.

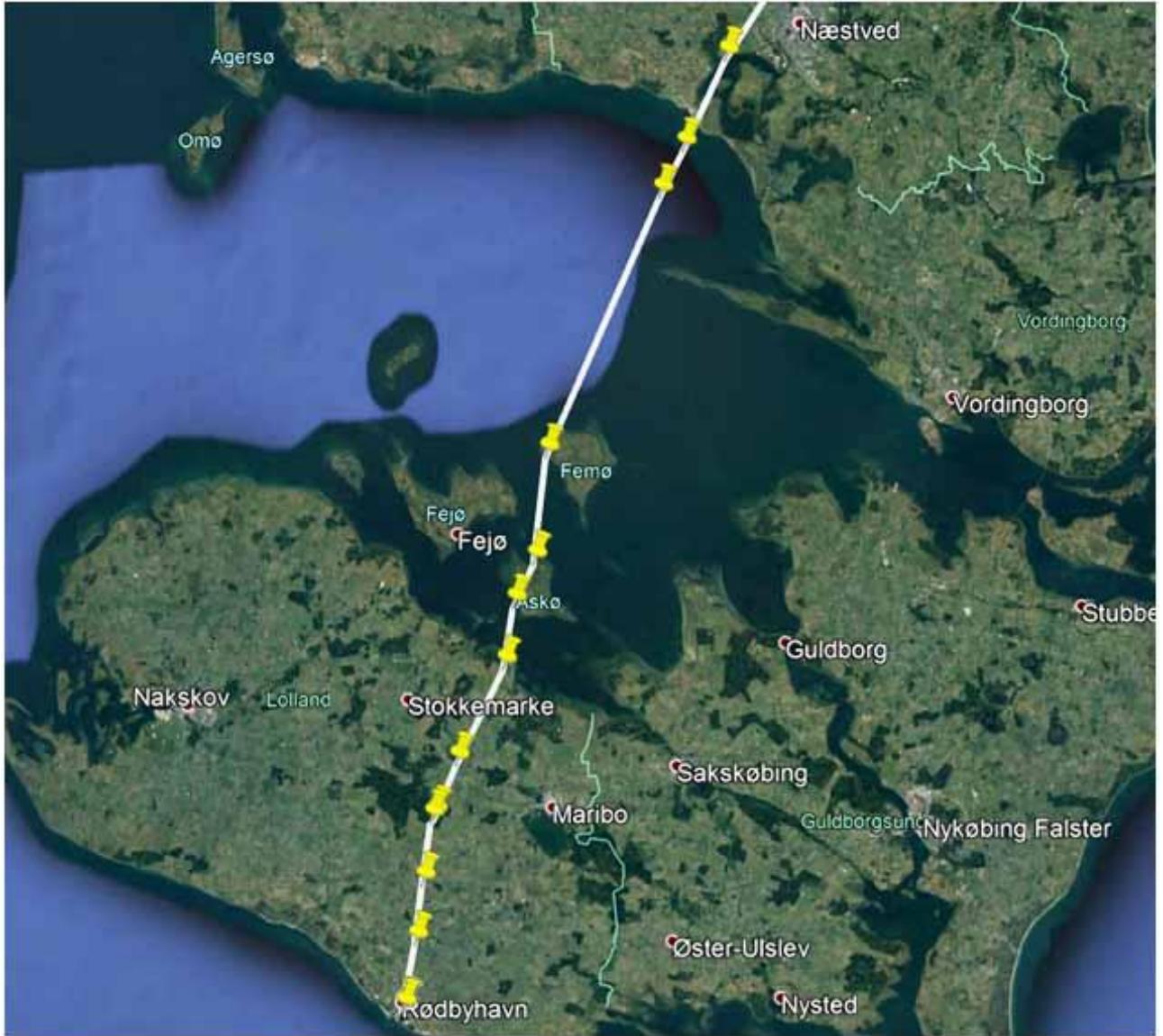
The weather 22. July 8.00



Cloudy on release site with height of clouds in 200 meters - even wind from east - visibility 20 kilometers. The humidity fairly high on 90%.



Start from release fairly low with 1380m/minutes going down to 1140-1200m/minutes going northeast. Height of flight are only 21 to 42 meters.



Same route as in wind from west!

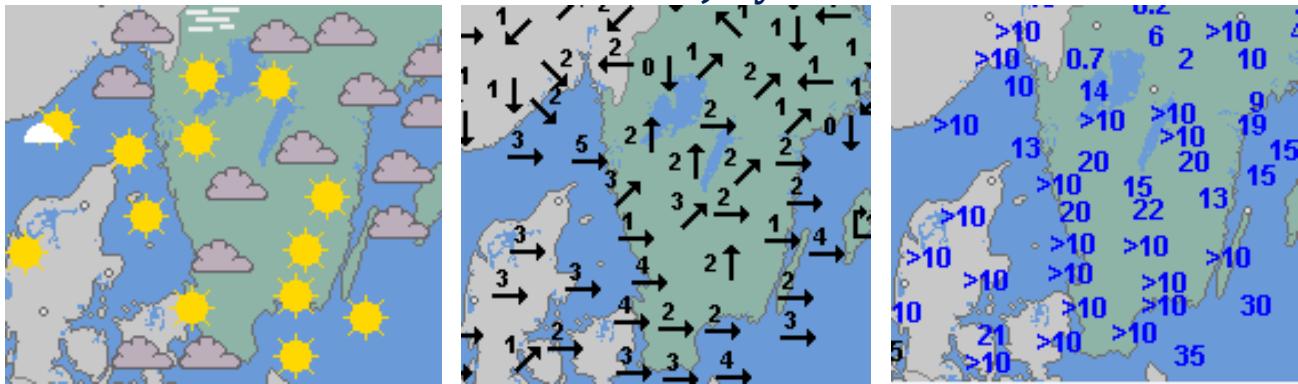
The very interesting in this route in even to fresh easterly wind are the fact, that it is exactly the same route as in wind from west! It is possible to show 2 routes in same picture in Google Earth, and if one do that it show clearly that the 2 routes from 15. July and 22. July are the same. How come this? The route in fresh wind from east should press the pigeons more to the west - right? The answer is simple: The pigeons use the type of navigation called "The Map", where the pigeons knows the landscape and the landmarks very well, and one can say that the pigeons "switch to the autopilot"!

With the GPS on a pigeon, we can ascertain the theory of "The Map" !

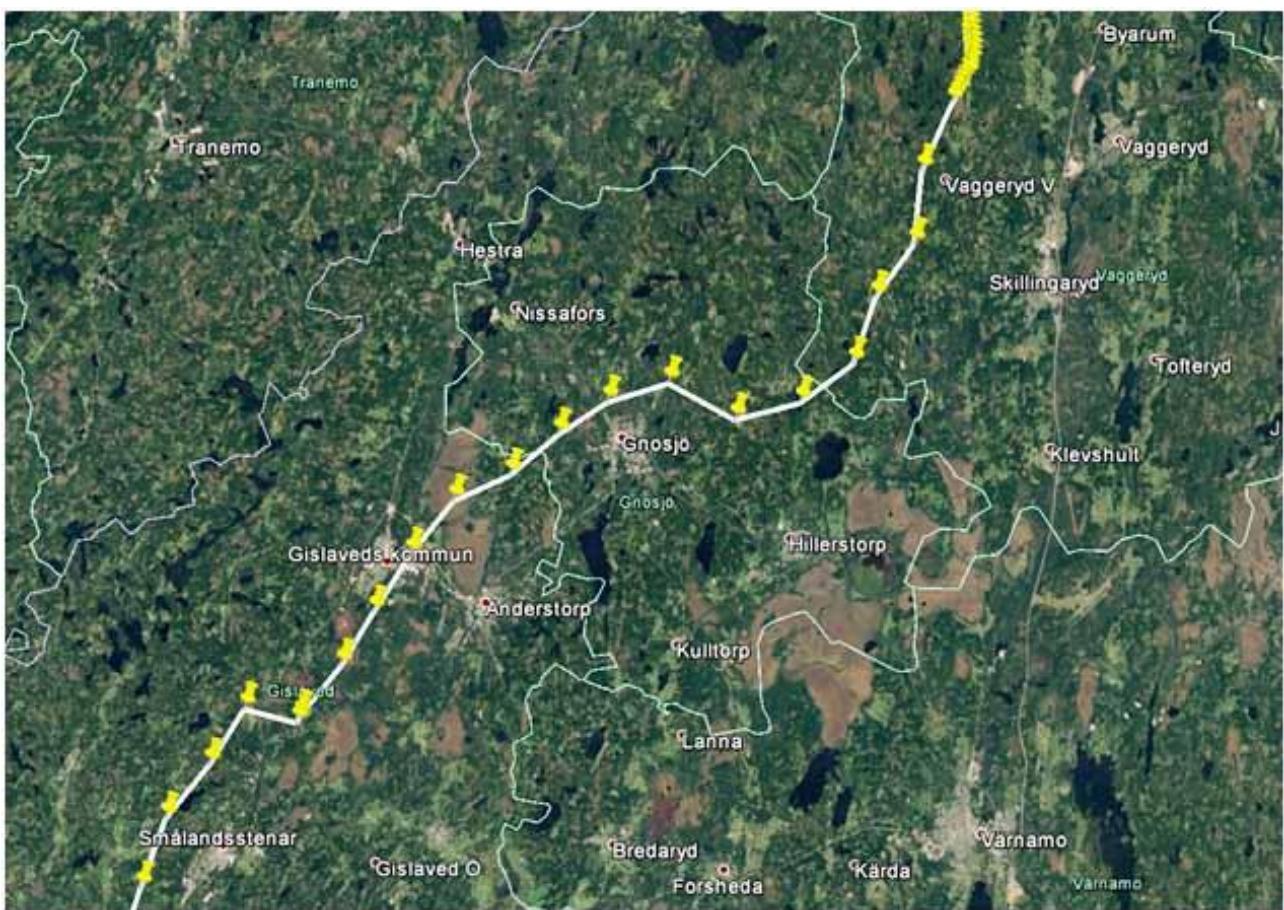
Jönköping 247 km. 9 July



The weather in southern Sweden 9. July 05.30

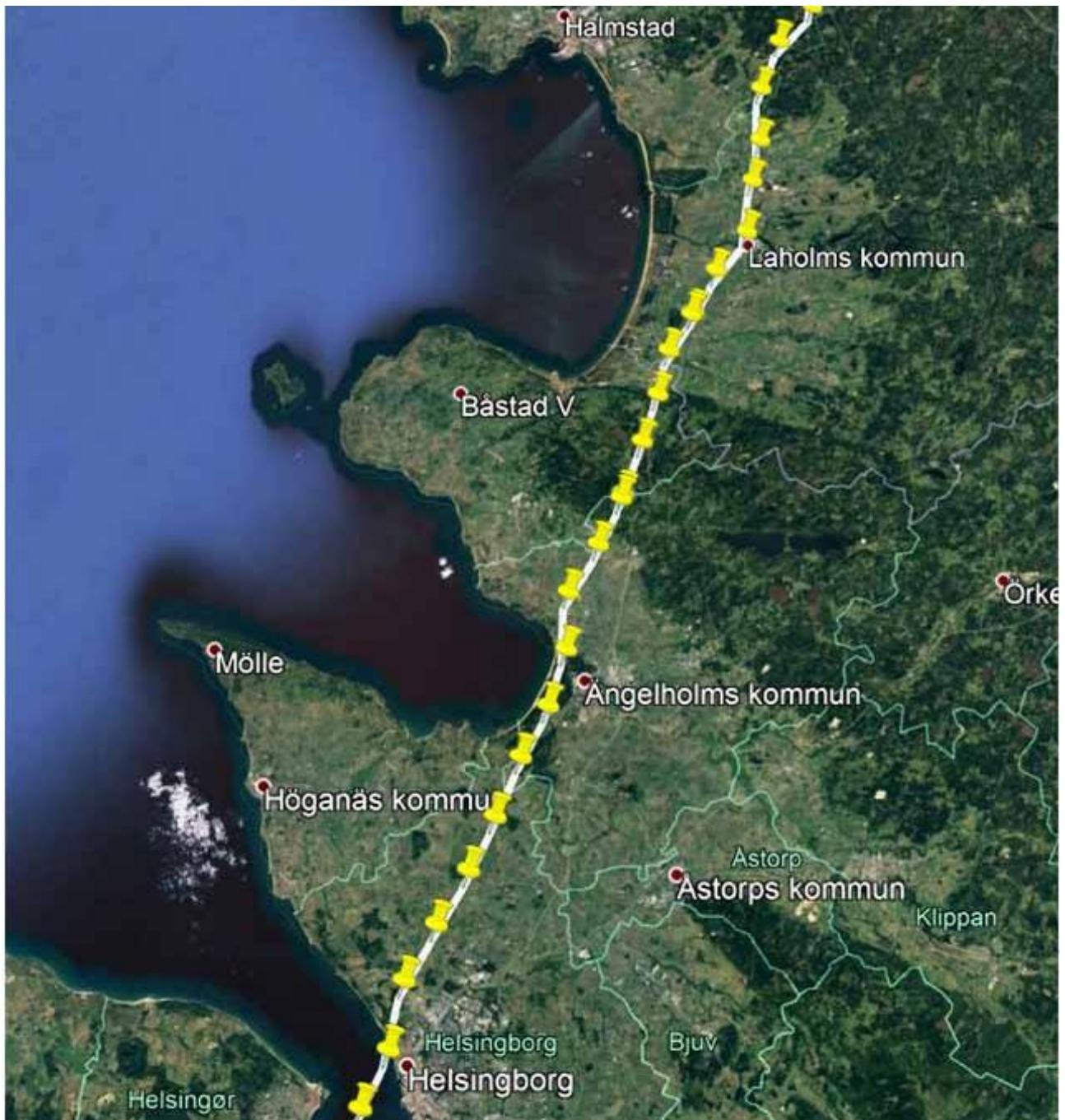


Partially cloudy with sun, but cloudy on release site with clouds in 400 meters height. Even wind from west going fresh in the south. Visibility are 15 km. even with a humidity on 92% at release site.

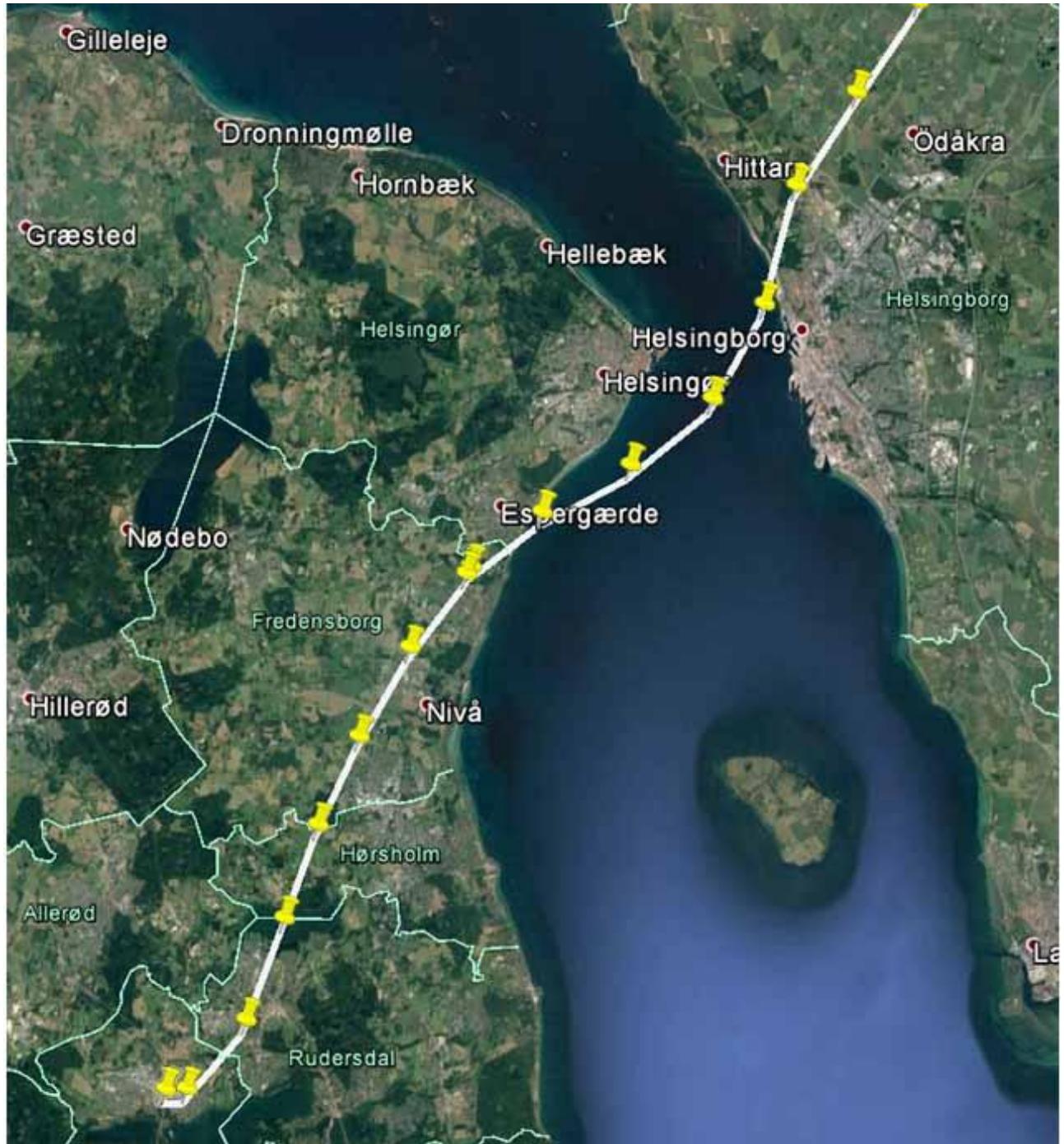


In the middle of Sweden the landscape are 120-150 meters over sea level, and this must be deducted from height of flight.

The start against the wind gives 1200m/minutes at a height of 30-80 meter over the landscape. 40 km. from releases site there is a bend in the route where speed goes down to 1020-1080m/minutes. Maybe two flocks of pigeons are divided - who knows?



In this part of the route, the pigeon follow the coastline, but the maneuver the pigeon doers in speed and height, are of a very different sort. In the top of the picture the pigeon flies over a landscape 120 meters over sea level, and flies 20-30 meters over the landscape. Arriving to the lowland, the pigeon goes down to 20 meters from the 150 meters before. At Hallandåsen (dark green) the height goes to 180 meter as the landscape are 170 meter, and there after goes down to 20-30 meters again. The speed varies from 980-1500m/minutes. The pigeon here uses the wind to make all these maneuvers - the racing pigeon are an excellent flier as we know!

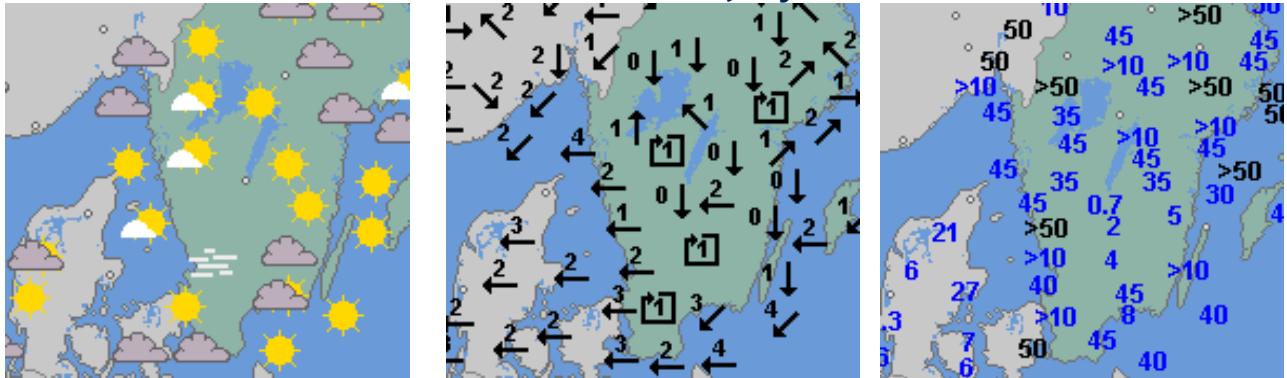


North of Helsingborg the speed are 1320m/minutes, but slows down near the coast to 1200m/minutes and height 60 meters, and at the coast to 96 meters. At the other site in Denmark the speed goes to 1320-1500m/minutes, but goes down again to 840-1140m/minutes - properly because other pigeon goes to their loft in the area. If there are pigeons within the flock to go more south, are not possible to reveal. Maybe they goes further south in on Sweden?

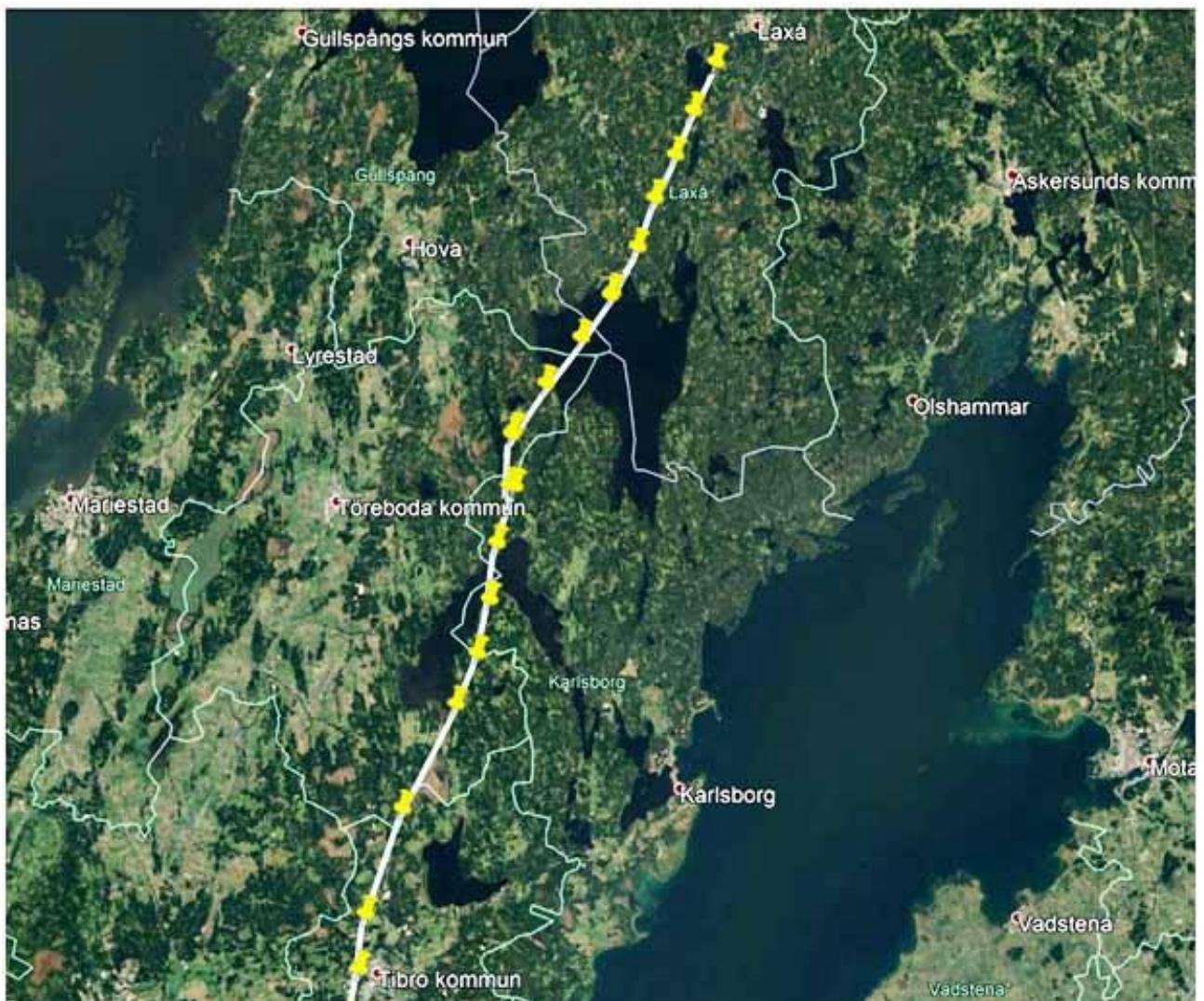
Laxå 361 km. 22. July



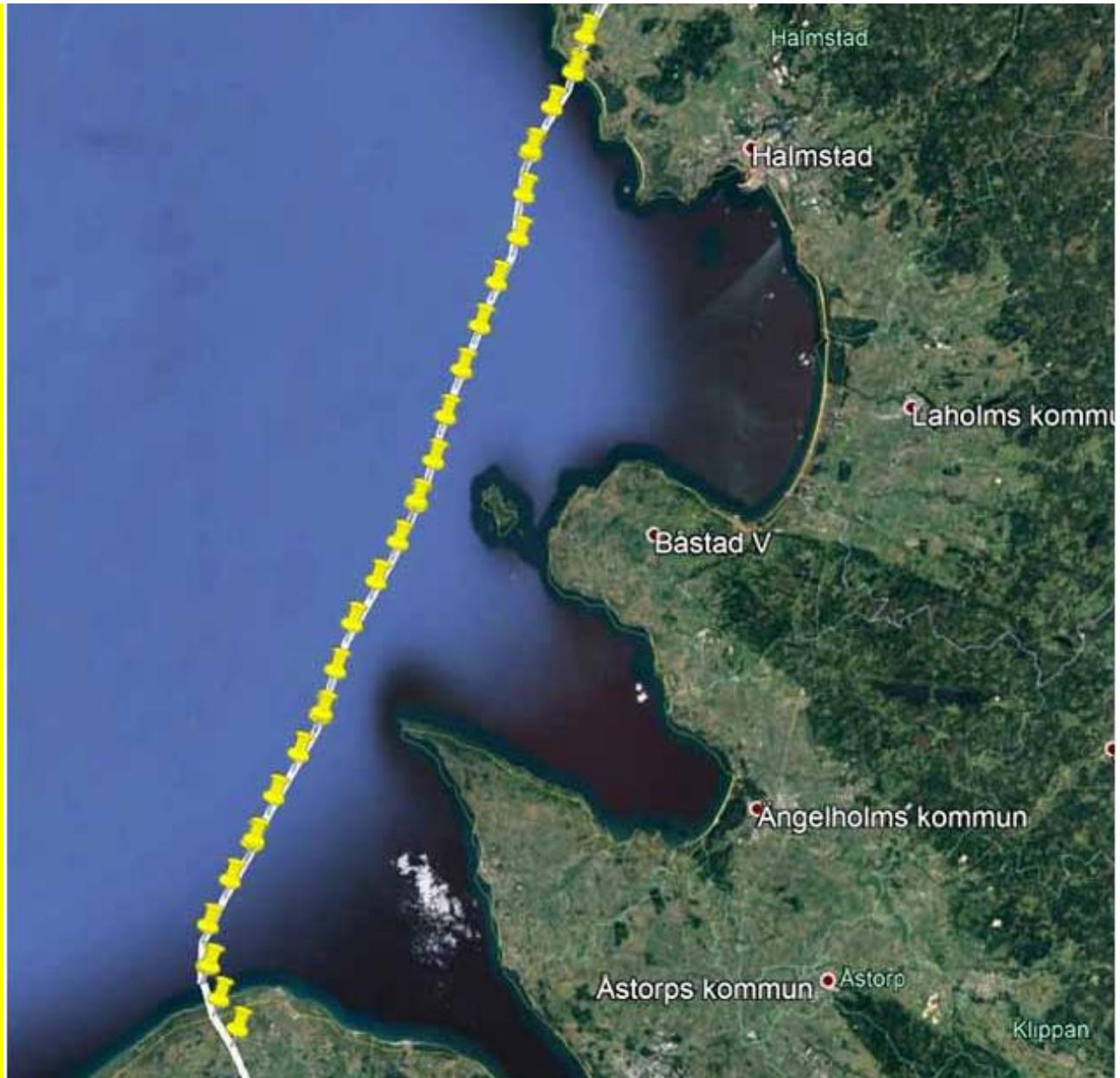
The weather in southern Sweden 22. July 07.00



Bright sunshine at site of release - alternating weak wind mainly from east, but in the south a more fresh easterly wind - visibility very good.



The speed after the start fairly slow at 1140m/minutes, but later rising to 1260m/minutes. Height of flying are 180 meters over landscape, but later on falling to 20-50 meters.



The very special in this route are, that the pigeon instead of following the coast, takes a route on the open sea. The pigeon start crossing the sea north of Halmstad, flying in a height of 120-130 meters over the landscape, and proceed in this height some time at the lowland, but soon goes down to 20-30 meters at the speed of 1200m/minutes. At the coastline the speed goes down to 840m/minutes and height of flying goes to 170 meters. Crossing the sea the height is 120 meters and the speed is 1020-1140m/minutes. 15 kilometers from the north coast of Sjælland, the height rise to 170 meters. The distance from the Swedish coast and Sjælland are 72 km, and it takes 65 minutes, and the average speed are then 1107m/minutes. The pigeon are doing this with a good visibility, easterly wind and a experienced pigeon in 4 years old.

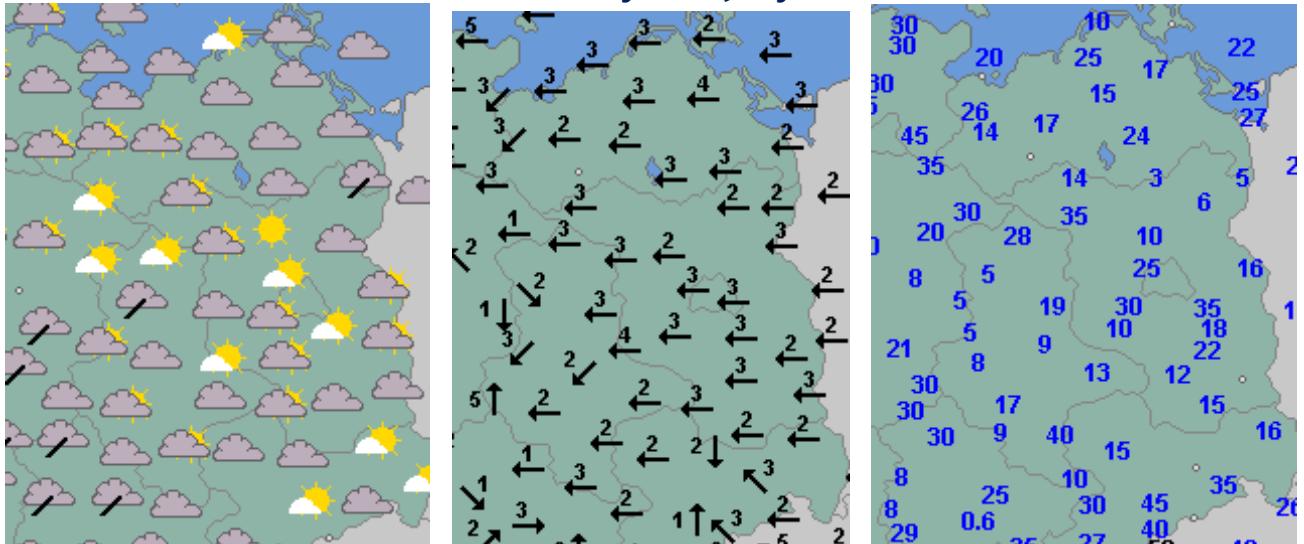


On arrival to the north coast of Sjælland, the pigeon goes down to 70 meters and after 3 kilometers to 6-9 meters while the speed goes to 840m/minutes. After the coastline the pigeons goes very low over the sand dunes at a speed of 1080m/minutes. The pigeon proceed in 30 meter over landscape except at the forest where it rises to 135 meter. The rest of the way to the loft the pigeon goes slow on 840-9860m/minutes. The pigeon became no. 20 in the Sektion, which are very good, and properly because of the crossing of the sea.

Dresden 510 km. 22. July



The weather in eastern Germany 22. July 07.00



Partially cloudy but rain coming from the west - wind even going to fresh from east - visibility fairly good but not in the rainy areas.



The pigeons are released a little north of Dresden. The landscape in eastern part of Germany are without mountains but is uneven and hilly, but the landscape are 90-140 meter over sea level. It is the Plateau of northern Germany.

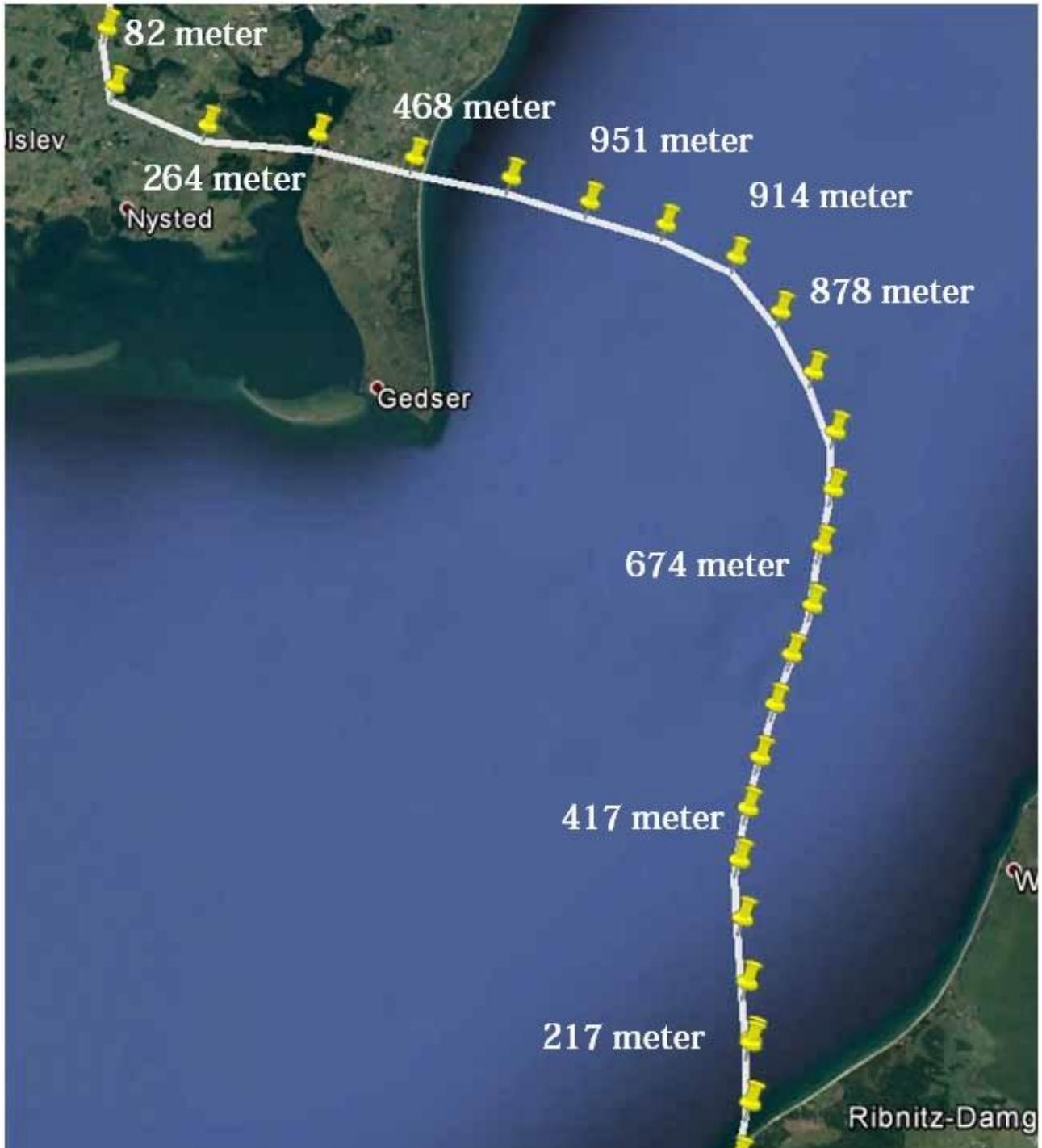
The pigeons starts in first 30 km. on 1440-1680m/minutes but after this less speed. The height of flying are 50-100 meters depending of the structure of the landscape. The pigeons are released at 07.00 and are west of Berlin at 08.45.



Until 50 km. from Rostock the speed of flight are 1260m/minutes and height of flying are 30-50 meters over the landscape. At the first bend at the route, the flying height goes to 250 meters and the speed lowers to 900m/minutes. After the next bend flying height goes up to 300 meters, and the course is set for Rostock. On the last 20 km. before Rostock the flying height rises to 375-440 meters. Every time a pigeon seeks higher up, the aim are to make an orientation of the landscape.

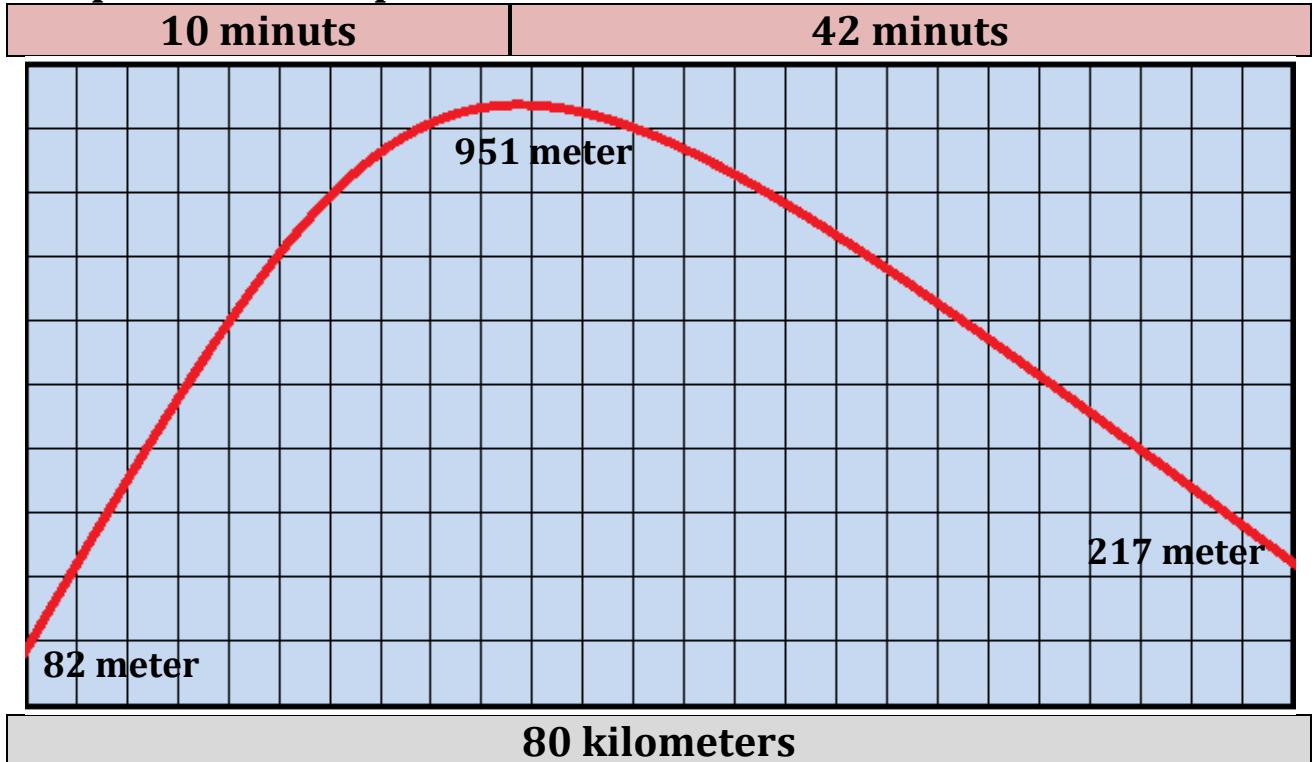
On the picture below, the pigeon has arrived to Rostock, and decide to take a rest - properly with other pigeons. One should now think that this GPS pigeon were lost in the race, but no! - it became no. 24 in Sektion from Dresden! The exciting of this pigeon and the little flock with it, are how they will be able crossing Østersøen to Denmark?



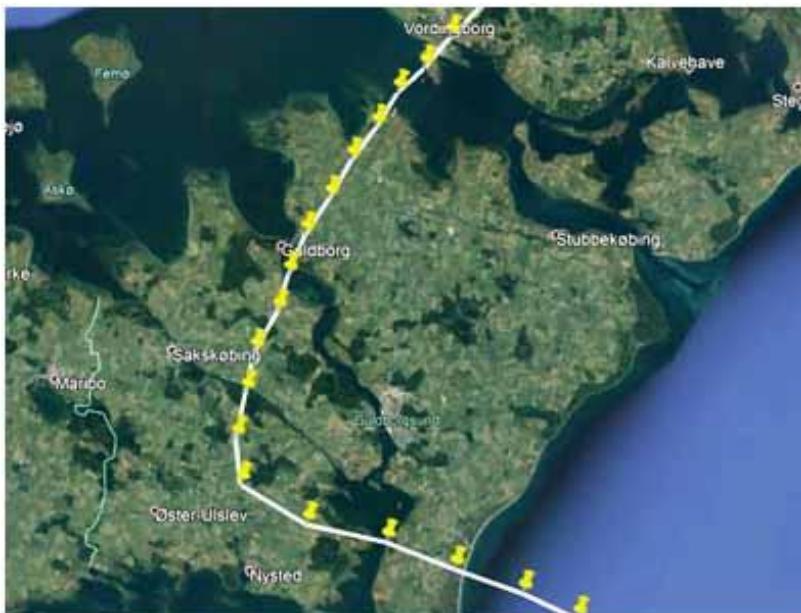


A few kilometers north of Rostock the pigeon begin to cross over the sea, and the passage are here 42 kilometers, but the route it takes are around 55 kilometers crossing the sea. The wind are easterly and fresh. The pigeons start the ascension at the coast, and the speed in the ascension are 840-900m/minutes, but at the turning point speed are 1320m/minutes. From the peak at 951 meters, the speed down are 1740-1860m/minutes (116km/hour)

Graphics of the trip over the Østersø



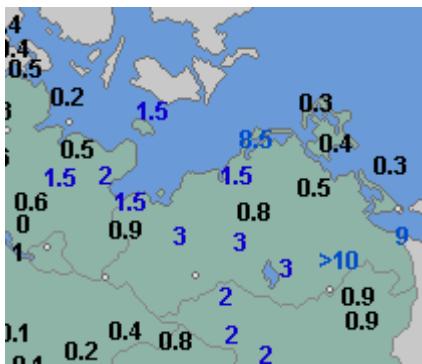
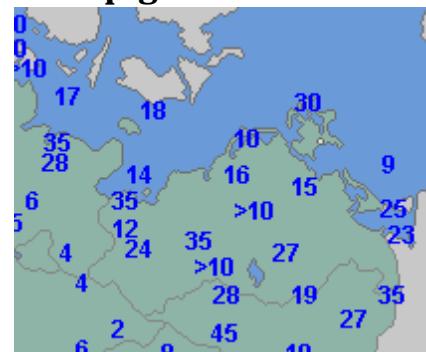
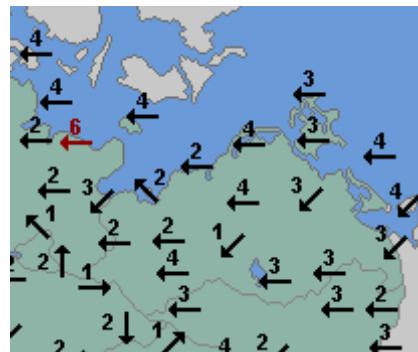
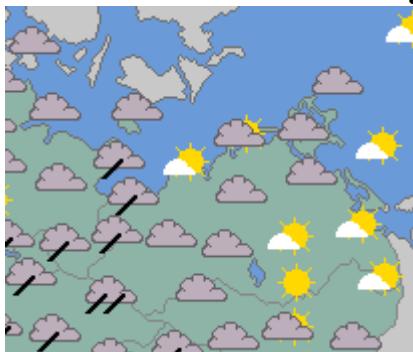
When the pigeons start crossing the sea, they increase the height until 951 meter, and this maneuver lower the speed also because of the fresh easterly wind. The ascent takes 42 minutes and near the top the pigeons turn to the west, and gaining tailwind and going down to 82 meters this only takes 10 minutes! The pigeons must have taken the trip down gliding most of the way, and gaining a speed of 116 km/hour. This trip down on 870 meters takes only 10 minutes - not bad at all!



When the pigeons turn 90 degree at 82 meters height, the speed goes down and crossing Sjælland are an average of 900m/minutes. 50 kilometers from the loft speed increases - home is near. All ni alll it is a very good race of this GPS pigeon!

Why the high altitude and route to cross Østersøen?

To understand the behavior of the pigeons crossing the sea, we have to take a look on the meteorological situation at 12.30 when the pigeon cross over.



The weather at 12.30 are pretty good in the north eastern part of Germany, but it is clearly that a area with rain are going northeast. The wind are even to fresh from the east and the visibility are 18-35 km. in the area. On the left are the height of the clouds which are 1.5 kilometers.

Noting the situation of the weather, it is very clear why the pigeons act as they do. The rain are coming from the south and are just south of Rostock where the pigeons are sitting - it is time for the pigeons to get on the move to the north! The wind are good for flying and the visibility are up to 35 km but there are 42 km. to Denmark, and the pigeons are properly not able to see to the other side. The clouds are in the height of 1.5 km., which are good for gaining height.

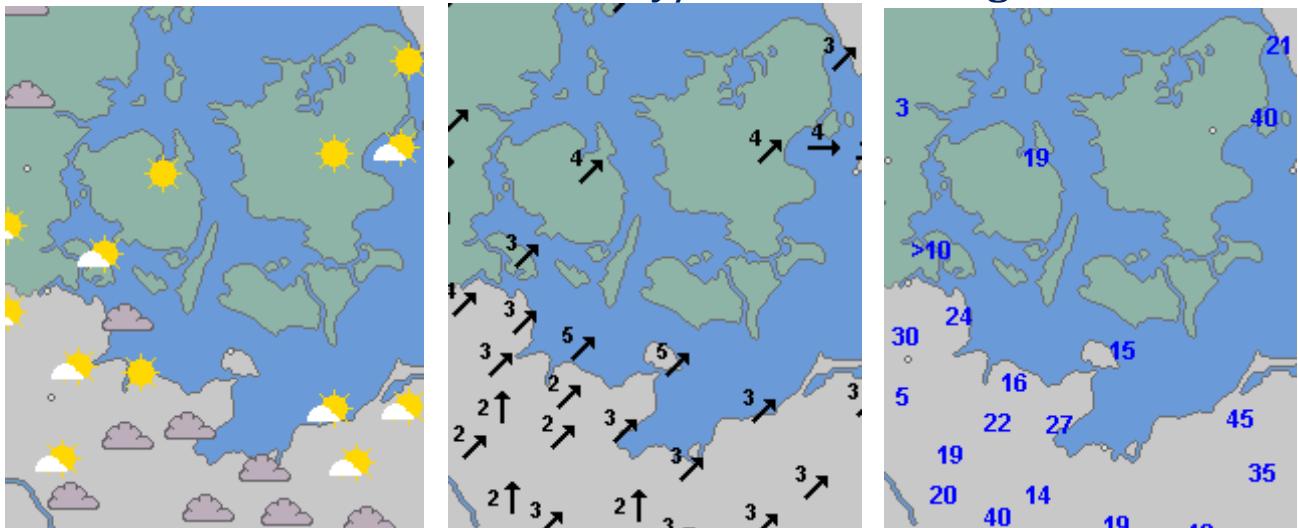
The fact that the pigeons goes up to 951 meters, shows us, that they want a visual navigating, and after 35 km. from the German coast the pigeons see good old Denmark and turn to the west. It is interesting to note, that the pigeons can only go to 1 km. height if the clouds allows it, and they are 1.5 km. Racing pigeons do not fly in the clouds!

What about the pigeons coming later on, can they make a passage of the sea in rainy weather? Pigeons can fly in squall weather but if the pigeon do not have a visual to go over the sea, they will not cross. The GPS routes shows us that the pigeons wants a visual orientation specially crossing water.

Henstedt 271km. 5. August



The weather in northern Germany/Denmark 5. August 08.00



The weather are sunny with few clouds - the wind are even to fresh from the southwest and visibility are near optimum.



From Henstedt to Kiel average speed are 1500-1680m/minutes and flying height are 120-150 meters. Near the coast the flying height are falling to 50-80 meters, but still good speed at 1620m/minutes. From Henstedt to the coast there are 75 km. and it takes 48 minutes, which gives an average speed of 1562m/m (94km/hour).

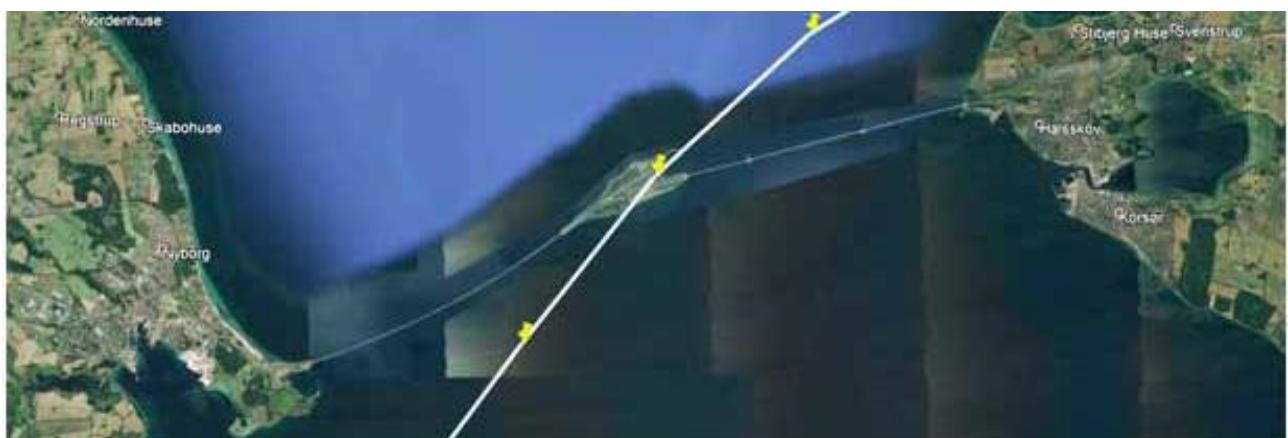
The wind from the release and up north are a tailwind, which easily can give the pigeons a speed of over 100kilometer per hour.



The route over water are 42 km. and the visibility are 24 km, which potbelly will hinder the pigeons to see from coast to coast. Half of the way over water, the speed are 1380-1420m/minutes, but where there are a bend on the route the speed an height are rising to 1500-1800m/minutes and 140-175 meters. Time of flight over water are 28 minutes on 42 km, which gives an average speed of 1500m/minutes (90km/hour). At the islands Ærø an Tnurø the speed and the height are the same, but at the mainland the height are 90 meters and speeds up to 1800m/minutes. At the arrival to Storebælt the speed and height goes down to 1200m/minutes and 30 meters.



Arriving to Storebælt should one expect that the pigeon increases in height and lower in speed, but nothing like that happens! The pigeon speed up to 1560-1620m/minutes, and are flying 60-70 meters over the water. Crossing the island of Sprogø the pigeon go down to 35 meters at a speed of 1620m/minutes (98km/hour). After this surprise effort, the pigeon goes up to 80 meters at a speed of 1560m/minutes. On Sjælland the height rises to 228 meters at a speed of 1680m/minutes (100km/hour). After this event, we must assume that the pigeon do not consider it unsafe if there are a bridge - the largest in Demark.





The last lap on the route do not seems to have any surprises - but it has! The speed on this part of the route are very fast - why? The wind in Denmark has turned to the west and it are now fresh, and this means that the pigeons have direct "tailwind".

The first 20 km. after Storebælt speed goes up to 1620-1800m/minutes in a height of 200-300 meters. At Ejby west of Roskilde are there a sort of "explosion" in speed and height: The speed goes up to 1680m/minutes and height rising to 524 meter. North of Roskilde speed/height rises to 1740m/minutes and 733 meters, and east of the town speed are 1800m/minutes. After this speed/height goes down.

From the first yellow marker to the one just south of the loft, there are a distance of 82 km. and the pigeon does it in 50 minutes, which gives an average speed of 1640m/minutes (98,4km/hour)

The pigeons are here making use of the "tailwind", the bright blue sky and the good visibility to gain speed/height and also in this way having a good navigation! This incident proves, that the racing pigeon always and in any meteorological situation tries to make the best out of the situation. Once again we must ascertain, that our pigeons are of the very best to navigate and be the "masters of the air"!

GPS reveals secrets

When you are a fancier, one quickly finds out that the weather have a very dominating role on the pigeon races. We know how ones loft lies in east/west winds, and we know where the big flocks of pigeons have their migration route. Many fanciers have for years had an opinion of how all this works, but seeing the routes of GPS pigeons they get very surprised

What have we seen in GPS flights?

When one are doing the analyze of a GPS flight, some events we know of both by scientific experiments and what we fanciers find out. Let us see what we up to now have found out through the GPS flight.

1. Great speed in release of the pigeons.

Do the pigeons have just a light or even wind on their back, the speed can be very high the first 20-30 minutes. Are the wind in front of the pigeons, they get a slower start.

2. The pigeons use "The Map".

Have the pigeons been released the same place many times, they know the area in all detail, and do not waste time on many loops, but go straight on the same route as always, and it does not matter if the wind are west or east!

3. The pigeons use the earth magnetic.

In some releases the pigeons are away in a "flash". While sitting in the baskets they already know the way home.

4. Navigation at the coast.

It is clearly to see when one are following the route, that at a coast line something is happening in the behavior of the pigeon - it is making a navigation visual. Most of the times the pigeons are gaining height for a better view of the landscape and find the direct route to the loft. To cross water on 20-30 kilometers, the pigeons can go up to 500 meters, and from Dresden we have the record on 951 meters!

5. The wind presses the pigeons out of course.

It has been seen the wind pressing the pigeons out of course from the start, but the pigeon flock will bend in a curve to get the right way to the loft.

