HISTORICAL RECONSTRUCTION OF THE BATTLE FOR NORMANDY

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ABSTRACT
In this article I am going to present the influence of geomorphology on the military tactics used in the first part of the operation Overlord. Before my research begins, it is important to understand the basic features of coastal geomorphology as well as the reason behind the allies' choice of location for the invasion. My first hypothesis was that the invasion of Normandy has a strong correlation with the military tactics used. My second hypothesis was that the allies decided to invade German forces specifically in Normandy, because of its geographical characteristics. I wanted to confirm or deny my hypotheses with a quantitative analysis by using GIS. The expectation is for the new map to clearly show the correlation between the data collected on location and the geoprocessed data from military situation maps. After thorough analysis there should be plenty of strong pieces of evidence that will either confirm or deny my hypotheses. Concerning the second hypothesis, we will find out if Normandy was the best decision for invasion. This will either provide strong support for the generals' decision to invade the area or, according to geographical data, provide a better result and location somewhere else.

Keywords: *invasion of Normandy; d-day; operation Overlord; military history; geomorphology; tactics;*

INRODUCTION

The Norman or Cotentin peninsula in the northwest France is one of the most strategically important coasts in history. The reasons for this can be found in the geographic location and in the landforms which allow us an easy outbreak in beachhead. What is concerned the geographic location Normandy is relatively close to Great Britain and that allows us to be situated on the island and have easy excess to the continent. In the article we are going to look at the main geomorphological features which had the most influence on the military tactics and strategy decisions. Furthermore, we are going to use GIS system to analyse all involved features.

THE GEOMORPHOLOGICAL FEATURES

The main characteristics of Normandy are that, one part of peninsula is a part of Variscan orogeny, Armorican Massif and the other is the western part of Parisian Basin. The main geological features on the peninsula are shale stones and white limestones. We can also find some sedimentary rocks of Quaternary age, near the rivers [1]. To present the main geomorphological features on Cotentin peninsula are the three natural regions: hills and valleys of western Normandy, sedimentary Normandy and costal Normandy. The hills and valleys are mainly a part of the Armorican Massif. Sedimentary Normandy is a geological continuation of the Parisian Basin and the costal Normady is a product of two very different geological bases. So both are presented at Norman coast, the Armorican Massif is where we can find high shore whilst the Parisian Basin is where the coast is sedimentary, full of dunes and low [2]. The sedimentary Normandy is full of plains, but they are flat because the erosion made its course. To the west the relief of the peninsula starts to rise and the main features here are hills and valleys. It is common that the reefs are interrupted with the marshlands [3]. Furthermore, we can recognize five coasts in Normandy, but these are not natural regions. They were code names while planning the operation Overlord but they became very useful for describing Normandy, therefore we are going to use them as well. On Norman coast from east to west there are: Sword, Juno, Gold, Omaha and Utah beach (first three are also known as Britain sector, last two as American sector). At Sword beach the first important thing is the Orne river estuary. It's very important because estuaries are really easy to cross. Also ports are normally situated there [4]. After that, the Sword beach is sedimentary full of parallel dunes, on the backshore the beach ends with a bigger back dune, which is normally covered with primal vegetation. But not the whole of Sword beach is sedimentary. Near the city of Lion-sur-mer the coast starts getting higher with cliffs.

Foreshore underneath the cliffs is primarily consisted with the sediment which is the widget of cliff [5]. Juno beach starts with cliffs that continue from Sword beach. Where cliff shore ends, the sedimentary shore starts. On the backshore there is a dune without a nice and round top, and is also covered with some vegetation. Further along the Juno beach we can again recognize river Le Seulles estuary [5]. The next coast is the Gold beach and as the name suggests it is covered with golden sand. This beach is probably the most flat beach in Normandy and it also does not have a lot of micro features. We can recognize some back dunes and really small parallel dunes. But along the shore there have risen some cliffs. The reason is in geology, because on this beach there is contact between different rocks. Near the city of Aromanches-les-Bains we can see the cliffs around the sedimentary coast. At Gold beach there are also phenomena of dead cliffs and terraces made from cliffs [6]. The high shore with cliffs goes further on the American sector. First, at Omaha beach we can observe high cliffs that are slightly covered with vegetation.

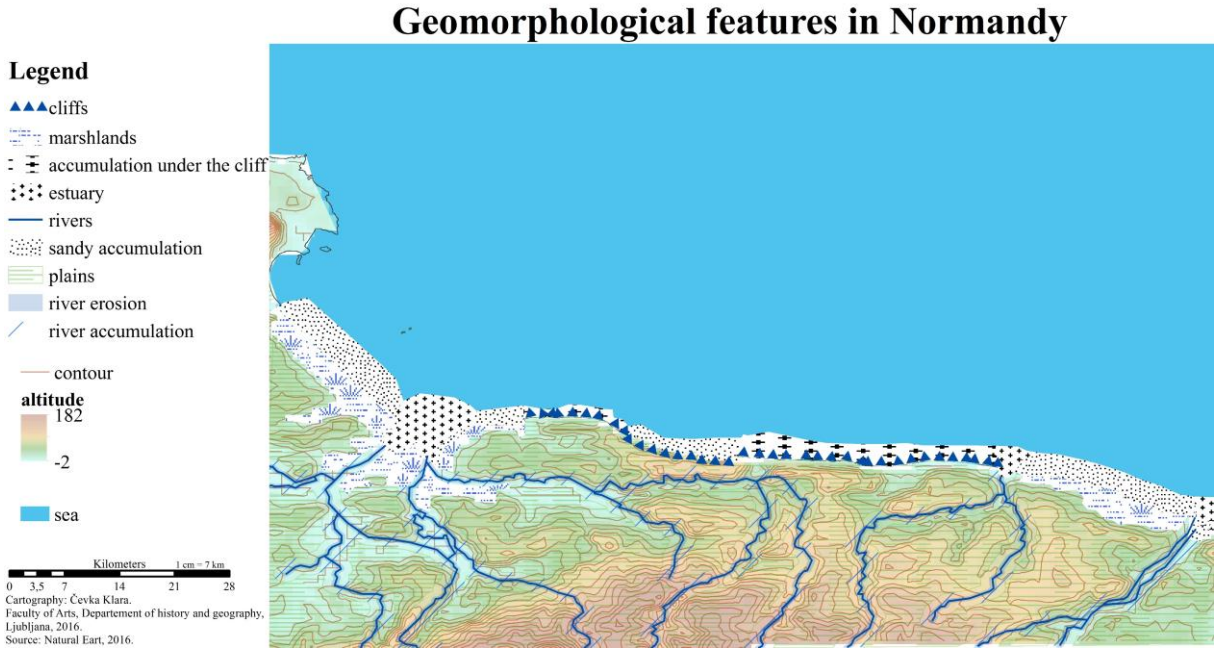
When the coast encounters softer bedrock shore, it is accumulated with the sediment. At Point-du-Hoc we can observe one of the most beautiful features of Norman coast, the natural bridge. The last coast is Utah beach and it is an accumulated coast made of sediment. The beach starts with huge estuaries of the two rivers Douve and Vivre. Further west, the cost is sedimentary and the most common features here are huge back dunes, which are also cliff-top dunes [7].

THE INVASION OF NORMANDY

Operation Overlord was the code name of the operation for liberating the whole Western Europe. The first phase of the operation Overlord was operation Neptune. Operation Neptune was the code name for the allies' landings and the first few weeks of the invasion. Officially the invasion started at night, between the 5th and 6th of June when the allies' air forces landed on the beaches. The units landed later that morning. On American sector, the landing started an hour before the landings on the Britain sector, the reason for that is the difference between the tides. The allies' attacked the German Atlantic Wall, which was defended by field marshal Römmel. The allies' attack was led by General Eisenhower. The first phase of the attack was in the hands of American and British air forces. On the west side, the American 82nd and 101st airborne division landed with an assignment to clear the area for the landings of infantry divisions. On the eastern side the British gliders landed with the assignment to take over two bridges. Meanwhile the German defence system on the beaches was led by field marshal Römmel. A few weeks before the landings took place on Normandy shore, he decided to improve the German defence system there. The reason for that decision was the assumption of German generals who thought there would be two invasions, one further north at Pas-de-Calais, which is the closest point of the continent with Great Britain, and one second, smaller in Normandy [8]. The main problem during the battle for Normandy were the differences between the tides, currents and winds. The problem on the German side was in Command, because all the commanders were directly under Hitler and they did not dare to move the troops without his permission [9].

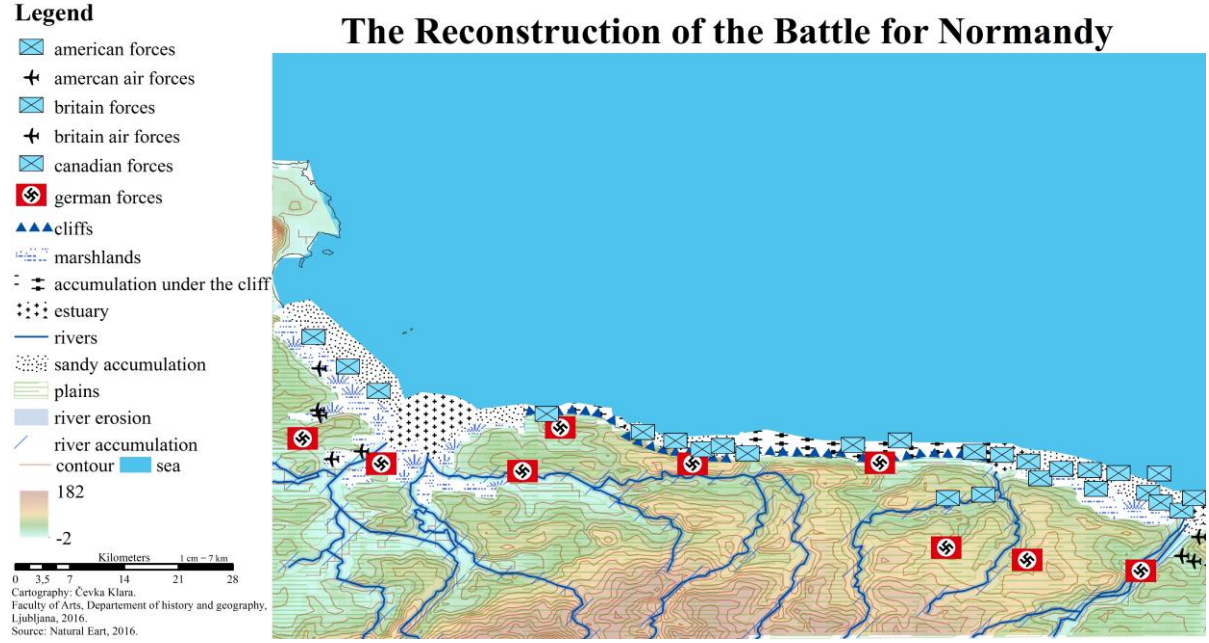
THE RECONSTRUCTION OF THE BATTLE FOR NORMANDY

We used GIS systems to reconstruct the battle for Normandy. From the maps we can see that basic geographic knowledge was used in planning the invasion itself at allies' side. The army uses some of the geomorphologic features to take cover and to defend itself while on shore. We got some of the data on the web, but the historical data were mainly drawn by using geoprocessing. The maps will show us, if the military tactics is adjusted to the features on the coast. Some of the adjusting took place during the planning of the invasion and these adjustments are also described in the bibliography.



Map 1: Geomorphological features on the landing beaches

On the first map we can see the features, which influenced the most during the invasion. On the other hand the two main reasons which also influenced a lot on the data and time of the allies' invasion, these are the tide and the moon, are not visible on the map. These features influenced the most on the tactics and also on the decision, why choosing Normandy as a place of the most important battle in history. Allies' chose Normandy as a place of the battle because she has sandy beaches, few ports and good outputs inland. Also from the city Caen on there is a road straight to Paris. The other reason was also in the position of the German defence system here. The Atlantic Wall was not fortified like near Pas-de-Calais, where the German forces expected the invasion to take place. From the allies' point of view the main problem was getting the army from the ships inland. Because when they land, the troops are without cover until they got ashore. It is also important to know that the first wave of the troops had the assignment to clear the area until the reinforcements arrived.



Map 2: The Reconstruction of the Battle for Normandy

On the second map there are locations of the divisions that landed on the shores of Normandy on the 6th June. First air forces landed in Utah Beach and Sword Beach. After that, the infantry divisions landed in the first wave and cleared the area before the reinforcements arrived. We can see that the infantry divisions landed mostly on the beaches with sandy accumulation, where it's clear that the entrance inland was to make a beachhead. There are some of the Special Forces which landed near the cliffs. Probably the most famous one, is the division that landed on Point-du-Hoc and climbed their way to the beach. There is a good reason why they decided to land on the sandy beach, where there's little to no cover. It is because the beachhead was easily taken over. The problem was, that the enemy could open fire at the army, when they wanted to walk their way inland. The Germans also used their defences inland. Because they used marshlands and flooded them, so that the progress of the allies' was more difficult.

CONCLUSION

With the help of the GIS, we can confirm that the using of Normandy for the decision to invade was in fact a good idea, because the geographical features actually allow the allies to get to Paris without a big port. German forces in Normandy faced a lot of problems so their defences were not so strong. We could not reach all the goals because we could not get all the data about the plans of the battle. The problem was with getting the military data of American forces, because they are not available on the web. So we used the data got in the books and some of them on the web. But most of the data used on the maps were geoprocessed from the paper maps. All the geographical data was taken on the field work, using GPS and then they were processed with the ESRI ArcGIS so that we got the maps in the article. The last hypothesis was confirmed with bibliography, because we cannot only use geographical frame work if that is the best decision, regarding the place of the invasion. We need to take into the account that an army cannot just go anywhere, it needed to be close enough and it also needed to be unsuspicious. The planning staff had to decide also from subjective point of view. So if we think about it the geographical features in Normandy were not ideal but they were the best they had. Cotentin peninsula was close to Great Britain, it had good ports, satisfactory beachhead and output in the hinterland. And the most important of all German defence system was not as fortified as it could have been. But at the same time the allies' underestimated the German defence system in Normandy, because on the 6th of June almost none of the goals from each of the division was not take in the time they thought it would be. With these analyse we can confirm that the allies' did adjust to the geographical features. The invasion had to be massive and destructive. The military tactics was infect adjust to the geomorphological features but not as much as it would be in a 1st world war, because all the new military technology allowed this. We can also say that the decision to invade on Omaha Beach, where the great massacre occurred, was not the best decision, because also the geographical features on the coast do not allow best cover and the German defences were really good there, because field marshal Römmel was in charge for Omaha Beach and he fortified it. But on the other hand if there would not be an invasion on Omaha the loophole between the American and British sector would be too big. We can confirm that the relief on the Norman coast and the military tactics goes hand in hand, and that the planning staff also took it into the account while planning the invasion. But for further analysing we would need more data on the plans of the invasion itself and actual course of the battle. But we also need to take in to the account that not only geography but also the military strategy decisions are important while. In future we need to use GIS system more often to present the battles, so that we can get a real decision on what is important and also it is easier to present the battles with the graphical work rather than words.

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