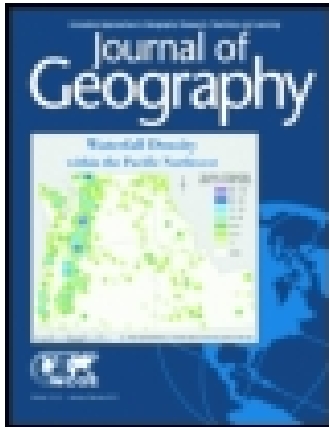


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THE WEATHER FACTOR IN THE GREAT WAR, VII SPRING AND SUMMER, 1917

By ROBERT DE C. WARD
Harvard University, Cambridge, Mass.

(Concluded from October)

THE BALKAN CAMPAIGN

During March and April much cold, unfavorable weather, with heavy snows, especially in the mountains, prevented extended military movements, although local fighting continued. In the latter part of April (28th) snow 6-8 ft. deep was reported in the mountains, snow falling at the greater elevations and rain in the valleys. Even May brought a fair share of foul weather, and much fog. The latter was used on at least one occasion (May 19) as a cover for a Bulgarian attack near Lake Presba. A British despatch from Salonika, June 19, stated that "owing to the advent of the malarial season, troops east of the Struma were somewhat withdrawn."

THE RUSSO-TURKISH WAR ZONE

There is practically nothing to report. The heavy winter snowstorms which hindered operations all through the colder months, continued well into the spring in this mountainous and elevated region. An interesting despatch dated March 17 reported: "The forward movement of our (Russian) troops is proceeding under exceedingly difficult conditions. Passages which have been cut through snow that is often higher than a man on horseback are frequently filled up again by the furious snowstorms. Owing to the absence of villages, our troops have to shelter themselves at night in caverns made in the snow." The breaking down of the Russian offensive, here as elsewhere, put a stop to military activity of importance.

THE CAMPAIGN IN MESOPOTAMIA AND PALESTINE *

In the House of Commons on Mar. 12, 1917, Mr. Bonar Law, in announcing the fall of Bagdad, said: "Notwithstanding heat and dust the British made a brilliant march toward Bagdad." The pursuit of the Turks "was conducted in a country destitute of supplies, despite the commencement of summer heat." Gen. Maude reported that "during the recent fighting, fierce gales and

* The Mesopotamian campaign was, during the spring of 1917, extended by the British forces into Palestine.

blinding dust storms, the lack of water away from the river, and the vigorous pursuit, made the operations arduous." †

Late in March (31st) the British and Russian troops, in their converging march toward Khanikin, had difficulty because of wet snow. Great difficulty has from the first resulted from the aridity of Mesopotamia. The former canal system has long ago fallen into disuse. Water can only be obtained from the rivers, and many of these dry up completely in the hot summers. Lack of water was also a serious difficulty in Palestine, into which region the war was carried by the British in the spring (1917). The season selected for this invasion was the most favorable, for after the winter rains there is then the most abundant fodder for the animals; occasional showers refresh the ground; the heat is not as intense as later in the year. Water and provender are more abundant in the north than in the southern sections. On Apr. 2 Mr. Bonar Law, in the House of Commons, said that the operations against Gaza were most successful, and if it had not been for a fog, which delayed the attack, and a shortage of water, complete disaster would have overtaken the Turks. And Major Gen. F. B. Maurice, on Apr. 5, said that complete British success was only prevented by "a thick seven hours' sea fog." An unusual occurrence was reported on April 10, when British fighting in Mesopotamia "had to be temporarily suspended owing to a mirage, but upon this lifting, our offense continued." The intense heat constantly interfered with the activity of the troops. On Apr. 13 the heat "rendered the task of keeping in touch with the retreating enemy difficult." A Constantinople despatch (Apr. 26) reported that Turkish (?German) airmen on the Sinai front totally destroyed the water supply system which the British had constructed for their troops.

As a whole it is evident that both British and Russians did their best (until the Russian Revolution demoralized the troops) to bring the campaign in Mesopotamia and Palestine to a successful conclusion before the intense summer heat and lack of water made operations more difficult, if not impossible. The preparations were far ahead of those of 1916. Ice plants; refrigerating barges for meat; hospital ships with complete electrical equipment for lighting, cooling and ventilation; transportation, etc., were all carefully planned for. "The soil, the rain, the climate, the floods, the flies and the heat combine to make the conduct of a campaign in the Tigris valley during the summer months a task of stupendous difficulty. These difficulties are being tackled

† A despatch dated March 17 notes the withdrawal of the Russian troops to a town on the Persian border north of Bagdad on account of the heat, which made a retreat to the mountains advisable.

and overcome with success." There could be only very slight activity during the hot season. One of the few reports (July 11) mentions a British advance which was broken off owing to the extreme heat. A despatch of July 12, dated Washington, notes Turkish preparation for a campaign for the recovery of Bagdad when cooler weather sets in in the fall. "The heat in Mesopotamia at present makes a campaign on a grand scale almost impossible."

THE WAR IN EAST AFRICA

Emphasis upon the extraordinary difficulties caused by the rainy season, and upon the injurious effects of the tropical climate upon the white troops are the two striking facts in the East African reports. Lieut.-Gen. Smuts (Mar. 12) said: "I have found the white troops were unable for any length of time to stand the climate The operations . . . will be undertaken by native troops whom I have trained Fever, even during the dry season, is deadly to Europeans." The rains are reported to have been unusually heavy, "wettest in 9 years"; "of a character quite unusual in intensity. The heavens came down in floods; rivers filled up; bridges were washed away; large parts of the country became swamps and lakes." For many weeks the army in the interior was cut off from its base. Thousands of white men were sent to Cape Town to recuperate. "Months will elapse before a large proportion of these will be in shape to return to the front." On May 29, the "exceptional rainy season" was reported at an end. The improved weather brought a renewal of military activity.

THE WAR IN THE AIR

On Mar. 13, Mr. James Ian Macpherson, Parliamentary Secretary to the Under Secretary of State for War, said: "During the winter all the belligerents endeavored to improve and to increase their air service. With the advent of good weather severe contests must be expected." Aerial activity has see-sawed with the weather, low clouds and gales interrupting reconnaissance work and fighting; fine spells leading to greatly increased activity. Yet stormy weather, with high winds, is obviously less and less of an obstacle to war flying. Even thunderstorms have not prevented flights. On April 10 the airmen flew though the day was anything but ideal. "It was blustery from sunrise to sunset, and furious snow-squalls were in the air at half-hour intervals. During these the machines were completely submerged by the snow barrage." The latter is a new term in military meteorology. Despatches have frequently mentioned the use, by

the Germans, of clouds for concealing themselves, or "digging themselves in." The German aviators seem to have been especially trained in the defensive use of clouds. This point adds emphasis to a study of cloud types, and their conditions of formation, on the part of our aviators. The Germans "lie in wait high above fleecy clouds, and dart upon isolated Allies' machines; avoiding open conflicts when possible. The Germans attain their best success when there are clouds. Hence the British and French airmen hope for cloudless days." Several British machines were caught in a sudden severe thunderstorm on July 30, and four were lost. During the British attack in the vicinity of Lens (August), aerial operations were carried on at times when "more unfavorable weather could hardly have been selected." On Aug. 10 strong westerly winds and thick clouds made it difficult to engage the enemy's machines. These westerly winds "greatly favored the enemy," forcing some British aeroplanes to land behind the enemy lines, i. e., to leeward. A similar condition was noted on Aug. 18, when twelve damaged machines were unable to reach the British lines, and on other days.

There have been numerous German Zeppelin and aeroplane raids on England. Most of these were made under weather conditions so favorable that it is clear, as it has been since the war began, that the German military meteorological service has been doing good forecasting. Usually the weather has been fine, with light winds, but hazy, so that the German airships could not be seen distinctly. On one occasion (May 23) the sky was overcast, and a thick bank of rain clouds made it possible for the raiders to escape. On another (June 5) a strong east wind was against the Germans on their return, but the haze and light clouds favored them. On another, before the start, as one of the Germans reported, the meteorological expert was consulted as to the probable weather. He replied: "Splendid; it could not be better." There was, as usual, a faint haze and light winds, such as anticyclonic conditions over the North Sea will give. On Aug. 18 a German air squadron flew over Dutch territory. Holland protested, and Germany replied that the airships had lost their way in the thick clouds.

The effective use of aircraft against submarines depends upon the possibility of seeing the U-boats from a considerable altitude. The foam in the wake of the periscope usually indicates the position of the vessel. Hence clear weather and calm water are the best conditions for the attacking aeroplane. In stormy weather it is difficult, if not impossible for an aerial observer to detect the wake of the periscope. On the other hand,

rough weather is unfavorable to the operation of submarines. The higher the observer in the air, the greater his range of vision, but the greater also the difficulty of seeing the object of the search.

THE WAR AT SEA

A British naval attack was made on Zeebrugge in a fog ("mist") and the German batteries were therefore unable to do effective work owing to the fact that the British vessels were concealed. In connection with the arrival of our own destroyers in British waters it is to be noted that our navy has been largely a "warm weather navy," the winter cruises having been mostly in the West Indies. The men were not properly equipped for cold weather, and were supplied, according to the despatches, with warm clothing on their arrival in England. The Navy Department also took steps to provide them with suitable clothing for the winter, which is stormy and cheerless in the waters north of Europe.

MISCELLANEOUS

The effect of weather upon crops is, indirectly, of military importance. Germany seems to have experienced a prolonged drought in May and June with "intense heat." Berlin reported the hottest June 17 in 70 years. Cattle suffered; and much damage was done to fruit, vegetables and other crops. Forest fires were common.

Harvard University, Sept. 1, 1917.

FRUIT GROWING IN MICHIGAN

By HAZEL M. KETCHAM

Grand Rapids, Mich.

CLIMATIC CONDITIONS

THE fourteen counties of Western Michigan that border on Lake Michigan and reach from the Indiana state line to the Straits of Mackinac form one of the great fruit belts of the United States. In this belt are raised apples, peaches, apricots, pears, plums, prunes and many varieties of small fruits.

The latitude of the southern peninsula of Michigan and that of Wisconsin are almost the same and yet in Wisconsin very little fruit is raised, while in Michigan there is a great abundance. This great difference is mainly caused by the difference in the position of the two states relative to the Great Lakes.

The winter winds in these states are chiefly from the west and northwest and in passing over Lake Michigan they are raised in temperature from ten to twenty degrees, because a large body of