

Endnotes Version

The Treachery of the Climate:

How German Meteorological Errors and the Rasputitsa
Helped Defeat Hitler's Army at Moscow

David W. Rolfs
Professor Schaberg
Special Topics in History: World War II
HIS 2930
September 30, 2010

It was the third year of the Second World War, and it increasingly looked as though Hitler's vision of a Third German Reich ruling continental Europe and the vast expanses of the East was about to become a reality. Germany's soldiers believed they were invincible, and recent events seemed to prove them right. The Nazi juggernaut had already overrun Poland, Norway, Denmark, Belgium, the Netherlands, Luxembourg, France, Yugoslavia, and Greece. Then, on June 22, 1941, Hitler ordered his armies to mount Operation Barbarossa, a mammoth invasion of the Soviet Union: the last major power in continental Europe capable of resisting the Nazis.

Hitler intended to crush the Russian colossus using the now well-proven tactics of the *Blitzkrieg*, a revolutionary new form of "lightning warfare" that employed modern weapons like tanks, motorized infantry, and dive-bombers to rapidly smash through the enemy's defenses, drive deep behind his lines, and cut his armies off from their headquarters and supply centers. Initially, it was the best Blitzkrieg yet; Nazi armies advanced 400 miles into the Soviet Union and killed, wounded, or captured over a million and a half Russian soldiers. By the end of August, the Germans stood within easy striking distance of Moscow: Russia's capital and most important political and transportation center. When their armies subsequently turned south, capturing more than half a million additional Russian prisoners near the city of Kiev, British and American military observers reported that Russian resistance was about to collapse: Hitler was on the verge of winning the war in Europe.¹

In September, Hitler issued Führer Directive No. 35, ordering Army Group Center, the largest of the three German army groups operating in Russia, to begin making preparations for a final, all-out offensive against Moscow.² Code-named Operation Typhoon, the goal of this campaign was to annihilate the Russian armies defending Moscow "in the limited time" that remained "before the onset of winter weather."³ Typhoon was a relatively simple plan. German

Summary

**Fragmentary quotation
incorporated into
surrounding text**

tank groups would rapidly surround and destroy the best remaining Russian armies deployed in front of Moscow and then proceed to encircle and besiege the enemy capital. Over seventy-eight divisions were allocated to the operation, and to ensure its success, almost a third of these were the elite motorized and tank divisions ideally suited for Blitzkrieg warfare.⁴ The attackers would also be well supported from the air by nearly a thousand German fighters and dive-bombers.⁵ Inspired by the opening words of Hitler's order on the day of attack, "Today begins the last decisive battle of the year," German soldiers believed that just one more successful advance to Moscow might successfully end the war in Russia.⁶

Website citation for a specific article or page with no author

Time was crucial to the entire operation as Hitler hoped his armies could advance the last 200 miles to Moscow before the winter weather arrived. As General Guderian, the commander of one of the lead tank formations, explained, "It all depended on this: would the German Army, before the onset of winter and, indeed, before the autumnal mud set in, still be capable of achieving decisive results?"⁷ Weather was clearly a critical factor in the campaign, but in their planning, the Germans completely underestimated the extreme challenges posed by Russia's climate. German meteorological errors and, above all, the Russian *Rasputitsa*, or infamous "mud season," played a decisive role in the defeat of the Nazi attack on Moscow.

Direct quotation with author tag

Thesis

While the extraordinarily resilient Red Army and Georgy Zhukov, the general hand-picked by Stalin to oversee Moscow's defense, deserve the bulk of the credit for the Russian victory, they received vital assistance from Generals "Mud" and "Winter." For this, Hitler could blame only himself, as it was his personal intervention in the German military's operational planning that produced this predicament. In late August, against virtually all his generals' advice, Hitler made the fateful decision to redirect Germany's tank armies away from Moscow when it was ripe for the taking to destroy the enemy armies defending southern Russia. The Soviet ruler,

Joseph Stalin, took advantage of this brief window to massively reinforce the Russian line in front of Moscow. The most important consequence of Hitler's interference in the original plan, however, was that by postponing the attack from early September until October, his advancing armies would now have to contend with Russia's Rasputitsa mud season as they maneuvered into position to administer the coup de grace to the Red Army and capture Moscow.⁸

Online article
without author tag

In their pre-invasion planning, the German high command placed great stock in the meteorological predictions of one of Germany's most successful pre-war weather forecasters, Franz Bauer, who predicted a mild or normal 1941-42 winter in Eastern Europe. Pre-war Germany possessed little information on Russia's climate, so Bauer based his long-range "scientific" forecast on a curious bit of *deductive* reasoning. Since the preceding three winters had been unusually cold, and there had never been four consecutive cold winters in the 150 years such records had been kept, Bauer predicted the 1941-42 winter would be mild. As sometimes happens with such long-range forecasts, he erred, and the resulting winter was one of the earliest and severest to date.⁹

Paraphrase
without author tag

German meteorologists also either disregarded or were unaware of the extensive local cultural and historical references to Russia's Rasputitsas. Although German forecasters did possess meteorological data on western Russia's annual precipitation rates, they completely misinterpreted its significance. Since pre-invasion precipitation tables suggested western Russia received its greatest rainfall in August, German forecasters concluded that Russia's dirt-based roads would be muddier and more difficult to negotiate in August than in October. They had, however, completely ignored evaporation rates in their calculations, which in the Moscow region were dramatically higher in the summer than during the cooler, overcast days of fall. These much

lower fall evaporation rates meant that even moderate levels of precipitation would leave the soil saturated and that October was, thus, much more likely to be the “mud season.”¹⁰

Hitler also contributed to Germany’s weather-related crises when he failed to heed his military advisors’ and meteorologists’ advice and—despite supposedly being an avid student of history—willfully ignored the historical role Russia’s climate had played in the defeat of Napoleon’s army when it, too, had invaded Russia in 1812. Hitler had been forewarned. When he first proposed invading the Soviet Union in the fall of 1940, Hitler had reluctantly postponed the attack, in part because a military advisor had warned him about the difficulties of mounting an offensive during Russia’s spring and fall Rasputitsas.¹¹ Then, after the invasion was finally underway, Hitler himself had cited meteorological reports about the Moscow region’s mid-October rainy season coming later than southern Russia’s when defending his decision to divert Germany’s armies south to capture Kiev before attacking Moscow.¹² Determined to surround or capture Moscow before the onset of winter, however, Hitler now ignored these inconvenient meteorological facts, dismissed his staff’s concerns about the weather, and forbade them from even discussing Napoleon’s catastrophic winter retreat from Moscow.¹³ Exasperated when German forecasters presented him with a historical weather chart containing data from the French 1812-13 Russian campaign, the Führer complained that now even “these damned meteorologists . . . are talking about Napoleon.”¹⁴

Try as they might, in the end, even Hitler and his seemingly invincible war machine could not ignore the harsh realities of Russia’s climate. When Operation Typhoon began on September 30, 1941, however, everything initially seemed very promising. The German tank columns rolled out under a brilliant blue autumn sky and taking advantage of the ideal flying conditions, Nazi dive bombers pummeled the Soviet defenders from the air. After advancing

Note: Use “Ibid.” for subsequent citations of the same source

“Quoted In” Example: Used when original source is unavailable

more than a hundred miles, the German spearheads linked up, surrounding the main Russian armies defending the western approaches to Moscow. Although heavy fighting continued in these pockets, by early October the northern-most German spearheads were poised just seventy miles west of Moscow.¹⁵

Stripped of its principal defenders, Stalin's handpicked general, Georgy Zhukov, questioned whether Moscow could be successfully defended: "It was an extremely dangerous situation," Zhukov said; "all the approaches to Moscow were open."¹⁶ "Did the commanders have confidence we would . . . be able to halt the enemy? I have to say frankly that we did not have complete certainty."¹⁷ On the German side, the high command expressed its confidence that Moscow could be successfully surrounded and besieged before winter. The chief of operations, General Alfred Jodl, crowed, "We have finally and without any exaggeration won this war!"¹⁸

Then the heavens broke. On the night of October 6-7, snow fell on the southern German spearhead and was subsequently followed by nearly a month of cold rain, mixed with snow, across the entire Moscow front.¹⁹ A seasonal shift in the regional storm track had begun pushing a series of Scandinavian Cyclones into the greater Moscow region.²⁰ These intermittent snow and rain squalls, driven by strong, northeastern winds, frequently grounded the two German air fleets supporting the offensive.²¹ More ominously, when coupled with the much lower fall evaporation rates, this steady wintry mix gradually turned the area's few existing roads into quagmires.

The sudden arrival of the fall Rasputitsa severely impeded the advance of the German motorized units. As Guderian later described:

The first snow of the winter fell. It did not lie for long and, as usual, the roads rapidly became nothing but canals of bottomless mud, along which our vehicles could advance only at snail's pace and with great wear to the engines. . . . The next few weeks were dominated by the mud. Wheeled vehicles could only advance with the help of tracked vehicles. These latter, having to perform tasks for which they were not intended, rapidly wore out. . . . Preparations made for the winter were utterly inadequate.²²

Note: Run-in quotations always need a proper lead-in that introduces the author and/or context

Block quotation with author tag

Vehicles sunk to their axles in the thick goo and had to be manually extracted with huge teams of horses or soldiers, and German mechanized units that had been driving up to eighty miles a day in September were now lucky if they could advance five.²³ Divisions dependent on draft animals for the movement of their supplies and heavy weapons came to a standstill when their horses died of overexertion while struggling to extract the equipment from the mud. Moscow beckoned, only fifty miles away, but as Luftwaffe staff officer General Hoffman von Waldau lamented, “Our wildest dreams have been washed out by rain and snow. . . . Everything is bogged down in a bottomless quagmire.”²⁴

On October 30, the German high command acknowledged the inevitable and temporarily suspended the offensive until the first winter frosts hardened the ground. Army Group Center planned to use the pause to replenish and re-equip its fighting formations in preparation for a renewal of the Moscow offensive, but the Rasputitsa had a catastrophic impact on the Germans’ ability to replace and re-supply their troops.²⁵ The army group had suffered two hundred thousand casualties since the beginning of the Russian campaign, and Guderian’s tank corps had lost all but fifty of its original 350 tanks.²⁶ Still clad in their lightweight summer uniforms, German soldiers were exhausted and suffering from a variety of respiratory illnesses after their arduous mud marches through rain, sleet, and snow.²⁷ The Germans desperately needed to rest, feed, resupply, and properly equip their troops for winter, but thanks to the Rasputitsa, their overtaxed logistics and supply network completely broke down.

Since the beginning of the Nazi invasion, the German transport and supply services had been plagued by a critical shortage of trains and trucks for moving and supplying their troops and by this equipment’s high rate of mechanical failure in Russia. With the arrival of the Rasputitsa, these problems only worsened. The sudden temperature plunges accompanying the fall storms

Note: Use ellipses to indicate words/sentences omitted from quote

severely damaged the elaborate external piping on the more technologically sophisticated German locomotives, significantly reducing the number of engines available for transport assignments.²⁸ The loss of these locomotives had a catastrophic impact on the Germans' ability to supply their troops.²⁹ For example, while Army Group Center required the daily shipment of thirty-one trainloads of supplies to sustain its offensive, after the arrival of the Rasputitsa, the number of daily trains actually arriving plummeted to twenty on October 11, and then only sixteen on November 6.³⁰ During major snow events, none of the trains arrived.³¹

Paraphrase with multiple citations

Russia's primitive road network also proved utterly inadequate for supporting the German offensive during the Rasputitsa. Over seventy German divisions had to share just three roads between them, and the only paved road quickly crumbled under the weight of the traffic. With the arrival of the Rasputitsa, travel on these damaged roads became a nightmare. Vehicles lurched through the muddy morass at a maximum speed of twelve miles per hour, consuming twice as much of the dwindling fuel supplies, and the larger trucks frequently bogged down.³² The appalling road conditions also dramatically increased the vehicles' rate of mechanical failure. By November 1, two-thirds of the German trucks were broken down, and the Rasputitsa had stymied the Germans' best efforts to resupply their Moscow attack force.³³

The loss of more than half the trains and trucks that delivered its supplies crippled Army Group Center's future offensive operations in the campaign. For example, according to historian Alfred W. Turney, the very armies Hitler was depending upon to make a final Herculean effort to surround Moscow were now limited to only a few gallons of fuel per vehicle, their ammunition and food was severely rationed, and they failed to receive either any significant replacements and reinforcements or winter uniforms and supplies.³⁴ It was, thus, hardly surprising that when the German offensive resumed on November 17, it made little headway and quickly petered out on

Paraphrase with author tag

the outskirts of Moscow. Stalin had used the month-long reprieve of the Rasputitsa to strongly reinforce the Moscow front with over 100,000 additional troops, including a sizable contingent of hardy Siberian troops, well-accustomed to fighting in freezing weather.³⁵

Physically exhausted and malnourished, Germany's inadequately dressed soldiers froze when the full fury of the Russian winter hit on December 5, and the temperature subsequently plunged to a staggering -40°F.³⁶ Over one hundred thousand German soldiers had fallen out ill during the month-long Rasputitsa, and now the rest of the army paid the price for its leaders' ignorance of Russia's climate and the desperate plight of their troops. Between the first week of December and early March, Army Group Center suffered frightful losses: over 256,000 dead and 350,000 sick or hospitalized with winter-related maladies such as frostbite.³⁷ On December 5-6, Stalin launched a fierce winter counteroffensive, and Germany's physically broken grenadiers hastily retreated; the myth of the invincible German army was forever shattered.³⁸

Hitler blamed his generals for the failure of Operations Barbarossa and Typhoon and immediately sacked several dozen top commanders, but the Führer and his meteorologists bore greater responsibility for the German defeat.³⁹ More than any other factor, however, it was the Rasputitsa that halted the Moscow Blitzkrieg in its tracks and sabotaged the Germans' resupply effort. As Guderian observed that fateful fall, "We have seriously underestimated the Russians, the extent of the country and the treachery of the climate. This is the revenge of reality."⁴⁰ By impeding the Nazi plan to decisively defeat the Red army before the onset of winter, the Russian Rasputitsa played a critical role in the Nazis' ultimate defeat.

Citation for YouTube and
Historical Cartoon Sources

Conclusion

ENDNOTES

1. Bethell, *Russia Besieged*, 189.
2. Cooper, *The German Army*, 328-329.
3. Quoted in *Ibid.*, 328.
4. *Ibid.*, 329.
5. History Learning Site, "Battle of Moscow"; Bauer, *World War II*, 180.
6. Quoted in Turney, *Disaster at Moscow*, 98.
7. Guderian, *Panzer Leader*, 226.
8. Hooker, "World will Hold," The Panzers Advance.
9. Neumann and Flohn, "Great Historical Events," 620-621; Irving, *Hitler's War*, 428.
10. Neumann and Flohn, "Great Historical Events," 624.
11. *Ibid.*, 625.
12. *Ibid.*, 624; Irving, *Hitler's War*, 401-402.
13. *Ibid.*, 429; Neumann and Flohn, "Great Historical Events," 620, 625.
14. Quoted in *Ibid.*, 625.
15. Bethell, *Russia Besieged*, 163.
16. Quoted in Ewers, "Stalin's top general admits."
17. Quoted in "Soviet commander admits," *Telegraph.co.uk*, May 5, 2010.
18. Quoted in Irving, *Hitler's War*, 420.
19. Turney, *Disaster at Moscow*, 105.
20. Neumann and Flohn, "Great Historical Events," 626; Lejenäs, Harald, "The Severe Winter in Europe," 272-274, 279-281.
21. Bekker, *Luftwaffe War Diaries*, 325; Bauer, *History of World War II*, 183.
22. Guderian, *Panzer Leader*, 233-234, 237.

For sentences derived from two or more important sources, the sources should be grouped together under one citation, and separated by semi-colons. Avoid overuse.

23. "Russia, Pulling Out a Car," Photo; Guderian, *Panzer Leader*, 216; Cooper, *German Army*, 331.
24. Ibid.; Quoted in Irving, *Hitler's War*, 428.
25. Turney, *Disaster at Moscow*, 137.
26. Ibid., 128; Bauer, *History of World War II*, 182.
27. Turney, *Disaster at Moscow*, 128.
28. Irving, *Hitler's War*, 437.
29. Guderian, *Panzer Leader*, 249.
30. Turney, *Disaster at Moscow*, 112; Cooper, *German Army*, 331.
31. Neumann and Flohn, "Great Historical Events," 629.
32. Guderian, *Panzer Leader*, 244; Cooper, *German Army*, 311.
33. Cooper, *German Army*, 331.
34. Turney, *Disaster at Moscow*, 136-137.
35. History Learning Site, "Battle of Moscow"; The History Place, "Defeat of Hitler."
36. Neumann and Flohn, "Great Historical Events," Table 1; Bethell, *Russia Besieged*, 170, 194; Turney, *Disaster at Moscow*, 136.
37. Cooper, *German Army*, 336-337.
38. "Barbarossa Jun-Dec1941 (part 5/5)"; Yfimov, "Myth of the Invincibility."
39. Cooper, *German Army*, 344-345.
40. Quoted in Bauer, *History of World War II*, 185.

BIBLIOGRAPHY

- Bauer, Eddy, Colonel. *The History of World War II*. Edited by General James L. Collins, Jr., and Correlli Barnett. New York: Galahad Books, 1979.
- Bethell, Nicholas and the editors of Time Life. *Russia Besieged*. World War II 6. Alexandria: Time Life Books, 1980.
- Cooper, Matthew. *The German Army 1939-1945: Its Political and Military Failure*. New York: Bonanza, 1984.
- Ewers, Justin. "Stalin's top general admits Germany nearly defeated Russia at Moscow." *World War II* 25, no. 3 (Sept./Oct., 2010): 10-11. Academic Search Complete (52847837).
- Guderian, Heinz, General. *Panzer Leader*. Translated by Constantine Fitzgibbon. Reprint of the 1952 edition, with a foreword by Captain B. H. Liddell Hart. Washington D.C.: Zenger Publishing, 1979. Page references are to the 1979 edition.
- The History Learning Site. "The Battle of Moscow." Accessed August 15, 2010. http://www.historylearningsite.co.uk/battle_for_moscow.htm.
- The History Place. "Defeat of Hitler: Attack on Russia – June 22, 1941." Accessed August 15, 2010. <http://www.historyplace.com/worldwar2/defeat/attack-russia.htm>.
- "Hitler's Germany Invades Russia Pt 11 -12." YouTube. Online Video Clip, 10:00. Accessed November 5, 2010. http://www.youtube.com/watch#!v=WS50_xx80-M&feature=related.
- Hooker, Jr., R. D. "'The World Will Hold Its Breath': Reinterpreting Operation Barbarossa." *Parameters: US Army War College* 29, no. 1 (Spring 1999): 150-165. Academic Search Complete (1708934).
- Irving, David. *Hitler's War*. Condensed edition. New York: Avon Books, 1990.
- Lejenäs, Harald. "The Severe Winter in Europe 1941-42: The Large Scale Circulation, Cut-off Lows, and Blocking." *Bulletin of the American Meteorological Society* 70, no. 3 (March 1989): 271-281. AMS Journals Online. Accessed August 10, 2010. <http://journals.ametsoc.org/doi/abs/10.1175/15200477%281989%29070%3C0271%3ATSWIET%3E2.0.CO%3B2>.
- Mulholland, John. "Axis Order of Battle 2 Oct 1941 – Operation Typhoon." *Axis History Forum*. Accessed August 25, 2010. <http://www.axishistory.com/index.php?id=6470>.
- Neumann, J. and H. Flohn. "Great Historical Events That Were Significantly Affected by the Weather: Part 8, Germany's War on the Soviet Union, 1941-45. I. Long-range Weather Forecasts for 1941-42 and Climatological Studies." *Bulletin American Meteorological*

Society 68, no. 6 (June 1987): 620-630. Accessed August 10, 2010.
[http://journals.ametsoc.org/doi/pdf/10.1175/1520-0477\(1987\)068%3C0620:GHETWS%3E2.0.CO%3B2](http://journals.ametsoc.org/doi/pdf/10.1175/1520-0477(1987)068%3C0620:GHETWS%3E2.0.CO%3B2).

Operation Barbarossa. Map. From Worldwar-2.net. Medium. Accessed August 17, 2010.
<http://www.worldwar-2.net/world-war-2-battle-plans/eastern-europe/barbarossa-220641.htm>.

“Russia, Pulling Out a Car.” Photograph. November, 1941. From Deutsches Bundesarchiv (German Federal Archives), Image 146-1981-149-34A. Medium. Accessed August 18, 2010. http://translate.google.com/translate?hl=en&sl=de&tl=en&u=http%3A%2F%2Fit.wikipedia.org%2Fwiki%2FFile%3ABundesarchiv_Bild_146-1981-149-34A%2C_Russland%2C_Herausziehen_eines_Autos.jpg.

“Soviet commander admits USSR came close to defeat by Nazis: An interview in which a Soviet commander admitted how close Moscow came to defeat by Germany during the Second World War has been broadcast in Russia for the first time.” *Telegraph.co.uk*. May 5, 2010. <http://www.telegraph.co.uk/news/worldnews/europe/russia/7681504/Soviet-commander-admits-USSR-came-close-to-defeat-by-Nazis.html>.

Stolfi, Russel H. S. “Barbarossa Revisited: A Critical Reappraisal of the Opening Stages of the Russo-German Campaign, (June-December 1941).” *The Journal of Modern History* 54, no. 1 (March, 1982): 27-46. JSTOR. <http://www.jstor.org/stable/1906049?seq=1>.

Turney, Alfred W. *Disaster at Moscow: Von Bock's Campaigns 1941-1942*. University of New Mexico Press, 1970.

Yfimov, Boris. “Myth of the Invincibility of the German Army.” Cartoon. Moscow, 1941. From Associated Press: *File 1941*. October 3, 2008. From Associated Press: *File 1941*. Medium. Accessed August 20, 2010. http://www.boston.com/bostonglobe/obituaries/articles/2008/10/03/boris_yefimov_108_political_cartoonist_satirized_soviet_foes/.

