

2011

Mapping Time

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Recommended Citation

Ayers, Edward L., "Mapping Time" (2011). *History Faculty Publications*. 136.

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Mapping Time

Edward L. Ayers
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Our tools for dealing with terrestrial space are well-developed and becoming more refined and ubiquitous every day. GIS has long established its dominion, Google permits us to range over the world and down to our very rooftops, and cars and cell phones locate us in space at every moment. It is hardly surprising that geography and mapping suddenly seem important in new ways.

Historians have always loved maps and have long felt a kinship with geographers. The very first atlases, compiled six hundred years ago, were historical atlases. But space and time remain uncomfortable—if ever-present and ever-active—companions in the human imagination. Maps, even in the newest technologies, grant us freedom to move in space by fixing a moment in time.

Historians reciprocate: we hold space constant whenever we move people across time. Indeed, asked the great historian Hugh Trevor-Roper, “How can one *both* move *and* carry along with one the fermenting depths which are also, at every point, influenced by the pressure of events around them? And how can one possibly do this so that the result is readable? That

is the problem.” Modernist and postmodernist novelists routinely play with time and space, of course, and moviemakers jerk us all over the place temporally and geographically, but historians tend to tell our stories straight. We need our readers to know where they are in space and time and we need to keep the relationship between the two as clear as we can. That’s our job, a responsibility not unlike that of geographers.ⁱ

It is possible that people simply do not have the neural bandwidth to deal with space and time simultaneously, in the same cognitive space, without the tricks of narrative or the aid of machinery. We tend to think of cause and effect in linear forms because that is how we get through life. We time travel constantly in our heads, telling ourselves stories from the past one more time to try to figure out what went wrong or what we might do differently next time. But we seem able only to tell ourselves one story at a time. We cannot sustain images of simultaneity or envision complex processes without at least writing things down or, better, drawing pictures—or much better yet, creating moving pictures. Scientists can do this no better than historians or geographers.

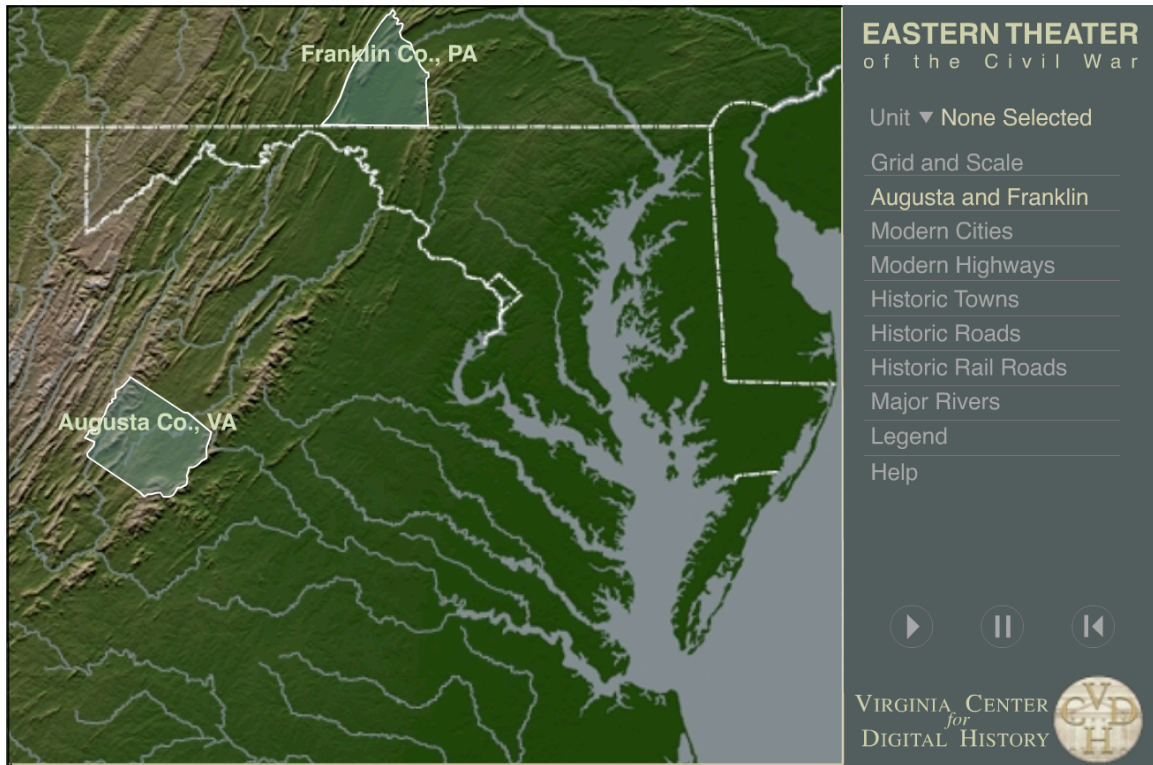
Scott Nesbit, Nathaniel Ayers, and I have been experimenting to see if new technologies might not permit us to approach this challenge in a new way. We began by trying to convey the unfolding patterns of the complex

historical processes in the massive dislocations of the American Civil War and emancipation.ⁱⁱ

The Civil War seems the least mysterious of subjects. Everyone thinks they know what caused the Civil War and what it means. Yet no one, abolitionist or secessionist, enslaved person or politician, expected a war that would kill the equivalent of six million people today and make the largest change in the history of this nation: the immediate emancipation of four million people who had been held for centuries in perpetual bondage. We have tamed too often that vast conflagration with a few stock images and easy explanations.

To throw us off balance a bit, to show the limitations of our formulaic understandings of the geography of the Civil War, we have focused on a boundary, a border, at the center of our work. The Shenandoah Valley was crucial to the entire Civil War, for it was the avenue that stretched from North to South, the route to and from Antietam and Gettysburg. We chose two places in the Valley, one on each side of the Mason-Dixon Line, and followed them through the war from John Brown's raid to the end of Reconstruction, a twinned microhistory of the entire Civil War. We created a vast digital archive that included massive evidence about

all the people who lived in those two communities—black and white, male and female, soldier and civilian.



Putting the border in the middle of the story disrupts the easy stories we have been taught: a modern North against an agrarian South, of past against future. It forces us to confront just how weird this war was, how amazing it was that the South, a place larger than Continental Europe, could almost overnight forge a nation state and an army that could hold off the richest country in the world for four years.

To explain this process, I use the phrase “deep contingency.” Only a process that reached throughout a society, deep into its ideology and psychology and even theology, could explain how millions of people could suddenly pivot into new identities, deep enough to kill for. Only contingency could explain how unexpected events, such as the *Dred Scott* decision and John Brown’s raid, could lead to unforeseen consequences such as the crystallization of the Republican Party and the election of Abraham Lincoln. Only depth and surprise could explain how two places so alike in every way but one—one had slavery, and one did not—redefined themselves so quickly and thoroughly. Deep contingency shows history moving tectonically, vast plates suddenly shifting, consequences connecting continents away, people finding themselves standing on new landscapes of politics and culture and self-understanding.

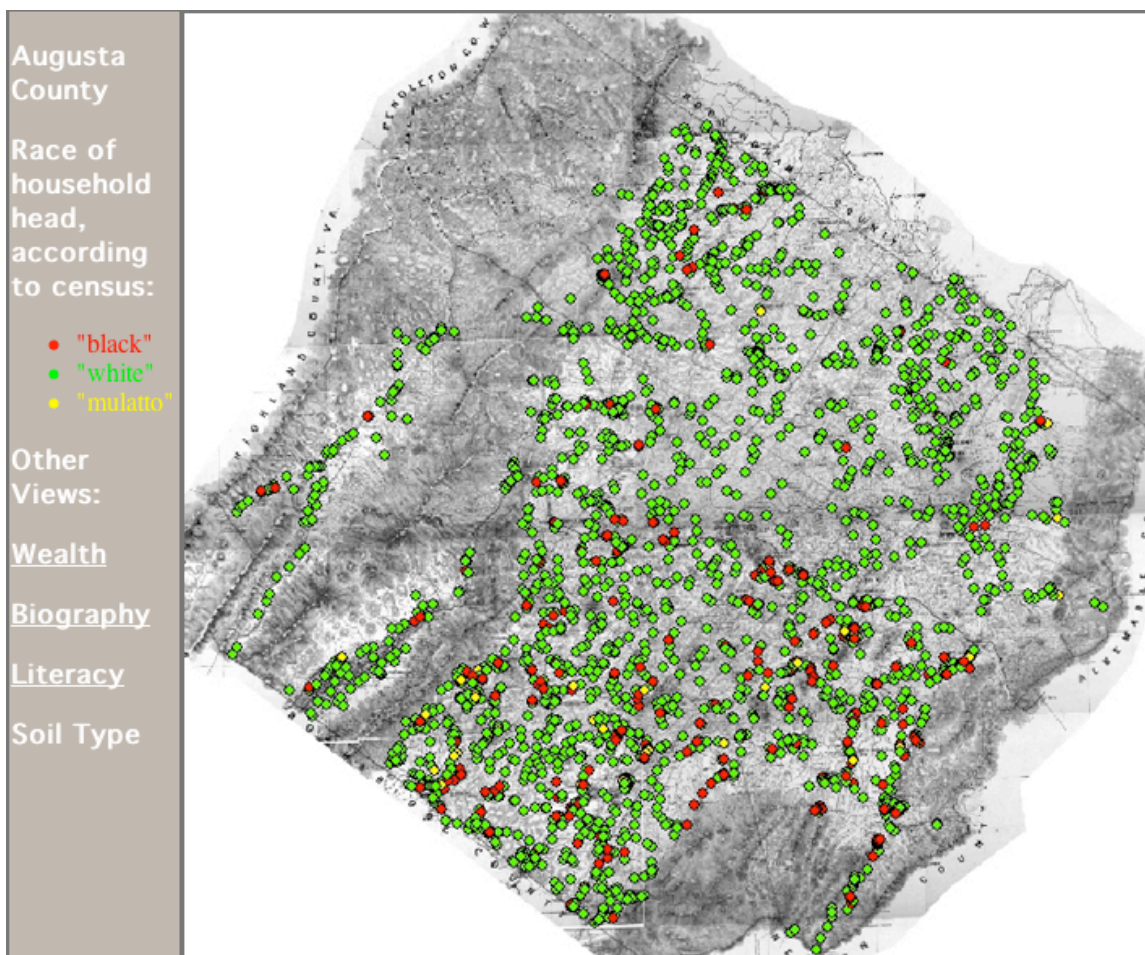
Emancipation, the great and unlikely outcome of the war that began in 1861 with no mention—or hope—of ending slavery instantly and in place, embodied another deep contingency. Abraham Lincoln said he would leave no card unplayed to save the Union. He soon discovered, thanks to the bravery of escaping enslaved people, that undermining slavery in the Confederacy would be a powerful accompaniment to military action. A year and tens of thousands of deaths into the war, Lincoln proclaimed the Union

effort a war to destroy slavery in the South, an act he could not have imagined only a year before.

Even as the war consumed a generation of young men, slavery's future remained uncertain, the consequences of emancipation undetermined. Indeed, while the coming of the Civil War was like a lens, focusing everything that came before in what we now call the "antebellum era," emancipation was like a shattered mirror. Every family, black and white, followed its own path through these years, picking its way through the broken images and sharp edges of history.

Emancipation might be imagined as something like the Big Bang. We have to follow the patterns of emancipation the way astronomers trace the expansion of the universe, extrapolating mass, size, speed, force, and dark matter from observable if faint points of evidence and perturbations of expected patterns. Just as we can no longer see the Big Bang we can no longer see emancipation, even though it occurred under our feet less than 150 years ago. We have only faint traces on pieces of paper, lost markings on the landscape. We have only scattered and incomplete testimony from the people making themselves free. Those four million people tend to dissolve into images of figures waiting for history to happen to them.

To capture the first decisions of freedom, we began with standard techniques of GIS to locate people on landscapes and then put down one layer after another: of race, of wealth, of literacy, of watercourses, of roads, of railroads, or soil type, of voting patterns, of family structure. We located newly freed people on the landscape, with greater detail than anyone else has ever attempted. We mapped churches, schools, and social networks. We mapped the relationships that newly freed people announced to the Freedmen's Bureau, showing how their marriages stretched far back into the darkness of slavery.



To set them in motion, we have begun to experiment with forms of mapping that are more fluid, dynamic, and cinematic. My colleague Cindy Bukach, a cognitive neuroscientist, tells us that “our perceptual system is not designed to perceive the passage of time, but it is designed to see the movement of objects through space. By converting time to motion, we can visualize the passage of time (as one watches the hands of a clock move). This same principle can operate not only on the scale of seconds, minutes and hours, but also on the scale of years.”

Our brains like seeing these patterns, it seems, because maps of time take advantage of our “multimodal cognitive system.” Motion and temporal sequencing are key to our constant triangulation of causation. “These dynamic patterns can be simultaneous, allowing inferences of common causes, or they can be sequential, suggesting causal relationships,” Bukach points out. “Motion captures attention. Displaying historical information in a motion map guides the viewers’ attention to changes in a somewhat automatic way, guiding even the most naïve observer to perceive the relevance of emerging trends and relationships.”ⁱⁱⁱ

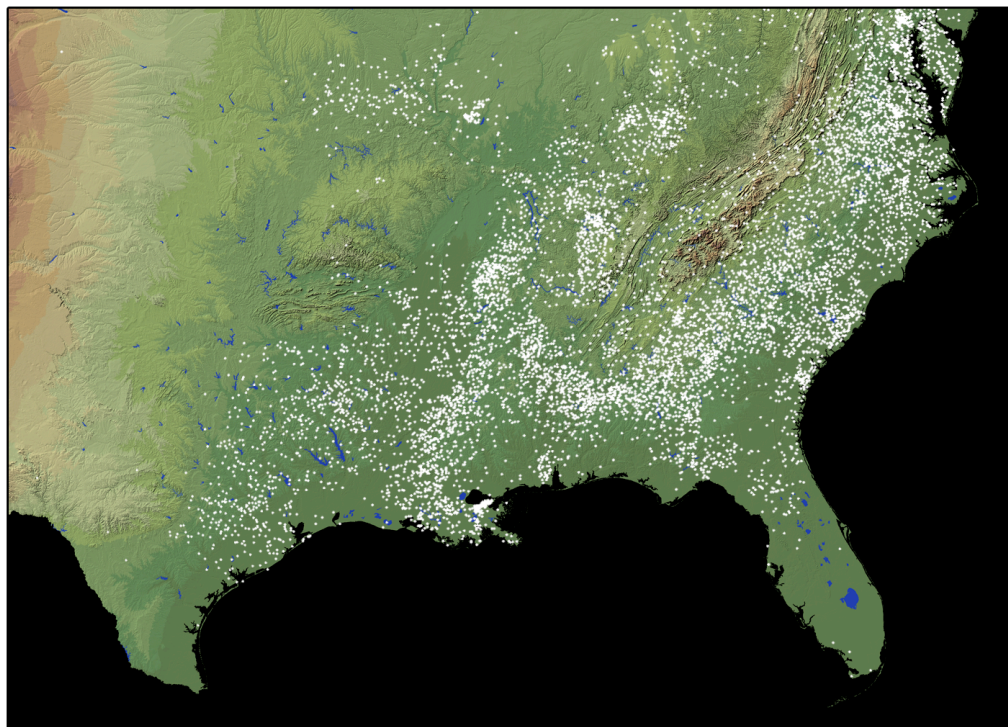
The techniques we have used thus far are simple—morphs and dissolves—but they represent something closer to the moving images of historical processes we imagine when we try to picture vast numbers of

people enacting significant changes. They are something like time-lapse photography of plants opening, of leaves unfurling in particular shapes, of vines reaching to grasp a nearby structures, of diseased or thwarted processes. Or perhaps they are like models of streams and rivers, with currents folding back on themselves, of flows around submerged objects. They cannot move on the pages of a paper book, so the examples that follow need to be understood as stills from moving images that can only be seen live in electronic environments.

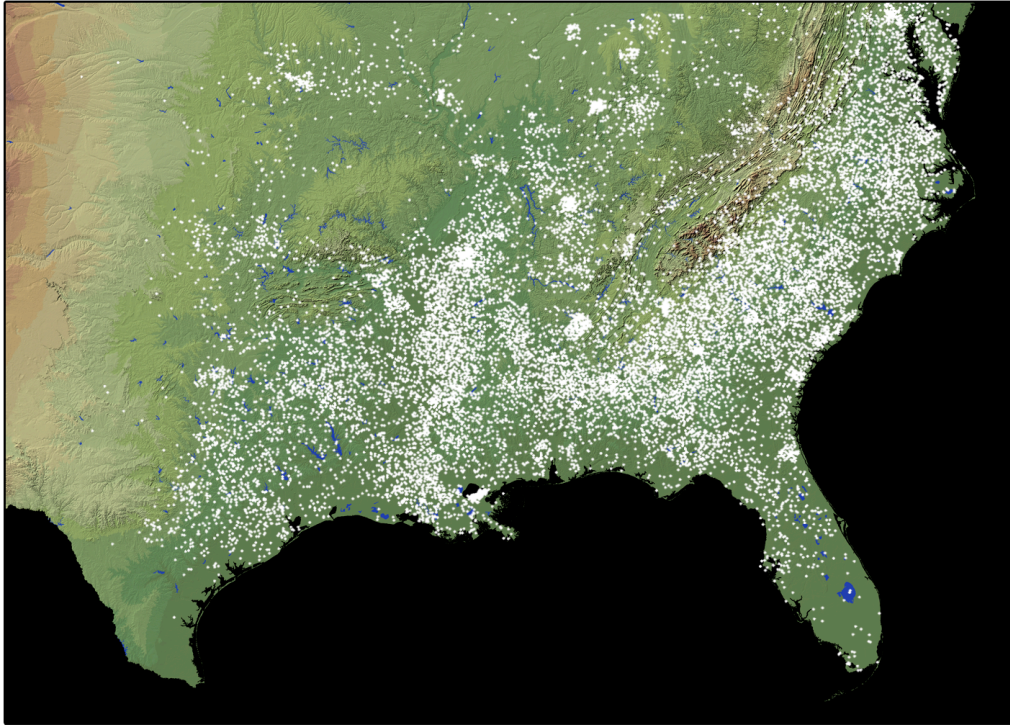
Let's look at a few stills that focus on the period between Reconstruction and the Great Migration. In most accounts of U.S. history, those decades are lost in African American history. They are the time simply of sharecropping, of immobilization, of waiting for history to happen. But let's look at the pattern of population movement between 1880 and 1910.

Two static maps, from 1880 and 1900, for example, might suggest that nothing much happened in that time.

Population of African Americans, 1880



Population of African Americans, 1900

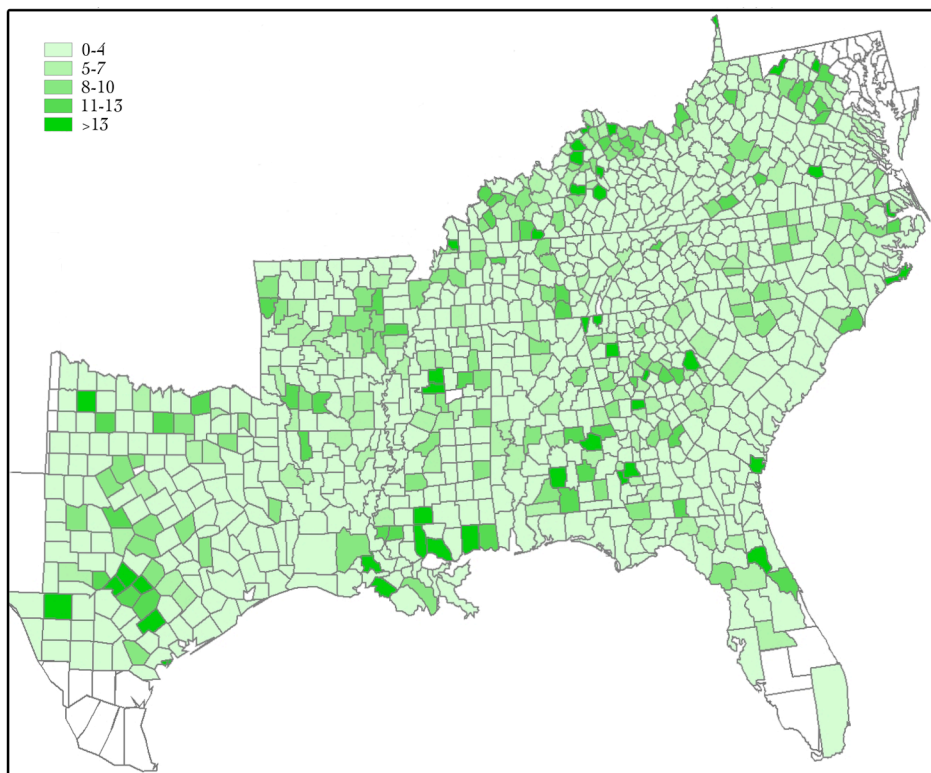


The great majority of black Americans remained black Southerners. And the great majority of them lived where their parents had lived in slavery, in a vast band from the largest slave state—Virginia—to the Mississippi River and beyond. But playing the film slowly, and moving over the same time with several passes, we see that as many black people moved during these years as they did during the Great Migration of World War I and following. The difference was that they moved within the South, to the very places we think of as being the Old South (the Delta, for example) but that were in fact new places for black people. Texas, Arkansas, Louisiana—these were

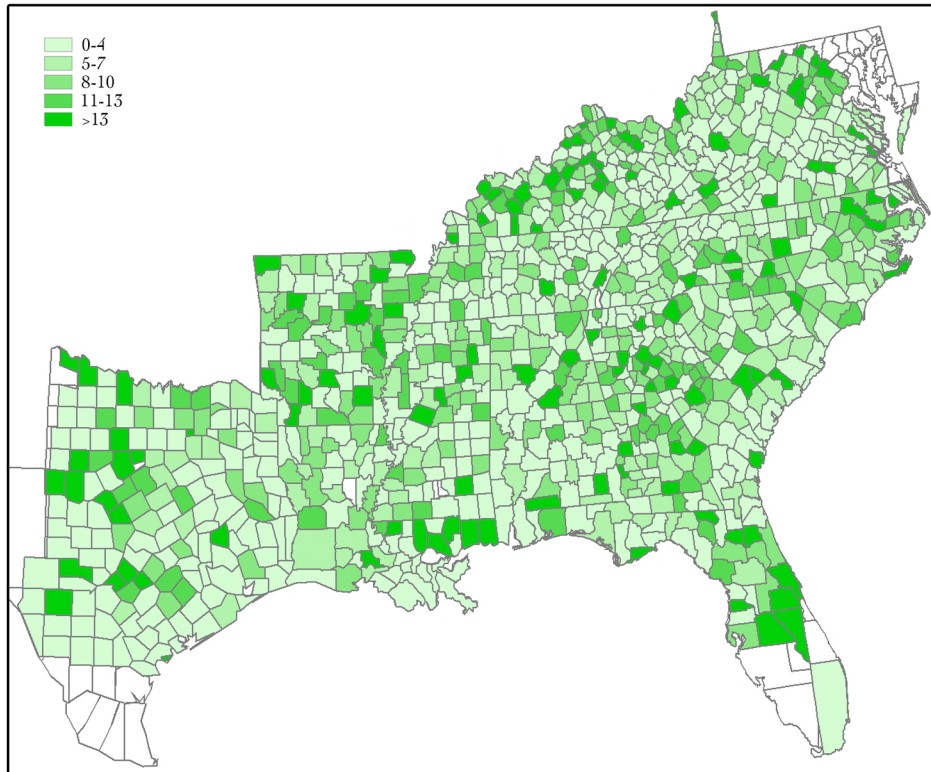
places of promise. We see a dispersion and then a reconcentration, an escaping from the South into the West and the North, before. And we see a large population growth, as the maps of population density grow brighter and more intense.

We also see something that doesn't fit the usual stories: the emergence of cities. As it turns out, the New South period saw a growth of small towns and cities faster than that of the United States as a whole. There were more small towns in the South a hundred years ago than there are now. Look at this very different kind of map, one that looks more like what you might expect a historian or a social scientist to show:

Percentage of Population in Small Towns, 1880



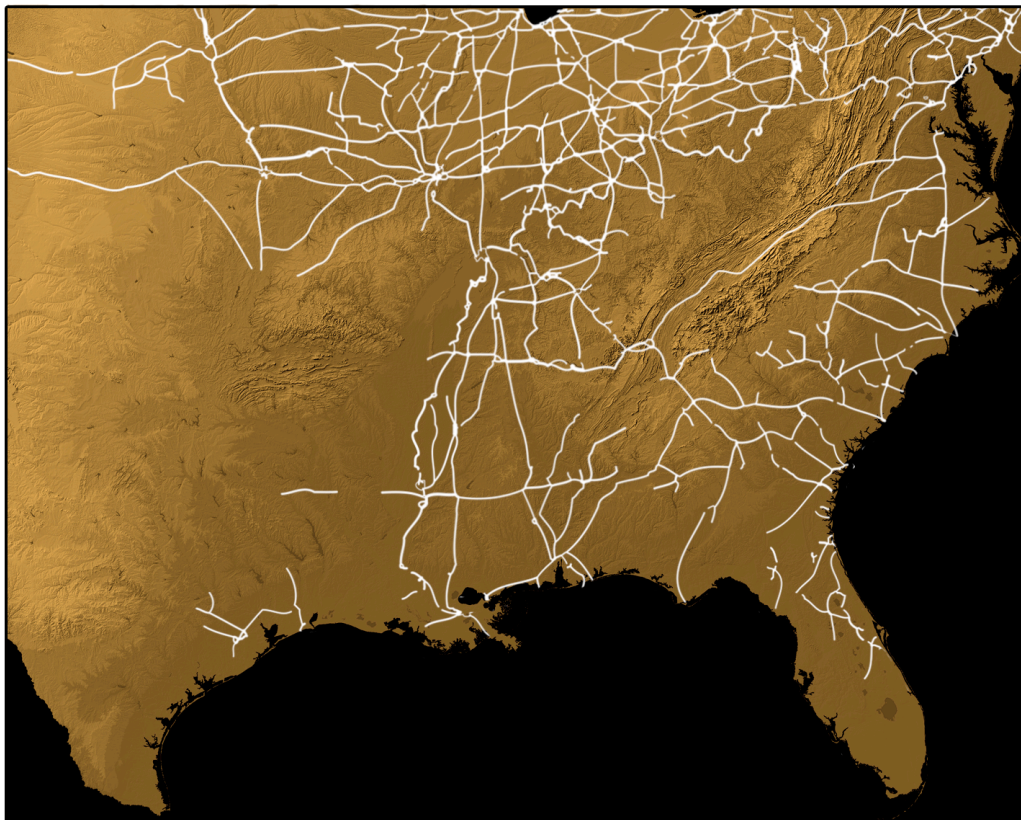
Percentage of Population in Small Towns, 1900



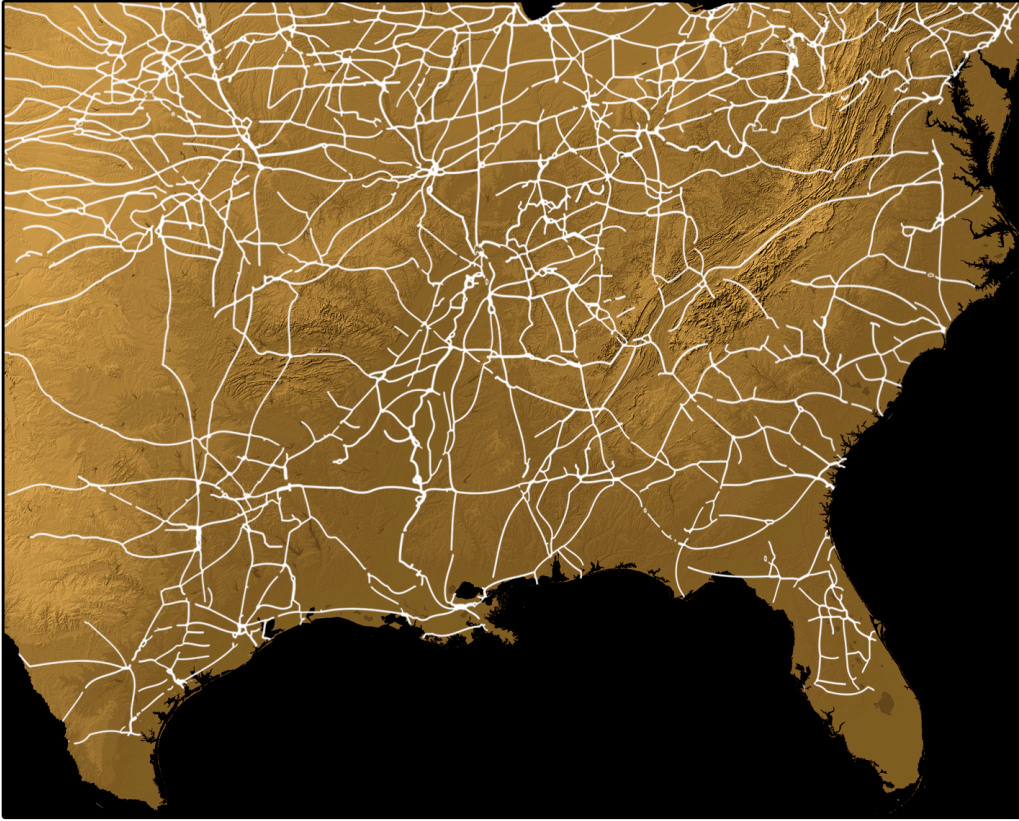
Moving back and forth across time, we see patterns of great subtlety that would be hard to see in other ways. Entire regions of the South turn into places laced by small towns. We see the Carolina Piedmont, now the home of Charlotte, taking shape around textile mills. We see Florida and Texas change quite substantially. We see the cotton belt changing less rapidly than the areas to its north and south.

We can see the reasons for this change on this map:

Rairoad Construction, 1870



Rairoad Construction, 1890



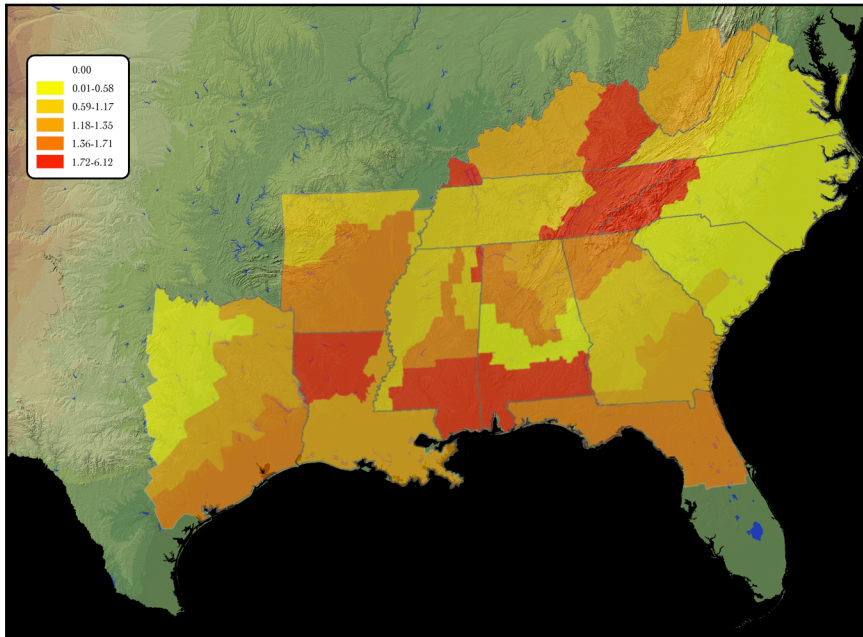
In 1870, the South had many fewer rail lines than the North (even though the South was still the third most railroaded society in the world, after the US and England, in 1860). But when the movie plays we see that the South is more transformed than the North in these decades of the Gilded Age.

During a time when supposedly not much was happening in the South, rail lines are racing through Texas, between the North and the South, through the coal fields of Appalachia, into the new citrus groves of Florida, up and down the Mississippi. By 1890, 9 out of every 10 Southerners lived in a county

with a railroad. The scale, suddenness, and complexity of this bright lattice of rail lines is more compelling and its effects more comprehensible if we can see it unfold before us. If we overlay the small town map on the railroad, we see a strong correlation between town growth and railroads.

Two other maps shows that we discover things with dynamic mapping that we could not see otherwise. In this map, we have counted the number of reported lynchings by subregion.

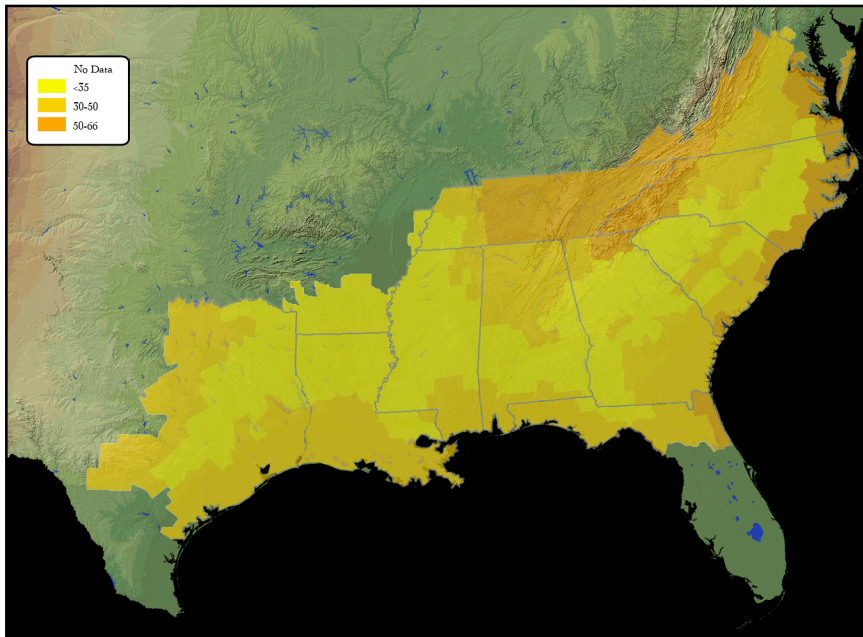
Rates of Lynching in the New South



This period was the heyday of this incredible brutality, in which black men were seized and murdered somewhere in the South virtually every day. The first map shows some surprising patterns: lynching rates were not highest in the areas with the most black men, nor in the notoriously brutal cotton belt, but rather in the Gulf Coastal Plain, in the mountains of Appalachia, and in the newly settled plains of northern Louisiana.

In this map, we show where the largest proportion of black Americans managed to acquire the most land:

Black Landholding in the New South



Looking at the two maps in conjunction, we see a surprising juxtaposition: the areas with the most lynchings were also some of the areas with the

greatest amount of black landholding. The areas of the greatest terrorism, in other words, were the areas where black people, despite all the odds against them, managed to save enough money, through heroic means, to buy small pieces of land.

So where does this point us in our understanding of geography and history and the other humanities? How might we use maps for discovery, not just the representation of what we already know? How might we combine the obvious strengths of geographic understanding with the traditional strengths of the humanities—the focus on the ineffable, the irreducible, the singular? How might we integrate structure, process, and event?

Perhaps we can return to the notion of deep contingency and use a metaphor from GIS, that of the “layer.” In GIS, we imagine layers for topography, for rivers, for people. That metaphor is a fiction, of course, since the layers continually interact and the “top” layer of humans constantly changes the “bottom” layer of landscape. But it is a useful fiction, since it reminds us of the structural depth of time and experience. GIS is about patterns and structures; history is about motion. By integrating the two, we can see layers of events, layers of the consequences of unpredictability. Deep contingency is a contingency that penetrates all those layers.

The great historian Marc Bloch wrote that time is the “very plasma in which events are immersed, and the field within which they become intelligible.”^{iv} Historians are obliged to deal with time. The beauty and utility of history is that it deals with the all-important fourth dimension in which we live, and of which we humans, alone of living things, are aware. With history, time can be mapped as it cannot be in our own lives—and history is the only tool we have to even guess at where our location in time might be.

Despite—or perhaps because of—the sometimes uneasy relationship between space and time in our neural machinery, deepening our understanding of one dimension deepens our understanding of the other. Combining them, we might be able to glimpse the plasma of time in which we move and live.

ⁱ Quoted in Keith Thomas, “A Highly Paradoxical Historian,” New York Review of Books, April 12, 2007, p. 56

ⁱⁱ For electronic versions of the maps that follow, see <http://www.vcdh.virginia.edu/emancipation/>

ⁱⁱⁱ Personal communication from Bukach to Ayers, November 15, 2007.

^{iv} John Lewis Gaddis, The Landscape of History: How Historians Map the Past (New York: Oxford University Press, 2004), p. 29.