

Figure 1. A screen shot of the interactive online Grapes of Wrath map. The colored layer shapes show the different levels of wind erosion resulting from the Dust Bowl.

creates a sense of community and academic integration. Several times, where the content allowed us, we prepared a map exhibit in support of the project; for example, in 2009, we mapped John Steinbeck's *The Grapes of Wrath*. The exhibit completed our involvement in the project and the celebration of the 70th anniversary of the publication of the novel.

THE GRAPES OF WRATH

When we learned that the incoming freshman class Reading Project was *The Grapes of Wrath*, we asked ourselves, why not map it? After all, the book is an extraordinary account of a major upheaval and transition in the way of life of large groups of people in America, caused by both environmental and social factors. We can read it from multiple perspectives—as literature, as a sociological or political study, or as an economic report on the poverty of the 1930s. We can also listen to the music it contains, or view the art that it inspired. And we can look at its geography, since there is a natural link between literature and geography. Geography has a big influence in shaping any society. Literature, like all art, is ultimately a reflection and illustration of the landscape that produced it. Virtually every story has a setting that can be expressed in geographical terms. Therefore, as part of the discussions within the Reading Project, in July 2009 we published an interactive online map (Figure 1) that drew some excited reviews from visitors on our blog page, like the one by Aimee Noel, Dayton, OH, on August 7, 2009: “This will be an extremely helpful site to use in my classroom. Thank you for the time and attention to detail that you are investing into this project.”

Encouraged by the positive response, we decided to continue our efforts and prepare a map exhibit aimed at helping to visualize the events and places in this extraordinarily rich account of a major transition and upheaval in the way of life for large groups of people in America, and showing the influence of physical, geographic space on human behavior and cultural development—at the same time demonstrating the possibilities that GIS affords us.

GIS as a tool faces significant obstacles at the outset. The basic problem is that GIS was not developed for the humanities; it emerged as a tool of the environmental sciences and was quickly accepted in the corporate world. Its uptake in the academy is much slower. On the other hand, the ability of GIS to integrate data from different formats by virtue of their shared geography (Bodenhamer et al. 2010, viii-ix) has attracted the interest of historians, archaeologists, linguists, and many other humanists. GIS can be applied in answering a variety of historical and cultural questions; e.g., did the Dust Bowl of the 1930s result from over-farming the land, or was it primarily the consequence of long term environmental changes; how did the internal migration of the 1930s–1940s change the demographics of the Great Plains; why were the migrant camps in California concentrated where they were; and so on.

We considered two methods of realizing our goal: (1) the above-mentioned interactive Internet map, and (2) a physical exhibit combining both maps prepared by using the mapping software ArcGIS and an explanatory text. We believed that, by using graphics together with text, we would enhance students' understanding. The expectation was based on the results of various studies showing that when users view a map prior to reading a related text, they are able to more accurately recall more information from both the map and the text (Verdi and Kulhavy 2002, 43).

THE GRAPES OF WRATH: GOOGLE MAPS

Of course, ours was not the first attempt to map a literary work. For instance, Jerome Burg, founder of the Google Lit Trips Project, has mapped the locations in *The Grapes of Wrath* and provides some additional information in the placemark balloons.

For our project, we did a similar thing—we mapped the Joads' journey and geocoded all the places mentioned in the book together with an excerpt from the novel that mentions the particular place. We did not stop here, however. As we all know, Steinbeck immortalized Route 66, the Mother Road, as a symbol of the quest for better life. Therefore, we felt that Route 66 must exist on our map. And, of course, we wanted to show the driving force of the events happening in the novel—the ecological disaster known as The Dust Bowl. It seems that we ultimately succeeded—in addition to the comments in the blog, an anonymous viewer posted the following comment in the body of the map: “You ... saved my life and my grade...”

THE GRAPES OF WRATH: EXHIBIT

With the permanent exhibit in the display case in front of the Map Room in Olin Library, we had a slightly different goal. We wanted to show the real physical/geographic context and environment. We did map the Joads' itinerary on Historic Route 66 (or "The Mother Road"), along which the migrants travelled to California; however, we put the emphasis on the Dust Bowl extent, the migrants' destinations, and the efforts of the federal administration to accommodate them. The maps in the exhibit came in different formats. Most of the materials shown were illustrations in books. We also showed, with their permission, a map from the National Agricultural Library special collections. The rest of the maps were original creations using GIS software based on data harvested in various sources (Figures 2, 3, 4, and 5).

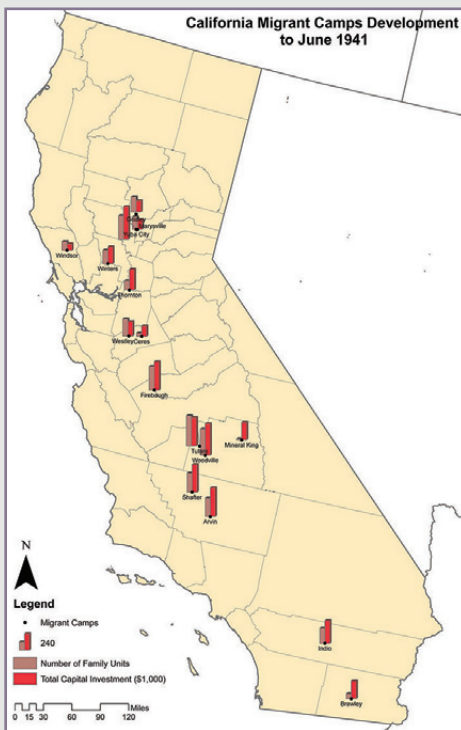


Figure 2. Development of California migrant camps to 1941.



Figure 3. Map of John Steinbeck's travels in California during the fall of 1937 in preparation for *The Grapes of Wrath*.

Extent and Intensity of Duststorms over the Southwestern Plain During March 1936

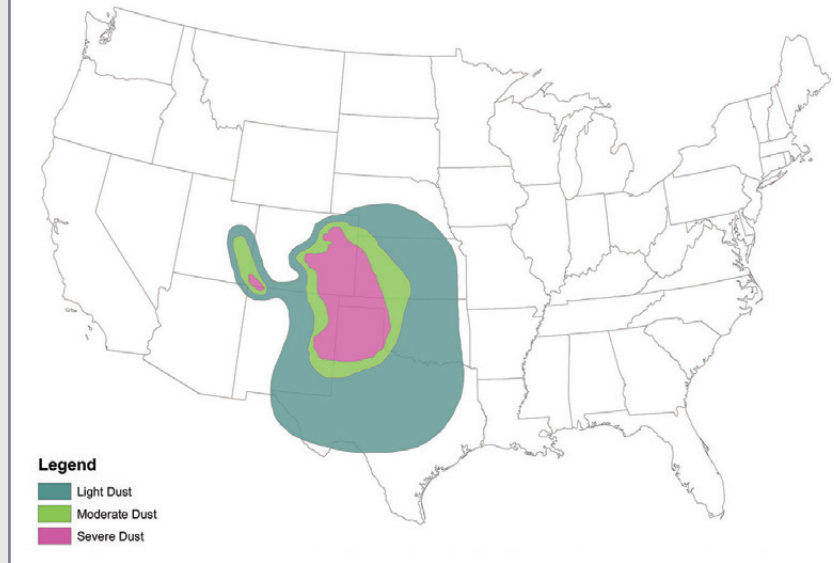


Figure 4. Extent and intensity of the dust storms over the Southwestern plains in 1936

Percentage of Normal Precipitation
During the 18 Months From September 1934 to February 1935, Inclusive

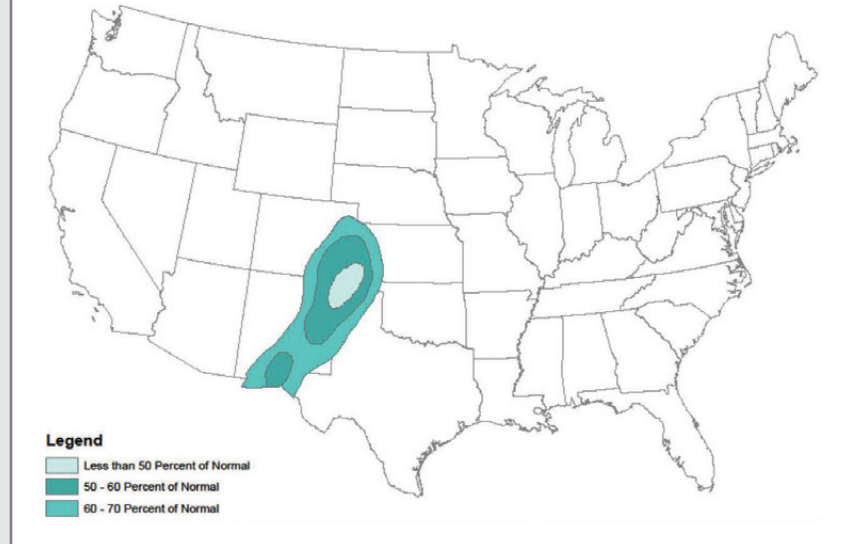


Figure 5. Percentage of normal precipitation between September 1934 and February 1935. The light, at best, rainfall and the careless cultivation and overgrazing depleted the subsoil moisture and greatly contributed to the dust storms of the 1930s.

THE 50TH ANNIVERSARY OF OLIN LIBRARY

2011 marked the 50th anniversary of the largest library on the Cornell University's Ithaca, New York, campus. The John M. Olin Library was built in 1961. It was the first library in the country to be purposely built as a research facility. Various events celebrated the anniversary, including an exhibition on display in Olin and Uris Libraries and also online. It traced Olin's history through photographs, drawings and artifacts, and examined how Olin had kept pace with evolving research needs.

This time, we took a different approach in preparing the map exhibit. We tried to show what the world looked like in 1961 by placing this concrete local event in a global geopolitical context, at the same time demonstrating the opportunities the various mapping software presents to visualize our experiences.

Arguably the most important event of the year was the inauguration of President John F. Kennedy (Figure 6). The inaugural address was the fourth-shortest in US history and one of the most crucial. It took place at the front steps of the US Capitol building and addressed the most critical issues of the time. 1961 also saw the emergence of perhaps the world's greatest symbol of division in the Berlin Wall. On April 12, a human being reached outer space for the first time. Despite the stated intentions, the arms race continued, leading to several serious nuclear accidents (Figure 7). Within the US, challenges to racial segregation gathered strength as the civil rights movement picked up speed. All of these events became part of the exhibit.

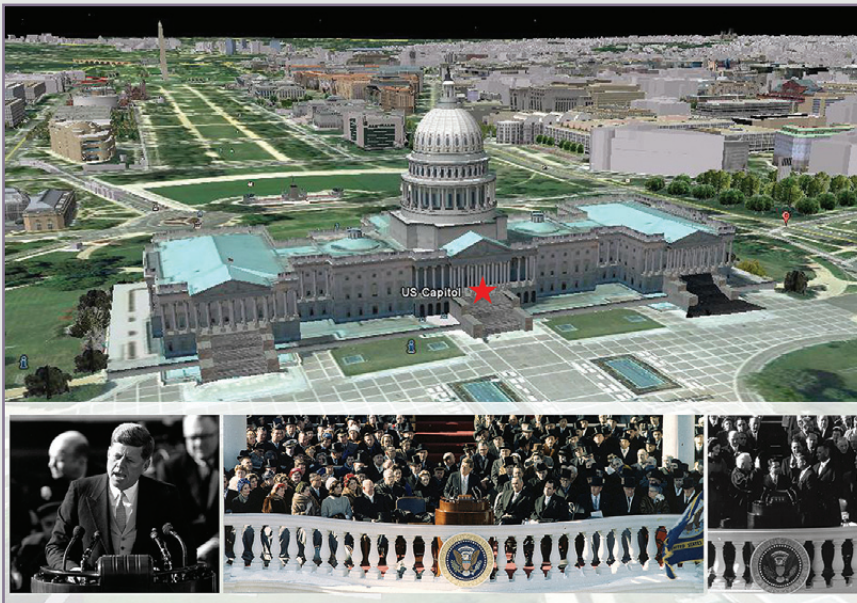



Figure 6. A poster of President John F. Kennedy's inauguration. The red star within the Google Earth image of the US Capitol indicates the location of the ceremony.

**“The Terrors of Science...”
J.F. Kennedy**

The SL-1 Nuclear Reactor Explosion


The SL-1 was a United States Army experimental nuclear power reactor that underwent a steam explosion and meltdown on January 3, 1961, killing all three of its military operators. This event is the only known field reactor accident in the United States, and is considered the deadliest in U.S. history. It resulted in planners abandoning its design and completely overhauling the structure of future reactors. While the tests had shown that nuclear power was likely to have lower initial costs, therefore of the Vietnam War caused the Army to favor lower initial costs. Therefore it halted the development of its reactor program in 1965, while allowing the existing reactors to operate. The remains of the SL-1 reactor are now buried near the original site.




SL-1 buried ground, support with signs. EPA took the image in 2003.

Tsar Bomba

Tsar Bomba ("King Bomb" in Russian) is the nickname for the AN602 hydrogen bomb, the most powerful nuclear weapon ever detonated. Developed by the Soviet Union, the bomb was originally designed to have a yield of about 100 megatons of TNT; however, the yield was cut to 50 megatons to reduce nuclear fallout. This attempt was successful, as it was one of the cleanest nuclear bombs ever detonated. Only one bomb of this type was ever built and it was tested on Oct. 30, 1961, in the Novaya Zemlya archipelago. Weighing 27 tons, the bomb was as large as 25 feet long and 6.6 feet in diameter) that the Soviets had to remove the bomb bay doors and fasten fuel tanks on the bomber carrying it. The bomb was attached to a 1,780-pound fall-retardation parachute, which gave release and observer planes time to fly about 20 miles from ground zero. The shockwave prevented the fireball, about 5 miles in diameter, from touching the ground, but it nearly reached the 6.5-mile altitude of the deploying Tu-95 bomber.




A simple graphic showing comparative yield of a number of nuclear weapons, including the Tsar Bomba. Full text effects are in the background. The map of the Novaya Zemlya, Image © J.F. Kennedy, printed on Wikimedia Commons.



The Goldsboro Nuclear Bomb Accident


On January 24, 1961 a B-52 Stratofortress carrying two nuclear bombs was re-fueling in mid-air, when the tanker crew noticed a leak in its port wing fuel tank. The aircraft was immediately diverted to land. During their approach to the airfield, the pilots lost control and ejected at 3,000ft. Three crew members perished in the crash. The two nuclear weapons separated from the straggling aircraft as it broke up. One of the two bombs parachuted to earth, embedding its nose 16 in. into the ground, which presented no difficulties for recovery crews. The other bomb hit the ground at high speed with no parachute deployment, disappearing in a farmer's field and leaving an eight-foot-wide, six-foot-deep crater. Recovery crews were never able to retrieve all of the free-falling bomb's components. The danger they encountered, the more problematic soil conditions became. Rather than continue a losing battle to recover the entire bomb, the military covered over the great hole it had dug, and purchased the land to prevent access to the bio-hazard. They never excavated the bomb.



B52 nuclear bomb retrieved after the 1961 Goldsboro B-52 crash. The weapon's parachute disintegrated, resulting in soft landing and straightforward recovery. The U.S. Air Force took this image on January 24, 1961.

The K-19 Soviet Nuclear Submarine Accident

K-19 was a first-generation nuclear submarine equipped with nuclear ballistic missiles. On July 4, 1961, K-19 was conducting exercises in the North Atlantic close to Southern Greenland when it developed a major leak in the reactor coolant system, causing the water pressure in the aft reactor to drop to zero and the coolant pumps to fail. A separate accident had disabled the long-range radio system, so the crew could not communicate with its home base. The reactor temperature rose uncontrollably, reaching 800 °C (1,470 °F) – almost the melting point of the fuel rods – and set off chain reactions. A team of seven engineering officers and crew members worked for extended periods in high-radiation areas to implement a new coolant. Because the ship carried chemical suits instead of radiation suits, the repair team was certain to be lethally contaminated, and the leak did contaminate the crew, parts of the ship, and some of the ballistic missiles carried on board. The entire crew received large doses of radiation, and all seven men in the repair crew died of radiation exposure within a week. Twenty other members of the crew died within the next few years.



This is a reported to be a photo of K-19 Soviet nuclear submarine. The U.S. Navy took this picture.

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Figure 7. A poster of several nuclear disasters of 1961, including the detonation by the USSR of the AN-602 hydrogen bomb, the most powerful nuclear weapon in history.

Our plans for map exhibits continue into the future. 2012 marks the 500th anniversary of the death of Amerigo Vespucci and, in March, a new exhibit will appear, “America or Columbia: 500 Years of Controversy,” which will try to present the opposing points of view and perhaps take a side itself.

CONCLUSION

The regular exhibits presented by the Map Unit of Olin & Uris Libraries are an important contributing factor to the increased visibility of the unit, the collection we curate, and the various projects we either participate in or have been commissioned to perform. Our collaboration with various departments at Cornell University have sharply increased over the past several years. For instance, Nij Tontisirin, student-assistant and the unit’s GIS specialist, created the original maps for the 2011 book *Islam: A Short Guide to the Faith*, by Prof. Shawkat Toorawa, Near Eastern Studies. She provided the maps and GIS analysis for Prof. Jon Parmenter’s (History) 2010 book *The Edge of the Woods: Iroquia, 1534-1701*, as well as the maps for Prof. Sandra Greene’s (History) 2011 book

West African Narratives of Slavery: Texts from Late Nineteenth- and Early Twentieth-Century Ghana. We also produced the maps for the Matthew Robar's 2010 senior honors thesis, "All Politics Is Local: Even the Politics of War in the Government Department." Currently, we are working with Prof. Thomas Pepinsky, Government, on his long-term project combining data from the 1930 Dutch census of Indonesia (Volkstelling 1930) with contemporary data on governance at the district level.

Thus, we hope to continue to increase the use and relevance of our map collection for both the humanities and the entire Cornell community.

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