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Review Article

Multiple causes of wind erosion in the Dust Bowl



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ABSTRACT

The Dust Bowl refers to a disaster focused in the Southern Great Plains of North America during the 1930s, when the region experienced extreme wind erosion. Dry farming techniques increased soil erodibility. Drought reduced both soil cohesion, making it more erodible, and land cover, leaving the soil less protected from wind action. Low crop prices (driven by the Great Depression), extremely poor harvests (driven by drought), and lack of knowledge of regionally-appropriate tillage practices left farmers unable to implement erosion control on their land. The 1930s drought was severe, but neither unusual in the region nor extreme in length from a climatological perspective. Sea-surface temperature changes in the Atlantic and Pacific forced changes in the large-scale atmospheric circulation over North America. The result was persistent, intensifying drought within the Southern Great Plains for multiple years, causing a cascade of desiccation. Increased atmospheric dust and increased frequency of cyclones crossing the region may also have exacerbated Dust Bowl conditions. The Dust Bowl resulted from the simultaneous combination of drought and economic depression in a region where farmers had not yet learned effective land management techniques. Economic recovery, cessation of drought, and implementation of erosion control programs combined to end the Dust Bowl by the end of the 1930s. Many lessons were learned from the 1930s Dust Bowl regarding the physical and anthropogenic causes of dust storms and how to mitigate them. As a result, though dust storms continue on the Southern Great Plains, their severity is significantly reduced.

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Fig. 1. Top: dust storm at Dodge City, Kansas (public domain). Bottom: dust storm at Lubbock, Texas, 30 May 1938 (Courtesy of the Heritage Club Photography Collection; Southwest Collection/Special Collections Library, Texas Tech University).

1. Introduction

And yet, if the field's unknown and new to us,
 Before our plow breaks open the soil at all,
 It's necessary to study the ways of the winds
 And the changing ways of the skies, and also to know...
 What crops will prosper there and what will not.

[The Georgics of Virgil, (29 BC)]



Fig. 2. Farm field near Dalhart, Texas, covered in windblown sand, 4 October 1937, with dunes in the background. (News photo from Chicago Tribune; public domain.).

Two millennia ago, the Roman poet Virgil (2005, p. 7) advised farmers to “study the ways of the winds” before farming in a new land. Farmers on the Great Plains of North America in the early twentieth century paid dearly for not heeding his advice. The greatest drought-related natural disaster and the most severe wind erosion in United States history occurred in the 1930s in the portion of the Great Plains known as the Dust Bowl. Massive dust storms (Fig. 1) swept through the region carrying soil thousands of kilometers to the East Coast and out into the Atlantic Ocean. In addition to dust, blowing sand covered farm fields (Fig. 2) and formed into dunes (Fig. 3), reducing the value of the land for agriculture. While the focus of this paper is soil erosion by wind, its causes and its impacts, the story of the Dust Bowl is intertwined with massive climatic, economic, social, agricultural, and environmental problems happening at the same time (e.g. Bonnifield (1979), Hurt (1981), Worster (2004), Egan (2006)). We will show that the scale and scope of the Dust Bowl cannot be well explained by any single factor alone – that the synergy of multiple natural and anthropogenic “extreme events” was necessary to create the disaster.

Robert Geiger, a newspaper reporter writing on the rural crisis in the southern Great Plains in the 1930s first used the name “Dust Bowl.” The opening line of his series of articles is: “Three little words—achingly familiar on a Western farmer’s tongue—rule life today in the Dust Bowl of the continent—If it rains...” (Geiger, 1935). Geiger described a region with massive soil erosion and dust storms contributing to the misery of the people in the area.

2. Extent, time span and severity of erosion in the Dust Bowl

There are no clearly defined spatial boundaries of the Dust Bowl (Porter, 2014; Porter and Finchum, 2009), but two studies done in the 1930s show its general location (Fig. 4). The rectangles on the map are counties identified as the “Core of the Dust Bowl” in an erosion reconnaissance survey conducted by the United States Soil Conservation Service (Joel, 1937). The irregular shapes are “blow area boundaries” identified by the Soil Conservation Service for different years in the 1930s (Finnell, 1939). Geiger, the reporter who introduced the term “Dust Bowl,” described it as “...the western third of Kansas, Southeastern Colorado, the Oklahoma Panhandle, the northern two-thirds of the Texas Panhandle and Northeastern New Mexico” (Geiger, 1935). While the Dust Bowl core region had



Fig. 3. Barchan dunes on farm fields, Dalhart, Texas, 1937(?). U.S. National Archives Record Group 114.

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