When J. Harlen Bretz first proposed in the 1920s that massive scale floods were behind the channeled scabland features of the Pacific Northwest, the idea was not well received by the geoscientific community. It took the work of geologist Joseph T. Pardee to make the connection between Bretz’s concepts and the evidence of Glacial Lake Missoula. From the late 1920s through the 1940s, Pardee included the above images (scanned from his original lantern slides) in presentations to help demonstrate this evidence of the Ice Age floods.
Glacial Lake Missoula, and its dynamic development during that epoch, is one of the more important and controversial topics in the study of Quaternary geology. The formation of Glacial Lake Missoula was the result of the blocking of the Clark Fork River by a massive ice dam, which eventually broke, resulting in a catastrophic flood that carved the Channeled Scablands. The floodwaters were so powerful that they were able to scour flood channels, high-velocity vortices, and gulch fills found along the Clark Fork and Flathead River drainages.

The Montana Bureau of Mines and Geology (MBMG) was established in 1919 as a non-regulatory public service and research agency for the State of Montana, to conduct and publish investigations of Montana geology, including mineral and fuel resources, geologic mapping, and groundwater quality and quantity. In accordance with the enabling act, the MBMG conducts research and provides information.

The term "Giant Ripple Marks" refers to large, regular wave-like patterns found in sedimentary deposits, typically formed by oscillatory flow in water bodies. These ripples are significant in understanding the dynamics of ancient water bodies and the processes that formed them.

Figure 1. Maximum extent of Glacial Lake Missoula. 1: Rainbow Lake–Markle Pass, high-velocity vortices; 2: Camas Prairie, giant ripple marks; 3: Camas Prairie, glacial drift. (Modified from Silkwood, 1998).

Figure 2. J.T. Pardee’s plat of mapped ripple marks. Modified from Pardee, 1942.

Figure 3. T.C. Chamberlin, J.T. Pardee, and T.J. Chubbuck, in addition to Pardee’s own field observations, published much of the scientific work on Glacial Lake Missoula. The results of Bretz’s research were presented at the American Association for the Advancement of Science meeting organized by the Montana Bureau of Mines and Geology and published in the journal *Journal of Geology*.

Figure 4. Pardee plat of mapped ripple marks. Modified from Pardee, 1942.