The recent record flooding in parts of the Midwest has prompted many to inquire about similarities and differences between the weather of 2008 and that of 1993. Earlier studies of the 1993 summer flooding showed that a stronger than normal trough tended to persist over the northwestern portion of the United States during all three summer months of June, July, and August. A strong trough in the western United States is the ideal situation for heavy rain and strong thunderstorms in the Midwest, since it results in strong dynamic forcing for rising motion which helps to initiate storms. Such a pattern also leads to strong low-level jets developing which supply copious moisture for convective systems, particularly those that occur during the night when this low-level jet reaches maximum intensity. Finally, an upper-level trough in the West is usually associated with southerly low-level winds in the Midwest, transporting moisture northward from the Gulf of Mexico, and often surface fronts passing slowly through the region.

An examination of the specific periods of heaviest rainfall during 1993, as identified by Kunkel et al. (1994) shows deep troughs present at upper levels over the northern Rockies and northern Plains during most of the events, and closed circulations aloft even present in a few. The same patterns have been present during the heavy rain events in late May and early June 2008. Thus, in these respects, the two years are very similar.

There are some subtle differences between the two flood events, however. The 1993 floods persisted over a very long period with anomalously heavy rainfall during all three summer months, over very large portions of the Midwest. Kunkel et al. (1994) identified 6 separate periods in June and July when at least one small area received rain exceeding 60 mm. The June events tended to be dispersed somewhat so that no one location received much more than 120 mm. One of the most active rain periods during 1993 occurred during the last days of June and first 2 weeks of July. During this relatively short time period, up to 360 mm of rain fell near the Iowa-Missouri border, with much of the southern half of Iowa receiving over 200 mm.

That particularly period is probably most similar to what has occurred in 2008, where especially heavy rainfall events have been concentrated in a roughly 3 week period during the end of May and first 2 weeks of June. During this period, much of Iowa received over 250 mm of rain, with
isolated areas approaching 400 mm. Unlike 1993, the heaviest rains during this three week siege fell in the middle and upper portions of some of the rivers flowing through Iowa’s largest towns and cities. In 1993, the heaviest rains in early July fell south, or downstream, from these cities.

Another important difference between the two years has been the timing. The winter and spring of 2008, much like 1993, were generally wet and cool. The cool spring during 2008 resulted in delays in both planting of crops and in the progress of development. The heaviest rains in 2008 fell over one month earlier than in 1993, at a time when the crops were barely established and unable to use much of the water. This likely increased the amount of rainfall that ran off into streams and rivers in 2008, compared to 1993.

A final difference, which likely made the 2008 flooding event seem even worse than 1993, was the increased number of tornadoes associated with the thunderstorms of 2008. The earlier timing of the most active period of thunderstorms in 2008 likely helped result in greater wind shear being present. The flooding rains fell during the period of the year that climatologically brings the most tornadoes to Iowa. During 2008, numerous severe thunderstorms, accompanied by tornadoes, affected the entire region at the same time that flooding was developing on rivers. Although severe weather was also frequent during the 1993 rain events, significant tornadoes were less common.