

Popular Summary for paper entitled, "What caused the August 2002 catastrophic floods in central Europe?"

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From the study of synoptic situation, we point out the circumstances that led to extremely strong rains in Europe in Aug. 2002.

For submission to: European Conference on Applied Climatology, Brussels, Belgium,
November 2002, email: gdemaree@oma.be

September 16, 2002

What caused the August 2002 catastrophic floods in central Europe?

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Abstract

The catastrophic August 2002 floods in central Europe followed very intense rains over a span of several days, reported over a large region. On Aug. 12 meteorological stations over an elongated swath, from the vicinity of Salzburg (Austria) in the south to the vicinity of Berlin in the north, reported precipitation exceeding 100 mm/day. Synoptic analysis points to a jet streak in the mid-Atlantic moving eastward, which reached Spain on about 9th of August. An understanding of the mechanism that ultimately produced the unprecedented rains was derived conveniently from the GEOS 3 Model developed at NASA Goddard Space Flight Center. Examining the scenarios of omega, we observe on Aug. 10, 00Z, a center of ascending vertical motions, stronger than 0.6 Pa s^{-1} at the 700 hPa level over the western Mediterranean. Advecting moist and warm air to higher levels from the near-ocean level, the center moved eastward, reaching the northern Adriatic on Aug. 11, 00Z, then continuing northeast to the regions where most intense precipitation was reported on Aug. 12. The omega at 850 hPa shows a closely similar pattern but especially interesting is the 850 omega pattern on Aug. 12, 12Z, which shows descending motions stronger than 0.4 Pa s^{-1} over the eastern Po Valley (northern Italy), and an elongated region of ascending motions stronger than 1.0 Pa s^{-1} coinciding in extent with the extreme-precipitation region on that day. At that time, the cyclone which formed over the Po Valley, was centered on eastern Czech Republic, producing on its western side these strong ascending motions over the precipitation region. The pattern of the surface-pressure lows provides further insight into the processes, and specifically, the Aug. 12, 06Z map, shows a 996 mb low over the western Czech Republic. The flooding following the extreme rains was exacerbated by the fact that river-channels were made narrower over the recent decades by the urbanization of river banks.