Year 2002 Flood Disaster Investigation in Europe

Summary Report

March 2003

Year 2002 Flood Disaster Investigation Team to Europe

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1. Formation of Investigation Team & Brief Flood Summary

Heavy floods broke out in Germany, Czech Republic and Austria in mid-August of 2002, and another in France in the following month. The institutions concerned weighed this heavily, and held deliberations on guidelines for conducting field investigations. As a result, the "Year 2002 Flood disaster Investigation Team to Europe" was jointly organized by dispatched personnel from the Committee on Hydraulics (Japan Society of Civil Engineers), Ministry of Land, Infrastructure and Transport, Cabinet Secretariat, National Institute for Land and Infrastructure Management (NILIM), Public Works Research Institute, Disaster Prevention Research Institute Kyoto University, Japan Institute of Construction Engineering (JICE), Foundation of River and Watershed Environment Management, Foundation of River & Basin Integrated Communications Japan, Infrastructure Development Institute – Japan. The investigation team split into four groups (Elbe A, Elbe B, Danube and Rhone) and conducted field investigations in their respected sites between Nov. 7 -17, and between Jan. 8-17 for a follow-up investigation. Also, on Sept. 2 & 3, immediately following the flood occurrences, a preliminary investigation team was dispatched to the disaster sites to gather useful materials for conducting the main investigations.

Figure-1 Center of slow-moving low pressure
(Courtesy of Germany's Federal Ministry of Transport, Building and Housing)

The low pressure that moved in from the North Sea in early August was blocked by the high pressure that hung over the Sahara – Barth region, slightly changing its course and coming to a near halt (Figure-1). As a result, Czech Republic received prolonged antecedent precipitation of 50mm between Aug. 1 – 10 in large parts of the upstream regions of the Elbe River, and 150mm in the south. On the country border of Elzebirge and

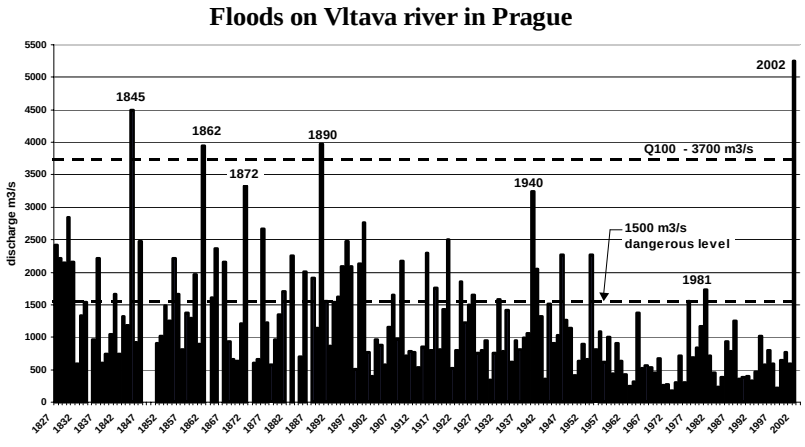

Figure-2 Change in maximum annual flow volume of Vltava River (upstream tributary of Elbe River) in Prague
(Courtesy of Ministry of Environment of the Czech Republic hydrology and meteorology research institute.)

around the upper main and tributary rivers, it received severe rains of more than 50 – 250mm between Aug. 11 – 13. The rainfall in the area turned out to be two to four times that of average years. Flood disasters broke out on Aug. 13 & 14 in upper main and tributary rivers. The maximum flow in Vltaba River along Prague marked 5,300m^3/s, which was the highest since 1828 (Figure-2). The chances for a rainfall of this scale is said to be one in 500 years. The water level in lower parts of the city reached 3 – 4m, flooding the subways (Photo-1). There were no direct casualties within the city since 50,000 people evacuated the city before the flooding occurred. However, in other parts of Czech Republic, a total of 220,000 people took refuge and 15 lives were lost. The cost of the damage is estimated at 3 billion euros. Germany recorded two occurrences of floods attributable to its geological formation surrounding the river basins. The first originated from the heavy rains over the Elzgebirge, where flash floods in the tributary rivers generated flood and sediment disasters along the river on Aug. 12. Floods also occurred downstream along Mulde and other tributary river basins. The second occurrence was from an overflow of the upper mainstream waters of Elbe River. It marked a record high water level in Dresden on Aug. 17 (Photo-2). Because the increase in river water levels served to raise the underground water levels

Photo-1 Traces from the flooding at the subway entrance (Prague)

Photo-2 Flooding in the Dresden city center (Near Zwinger Palace and Semperoper)
(Courtesy of Dresden Municipal Office)

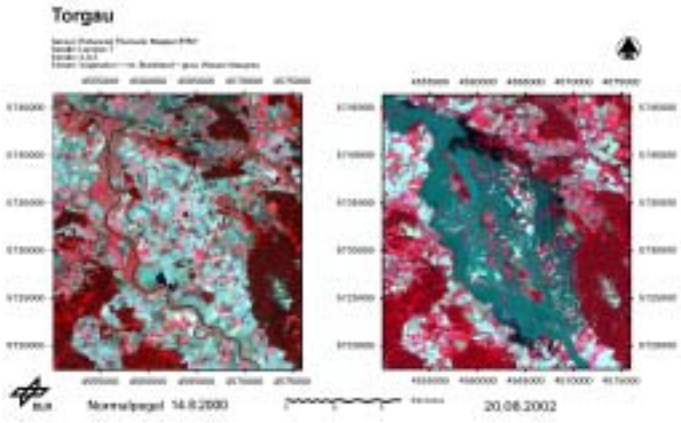

Figure-3 Satellite pictures before and after the flood (downstreams rivers in Torgau: flowing to upper left direction) (Courtesy of Germany's Federal Ministry of Transport, Building and Housing)

over a wide area, damages were worsened. The city counts this as the third occurrence of the flood. Fifty 50km^2 of Dresden was covered with water and 12,000 people had evacuated, 4 lives were lost through accidents and other causes. Downstream, river waters either flowed over or broke past levees, flooding the region. Figure-3 is a satellite photo of the flooding on the right bank in the downstream regions in Torgau. Due to this flooding, a big change in water level was observed between the upstream (Torgau) and downstream (Wittenberg) rivers as shown in Figure-4. The chances of reaching such water levels are estimated as ranging from one in 100 to 1,000 years, depending on the region. The estimate for damage costs in Germany is 9.2 billion euros.

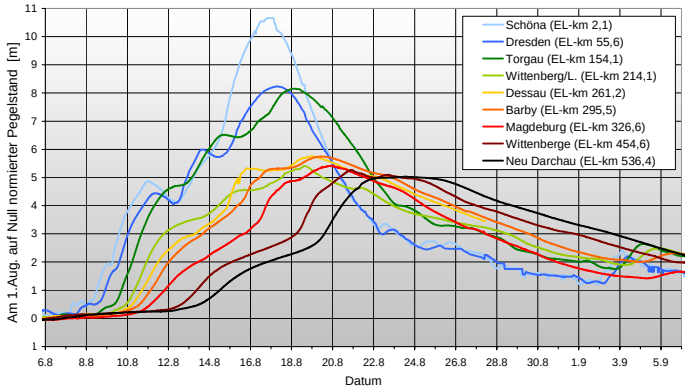

Figure-4 Comparison of water level hydrographs along Elbe River (Courtesy of Germany's Federal Ministry of Transport, Building and Housing)

River basins of Danube River in both Germany and Austria received rainfalls between Aug. 6 – 8, and 10 – 13. The pattern may have served to even out the overflow of Danube mainstream waters, for almost no damage was observed in the two countries. It is characteristic that damages occurred in the tributary rivers along the areas that received the severe rainfalls. First rainfall was along the Kamp River in Lower Austria, and the second was along the Inn, Salzach, and Enns Rivers and the like. In Zwettl, located along the Kamp River, the first peak recorded a flow of 460m^3/s, calculated to be a one in 1,000 – 5,000 year chance (based on annual statistics of past 30 – 50 years.) Roads were washed away and river structures were damaged throughout the city. As was the case with Prague along the Vltaba River, mobile levees that were installed to replace permanent levees have functioned effectively in certain regions (Photo-3). On the other hand, in Salzburg along the Inn River, there were places where the rainfall in one day exceeded 140mm (One in a a100 year chance). Houses were damaged in the built-up areas along the river, and an oil spill aggravated the situation. There were no fatalities in Bayern, but 8 in Austria. The economic cost of the damage is estimated at 2.5 – 3 billion euros.

Photo-3 Mobile levees at Krems along Danube River (Courtesy of Municipality of Passau)

Meanwhile, on Sept. 8 & 9, a flood accompanied a severe storm in the

southeast region of France, claiming 24 lives, and causing great damage estimated at 1.12 billion euros in total. Especially along the Gard River, a tributary river running right of Rhone River, a concentrated rainfall occurred fom the night of Aug. 8 until early morning on Aug. 9. (Anduze, Gard Province recorded a maximum rainfall of 687mm/24hrs). With rapidly increasing water levels, it became the largest flood since 1958. In Ales along the upstream regions of Gard River, and in Aramon located close to where the Gard and Rhone rivers merge, a great number of cars were washed away, houses were isolated, and the bank surrounding the town was broken down, causing considerable damage (Photo-4).

Photo-4 Damages on railroad bridge (fillings around the abutment have been washed away)

2. River and Watershed Administration

Apart from the navigable channels (federal channels: middle section of the channels), river administration in Germany is basically left to the states. It is different from Japan, where a consistent river planning is implemented throughout the river system. River facilities are managed on a one in 100-year flood scale, but the control over levee materials and levee conditions were insufficient, which is believed to be one of the reasons that lead to the leaks and breakdown of the levees. One of the five important projects drawn up following the disaster was the implementation of a nationwide (consistent throughout the federal and state governments) protection plan against floods. In principle, it is necessary to preserve all the flood planes along the rivers, however, 85% of them have diminished over the last 150 years for land utilization. Thus, damages resulting from broken levees were very typical of these floods. The water administration bureau in Sachsen hammered out the new “Mulde Concept,” named after the tributary Mulde River on which the project will be carried out, in which it attempts to make effective use of the natural flood drainage functions of the river, allowing floods to occur on farmlands, but protecting only densely populated areas with circle dikes and closed dikes.

In Prague in Czech Republic, there is also a 1/100 plan, but which has not been implemented due to budgetary constraints and from a landscape protection perspective. The current safety level is only 1/20. Nevertheless, sites like ancient city areas declared as world heritage, and other important sites are to be protected with special mobile levees. These levees were installed by the fire department when the floods occurred, which prevented the ancient city

areas from being flooded.

Austria specifies that the standards of urbanized areas should be set at 100 years, and at 30 years for all other areas. Danube River that runs through Vienna, however, is an exception. Danube River was originally a braided river that has been straightened out around 1870. It recorded a flow volume of more than 10,000m^3/s after flood in 1954, so the planned flow volume was set at 14,000m^3/s and the new river channel was excavated (a bypass water channel was opened parallel to the mainstream Danube River). This radically raised the safety level of flood control (less than 1/10,000). In addition, Austria has a nationwide flood control policy, aiming for minimum river development through "Water Care," for protection of water preservation zones, and land administration. Since most of the floods that occurred are believed to have been caused through heavy rainfall along the tributary rivers, rather than along the mainstreams of Danube, it may be correct to assume that there will not be a big change in Austria's future flood control policies.

In France, riverbank owners have historically been held responsible for flood prevention, not the national government. Especially along the mid- and small-sized river basins, local governments and multiple institutions are in charge of operation in the respective areas. There has not been a great change concerning the responsibility in this flood prevention framework among the national and local governments and residents after the flood, but new deliberations are being held regarding information distribution enhancement, and for new legislature for protecting forests and natural land.

As can be seen from the above, European countries have traditionally imposed regulations on land utilizations of flood plane. Especially in Germany, through the recent flood experience, there is a movement to secure more flood zones and further enforce land utilization regulations. In Japan, approximately 50% of the population and 75% of assets are concentrated in the anticipated flood planes that account for about 10% of total national land. Because these areas are already urbanized, it will be difficult to apply European land utilization regulations directly to Japan. Even so, it will become all the more necessary to further promote the comprehensive flood control measures that have been pursued in Japan until today, and river administrators should, for example, take measures to actively improve the retarding basin within the flood plane.

Although none of the flooded countries believe that straightening of river channels contributed to the flood, measures are taken to enlarge the river banks and to secure larger area so the river can flow freely as allowed within the flood control measures. With floods of this scale, the river banks will become just saturated in the early stages of the rainfall like in Japan. Beyond that stage, the flood alleviation functions of the forest would most likely be very limited.

Including those of Japan, the mass medias over the world reported only about dam failures, and not a word about their effectiveness. Through the investigation, damages were found in part on spillways on small dams and on levees around the reservoirs, but the dams in Germany and Czech Republic have effectively carried out their expected functions from the very beginning to contribute to controlling the floods.

Also, a large part of the damages incurred from these floods were attributable not only caused by the overflow from the main rivers but also from inundations. In drawing up future hazard maps in Japan, we should also take into consideration the effects of the inundations.

The Internet was widely used for conveying information regarding disaster prevention. Information is also provided over the Internet in Japan, but it is necessary to provide information to residents and those involved in disaster prevention through a more understandable communication form. Blackouts in the damaged areas will unable the use of Internet. Therefore, radios running on batteries will become a valuable tool and such alternative methods should also be considered.

In Czech Republic, mobile device with prioritized telephone numbers were given out to 18,000 government personnel in the time of emergency, which exerted great power. Congestion of phone lines under emergency conditions have been noted in Japan, and measures must be taken quickly to improve related facilities.

Photo-5 Mobile devices used in Czech Republic

3. Crisis Management

In Germany, Czech Republic, Austria or France, disaster response was led by local authorities, the closest administration body to the residents. As the scale of the disaster increases, it gets handed over to the prefecture, state and the national government. This basic trend is common to all, and is similar to the Japanese system.

Germany employs a federal system, and disaster response is basically led by state governments. In this flood disaster, however, at the request of the state of Sachsen, the disaster countermeasures headquarters was established on the federal level to respond immediately in support of the victims. Deliberations have begun on the necessity of a central headquarters for disaster cases stretching over wide areas, beyond state boundaries.

In Czech Republic, the Prime Minister held a conference with the crisis management staff that consist of ministers, and proclaimed a state of emergency. It then established the disaster countermeasure headquarters on a government level. In the case of Austria, the government took measure as deploying a third of its federal forces, but the aide and support toward victims were largely carried out by the civilian volunteer organizations. These organizations possess a strong sense of duty, and are well-trained and well-equipped.


Photo-6 Technical assistance group dispatched to Sachsen and Anhalt and its draining activities (Courtesy of states Sachsen and Anhalt)

Also in Germany, the "technical assistance group," which is a specialized volunteer organization, played an active part. This organization is under the federal government, but the staff is composed of volunteers, who receive training and play the central role. Their role is similar to that of the Japanese 'Suiboudan', flood prevention volunteer, and the system is similar to that of the disaster dispatching system of the Self Defense Forces. They have high-level expert technology, and they receive the same level of benefits as other public employees if dispatched to the field. The power of spontaneous volunteer groups cannot be neglected of course, but the existence of groups with technology and organizational strength as that of this technical assistance group will definitely demonstrate great power. This may serve as a good example for Japan as well.

In Germany and Czech Republic, following the evacuation of victims, a counseling center was quickly opened to provide services to victims and others who were involved. It is something that we must also consider in Japan in terms of emotional care.

4. Attitude and Responses of Residents and Mass Media

A large-scale evacuation took place along the Elbe, Danube, and Rhone Rivers. In large, all were carried out in a quick and efficient manner. Nevertheless, there were some criticisms regarding the timing of the evacuation order, information conveyance, and regarding emergency flood preventative policy. They point out that if more accurate information had been conveyed, the residents could have taken measures to minimize their losses by moving their household effects to a more secure place, or arranging for sandbags, etc.

Also, during this flood, over a long period, televisions, radios, newspapers, and other medias in the disaster-affected countries of Germany, Czech Republic, Austria and France, had closed up on the flood and its damages. Detailed information on the flood could also be found over the Internet, and the Internet was used to a great extent. The overall tone of the mass media was that it was a rare disaster, judging from the scale of the flood. The coverage for this flood received

high admiration in that, information regarding the disaster, the flood scale, and incurred damage was appropriately conveyed both in and outside of the country. Also, the media contributed to create a sense of community among the citizens, having a positive influence on volunteer activities and in collecting relief and condolence money.

On the other hand, criticism from residents and others involved claimed that the media only broadcasted selected sites, or that the coverage was sensationalized.

As such, the mass media played a significant role under the occurrence of these floods. The television enjoyed a huge audience, and attracted cooperation of supporting volunteers. But since there were some misunderstandings and confusions in part, it provided a good opportunity to discuss what information would be easy for the residents to understand, and what kind of advise would be appropriate, rather than simply reporting just any information. The media plays a vital role in disaster measures. Therefore, also in Japan, it will be necessary to create a new framework in which a representative of the mass media can position himself inside, or remain close to, the disaster countermeasures headquarters, so that he can adequately receive information from the person in charge of disaster prevention to report the current developments as necessary.

The medias in Japan and other countries have been reporting dam failures, but with this investigation, we found that most of these “dams” were what are referred to as “levees” in Japan. Damages were found in certain spillways of small-scale dams and in levees around the reservoirs. In Germany, a dam is referred to as a facility that shuts out water. As such, a same word may have a different meaning if used in a different country, so that a common definition must be established in the future. Those facilities in Germany and Czech Republic which are referred to as “dams” in Japan have effectively carried out their expected functions from the very beginning for controlling the floods.

Photo-7 Passau broadcast station
(Courtesy of Passau Municipality Office)

5. Flood Insurance / Support for Victims

Flood insurance in disaster-stricken countries of Germany, Czech Republic, Austria and France are covered by private sectors. It is widespread in France, but not quite so in Germany. Flood insurance is optional, and approximately 4% of buildings and 10% of household effects in the country are currently covered. Of Germany’s damages amounting to 9.2 billion euros (approximately 1.1 trillion yen), 20% or 1.8 billion euros (approximately 220 billion yen) has been paid by insurance. About 50% of that was paid to companies, and the other 50% has been paid to individuals.

In France, an insurance system for natural disasters called the CatNat (natural disaster compensation system: Catastrphes Naturelles) was established following the great flood in 1981. This CatNat system comes automatically with fire insurance, auto insurance or other non-life insurances. The government provides reinsurance through a government operated-reinsurance company. It has a high purchase rate with its virtually mandatory joining system, and sets a uniform insurance fee. It is a unique system that is different from the one in our country, and seems to play a very important role.

In terms of victim support in Germany, Czech Republic, Austria and France, financial compensation from the government was provided to victims whose houses were damaged. Germany has even made special arrangements to provide 100% compensation for damaged houses, regardless of insurance, for this one time only. Some of the special reasons behind this decision are believed to be due to the great flood scale, or because the disaster-stricken areas was formerly a part of East Germany that is presently a focus of economic development, and also because the flood occurred in the middle of the general election. On these grounds, the present federal government and the insurance companies are holding discussions on flood insurance and reinsurance systems. Japan should also follow the developments of these movements for our future example.

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Hamburg
Bremen
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Berlin
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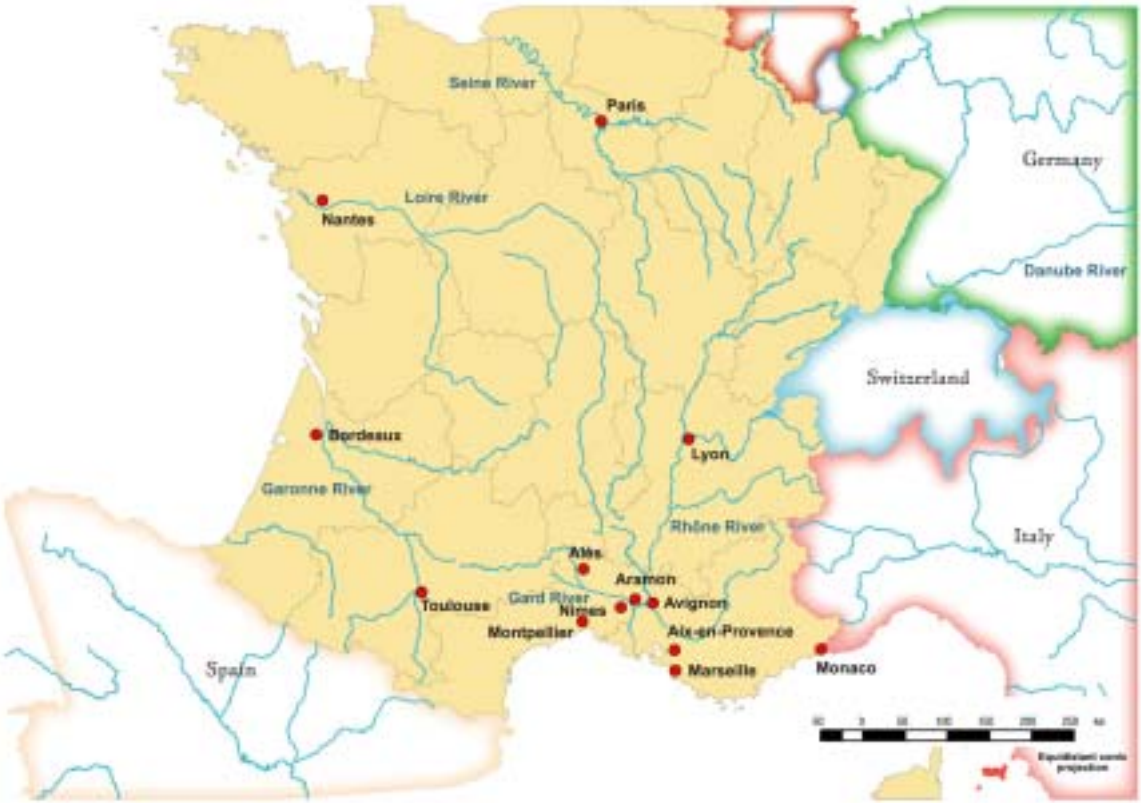
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Aix-en-Provence
Spain
Marseille
Monaco

Cover photo: Citizens waiting the rescue team at the Mueglitz River (left tributary of Elbe) (courtesy of Sachsen Municipality Office)

Photo-back cover 1: Flooding in the vicinity of Dresden caused by the Elbe River (courtesy of Sachsen Municipality Office)

Photo-back cover 2: Dresden central station flooded by the overflow of Weisseritz River (left tributary of Elbe)(courtesy of Sachsen Municipality Office)

Photo-back cover 3: Damages caused by the flooding of Gard River (right tributary of Rhone)


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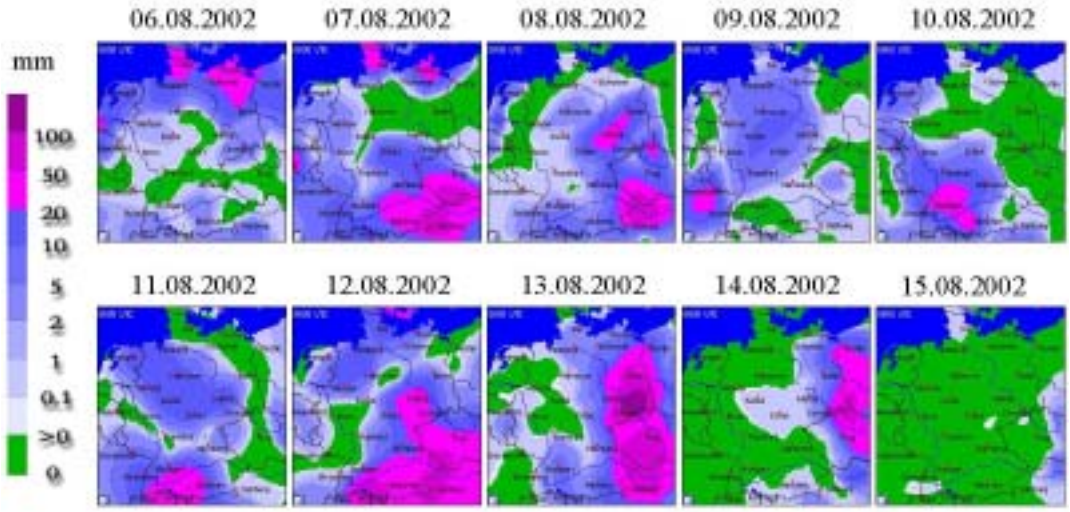
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