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Storms and Floods in the Alpine Region: Towards Combining a Database of Natural Damaging Events and MAP Data for Eight Seasons

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ABSTRACT

This presentation reviews for the Alpine region and the MAP seasons 1992–1999 material which is available from the NatCat*SERVICE* of MunichRe and at the MAP Data Centre (MDC). The gap between these different sources reflecting respecitively a purely economical and a solely atmospheric science perspective is still wide. But there appears to be potential for a more integrated approach in the future.

1. Introduction

The MAP Steering Committee decided at its summer session in 2002 to develop a Societal Impact Subprogramme in order to better expose the potential benefits of the research programme in atmospheric and hydrological sciences for the society at large. During a dedicated workshop held in Bad Tölz in October 2002 presentations and discussions made clear that there is an overlap between the database for natural desasters of MunichRe, a large re-insurance company, and the archives of the MAP Data Centre at ETH Zurich for the so-called MAP seasons, June to November of the years 1992–1999, which preceded and finally included the Special Observing Period (SOP) of MAP. A general problem in the societal impact area lies in the quantification of (potential) benefits. Damages, and especially the subset of the insured ones, can be related to monetary values and an assumed (partial) prevention appears, at least at first sight, to be readily measurable.

During the planning phase for the MAP-SOP conventional meteorological data were collected and stored at the MDC for eight half year periods which embedded the SOP duration (7 September to 15 November). Furthermore twelve episodes were selected as test cases for newly developed high resolution simulation models. Among these are the heavy precipitation and flash flood events named after the most pronounced impact location, i.e. Vaison (20-24 Sep. 1992), Brig (21-25 Sep. 1993), Piedmont (3-6 Nov. 1994), the heavy thunderstrom occuring during the SETEX campaign in southern Bavaria (5 July 1994) and the heavy precipitation episode over Friuli (16-20 Sep. 1995). Some of these cases were also investigated during the European projects HERA (i.e. Heavy precipitation in the Alpine region; cf. Volkert 2000) and RAPHAEL. All five also show up within the NatCat database of MunichRe with damage reports exceeding 100 mill. US dollars.

This presentation aims at an inspection of the NatCat data tailored for the Alpine region during the eight MAP seasons and at an exemplication of the spatial extent of past precipitation events with large damages. Finally hints are given of possible future cooperations.

2. NatCat at MunichRe

The Geo Risks Research Group within Munich Reinsurance has been gathering information about natural damage events and natural desasters on a systematic and global basis for approximately 25 years. For this purpose a considerable number of reliable sources, e.g. press agency reports and newspaper articles, are regularly scanned. In addition to general information, such as location, date, and duration of damage events, there is a brief description which gives a quick idea of the size of loss events due to natural hazards. If available, information is stored about damaged or destroyed buildings, effects on the infrastructure, losses to lifeline facilities, and agricultural losses. The number of people affected (fatalities, injured persons) is also registered, as are economic and insured losses. These data are collected by year, country and in four distinct categories: earthquakes, floods, storm and others (e.g. avalanches, forest fires). A general idea of the collection can be gained from a publicly available CD-ROM (Berz and Siebert, 2000).

Table 1: Number of damage events due to flood (F), storm (S) and other (O) natural desasters (e.g. avalanches, forest fires) in five Alpine countries during the MAP seasons June to November 1992–1999 as well as summed up over the Alpine region and all categories (Σ). Source: MunichRe NatCat*SERVICE*.

year	Switzerland			Austria			Germany			France			Italy			Alpine region			
	F	S	O	F	S	O	F	S	O	F	S	O	F	S	O	F	S	O	Σ
1992	–	4	5	–	2	2	2	3	–	3	3	2	3	–	–	8	12	9	29
1993	5	7	2	1	4	2	2	9	–	4	2	–	2	–	–	14	22	4	40
1994	3	5	2	1	2	1	2	4	–	3	4	1	1	2	–	10	17	4	31
1995	6	1	3	1	1	2	5	–	1	2	–	1	2	–	–	16	2	7	25
1996	1	7	2	2	1	–	3	1	1	2	3	–	2	3	3	10	15	6	31
1997	1	3	4	1	1	1	–	5	1	1	–	3	2	4	1	5	13	10	28
1998	1	9	1	1	2	–	1	5	–	–	–	1	1	3	2	4	19	4	27
1999	3	1	–	–	2	2	1	4	–	–	1	4	2	3	–	6	11	6	23
total	20	37	19	7	15	10	16	31	3	15	13	12	15	15	6	73	111	50	234

For the three classes 'Stroms', 'Floods' and 'Other' all stored entries of the years 1992–1999 were retrieved from the NatCat database for the inner-Alpine countries Switzerland and Austria, and the neighbouring ones Germany, France and Italy. All off-season events (Jan.–May, Dec.) and those not geographically related with the Alpine region (for D, F, I) were eliminated. This results in a collection of 234 events, which are stratified in categories, countries and years as given in Tab.1.

The comparatively few severe and costly cases (among them the mentioned MAP episodes) include figures of economic and insured losses (several hundreths of million US dollars), while for the majority of less prominent events official estimates of damage are not available. Better information about the spatial extent and the duration of particular events appear to be desirable, not the least to build up a spatial scale of risk and damage. A general overview concerning the complicated chains linking the type of the physical event, of its risk, and of the vunerability from an insurance perspective can be found in Kron and Thumerer (2002) for the category 'floods'.

3. Severe weather information at MAP sources

Different electronic and openly accessible archives exist within the MAP community to provide meteorological information that may be relevant for an atmospheric extension of NatCat. The MDC provides surface observations for the basic parameters pressure, temperature, dew point, wind speed and wind direction from SYNOP stations of 29 European countries on a daily basis together with daily precipitation sums (access via http://www.map.ethz.ch/map-doc/pubindex.htm). At the same address descriptions of the mentioned MAP episodes are available together with sample results from numerical simulations.

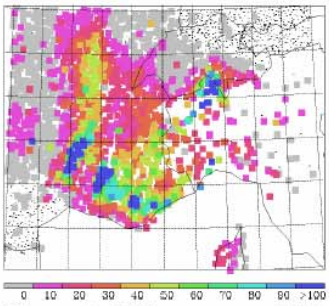

Figure 1: Vaison case: 24 h accumulated precipitation until 23 Sep. 1992, 06 UT. Maximum: 327 mm/24 h.

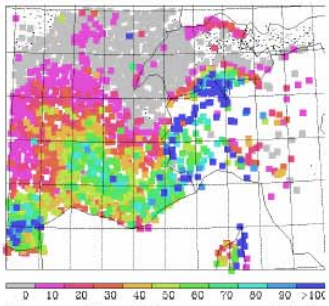

Figure 2: Brig case: 24 h accumulated precipitation until 24 Sep. 1993, 06 UT. Maximum: 405 mm/24 h.

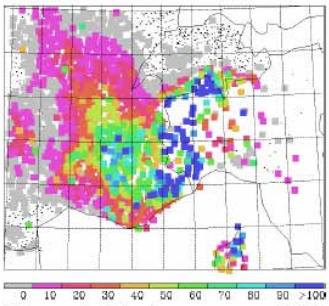

Figure 3: Piedmont case: 24 h accumulated precipitation until 6 Nov. 1994, 06 UT. Maximum: 351 mm/24 h.

Additional information and instructive graphics can be accessed from the recently built website of the MAP working group 'Numerical Modelling (WGNUM)' c/o Lab. d'Aérologie in Toulouse (http://www.aero.obs-mip.fr/map ; click 'preMAP episodes' or 'WGNUM'). Figures 1–3 are examples depicting the considerable spatial extent (the geographical one-degree-grid shows well the 111 km separating the latitude circles on the steoreographic projection) of the south-Alpine precipitation events of Vaison, Brig and Piedmont as well as the very different location receiving the highest precipitation amount.

4. Conclusion

Within a developing Societal Impact Subprogramme (SIS) the MAP seasons June to November 1992–1999 are ready to serve as a pilot period for a cooperation between the re-insurance industry and the communities of the meteorological and hydrological sciences. The quite diverse nature of the available data catalogues clearly point to an intensification of the dialogue between the partners. Then, it is felt, better and more quantitative data concerning spatial and temporal extent of severe-impact weather in the Alpine region as well as thresholds for severity classes can be deduced.

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