The Mesoscale Alpine Programme

MAP newsletter

no. 10
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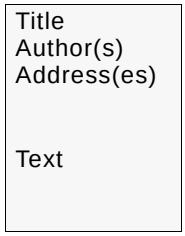
The MAP newsletter invites short articles on MAP-related topics. **Contributions** to the MAP newsletter should be sent to the Editor Andrea Rossa. **Please deliver your text (graphs included) in a camera-ready format** (see templates at the MAP Data Centre), and be sure that figures are suitable for black and white reproduction.

Your contribution must not exceed 2 pages!

Camera-ready format:
16.0 cm (6.3 inch)



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Deadline for contributions to the MAP newsletter No. 11:
July 5, 1999 (to appear in August 1999)

Editorial

It is quite something to watch how the MAP planning process is about to converge and materialize into an outstanding field experiment! What the ideal weather should be, in order to make the MAP community happy, is detailed in Reinhold Steinacker's article. He sketches a strawman scenario, derived from a detailed analysis of the most recent seasons corresponding to the MAP field phase, and addresses the various alert levels to be issued to the operators of the observing systems. During the Special Observing Period (SOP) the MAP Forecast Office (FO) is to issue such warnings not diagnostically, but prognostically! Peter Parson discusses the organisation of the FO in his article.

The technical and logistical backbone of the campaign is an extremely complex one and consists of the MAP Operation Centre (MOC) in Innsbruck, Austria, the Project Operation Centre Radar (POC) in Milano Linate, Italy, the MAP Data Centre (MDC) in Zurich, Switzerland, the Coordination Centre in the Rhine Valley, and more. Additionally, there are all the necessary complex communication needs to be fulfilled. In response to this challenge the MDC hired a network specialist from Canada, Ann Guy, to help with the installation of a wide area network and to assist the start of the Special Observing Period (SOP). A lot of effort is devoted to the setup of the operation centres in Innsbruck and Milano. Useful information, particularly for participating groups, is included in articles devoted to these issues written by Herbert Pümpel, Giuseppe Frustaci, and Hans Hirter and Hans Richner.

These articles reflect but a part of the ongoing intense planning process culminating in the MAP Implementation Plan (MIP), which is to be the reference hand book for SOP operations. As described in the article of Peter Binder and Christoph Schär, the MIP was laid out during the Ascona Planning Meeting of last October, and will be approved by the IGP in June.

Besides the organisational articles, reflecting the intense preparation of the SOP, there are also scientific contributions in this newsletter. Read Hans Volkert's report on the successfully completed EU project HERA, and the progress report of Baldassare Bacchi and Roberto Ranzi on EU project RAPHAEL. Also, two papers from the MAP community are included. More MAP-related science will be presented during the fifth annual MAP Meeting in Appenzell, Switzerland on 9-11 June 1999. A meeting overview is included in this newsletter. Extended abstracts of this meeting will be published in newsletter No 11 before the start of the SOP still.

Last but not least, I wish to inform you that the Programme Office took over Stephan Bader's job as technical editor of the MAP newsletter. Due to a change in Stephan's job description he no longer can fulfil this important task. All the more I deem it appropriate to thank Stephan very much on behalf of the MAP community for his effort to make the MAP Newsletter an attractive and clear-cut information platform for our programme; we appreciate it!

Andrea Rossa
MAP Programme Office

Strawman scenario for MAP-SOP events

Reinhold Steinacker, Institut für Meteorologie und Geophysik University of Vienna,
1190 Vienna, Austria

Introduction

This strawman scenario is based on an evaluation of the MAP-seasons 1989–1998. The evaluation was carried out with the aid of the daily weather map of the University of Berlin (Berliner Wetterkarte, 1989-1998), which contains an excellent overview of the large-scale weather situation, the central European weather situation including the Alpine region, and an extensive overview of local observations focusing on extreme events.

The evaluation covered MAP-relevant weather situations leading to Foehn events in the Rhine valley and in the Wipp valley over the Brennerpass (gap flow), to heavy precipitation events in the southwestern part of the Alps (especially in the western Po valley and Ticino area) and in the southeastern part of the Alps (especially in the Friuli and Julian Alps region) and to pronounced deep southerly or northerly flows over the Alps, favourable to potential vorticity banner generation and to gravity wave breaking.

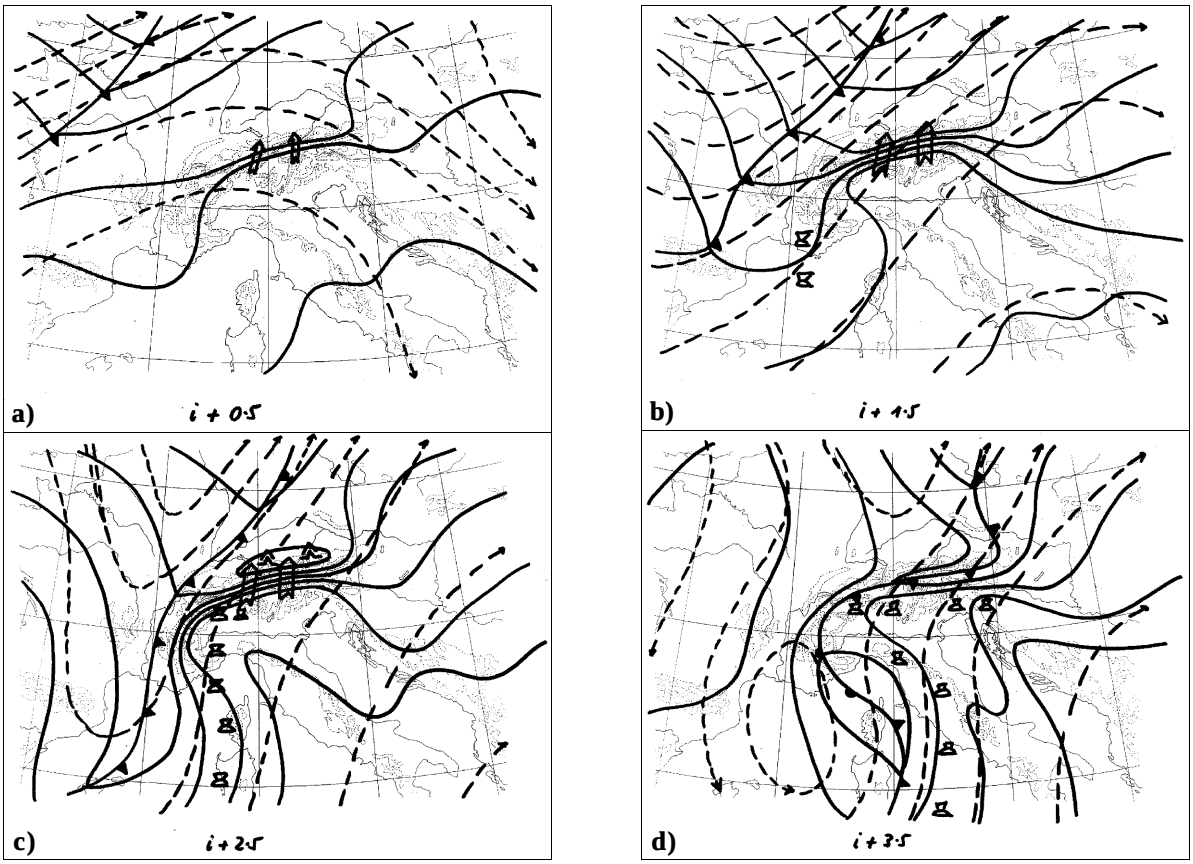

Figure 1. Schematic depiction of the time sequence of a major MAP event. Continuous lines are surface isobars with say 4hPa spacing, dashed are 500hPa contour lines with say 40gpm interval. Thick arrows indicate Foehn flow in the Rhine valley and gap flow over the Brenner pass, other symbols are conventional. It should be noted that with slowly moving, intensifying troughs the surface front may very often consist of more than one line which may modulate the Foehn flow considerably. Panel a) denotes day i + 0.5 (onset of shallow Foehn in the Wipp valley), panel b) approaching trough over France, panel c) onset of heavy precipitation in the SW-part, and panel d) end of Foehn in the Wipp valley, onset of precipitation in SE-part.

day	event	event type
i-3	pre alert	
i-2	pre alert confirmed	
i-1	alert	
i	onset of shallow foehn in the Rhine valley	FOR
i+0,5	onset of shallow foehn in the Wipp valley	FOR,GAP
i+1	intensifying/deepening foehn in the Rhine and Wipp valley	FOR, GAP
i+1,5	approaching trough over France	FOR,GAP,ULF
i+2	vorticity banners and wave breaking north of Alps	FOR,GAP,ULF,PVB,GWB
i+2,5	onset of heavy precipitation in the SW-part	FOR,GAP,PVB,GWB,ORP
i+3	end of foehn in the Rhine valley	GAP,PVB,GWB,ORP
i+3,5	end of foehn in the Wipp valley, onset precip. in SE	ORP
i+4,5	possibly north foehn	

Table 1 Major event strawman scenario. See text and Fig. 1 for a more detailed description.

South Foehn events were selected if a significant (roughly 5 hPa or more at sea level) cross-Alpine pressure difference was present in the high-resolution weather map, without (shallow Foehn) or with (deep Foehn) a pronounced southerly flow at crest height and above. Heavy precipitation events were selected if at least one station in the relevant regions reported a 12-hourly precipitation of roughly 30 mm or more, associated with a southerly low-level flow component impinging on the Alps. If a heavy precipitation event was obviously associated with a pronounced upper-level trough (indicating high upper tropospheric potential vorticity) approaching the Alps via France, it was selected as 'upper-level feature' event. The lack of upper level PV-maps for the present evaluation may have considerably underestimated such events. This should be kept in mind when interpreting the statistics. Both potential vorticity banner and gravity wave breaking events were pragmatically declared to take place when a southerly or northerly flow across the Alps with approximately 30 knots or more at crest height was present. It has to be considered that very often this criterion is fulfilled only over part of the Alpine crest. In principle, gravity wave breaking is also possible with an arbitrary flow direction, e.g. a westerly flow over the Alps. Due to the lack of experience on that matter and to avoid confusion, no such cases have been selected.

Statistics of the SOP periods of the last ten years

MAP events that occurred during the SOP period of the last ten years have been singled out and displayed in Table 3. Some statistics on these events is presented in Table 2

Conclusion

The very positive result is that during each of the MAP seasons from the most recent 10 years all of the MAP-relevant phenomena occurred at least once within the period September 7 to November 15. Even if we count major events, i.e. time windows of a few days where several (three or more) of the MAP-relevant phenomena occur, at least one such event was present in each of the 10 years. The duration of a major event may vary between 2 and 7 days with a mean of 3.5 days. A typical major event has a temporal characteristic as displayed in Fig. 1 and in Table 1 (major event strawman scenario).

The less positive result is that there is a strong tendency for repeated major events within a short period and hence quite an unbalanced distribution of expected actions within the MAP SOP. The median of the interval between the onset of two events is 8 days, with a modal value of only 5 days. The distribution ratio tells us that we have to expect two thirds or more of all events within one half of SOP. Looking at special phenomena, the distribution becomes even

phenomenon	mean number of days (/SOP)	mean number of events	mean duration of events (days)	distribution ratio (%)	mean maximum interval (days)
ULF	3.3	3.3	1.0	71:29	41
FOR	16.4	9.0	1.8	71:29	22
GAP	18.0	9.7	1.9	73:27	18
ORP	14.5	5.2	2.8	75:25	30
ORP (W)	10.2	3.9			
ORP (E)	4.3	1.3			
GWB/PVB	11.2	4.3	2.6	67:33	27
GWB/PVB(N)	5.9	2.5	2.4	85:15	40
GWB/PVB(S)	5.3	1.8	2.9	94:6	48
one or more phenomena	25.6	12.1	2.1	68:32	14
two or more phenomena	19.0	9.8	1.9 (2.4)		
three or more phenomena	5.9	4.4	1.3 (3.5)		

Table 2 A ten-years statistics of MAP events in the SOP period (see Table 3). The table headings are explained in the following: **phenomena**: according to the MAP Science Plan, 1998; **mean number of days**: number of 24 hour periods, not necessarily calendar days; **mean number of events**: an event is a continuous period of the occurrence of one or more MAP-related phenomena; **mean duration of events**: ratio between mean number of days and mean number of events; the number in brackets are based on the total number of days of a two- or multi-phenomenon event irrespective of a simultaneous occurrence of phenomena; **distribution ratio**: indicates the ratio between the mean maximum number of events within an arbitrary five week period and the mean number of events within the rest of the MAP season (the total length of SOP is exactly 10 weeks); **mean maximum interval**: mean value for the ten years 1989 to 1998 of the maximum observed interval between two successive occurrence of a phenomenon within the SOP period; **ULF**: Upper level feature event; **FOR**: Foehn event in the Rhine valley; **GAP**: Gap flow (Foehn) event in the Wipp valley (Brenner pass); **ORP**: Orographic precipitation event (W: In the western section, E: in the eastern section only); **GWB**: Gravity wave breaking event (N: north of the Alps with a southerly flow, S: south of the Alps with a northerly flow); **PVB**: potential vorticity banner event (N: north of the Alps with a southerly flow, S: south of the Alps with a southerly flow).

more unbalanced. For orographic precipitation events we must expect three quarters of the events within one half of SOP and even much worse, nearly all pronounced northerly or southerly flow regimes leading to gravity wave breaking and vorticity banners have to be expected in one half of SOP. This may be explained by the persistence of the large-scale flow regimes over the Alpine region.

Minor events (only one or two phenomena occurring simultaneously or overlapping) usually either concern periods with only shallow Foehn (westerly upper level flow) or with potential vorticity banner generation and wave breaking south of the Alps with a deep and pronounced northerly flow. The latter sometimes occurs after a major event, i.e. after the passage of the upper-level trough.

In most of the 10 most recent MAP seasons long periods (14 days mean maximum interval) without any of MAP relevant phenomena occurred. This is usually caused by a stationary/blocking high pressure cell over or close to Central Europe, a phenomenon called “Altweibersommer” in German (corresponding to the American “Indian summer”). For some of the phenomena the maximum period without an event may be as long as 4 to 5 weeks for gravity wave breaking, potential vorticity banners or orographic precipitation and even 6 weeks for upper-level features. Also for the more frequent Foehn events (FOR and GAP) a period of roughly 3 weeks has to be expected without any occurrence.

References:
Berliner Wetterkarte, 1989-1998: FU Berlin
MAP Science Plan, 1998: Zurich

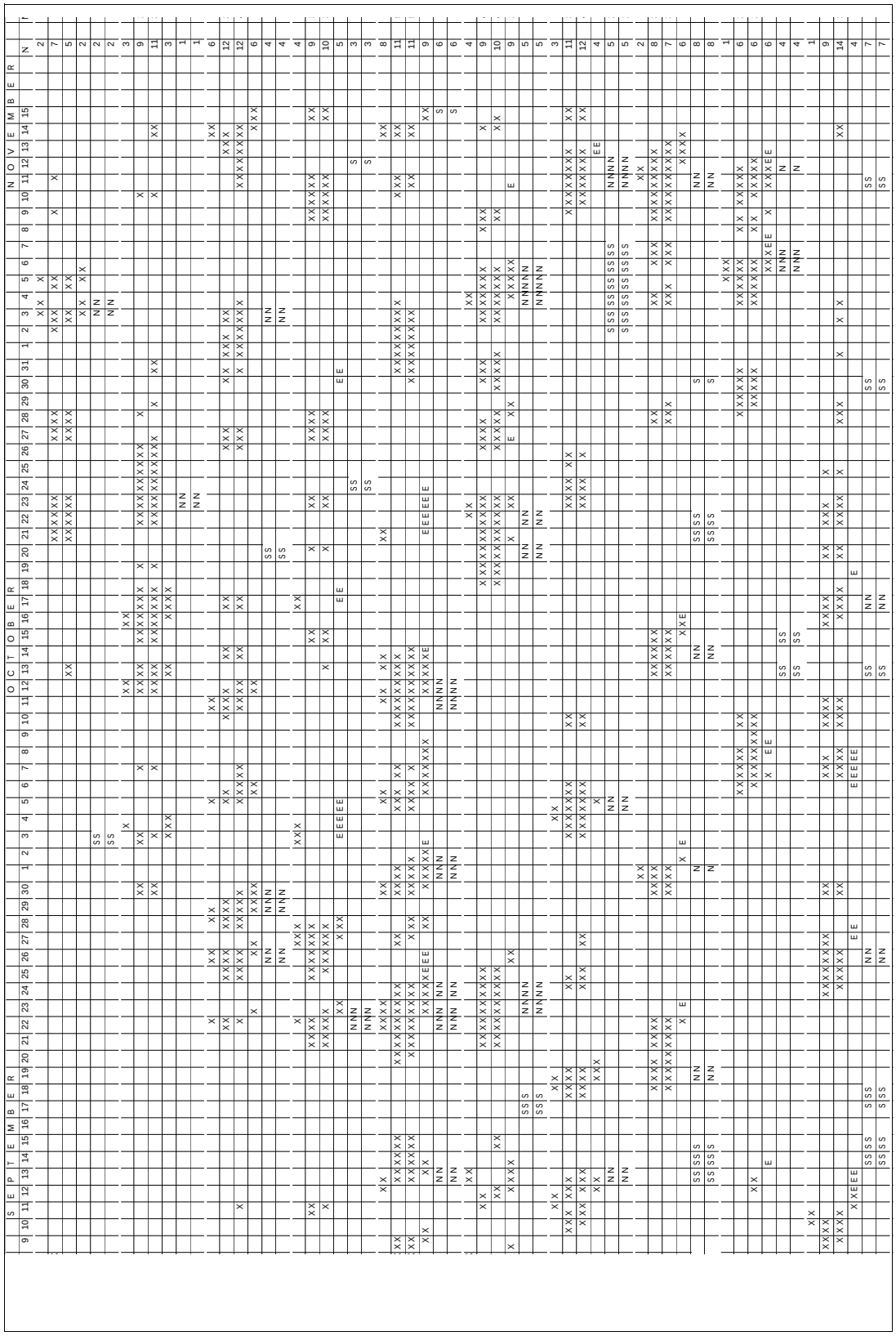

Table 3 Statistics of MAP events. For explanation of acronyms see legend of Table 2.

MAP Operations Centre Innsbruck

Herbert Pümpel, Aeronautical Meteorological Service, Austro-Control,
6020 Innsbruck, Austria

For all participants and visitors to the Map Operations Centre Innsbruck (MOC), the first question will be:

How do we get there?

The MAP Operations Centre (MOC) in Innsbruck is located at Innsbruck Kranebitten Airport. Administrative Offices and MOC Forecaster Centre are within the facilities of the Austrian Civil Aviation Authority (AustroControl, ACG) at the General Aviation tract near the tower at Fürstenweg 180 at the airport. The Secretariat is found within the same building on the first floor. The terminal room, general assembly/ briefing room-cum-display-room for forecast products is found nearby at the WIST student hostel at Fürstenweg 174.

Accommodation/private offices for participants to the experiment will be mostly at the student hostel, and partly at the Hotel Penz across the street. Storage and workshop facilities for aircraft operators will be handled by the Tiroler Flughafen Gesellschaft Innsbruck (TFG) by individual arrangements with aircraft operators. All these are found in the western part of the town (3 km from the town centre) near the Autobahn A12, exit *Innsbruck West* for travellers arriving from Brennerpass or Kufstein/Munich or exit *Kranebitten* for those arriving from West (Switzerland, Garmisch). Just follow the signs to the airport. Please do not forget to buy a 'Autobahn Vignette' (windshield sticker) at the border if you are going to drive on the Autobahn. They are available for one year (about ATS 500), or 10 days (around ATS 90).

For participants arriving by train, there is a direct bus (line *F*) from the railway station at regular intervals (15 min daytime, 20 min evenings). For train connections, check the website of Austrian Railways (http://www.oebb.at). Airline connections through Zurich (3 flights/day), Amsterdam, Frankfurt, Vienna and Paris are easily found from all destinations.

Offices

Administrative Offices: Scientific Director (SD), Operations Director (OD) and Flight Coordinator (FC) will be housed within the Austro-Control area of the airport building. It is anticipated to assign the SD a first-floor office (the Secretariat Office), the OD and FC will be housed at a large communal room (~70 m^2) together with the secretary on the ground floor next to the office of the MOC Director (25 m^2). If preferable, the sharing of the MOC director's office by OD might be an alternative, ensuring excellent communication.

Forecast Centre: This will be also within the AustroControl-compound at the ground floor, opposite the MOC SD-office.

The General Assembly/Briefing room: at the student hostel is located on the ground floor and has dimensions of approximately 15x10 m^2. There is 24 h-access for all residents at the hostel and daytime access for all other participants.

Network Connection and Communication

The terminal room for work groups at the student hostel is located in a quiet courtyard, sheltered from the hustle of the hostel and airport traffic and has approximately 50 m^2. There will be around 15 desks for workstations. Due to an increased demand for workstation placement, some 5-10 workstations could be placed in the General Assembly room, separated by a mobile dividing wall. Some 5-8 rooms in the hostel will be equipped with high-speed network access to the MOC-net using the TV-cables into the room, the other rooms may use the telephone for internet-access. This will require an account and will be somewhat slower than the MOC-net, and is envisaged for occasional downloading of information from home institutions, e-mail etc.

Phones and faxes: The MOC forecast office will be equipped with an open telephone link. All users of the terminal room will have access to telephones there upon opening an account with the hostel management. It is advised to use your personal commercial phone accounts (such as AT&T, Bell, Visaphone, Mercury etc.) for all international and overseas calls as telephone rates in Austria are still higher than most US and many European companies rates.
For OD/SD/FC arrangements will be made to have a phone account for their office phones. Key staff will also have access to a limited number of mobile phones for calls to each other and local calls; these will be accessible from any outside phone. A deal is being negotiated with a cellphone operator using dual-band phones (900/1800MHz). Anybody needing a cellphone is encouraged to use the same company since calls within an operator's network are much cheaper than calls between different companies' networks. Do not bring your own national cellphone, since each call would be billed as an international one.

Numbers for the fax units at the MOC forecast office and communal office (secretariat) will be published as soon as lines have been established.

PC/workstations: All research groups and aircraft operators are expected to bring their own workstations. A MOC technician will assist in the hook-up to the local networks/internet. Please allow ample time for this work, as things are bound to become hectic prior to the start of the SOP!

Copiers: A3-size black-and-white copiers can be used with an account card at the student and at the ACG offices in immediate vicinity to the administrative offices. Additional copiers can be rented for groups, provided there is a timely request to the secretariat. Several commercial copy shops within a 3km-radius offer colour copy services.

Other Important Issues

Rental Cars: An arrangement has been concluded with the local FIAT dealership for long-term-rental cars on a monthly basis. The approximate monthly rates are 700 Euros for a 5-seater Punto (small-intermediate), 850 Euros for the intermediate 6-seater Multipla, and 1000 Euros for the 8-seater Minivan Ulysse. These rates include all taxes, unlimited mileage and CDW. These rates are approximately 50% below normal tariffs. Interested groups please contact the MOC secretary, Harald Schellander, before May 1, 1999.

Meal Vouchers: It is planned to provide meal vouchers for a number of nearby restaurants and cafes at a fixed cost. They can be purchased from the secretariat upon arrival.

Security: All participants requiring access to the non-public areas of the Airport, including the ACG tract of the building, will need an ID card to be worn visibly at all times. Please allow approximately one day for the production of these cards by the Airport Security Manager, Mr. H. Wilhelm. Only aircraft flight and maintenance crews have access to the airfield at any time. Crew and on-board scientists need to pass customs on departure and return from any international flight.

Access to administrative offices is strictly limited to persons on MAP business only, as they have to pass through ACG private areas.

Access to the general assembly room at the student hostel will be open during daytime, but wearing a MAP name-tag may be required. Groups with a workstation in the terminal room will be given access keys and are responsible for any loss or damage to their and/or MOC equipment and installations.

Innsbruck and the airport are very safe areas; normal precautions for valuables apply as in any other place. A police station is in the same building as the administrative offices. There is no military sector at the airport so that no limitations in terms of free movement, photography etc. are in force.

Storage: Storage of equipment other than data processing hardware needs to be arranged with commercial companies. The official handling agent for air freight and storage at the airport is Schenker & Co AG tel. +43-512-22521-0, fax: +43-512-282125.

Radio links and antennae

Since a complicated exam is required to use radio communications for any frequency other than the CB-band, we discourage the idea of using individual radio links other than those already present in aircraft. A special MAP-VHF communications frequency (136.8MHz) is currently being reserved in all participating countries. We are considering the use of AustroControl aerials installed at the Zugspitz Observatory (3000m) and point-to-point radio channels to relay this frequency to the operations facilities, but are awaiting confirmation from the relevant authorities. For brief messages between ground and research planes, the air traffic control staff at Innsbruck airport would be prepared to act as 'relay' using the approach frequency.

Insurance and liability

All aircraft operators flying in Austrian airspace need third party liability cover through an insurance company registered in Austria. For operators having difficulty meeting this requirement (government regulations) we suggest to obtain a pro-forma covering letter from an insurance company that has a contract with the respective government authorities. This regulation ensures that anyone suffering damage can obtain compensation through national courts of law rather than having to litigate with a foreign government. In particular, those operators wishing to use dropsondes are strongly advised to arrange for such a pro-forma cover.

For vehicles brought into the EU, please make sure you obtain sufficient cover if your stay exceeds 30 days! (Green card or similar). There are serious problems to get Swiss-registered rent cars into EU and therefore Austrian territory without having to pay import duties. You may contact Schenker & Co for detailed information on customs formalities.
Anyone entering the airfield would be strongly advised to take out personal liability insurance with adequate cover (think of an Airbus A300 running off the taxiway because you disregarded instructions!).

For health insurance, EU citizens are usually covered under state treaty for any unavoidable treatment cost. Please request the relevant forms from your employer/insurer. Non-EU-citizens, please check that your insurance covers costs for treatment abroad including a possible transfer back home (there are ambulance jets at the airport). Daily costs at the (excellent!) University Hospital at Innsbruck are in excess of 300Euro/day excluding medication and fees for surgery.

The Project Operation Centre (POC) in Milano

Giuseppe Frustaci, CMR – National Meteorological Service, 20138-Milano, Italy

The POC's role for the field phase

The main duty of the Operation Centres during the field phase will be the best possible exploitation of the very large observational network that has been set up for the experiment. Surface and upper air observations will be available in real time at a very high time and spatial resolution, as well as radar and satellite imagery. Therefore, there will be enough detailed information to efficiently guide in situ measurements by aircraft and radio-soundings, and remote sensing observations by other mobile instrumentation, like experimental radar with very fine resolution capacities and sophisticated measuring characteristics. A lot of information of this type is planned to be directly available at the Project Operation Centre (POC), being set up in Milan by the Italian Meteorological Service and hosted in the CMR building in the airport area of Linate Airbase. Planned are direct links to the main mo-

bile radars (Ronsard and S-Pol), which will be deployed in the Lago Maggiore target area, and real-time transmission of radar imagery from all the operational radars in the North-Italian regions as well as from Monte Lema.

Whereas MAP Operation Centre (MOC) in Innsbruck has the responsibility for the general direction of SOP, for declaring start and end of intensive observation periods (IOP) according to the general short and medium range forecasts, and for the definition of the general strategy for each IOP, POC will be mainly in charge of the real time control and guidance of airborne and mobile radar operations. Its proximity to all the southern slopes of the Alps, especially to the Lago Maggiore and Toce-Ticino areas gives POC a unique advantage in collecting information in this large and relevant region of the experiment domain.

POC Implementation

The set up of an operation centre for such an important project as MAP is obviously hard work and a similarly very large number of issues have to be solved in Innsbruck as well as in Milan. Common and important items are:

- logistics (tens of scientists and many aircraft crews have to be hosted together with their computational and technical equipment),
- telecommunications (quantity and speed of data and information exchange),
- meteorological information (a lot of numerical products are to be made available in the Forecast and Operational Rooms, as well as a large number of different real time observations).

At POC further problems arise because of the necessity of collecting information from a large number of different data providers, which up to now have operated mainly on a regional basis and almost without any data exchange. MAP has been a unique opportunity to start a strong and effective co-operation, giving momentum toward an enlarged and integrated national meteorological service. Important achievements have already been made in organising and establishing common procedures and metadata, in defining a unique format for surface observations and radar images exchange, and setting up an efficient network using Rome (CNMCA) and Milan (CMR) as telecommunication hubs. Both centres are directly linked by high-speed data transmission lines and use a common H/S system of the Italian NMS. At the end of March POC was already operationally collecting surface data and radar images of the North-Italian regions.

On the international side, a preliminary installation of the SOP operational database and telecommunication software has been done at POC by H. Hirter (MDC), allowing tests and experience in exchanging information with the MDC and the MOC. For this purpose, the co-operation of the Milan University (Physics Department) and INFN has been crucial as they provide an efficient communication link to the Internet (2Mb/s GARR backbone) at no other cost than the necessary CDN urban connection planned for tests and SOP, which will be supplied by the Italian NMS.

Two other important items especially relevant for POC are:

- the VHF communications from ground to the MAP aircraft, for which a specific frequency (138.6MHz) has been agreed upon at the international level. The Italian Air Force is setting up a communication link for POC to a number of radio repeaters equipped for the same frequency, which will give a sufficient coverage in the area south of the Alps. Using this equipment, the POC will be able to efficiently guide scientific crews on board to the best locations and flight tracks to optimize the use of airborne instruments. Tests are planned in summer. Efforts have been made to obtain MAP aircraft tracks in digital form and in real time at the POC in order to superimpose them on meteorological displays of the Mountain-Zebra software from Washington University. Unfortunately, no definite solution has been found so far.

- the logistic support to Merlin IV and Fokker 27-ARAT at Linate Airbase. These French aircraft will operate from Linate and the Italian Air Force is offering them free parking, power and hangar space. Pilots and crews will have the opportunity of dedicated meteorological briefings. The POC is no more than 200m away from hangar and parking area.

Information available

During the SOP the POC Oracle database, which is installed on an Alpha Workstation/Windows NT Server, will be regularly updated through a mirroring process with the MDC and MOC servers. Therefore the same information will be available to the MAP community in Milan and Innsbruck. Graphical model outputs from ECMWF, DWD, SMI, Aladin and MC2 (as selected by the MAP forecasting working group), satellite pictures, and radar composites will allow the forecasters to prepare well-documented reports and short/medium range weather forecasts. At the POC there will also be a variety of radar images from the operational as well as from the special mobile radars. Pictures in GIF formats will be made available to the MOC, but high-resolution data from Ronsard and S-Pol will probably be available only locally on dedicated workstations. This information will be of extreme interest and will constitute the principal source of information for real-time decisions on flight tracks to be transmitted to the aircraft crews.

A small team of dedicated POC forecasters (1-2 persons) working mostly separately from the CMR shift forecasters (there will be anyway some form of co-operation at fixed times) is expected to give daily briefings to POC scientists in the morning and late afternoon, to prepare meteorological documentation, and to assist the POC staff in defining plans and operations. During IOPs a reinforced team (2-3 persons) has to assure continuous monitoring of the weather situation especially over the target and mission areas, and to produce special nowcasting reports in order to guarantee the best possible guidance to aircraft and mobile radar groups. The working place will be the POC Operation Room, together with the field observation coordinator, the ATC coordinator, scientific director, and POC director.

Daily schedule overview

The detailed schedule has still to be worked out, especially for information exchange between scientists operating at MOC and POC. During normal non-IOP days the routine will be based on the following:

- a morning briefing, with meteorological information and forecasts (as preliminarily agreed by phone/e-mail with the MOC forecaster team), instrumentation reports and outlook;
- a decision-making procedure, based on local discussion and teleconference with the MOC scientific group;
- the start of specific operational procedures in case of pre-alert, alert or IOP declaration by the MOC;
- an evening briefing, updating the meteorological and operational situation.

If an alert has been issued or an IOP has been declared, the POC operational team has to start a 24 hours monitoring phase, prepare and issue hourly special reports and assure real-time guidance of the aircraft via the VHF link. In this case forecasters from different North-Italian meteorological agencies who are on call during the SOP can join POC within a few hours.

Address and Contact Points

The Project Operation Centre will be hosted by the 1° Centro Meteorologico Regionale (CMR - Italian Meteorological Service) in Milano – Linate (Military Airbase of the Italian Air Force). Address and phone numbers are:
Centro Meteorologico Regionale,
Viale Aviazione 1 - I-20138 Milano (Italy)
Phone: +39 02 7010 2389/7390 4298
fax: +39 02 740821/7390 4576
e-mail: poclin@mi.infn.it
Contact persons: S. Fiacconi, D. Nappi, G. Alessio, F. De Nile. Director: Giuseppe Frustaci
phone: +39-02-7390 4310
e-mail: giuseppe_frustaci@rcm.inet.it

The CMR is an operational centre of the Italian Meteorological Service. Among its duties: 24 hourly meteorological assistance to civil and military flights in the Milano FIR, SIGMET and AIRMET for the same area (1999 planned extension to all the other Italian FIRs), forecasts for Norht-Italian seas and for the Alpine regions, four radio-soundings a day (WMO 16080), regional meteorological telecommunication hub connected to the national meteorological centre (CNMCA) in Pratica di Mare-Roma. Located on the west part of the Linate Airport Forlanini, the POC is close to the airport buildings as well as to the Milan eastern highway, and is easy to reach in less than half an hour from downtown Milan and in about an hour from Malpensa International Airport.

Forecaster Working Group: State of preparation for the SOP

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Forecasting Office, technical equipment, staff

The Forecast Office (FO) is part of the MAP Operations Centre (MOC). It is situated within the rooms of the Austrian Aviation Weather Service (ACG) at Innsbruck Airport, in the vicinity of the civil Austrian weather service (ZAMG). The FO at the ground floor has about 46 m^2 and will be equipped with 3 SUN workstations, 4 PCs, 2 printers, phones, a copy machine and a fax. The forecasters will have available both the large set of data especially designed for MAP-SOP and the routine analysis and forecast tools from the Austrian weather services ACG and ZAMG.

All MOC-forecasters coming from different parts of the Alps, from the U.S. and Canada are members of the Forecaster Working Group. Founded in 1996 this group has worked hard to prepare for the SOP (MAP seasons, forecaster handbook, meteorological checklist, list of parameters for MAP-designed NWP models, working schedules etc.). About 25 forecasters will do their shifts in the FO. The Forecaster office will be open from 03:00 to 19:00 UTC, longer hours upon request.

The 'MAP-seasons' of the Forecaster Working Group

As the members of the Forecaster Working Group come from different countries and weather services it was necessary to develop procedures of cooperation, to initiate an exchange of know-how and to share operational forecasting methods adapted to MAP-related meteorological phenomena. Therefore a joint activity for monitoring and documenting MAP relevant meteorological situations occurring during the extended MAP season (June to November, 1996 to 1998) was initiated. In Fall 1998 the Forecaster Working Group was authorised to suggest test runs of the MAP experimental NWP MC2 and of Meteosat 6 - Rapid Scans by Eumetsat and the MAP season was extended to the start of the SOP on September 7, 1999.

Meteorological handbook and checklist

In order to ensure a uniformly high standard of forecasting knowledge and skills for the entire MAP area a meteorological handbook was compiled on the basis of contributions from forecasters with excellent knowledge of MAP phenomena relevant for their area of experience. These contributions are distilled into a 'checklist' which will serve as meteorological guideline for the work during the SOP. Additionally this handbook is intended to become a unique collection of meteorological knowledge and experience for different parts of the Alpine region.

Support to scientists

The basic requirement to be satisfied by the forecasters is to give support for mission planning and decision making by covering all forecast ranges from medium range (48-120 h), short range (24-48 h), very short range (6-24 h), nowcasting (0-6 h) to real-time mission support. During missions a team formed by a forecaster and a ground-based mission scientist shall provide real-time guidance to the aircraft and radar teams.

Only a restricted number of persons will have access to the FO. For core briefings, scientific director, operations director, principle investigators, MOC-personnel and forecasters will be in the forecast office. The main briefing will take place in the student hostel. This 'briefing room' is also intended to be a general information- and communication centre. Therefore one of the forecasters / student assistants will be available in the briefing room during fixed hours.

Availability of data and products

In principle all data and products offered to the forecasters in their office are available for scientists in the briefing room.

Observational data

Synops, real-time hourly surface data from automatic stations: (I, CH, A), metars, radiosoundings both in GTS- and in high-resolution, radar images (Austrian Network & European Composite, National Composites of F, I, CH, D, Alpine Composite by DLR), Lightning Detecting Systems, windprofiler (CWINDE, Payerne, Vienna, Innsbruck), objective analysis schemes (VERA, LAPS).

NWP products

A large number of forecast charts were designed especially for MAP. The list of meteorological parameters, the time steps, the location of vertical sections etc. have been discussed exhaustively by scientists and forecasters. As no interactive use of the NWP products is possible, a large number of potentially interesting charts will be produced every day (about 800(!) charts per model-run). Besides the ECMWF global model, the following LAMs will be available for MAP-SOP: Swiss Model, Local Model of DWD, and ALADIN/LACE. A special support for forecasters and scientists will be given by the output of the MC2 model, the experimental NWP of MAP.

Satellite products

All METEOSAT 7 products (IR, WV, VIS) and NOAA IR / VIS images will be available in real time in the forecast office and in the briefing room. EUMETSAT will provide 'Rapid Scans' from Meteosat 6, satellite images with a reduced domain but higher resolution in time.

The MAP Data Centre during the MAP field phase

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All data gathered during the MAP field phase will be stored and made available by the MAP Data Centre (MDC). In special case of real-time data there are centres where the data will be available for the forecaster group. The centres are: MAP Operation Centre (MOC) in Innsbruck, Austria, Project Operation Centre Radar (POC) in Milano, Italy, MAP Network Centre (MNC) located at MDC in Zurich, Switzerland and Co-ordination Centre Rhine-Valley (COC) in Bad Ragaz, Switzerland.

MAP field phase network

The computer network for the MAP field phase is based on know-how of the MAP Data Centre. For the MAP field phase we will use the same database and web server software and the same access strategy as well. Fig. 1 shows an overview of MDC and MAP field phase network. At MDC MAP Episode and seasons data are available, GOP and SOP except real-time data will be available. MOC, POC, COC and MNC will contain real-time data for forecasters only.

At every MAP field phase network centre there are a Web and Database server located. Data access through the local network (Intranet) at each centre allows reducing data traffic over the Internet dramatically. All data gathered during the SOP will be stored at the MDC. But only surface, sounding and quick look data will be available on-line. That means most raw data are not available through the MDC Web interface. With an MDC account you will have access to SOP data only, for real-time data a forecaster account is required. Data processing of real-time data takes place at each individual centre depending on data and provider.

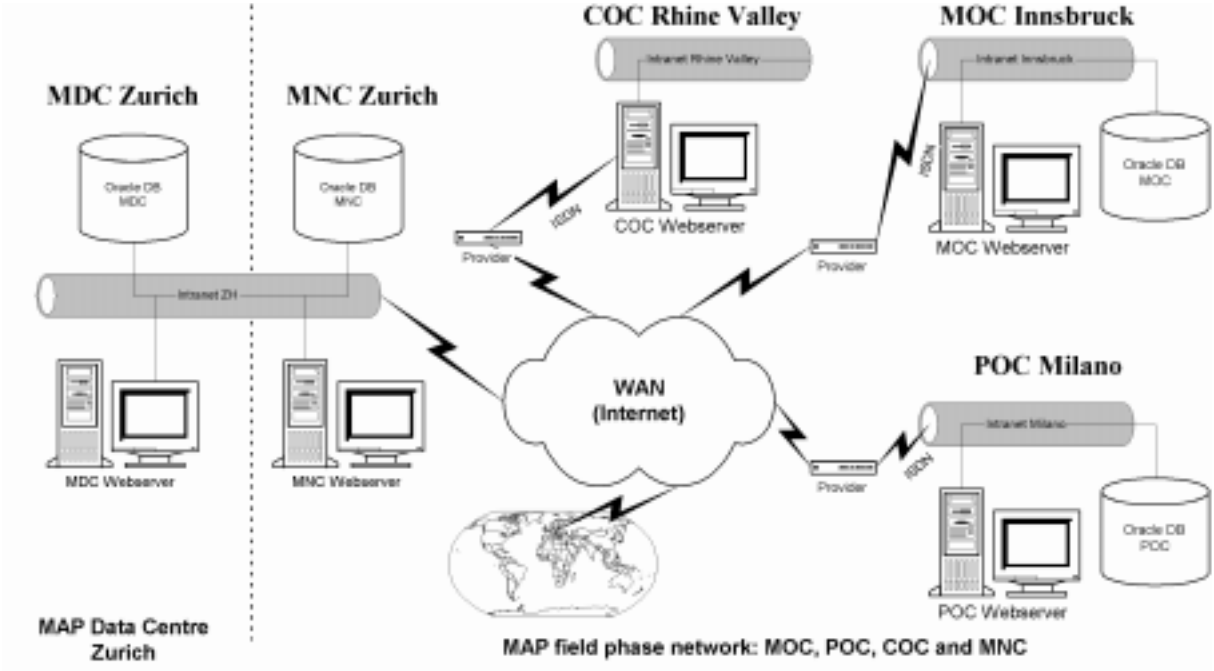

Figure 1. MAP field phase network overview.

Status of MAP field phase network installation

MDC is running since 1995 and is well known and reachable through the Internet address www.map.ethz.ch. The MNC Server in Zurich (MNC) is running since May '98 and the MOC server in Innsbruck since January '99. That means the replication mechanism between Innsbruck and Zurich has now been running for one month under real conditions. Full remote control of the MOC server in Innsbruck from Zurich over the Internet is possible as well. The first test of voice communication over the Internet was a success as well. A voice and/or video communication over the Internet seems to be possible. But we have to do more tests to get a definitive answer.

Security at MOC, POC, COC and MNC

The **Internet accesses** for MOC, POC, COC and MNC are similar to the Internet access of MDC itself. Each web server has a public and a member area. The public part is for everybody and the member area is for forecaster and authorised scientific people only. Each Oracle Application Server handles the authentication mechanism at each site. Only forecasters will get an account at each site automatically.

On the other hand the **Intranet access** is open for every Intranet user. The restriction is that only users on a computer with a MAP field phase Network IP-number (172.16.x.x) and who are connected physically and directly to the Intranet will be able to access the MAP field phase network. From a technical point 'physically' and 'directly' means that there is no router or switch between the user workstation and the server of the centre. To get a MAP field phase Network IP-number, please contact the network administrator at the corresponding centre.

MDC Archives

All data gathered during the MAP field phase would be stored at the MDC in Zurich. Data access will be through the MDC's web interface. In general all data will be available in 'Internet-like format'. That means ASCII tables for surface, radiosonde data etc. and GIF-images for radar, satellite images etc. (Raw data for example radar data will not be accessible on-line).

Characteristics of MDC Archive

The success of data ingestion into the MDC archive will be based on the following principles:

- There will be few entry requirements for data providers. Input format is restricted for on-line data only (see MDC Archive formats). MDC will not decode any data to store in the database. Input media will not be restricted, although a few recommendations will be made in order to minimise the entry work.

- Data transmission to the MDC will be directly by anonymous FTP over Internet or through an external media. We prefer CD-ROM's, but we will accept tapes in any common format as well. For raw data we will not have any restriction, but we will accept only data with a full format description and, if necessary, with corresponding decoder programs.

A detailed description of MDC archive formats is available at MDC under the address: http://www.map.ethz.ch/DIformat.htm

Report on the international planning meeting in Ascona, Switzerland, 25-30 October 1998

Peter Binder, Swiss Meteorological Institute, 8044 Zurich, Switzerland
Christoph Schär, Department of Geography, ETH, 8057 Zurich, Switzerland

Under the heading 'Challenges in Mountain Meteorology' a one-week workshop devoted to the planning of the MAP field experiment was held in the premises of the Centre Stefano Franscini on the Monte Verità, located above Ascona in the heart of the Lago Maggiore target area. Huw Davies and Christoph Schär had obtained the facilities by submitting a convincing proposal in favour of MAP to ETH. The local organisation was supported by an efficient staff led by Eva Choffat. Her and her colleagues' effort and commitment is greatly acknowledged. The overall aim of the workshop was to advance the preparation of the MAP Special Observing Period (SOP).

The workshop was attended by 71 participants from the following countries: Austria, Canada, Croatia, Germany, France, Hungary, Italy, Slovenia, Switzerland, United Kingdom and the United States.

The first day of the programme was reserved for detailed review of the science and the formulation of the scientific projects. The second day was devoted to establishing the desirable layout of the surface-based observing systems for the SOP. Separate working groups were formed to look into the set-up of radars, wind profilers, and surface observations in the Lago Maggiore, Rhine Valley, and Brenner target areas.

Funding decisions for most research aircraft flights only became available immediately prior to the workshop and were, in fact, very positive. A total amount of almost 600 flight hours were allocated to the 8 aircraft. Most of Wednesday was devoted to the detailed planning of these aircraft facilities. To this end, working group discussions on flight instrumentation were conducted, and different suggestions from various scientists were combined into a few comprehensive flight plans.

Key issues of organizational nature were approached on Thursday. This included the final timing of the SOP, which is now officially **7 September 1999 – 15 November 1999**.

The agreement on the mission selection procedure was a further important achievement, as well as the definition of the **key functions** for conducting the experiment. Meanwhile the International Governing Panel (IGP) has elected as Scientific Directors Philippe Bougeault and Ronald Smith, as Operations Directors Dick Dirks

and Peter Binder. As Centre Directors Herbert Pümpel and Giuseppe Frustaci were confirmed for the MAP Operations Centre in Innsbruck and the Project Operation Centre Radar in Milano-Linate, respectively.

Further discussions were conducted about the apportionment of flight hours to the scientific projects, the preparation of forecasting procedures at the MAP Forecasting Office (in Innsbruck) and the communications between Innsbruck and Milano. Albeit some of these discussions were difficult since they touched upon critical issues, agreement was achieved in all the major aspects. However, much effort has still to be devoted to resolve all the details to ensure a smooth conduct of the experiment.

On Friday morning action items were identified. In particular, the work on the **MAP Implementation Plan** (MIP) was initiated. This document will be the reference handbook for the SOP. The results of the Ascona week are crucial ingredients to this document.

One of the final discussions was about fall back strategies: what do we do when the weather does not cooperate during the SOP? Quite a bundle of ideas was presented so that there is no concern that we will walk out 'with empty hands'.

We should not close this report without mentioning that the weather during this week was not at all appropriate for wet MAP studies. On the contrary, PV banners and bright sun shine were predominant. The friendly weather and the laugh-bursts exiting mime show on Wednesday evening are only two facets which contributed to the enjoyable environment of the workshop.

Heavy Precipitation in the Alpine Region (HERA): First MAP-related EU-project completed

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At the end of March and six months before the special observation period (SOP) of MAP, the nine partner consortium of HERA completed their studies regarding recent heavy precipitation cases in various parts of the Alpine region. The aims of the project and first results were outlined in MAP newsletter 8, 1998, pp. 16-17. The bulk of the results is contained in 14 contributions to a special issue of the journal Meteorology and Atmospheric Physics (published by Springer, Vienna), which at present undergo the regular review procedure. Their appearance in print is scheduled for autumn this year.

Nine heavy precipitation episodes of the years 1992, 94, 95, 96 were selected for the construction of HERA radar composites combining data of up to twenty radars operated in Austria, France, Germany, and Switzerland. A grand total of 1104 half-hourly pictures have been produced spanning a period of 23 days. All pictures (GIF-format) and datafiles are collected in the user section of the MAP Data Centre (http://map.ethz.ch/mm-doc/HERA.htm). Such composites will be provided in near-real-time during SOP for the guidance of wet-MAP-missions.

Systematic modelling studies were undertaken with both operational forecasting models (DM, LAMBO) and research versions (MEOS-NH, BOLAM). Besides a large number of detailed findings they revealed that the current horizontal resolution (10 to 15km) and micro-physical parametrizations are suitable for the simulation of events with dominant synoptic-scale forcing, but that the prediction of mainly convectively

driven storm systems calls for a higher spatial resolution, more advanced micro-physics and better initial data.

Furthermore, the first cross-validation on a daily basis of four operational forecasting models (used in France, Germany, Italy, and Switzerland) with a trans-national gridded observational dataset was carried out for selected time windows within the MAP seasons of 1995 and 96 (together 164 days). It points to systematic deficiencies in the operational models and in the observational database, which in themselves justify a concerted action such as the MAP-SOP.

A step forward regarding a more realistic description of the lifecycle of convective storms near the Alps during special campaigns is envisaged through the adoption of airborne Doppler radar techniques for cases over complex terrain. Novel retrieval algorithms were developed within HERA and will be applied during MAP-SOP.
Finally, different synthetic modelling studies with parameters derived from the selected cases were carried out to investigate some basic processes in isolation, viz. a half-analytical approach for the interaction of mature atmospheric fronts with idealized topography, the enhanced generation of convective systems north of the Alps during southerly flow, the combined effect of the Alpine arc-shape and moist low level jets on the concentration of precipitation into a comparatively small area, and serious implications for the predictability of heavy precipitation events due to the only coarse grain knowledge of upper-tropospheric perturbations on their way towards the Alps.

In summary, project HERA achieved a hitherto not available synthesis between quite diverse aspects of today's measurement and simulation capabilities regarding heavy precipitation over terrain as complex as the Alps in the heart of Europe. Reliable observations and forecasts for the majority of severe events, which largely determine the spatio-temporal variability of the atmospheric branch of the hydrological cycle, are expected to be available in the near future. Techniques developed within project HERA will play a central role during the conduct of the MAP-SOP. The resulting datasets of unprecedented spatial and temporal resolution await an application regarding the construction of integrated hydro-meteorological warning systems, especially the areas of steep terrain.

The RAPHAEL Project: the 1st year of activity.

Baldassare Bacchi and Roberto Ranzi, Department of Civil Engineering,
University of Brescia, 25123 Brescia, Italy.

In the MAP newsletter 7 the RAPHAEL (Runoff and Atmospheric Processes for flood HAzard forEcasting and controL) project was presented (Ranzi, 1997). The project's objectives, the study areas (Lago Maggiore and Ammer watershed) and the partnership, with a significant presence of MAP groups were summarised there. Since then this partially EU-funded project officially started and in February 1999 the first year of activity was completed. Coupled hydro- meteorological models are being tested to improve flood forecasts in complex and trans-national mountain watersheds. Four relevant flood episodes have been selected for the Ticino- Toce (TT) watershed, in the Lago Maggiore area:

TT1: 22.09 - 25.09 1993 Brig,
TT2: 11.10 - 14.10 1993,
TT3: 03.11 - 06.11 1994 Piedmont,
TT4: 27.06 - 30.06 1997,

and three in the Ammer watershed area, in the Bavarian Alps, with a small upper part in Austria:

A1: 16.07 - 20.07 1993,
A2: 27.08 - 30.08 1995,
A3: 17.07 - 20.07 1997.

The data set

Two of the Lago Maggiore events (TT1 and TT3) are well known in the MAP context, and within RAPHAEL relevant additional information have been collected: physiogeographic, hydrological (streamflow and reservoir levels) and meteorological data that are not distributed by the standard operational networks of hydrometeorological monitoring services are now available. For example in Fig. 1 the 24 hours accumulated precipitation over the Lago Maggiore area during September 24 1993, computed on the basis of 120 raingauge data, provides some indications on the effect orography plays in the precipitation enhancement. The local precipitation maxima are close to steep mountain barriers, indeed. Altitude only, however, is not able to explain the spatial variability of data, as is shown in Fig. 2.

Unfortunately, until now, the data providers have posed strict limitations to the data distribution and efforts are now being taken by the project s partners to have the authorisation for the data distribution, outside the project also. As soon as this problem will be solved, a link between the RAPHAEL and the MAP web site will be established and instructions for getting the authorised data will be accessible from there. In the next months the MAP community is deeply involved in the preparation of the MAP-SOP. Since the Lago Maggiore MAP target area includes one of the Raphael target areas the information collected during the project could be of some help for the preparation of the experiments and for the interpretation of their results.

Some preliminary results

Meteorological fields for some of the seven events have been simulated by the SM, BOLAM, MC2 and the NH meteorological models. Hydrological models are using the simulated precipitation fields as well as raingauge and radar data as input for modelling rainfall-runoff processes. The preliminary results are promising. For example, a test event was created using 120h of data obtained from output of sample runs of MC2 (Benoit at al. 1997) for the Brig case. The 72h accumulated precipitation terminates on September 25, 1993 1800 UTC; the MC2 mesh used was 10km and re-initialisation occurs every 24h (i.e. 3 independent 30h runs

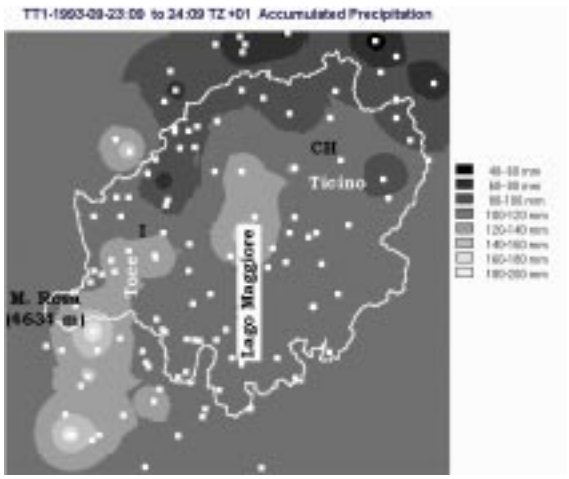

Figure 1. Daily (24 September 1993) precipitation for the TT1 (Brig) event. The white squares represent the position of the surface meteorological stations in the Ticino-Toce area. Only for a few of them precipitation data have not been collected within the Raphael project. The white line represents the Ticino at Miorina (6599km^2) watershed boundary.

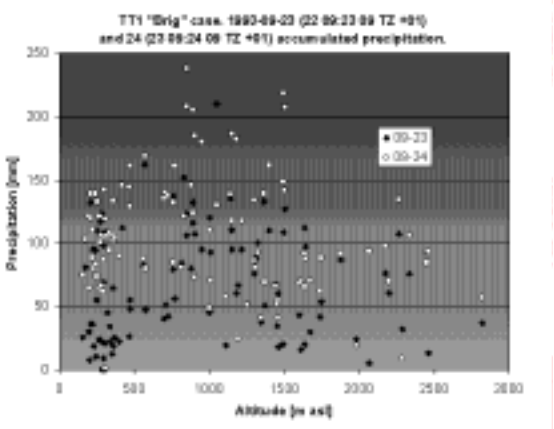

Figure 2. Altitudinal variability of the daily precipitation from 22 September 08 through 23 September 08 UTC and from 23 September 08 through 24 September 08 UTC 1993 (Brig case) in the Ticino Toce area.

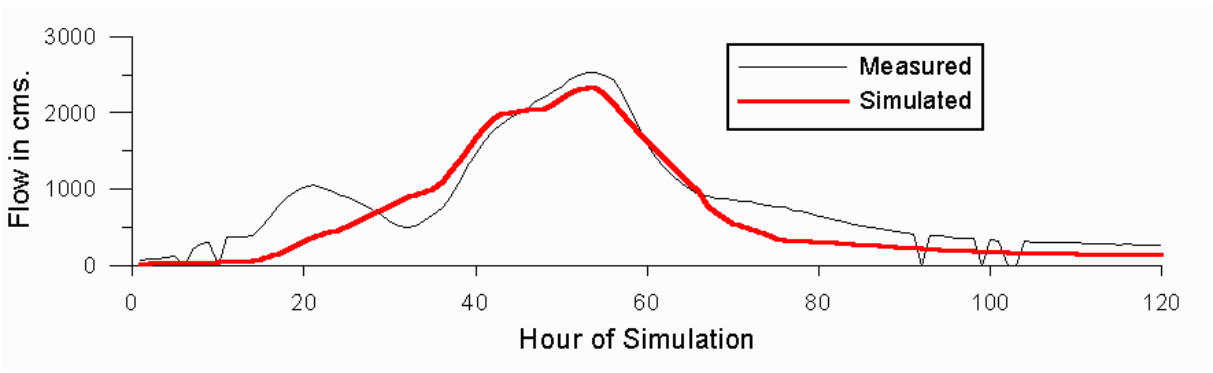

Figure 3. Simulated streamflow at the stream gauge at Candoglia (above Mergozzo in the Toce valley) from WATFLOOD using test event.

have been spliced together, with removal of initial periods). The streamflow hydrographic simulated using the WATFLOOD (Kouwen et al., 1996) model forced by the MC2 precipitation simulation was then compared to the measured values (Fig. 3) at the stream gauge at Candoglia, above Mergozzo (Longitude: 08°25'19" Latitude: 45°58'27"). Additional events will be modelled in the future. At the same streamgauge station encouraging results have been provided by coupling, for instance, the BOLAM (Buzzi et al., 1994) meteorological model with the hydrological flood model developed by the team of the Polytecnico di Milano.

Another interesting aspect that is resulting from the first projects activities is the problem of the standardisation of, for instance, land-use and soil classification in different European countries. For instance the land use as derived from satellite-based classification in the Italian, south-westerly part of the Ticino-Toce area marks a contrast with the Swiss land-use data derived from the Arealstatistik data base. A similar result, although not so evident, is shown by the soil permeability map processed with the contribution of the University of Munich on the basis of field and laboratory measurements and existing maps prepared by the ETH and the University of Brescia.

So, a question arises: should we expect different hydrological responses in the Italian and Swiss catchments due to different surface properties or due to differences in the classification systems? These and other problems are addressed when dealing with transnational watersheds as those selected within RAPHAEL. The collaborative participation of six end-users is giving us the feeling that our research might be really useful, some day, both for science and applications: if this will not be the case, we can still say that we have tried to do our best to reach this objective!

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WG-HYDrology news

Roberto Ranzi, Dept. of Civil Engineering, University of Brescia, 25123 Brescia, Italy.

The Working Group on Hydrological Modelling met last June 1998 for its third meeting. Fourteen members participated and some issues have been discussed, mainly concerned with the preparation of the experiment of monitoring the soil moisture content during the Special Observing Period (SOP). Since then further progress has been done.

As will be reported in the in forthcoming MAP Implementation Plan, some flights are planned by CNR-IROE with airborne microwave radiometers in the Lago Maggiore target area. The experiment intends to measure soil moisture conditions over some selected sites (indicated with the white squares in Fig. 1) where some research teams will measure ground truth data for the antenna calibration and verification.

It is planned to carry out at least 5 flights (5 missions of maximum 3 hours duration each), using an ultralight aeroplane, over the Pieve Vergonte (8.283°E, 46.017°N) to Domodossola (8.283°E, 46.093°N) area in the Toce valley floodplain and over the lateral slopes (Fig. 1).

One flight is planned at the end of August beginning of September, when dry soil moisture conditions are more likely to occur.

A couple of supplemental flights are needed 24-48 hours before precipitation is expected. For these flights a strict contact with the POC/MOC is needed, because the take off will be based on the rainfall warnings issued by the weather forecasters. The measurements taken during these flights are intended to provide initial soil moisture conditions prior to the expected flood events.

Other flights will be done 24-48 hours after relevant IOP rainy episodes, when the soil moisture content will be close to saturation and during the soil-drying phase.

The missions will be planned in connection with the MOC and the POC, but the small aircraft will not be based in Milano Linate.
The characteristics of the small aeroplane are the following:

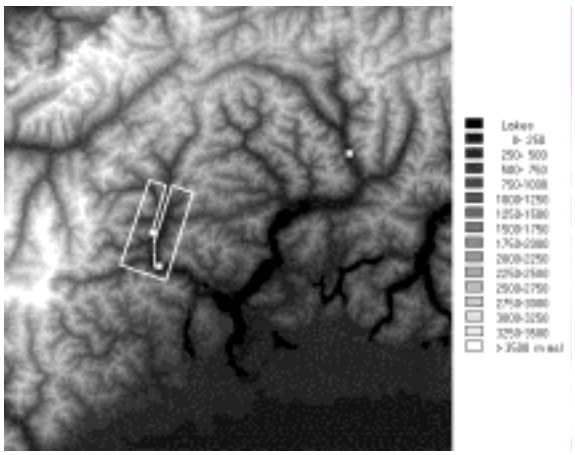

Figure 1. The flight track of the aeroplane used for the microwave soil moisture monitoring in the Toce valley. The white squares indicate the position of the fields where the soil moisture will be measured.

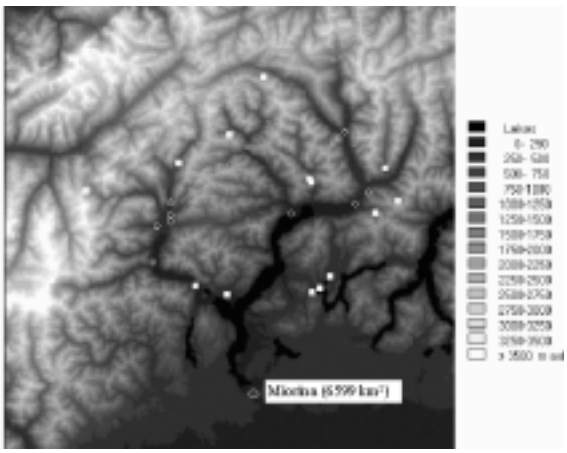

Figure 2. Ticino-Toce watershed: the existing hydrometric stations (non real-time in white squares; real-time in grey circles).

Aircraft: Flash
Ceiling: 6.000-7.000ft
Endurance: 3h
Range: 215nmi at1.000ft
Payload: 140kg

For this type of experiment the aircraft needs to fly at a height lower than 300m (1.000ft).

Some research teams, linked with the MOC and the POC will implement quasi-operational flood forecasts using hydrological flood models forced by rainfall observations and NWP fields. The streamgauges where the forecasts will be issued will be selected among those existing in the Lago Maggiore target area and indicated in the Fig. 2. Details on their characteristics can be asked to ranzi@bsing.ing.unibs.it.

In summary, the research teams that officially confirmed their involvement in the hydrological SOP activities are those reported in the following Table 1. Also French hydrologists have expressed their interest in participating in the SOP, although their involvement has not been officially confirmed yet.

Table 1 The research teams involved in the activities of the MAP-SOP that are of peculiar interest for hydrology.

Group	**Instrument/task**	**objective**	**location**
University of Brescia-I	Laboratory oven for Gravimetric soil moisture measurements	HYD	Brescia for Lago Maggiore
Hydrographic Services-I	Telehydrometers	HYD	Lago Maggiore-Toce
Istituto Agrario s.m.a.Adige-I, Politecnico di Milano-I, University of Modena-I, University of Brescia-I	Time Domain Reflectometers	HYD-PBL	Lago Maggiore- Toce
CNR-IROE-I	1.4 Ghz antenna on airborne platform	HYD	Lago Maggiore-Toce
GI-ETH-CH	Time Domain Reflectometers	HYD-PBL	Lago Maggiore-Riviera
National Hydrographic Service-CH	Telehydrometers	HYD	Lago Maggiore
University of Bologna-I	Flood forecasting	HYD	POC
University of Brescia-I	Flood forecasting	HYD	POC
Polytechnic of Milan-I	Flood forecasting	HYD	POC
University of Waterloo-CAN	Flood forecasting	HYD	MOC/POC

Ongoing Activities and Future Events

MAP Meeting 1999, 9-11 June

Appenzell, Switzerland is getting ready to host the fifth annual MAP Meeting! The conference will be held in a newly renovated auditorium of a school located within walking distance from the picturesque town centre. The registration procedure is almost completed, but a small number of on-site registrations still can be handled.

The overall format of the meeting will follow previous MAP Meetings, with committee and working group meetings on Monday and Tuesday, and the main scientific conference from Wednesday morning to Friday noon. The scientific programme will be posted on the MDC (http://www.map.ethz.ch) beginning of May. In some more detail the following will await you:

- Tue: Ice breaker at 18:00 and a slide show from 19:00 to 20:00;
- Wed: 9:00 start of the scientific meeting;
- Wed evening: a choice of three small excursions in Appenzell (local brewery, distillery, or museum);
- Thu evening: Excursion to and conference dinner on Mt. Kronberg (1663masl);
- Fri: 12:00 end of the scientific meeting.

For any questions please do not hesitate to contact the conference secretariat: MAP Meeting 99, Swiss Meteorological Institute, Krähbühlstrasse 58, CH-8044 Zurich, Fax: +41-1-256 96 66, e-mail: map99@sma.ch. The local organizing committee is looking forward to seeing many of you in Appenzell for the last pre-SOP MAP Meeting!

Activities within MAP

date	**event**
October 1, 1998	Start of the GOP
June 7-8, 1999	MAP committee and working group meetings, Appenzell, Switzerland
June 7-8, 1999	SSC and CIG Meeting, Appenzell, Switzerland
June 8, 1999	IGP meeting, Appenzell, Switzerland
June 8, 1999	MAP-NWS Board meeting, Appenzell, Switzerland
June 9-11, 1999	MAP Meeting '99, Appenzell, Switzerland
September 7, 1999	Start of the SOP
June 2000	MAP Meeting 2000

Future events related to MAP

date	**event**
April 19-23, 1999	EGS in The Hague, Netherlands
June 28-July 2, 1999	Eighth AMS Conference on Mesoscale Processes, Boulder, CO, USA
July 12-16, 1999	29th AMS Conference on Radar Meteorology, Montreal, Canada
July 18-30, 1999	IUGG in Birmingham, UK
September 13-17, 1999	13th AMS Conference on NWP, Denver, CO, USA
September 11-15, 2000	ICAM 2000, Innsbruck, Austria