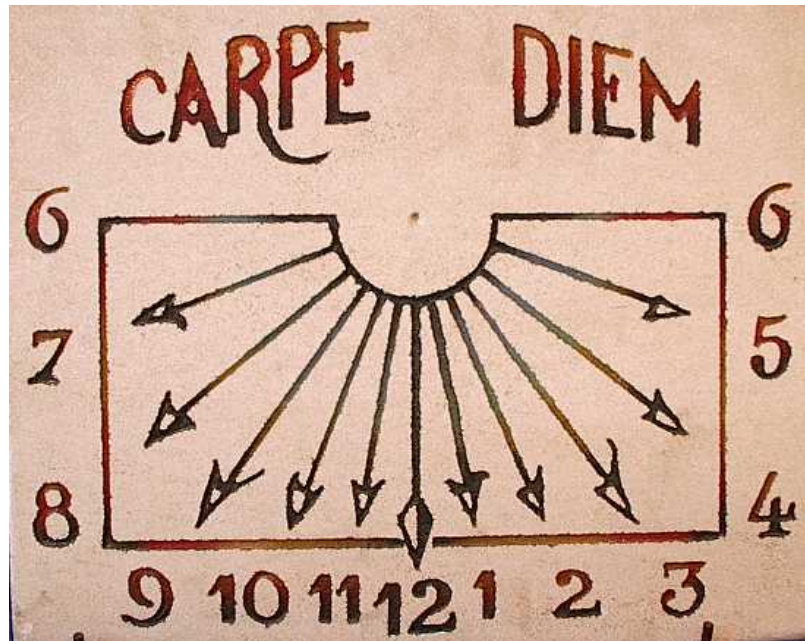


CARPE DIEM

Critical **A**ssessment of available **R**adar **P**recipitation **E**stimation techniques
and
Development of **I**nnovative approaches for **E**nvironmental **M**anagement



Contract N° EVG1-CT-2001-00045

Kick-Off Meeting
Minutes

AGENDA



28 January 2001

10:00 - 10:30 Welcome address and general presentation of CARPE DIEM Pier Paolo Alberoni
ARPA – SMR

***Presentation of CARPE DIEM TSC (external members)
Current state of the art and a look ahead***

10:30 – 11:00 CARPE DIEM – use of radar data Dusan Zrnica
NSSL

11:00 – 11:30 CARPE DIEM & COST 717 Andrea Rossa
SMA

11:30 – 12:00 CARPE DIEM – Hydrological consideration Paolo Burlando
ETH (CH)

12:00 – 13:00 Lunch break



Other European Projects

13:00 – 13:15 MUSIC Ezio Todini
PROGEA

13:15 – 13:30 EURAINSAT Vincenzo Levizzani
ISAO-CNR

Presentation of CARPE DIEM activities

14:00 – 14:40 Area 1 Nils Gustafsson
Data assimilation and NWP improvements SMHI

14:40 – 15:20 Area 2 Madhu Chandra
Improve radar products by using NWP DLR
results

15:20 – 16:00 Area 3 Ezio Todini
Flood forecasting PROGEA

16:00 – 16:30 Coffee break

16:00 – 16:30 Coffee break

DINNER

(somewhere)





29 January 2001

Presentation of Partners activities

09:00 – 10:30 10 minutes each partner

10:30 – 11:00 Coffee Break



11:00 – 11:30 Area 1 – Discussion

11:30 – 12:00 Area 2 – Discussion

Parallel session

11:30 – 12:00 Area 3 – Discussion

Parallel session

12:00 – 13:00 Lunch break



13:00 – 13:30 Web design and discussion

Bernat Codina
Univ. of Barcelona

13:30 – 14:30 END-USERS' level-of service requirements

Michael Bruen (Prof. Dooge)
NUID

14:30 – 16:00 Discussion

16:00 (aprox.) End of Kickoff meeting

CARPE DIEM – Kickoff Meeting – PARTECIPANT LIST

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Paolo	Burlando	IHW – ETH Zurich	Paolo.burlando@ethz.ch	+41 1 6333812

Presentation shall be made available on the project's web site.

<http://carpediem.ub.es>

INTRODUCTORY PRESENTATIONS

Alberto Moreira, DLR.IH, Wessling, Germany

Welcome address and introduction to the DLR strategies in atmospheric sciences.

Pier Paolo Alberoni, ARPA.SMR, Bologna, Italy

Critical Assessment of available Radar Precipitation Estimation techniques and Development of Innovative approaches for Environmental Management – CARPE DIEM

An overview of the project structure, its genesis and evolution, composition of the consortium. Special emphasis on the key elements of novelty grouped under:

Research perspective

- Use of Doppler radar data for assimilation into LAMs.
- Extraction of dynamical information from radar data.
- Use of combined radar and NWP data and techniques for more precise rainfall determination and prediction.
- Exploration of strategies for mesoscale analysis that make use of radar data.
- Improvement of radar products.
- Combined use of radar, satellite, NWP outputs in a hydrological framework.

Operational perspective

- Exploitation of radar data for operationally oriented products.
- Contribution to the verification of the potential of initializing LAMs.
- Production of operational algorithms for improving radar products. Assessment the sensitivity of hydrological models to rain-estimate/rain-forecast uncertainty
- Foster collaboration within the radarmeteorologist, numerical and hydrological communities.
- Provide a forum for research and operational groups to convey needs, conceive new ideas and work together on existing and future projects.
- Provide a forum for end-users to convey needs and operational constraints.
- Collaboration with other two EU projects: MUSIC and EURAINSAT.

As a part of the general presentation of CARPE DIEM, the co-ordinator propose, as agreed during the preparation and negotiation phases, to constitute a project Technical Steering Committee (hereinafter TSC). The TSC has the following commitments:

- Provide advice, criticism and guidance to the Co-ordinator and project participants in order to ensure a more efficient execution of the proposed tasks and WP.
- Provide requirements and feedback for the correct development of products following specific users' needs.
- Evaluate contributions from all partners and decide on their quality.

There was a general agreement that the TSC is formed by:

- Pier Paolo Alberoni, ARPA.SMR, as project co-ordinator;
- Nils Gustafsson, SMHI, as AREA 1 scientific rapporteur
- Madhu Chandra, DLR, as AREA 2 scientific rapporteur
- Ezio Todini, PROGEA, as AREA 3 scientific rapporteur
- Dusan Zrnica, NSSL-NOAA, as expert on radar-meteorology
- Andrea Rossa, MeteoSwiss, as expert on weather numerical model and COST717 chairman;
- Paolo Burlando, ETH, as expert on hydrology.

STEERING COMMITTEE PRESENTATIONS

Dusan Zrnica, National Severe Storm Laboratory – NOAA, Norman, OK, USA

General presentations of the current state-of-the-art in radar-meteorology (PowerPoint presentation available on the web site).

As regards the rainfall estimation, which is one of the main topics of CARPE DIEM, the following point need to be tackled:

- Z-R relationship;
- Radar calibration;
- Height of measurements;
- Attenuation (that a C-band could be very severe in some occasion);
- Incomplete beam filling;

- Evaporation;
- Beam blockage
- Gradient of rain rate
- Vertical air motions
- Variability in DSD

All previous points are summarised in these two fundamental problems in remote sensing of precipitation:

- Classification – i.e. what is where?
- Quantification – i.e. what is the amount?

In this respect polarisation quantities play a fundamental role. Anyway it is important to develop methodology to address these questions also for non-polarimetric radar, which are the most common in an operational framework.

Andrea Rossa, MeteoSwiss, Zurich, Switzerland

General presentation of COST 717 activity.

Founded in 1971, COST is an intergovernmental framework for European Co-operation in the field of Scientific and Technical Research, allowing the co-ordination of nationally funded research on a European level. COST Actions cover basic and pre-competitive research as well as activities of public utility. The goal of COST is to ensure that Europe holds a strong position in the field of scientific and technical research for peaceful purposes, by increasing European co-operation and interaction in this field.

COST activities are divided in a number of relevant domain (e.g. Meteorology, Physics, Chemistry, etc.) In the Meteorology domain the action 717 is devoted on "Use of Radar observation in hydrological and NWP models". Such action was started on March, 1st, 1999 and will end in Feb. 2004, a web site is available at <http://www.smhi.se/cost717/>.

The action is structured in three working groups:

- Using radar information in hydrological models
- Using radar observations in parameterization and validation of atmospheric models
- Using radar information for assimilation in atmospheric models

The main objectives of the proposed project may be summarised as follows:

- investigate how radar data can be most effectively utilised in model assimilation schemes and in combination with other observations;
- identify the requirements from NWP assimilation for quality control and international transmission of radar data in line with the developments under EUMETNETS's OPERA project;
- identify and demonstrate the potential contribution that radar-based observation techniques can make to the development of physical parametrisations for NWP models, in particular for representing convective processes, and identify examples of studies undertaken to date;
- examine and define the requirements on European radar data for use in hydrological models, for river flow in rural and urban catchments, and for the real-time control of urban drainage systems;
- provide standardised European methods and algorithms for validating model performance against observations from radar networks and other sources for "ground truth";
- document the improvements (both established and potential) to modelling by the use of radar information as vertical wind profiles, radial Doppler winds, rainfall and reflectivity;
- recommend algorithms for quality control of radar data and on-line error estimation.

Paolo Burlando, Inst.f. Hydromechanik u.Wasserwirtschaft- ETH, Zurich, Switzerland

Few comment about the project (copy of the slides available on the project web site).

As a general recommendation project proposal and project report (when will be delivered) has to be explicit on the possible or reached results.

As CARPE DIEM is concerned, comments on the project will follow this logical order:

- RADAR & NWP
- FORECASTING SCALE & BASIN SCALE
- TARGET AREAS
- FLOOD MODEL VALIDATION STRATEGY

RADAR & NWP

Both radar and NWP are affected by errors, further the "intrinsic" scales of radar and NWP differs in terms of time and space.

FORECASTING SCALE & BASIN SCALE

A mismatch of scale is also present if considering the forecasting scale (i.e. typical scale of a hydrostatic model is around 5-10 km) and the basin scale (e.g. the Darglee catchment, close to Dublin) has a dimension of about 120 km²).

To solve this ambiguity a precipitation disaggregation process need to be considered (as will be done for example on the Swedish .catchment).

TARGET AREAS

To better validate CARPE DIEM results in a flash-floods prone area some other catchments (at least one) need to be considered.

FLOOD MODEL VALIDATION STRATEGY

The complexity of the forecasting chain suggest to approach model validation by means of cross and internal validation.

Major results to be achieved are:

- Define the relative benefits in the use of radar and NWP results in flood forecasting;
- Assess how reliable are the radar measurements.

PRESENTATION OF OTHER RELATED EU FUNDED PROJECTS

Vincenzo Levizzani, ISAC-CNR, Bologna, Italy

General presentation of the EURAINSAT project (PowerPoint presentation available on the web-site).
European satellite rainfall analysis and monitoring at the geostationary scale – EURAINSAT

EURAINSAT is a shared-cost project (contract EVG1-2000-00030) co-funded by the Research DG of the European Commission within the RTD activities of a generic nature of the Environment and Sustainable Development sub-programme (5th Framework Programme)

Project web site: <http://www.isac.cnr.it/~eurainsat/>

The key objective of the project is the development of algorithms for rapidly-updated satellite rainfall estimations at the geostationary scale. The new channels available with the SEVIRI radiometer in the visible (VIS) and infrared (IR) portion of the spectrum will gain better insights into the microphysical and dynamic structure of precipitating clouds thus allowing for a more precise identification of precipitation levels. Microwave (MW) radiometers on board polar orbiting satellites will be used because of their information on the clouds vertical structure. The method(s) will work as follows:

- Microphysical characterisation of precipitating clouds with VIS/IR sensors;
- Creation of microphysical and radiative databases on cloud systems using cloud model outputs and aircraft penetrations;
- Tuning of MW algorithms on the different cloud systems (convective, stratiform,...);
- Combination of data from the different algorithms and application to a rapid update cycle that makes use of the different sensors at the geostationary scale.

In this respect EURAINSAT results will be used as an input of the hydrological models.

Ezio Todini, PROGEA, Bologna, Italy

General presentation of the Music project.

MUSIC - Multi-Sensor Precipitation Measurements Integration, Calibration and Flood Forecasting

MUSIC - A research project supported by the European Commission under the Fifth Framework Programme and contributing to the implementation of the Key Action "Sustainable Management and Quality of Water" within the Energy, Environment and Sustainable Development

Contract n°: EVK1-CT-2000-00058

Project web site: <http://www.geomin.unibo.it/orgv/hydro/music/>

The basic role of any real-time quantitative precipitation and flood forecasting system lies in its capability, within the forecasting horizon, of assessing and reducing the uncertainty in forecasts of future events in order to allow improved warnings and operational decisions for the

reduction of flood risk. In line with this requirement, the MUSIC project is to develop an innovative technique for improving the weather radar, weather satellite and rain gauge derived precipitation data, taken as independent measurement sources, and to use the resulting product in an integrated prototype flood forecasting system.

In broad outline the work consists of developing a number of guided procedures and tools for combining in an objective and optimal way different sources of precipitation estimates in order to reduce the final product bias and uncertainty and to make the resulting precipitation estimates available for the analysis of areas at risk from flooding as well as inputs to real-time flood forecasting systems.

In this respect all techniques that will be developed within MUSIC will be made available for CARPE DIEM.

PRESENTATION OF PARTNERS ACTIVITIES

Partner 1

Pier Paolo Alberoni, ARPA-SMR, Bologna, Italy

Partner 2

Ezio Todini, PROGEA, Bologna, Italy

Partner 3

Madhu Chandra, DLR, Wessling, Germany

Partner 4

Magnus Lindskog, SMHI, Norrkoeping, Sweden

Partner 5

Jarmo Koistinen, FMI, Helsinki Finland

Partner 6

David, Bebbington, University of Essex, Colchester, United Kingdom

Partner 7

Bernat Codina, University of Barcelona, Barcelona Spain

Partner 8

Vincenzo Levizzani, ISAC.CNR, Bologna, Italy

Partner 9

Michael Bruen, NUID, Dublin, Ireland

AREA 1 – DATA ASSIMILATION AND NWP IMPROVEMENTS – Overview and discussion

Nils Gustfasson, SMHI

An overview of the activities under area 1 was presented (see CARPE-DIEM–AREA1-overview.pdf, disseminated with these minutes).

CARPE DIEM objectives related to area 1 are:

- To focus on flood in small, medium and localised urban catchments (100-5000 km²);
- To improve the numerical prediction of rainfall (at model grid resolution $\Delta x \approx 5-10$ km, forecast lead time 0-48 h);
- To assimilate radar doppler velocity (and spectral width) in both clear and precipitation filled atmosphere into NWP models.

The discussion outcomes are reported in the document (CARPE-DIEM–AREA1-notes.pdf) disseminated with these minutes.

AREA 2 – IMPROVEMENT OF RADAR DERIVED PARAMETERS – Overview and discussion

Madhu Chandra, DLR

An overview of the activities under area 2 as well as the outcomes of the discussion are reported in the document CARPE-DIEM-AREA2-status.doc, disseminated with these minutes.

AREA 3 – FLOOD FORECASTING – Overview and discussion
Ezio Todini, PROGEA

An overview of the activities under area 3 as well as the outcomes of the discussion are reported in the document CARPE-DIEM-AREA3-status.doc, disseminated with these minutes.

TSC EXTERNAL MEMBERS - Comments

Dusan Zrnica, National Severe Storm Laboratory – NOAA, Norman, OK, USA

Andrea Rossa, MeteoSwiss, Zurich, Switzerland

Paolo Burlando, Inst.f. Hydromechanik u.Wasserwirtschaft- ETH, Zurich, Switzerland

After the partner presentations and the detailed presentations and discussion of each CARPE DIEM areas, TSC members give their expert comments and suggestion on the project. Further they are committed to detail and summarise comments in a document that will be provided in a short time.

- Very large efforts in Data Assimilation
- Very ambitious project
- Separate QPE from QPF
- Explain how σ_v will be used
- Mismatch between small/medium basin scale and actual NWP scale
- Synoptic not well addressed
- Actual representation of PBL in NWP could be problematic of anprop modelling
- CARPE DIEM well in the scope of COS717
- Project well structured
- A strong point is the involvement of the end-users form the very beginning

WEB SITE

Miquel Picanyol, University of Barcelona

Short demonstration of the project web site.

It contains:

- relevant documents available to public;
- meeting material;
- an electronic board where to append news and updates;
- non-disclosure sector, password protected:
 - results;
 - strategies;
 - ...

ACTION TO BE TAKEN

- ◆ Send meeting presentations to web manager
- ◆ Send high resolution partner's logo to web manager

END-USERS

Jim Dooge, Centre for Water Resource Research, University College of Dublin

An End-users panel should be defined within the first 6 months.

Interchange between EU and researchers.

The End-users panel should help in answer to this fundamental question:
What type of early warning/alarm do you want?

ACTION TO BE TAKEN

- ◆ Identify a contact person for each end-user.
- ◆ Send a contact point for each End-User to Prof. Dooge.
- ◆ Definition of activities plan.

CONSORTIUM AGREEMENT

General discussion on the proposed Consortium Agreement.

No relevant objection was raised during the discussion. It was agreed the following actions.

ACTION TO BE TAKEN

- ◆ Within three weeks after the end of the kickoff meeting the document will be revised from each partner.
- ◆ If a general consensus will be reached the coordinator is committed to circulate the agreed version for the signature process.

PLANNED PUBLICATIONS

During the kickoff meeting the following publications have been planned:

- ◆ Comparison between the super-observations of radial wind vectors (SMHI) with the pre-processing of radial wind vectors by volume averaging (ARPA-SMR).
- ◆ Comparison between the dual Doppler wind retrieval (Univ. Essex – ARPA.SMR) with the direct variational assimilation of radial wind vectors (SMHI – FMI).
- ◆ Radar VAD profiles in clear air condition will be compared with DLR clear air efforts.
- ◆ Comparison between the data assimilation methodologies used in CARPE DIEM, 3D-var and 4D-var (SMHI and FMI), nudging (Univ. Barcelona), LAPS (ARPA-SMR).
- ◆ The collaboration between PROGEA, SMHI and Univ.Barcelona on assessment of NWP uncertainty is well-defined in the proposal.
- ◆ Modelling of anaprop from NWP temperature and humidity fields. (univ. Essex and Univ. Barcelona)
- ◆ Application of Z-Profiles obtained from HIRLAM data. (FMI and SMHI)
- ◆ Use of polarimetric weather radar to measure variations in rainfall intensity obtained from conventional systems. (Univ. Essex and DLR)