

VOLTAIRE PROJECT

Validation of multisensors precipitation fields and numerical modelling in
Mediterranean test sites



ROME 2 - 3 APRIL

WORKSHOP

**DETERMINISTIC AND/OR STATISTICAL COMPARISON OF OBSERVATIONS WITH
NUMERICAL FIELDS: THE GENERAL PROBLEM AND THE SPECIFIC CASE OF
PRECIPITATION**

Involved: WP7; *POLITO, CYMET, MCH, UNILJ, APAT, UNICAM.*

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PROJECT SUMMARY

Challenges

In the Mediterranean area the climatic effects of the distribution of precipitation is complicated by the effect of mountains chains, which act as a physical barriers to atmospheric circulation and often introduce large precipitation gradients within small regions. Given such geographical complexity, an improvement in observational techniques is a prerequisite for precipitation estimates related to climate problems: associated on the one hand, to droughts and, on the other hand to the frequency of extreme rainfall events. One of the specific aspects of Mediterranean climate is such that the absence (or presence) of few precipitation events may switch the climate characteristic from semi-arid to arid (or viceversa).

The evaluation of climatic trends depends on the accurate estimate of intrinsically complex (both in time and space) precipitation fields, especially during extreme events, whose statistic could represent a finger print of such trends. Measuring and monitoring precipitation over the Mediterranean Sea has not yielded satisfactory results so far (apart from some coastal and insular regions covered by land-radar), but it will be thanks to the precipitation radar onboard the future Global Precipitation Measurement (GPM) satellite mission(able to extend the recent TRMM observations to higher latitudes than the present limiting one at 35?). Actually, there is a European land covered by TRMM: the southern part of Cyprus. Since it is instrumented with a dense network of gauges and even a weather radar, it would be an unforgivable mistake not to exploit this unique opportunity of gaining in experience with spaceborne radar observations in the Mediterranean region, by setting up accurate validation procedures and prepare an effective European participation in GPM.

Scientific objectives and approach

The objectives of the project are:

- 1. to compare data quality insurance schemes for ground and space radar; to use radar-adjusted and gauge-adjusted precipitation fields as ground validation for TRMM radar (in order to assure its data validity in areas not covered by ground radar); to gain in experience and prepare European participation in GPM;**
- 2. to improve the accuracy of surface-radar-derived precipitation fields in Mediterranean test sites using in situ measurements and adjustment techniques tailored to mountainous and hilly regions; to quantitatively compare precipitation fields as represented by numerical models, by adjusted ground-radar and satellite radar (where available, i.e. in Cyprus).**

The accuracy of land-radar estimates at ground will be improved by addressing the various sources of error in mountainous terrain in a painstaking manner and by focusing on the variability (continuity) of precipitation fields. The improvement in the accuracy will be reached through the following milestones: clutter elimination, correction for visibility and/or vertical profile correction, gage-adjustment

Expected impacts

One workpackage is entirely devoted to data quality control of time variable data., which is one of the basic tasks that assures a reliable quality of the project itself. The developed criteria and software tools could be easily adapted and adopted for exploitation by many European operational and research Institutes. As a consequence, it will be straightforward to achieve the objective of a better exploitation of existing data within the European component of the global observing system. As an example, the Weighted Multiple Regression technique should be able to mitigate the macroscopic errors affecting radar estimates in mountainous regions. We expect that this method will improve further land-radar estimates by allowing an efficient adaptation of existing observing systems (network of radars) operating in hostile mountainous terrain to better rainfall estimation.

The TRMM-related activities performed in the Cyprus pilot site will allow us: to gain in experience with the first spaceborne weather radar; to prepare an active European participation in GPM; to contribute to an innovative European development of a new long-term satellite-based observing capacity in such a key area like the Mediterranean Sea. These aspects are in line with the recent European initiative called “Global Monitoring for the Environment and Security (GMES)” and in fulfillment of European policies. We expect VOLTAIRE research activities will be able to assess the current capabilities, to influence the supply of information and to help the definition of future radar systems for monitoring precipitation fields from land and space.

VOLTAIRE AT A GLANCE

In order to safeguard the various research activities, with the need for data and knowledge exchange, the project has been organised into ten Work Packages (WP). They comprise an interrelated series of data collection and exchange, development of methodology, calibration, adjustment, verification, model validation, parameterisation and uncertainty analysis.

Project Workplan

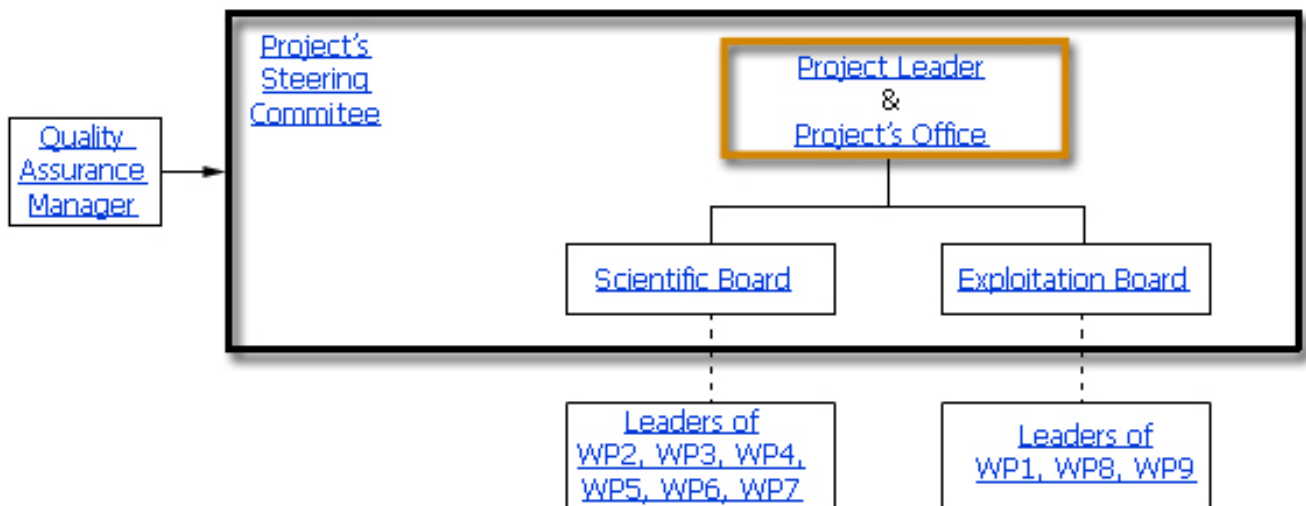
WP No.	WORK PACKAGE SUBJECT	WP LEADER	COORDINATING PARTNER	PARTICIPATING PARTNERS
<u>WP1</u>	Data bank building, standardization and management.	Marco Gabella	POLITO - Politecnico di Torino	E&H, CYMET, GMU, MCH, UNILJ, UPC, UNICAM
<u>WP2</u>	Data quality control.	Thomas Einfalt	E&H - Einfalt&Hydrotec GbR	POLITO, GMU, UNILJ, UNICAM
<u>WP3</u>	Radar/Gauge adjusted rain fields in Cyprus and comparison with TRMM data.	Silas Michaelides	CYMET - Meteorological Service of Cyprus	POLITO, E&H, GMU, UNICAM
<u>WP4</u>	Improved radar/gauge adjusted rain fields based on the TRMM validation programme.	Eyal Amitai	GMU - George Mason University	POLITO, E&H, CYMET, UPC, UNICAM
	Structural			

	characterization of precipitation fields	Galli		UNICAM
WP6	Optimized/adjusted rain fields in complex-orography regions	Marco Gabella	POLITO - Politecnico di Torino	E&H, CYMET, MCH, UPC, UNICAM
WP7	Numerically modeled rain fields and comparison with observations	Antonio Speranza	UNICAM - Università di Camerino	POLITO, CYMET, MCH, UNILJ, APAT
WP8	Preparation of a Validation Supersite for GPM in the western Mediterranean site	Daniel Sempere Torres	UPC - Universitat Politècnica de Catalunya	POLITO, E&H, GMU, UNICAM
WP9	Dissemination	Tomaž Vrhovec	UNILJ - University of Ljubljana	POLITO, E&H, CYMET, GMU, MCH, UPC, APAT, UNICAM
WP10	Project management	Giovanni Perona	POLITO - Politecnico di Torino	ALL

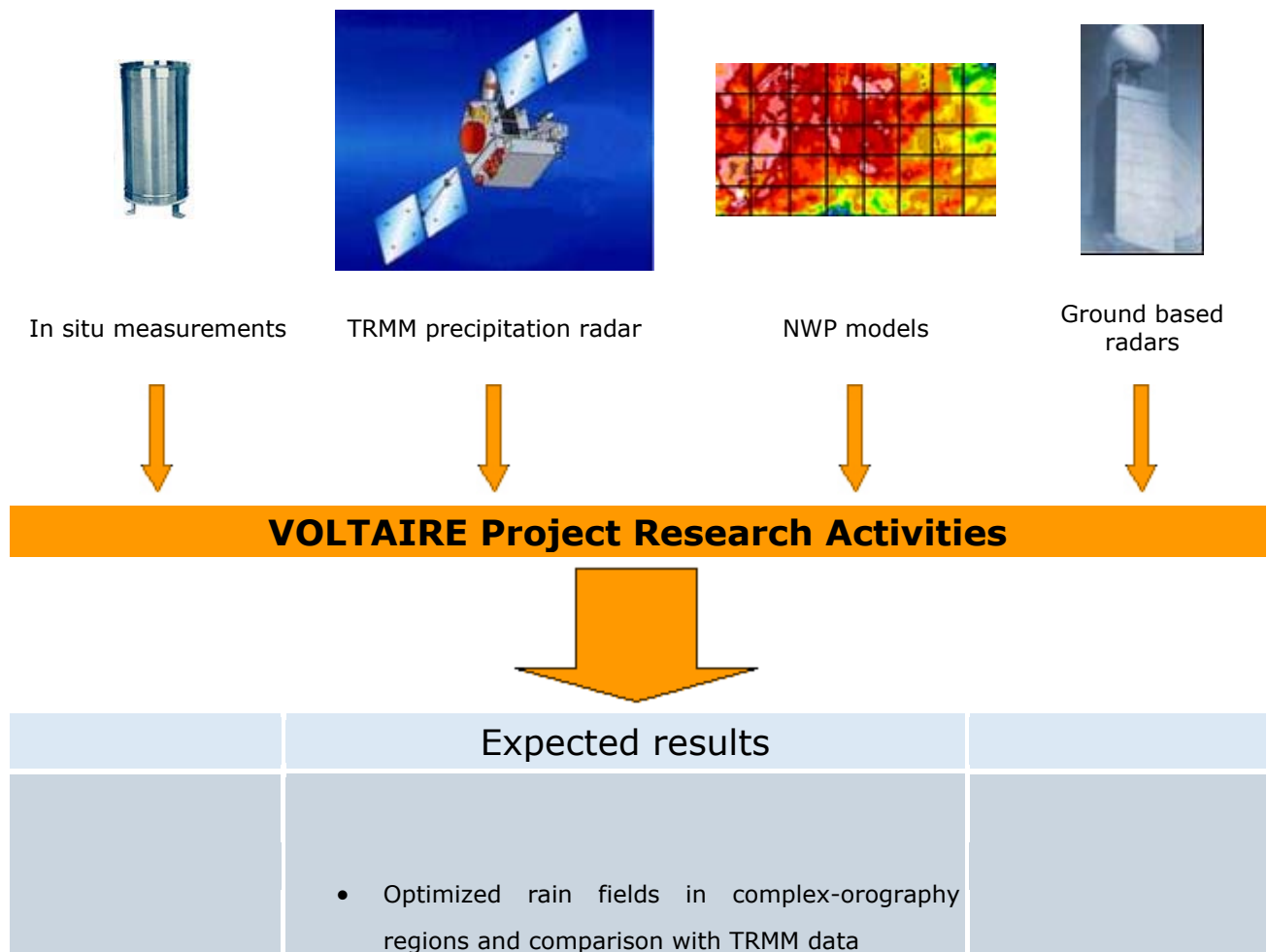
Project management

The management structure of the VOLTAIRE project is presented

schematically in the follow figure








Expected Results



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| | <ul style="list-style-type: none">• Comparison between numerically modeled rain fields and observations• Structural characterization of precipitation fields• Preparation of a Validation Supersite for GPM in the western Mediterranean site | |
|--|---|--|

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