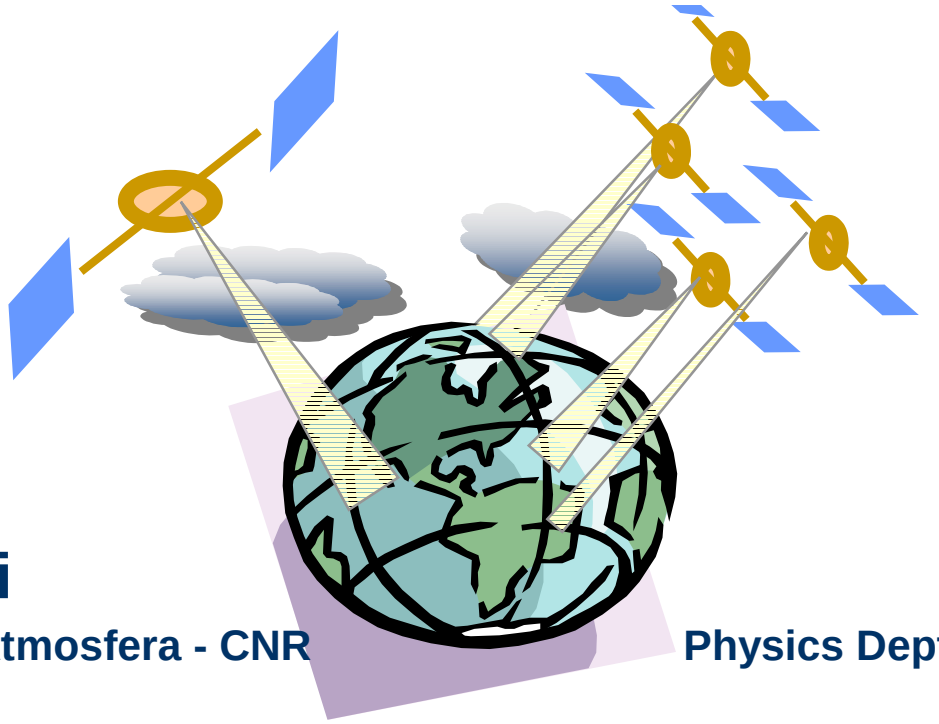
GPM Planning Workshop
May 16-18, 2001 - College Park, Maryland (U.S.A.)

Italy's Provisional Interest/Role in the Global Precipitation Mission



Alberto Mugnai
Istituto di Fisica dell'Atmosfera - CNR
Roma (Italy)
alberto.mugnai@ifa.rm.cnr.it

Franco Prodi
Physics Dept. – University of Ferrara
Ferrara (Italy)
f.prodi@isao.bo.cnr.it

Interest of the Italian Scientific Community

- **Fields of interest in Italy**
  - **Meteorology**
  - **Hydrology – Natural Hazards**
  - **Oceanography**
  - **Agro-meteorology**

- **Participation in Scientific Programs**
  - **STORM**
  - **MEFFE**
  - **EuroTRMM**
  - **EuRainSat**
  - **GNDCI**
  - **ASI**

Italian Scientific Focal Points

- **A. MUGNAI (CNR-IFA)**
  - **Coordinator**
  - **Rainfall Retrieval - Microwave Radiometry**
- **F. PRODI (Univ. Ferrara)**
  - **Cloud Physics - Satellite Meteorology**
- **D. GIULI (Univ. Florence)**
  - **Radar Technology**
- **F. SICCARDI (CIMA/Univ. Genoa)**
  - **Hydrology - Natural Hazards**
- **G. MARACCHI (CNR-IATA)**
  - **Agrometeorology**
- **F. BIGNAMI (CNR-IFA)**
  - **Oceanography**
- **E. GORGUCCI (CNR-IFA)**
  - **Radar Meteorology**

Participation in TRMM

- **Italian scientists and institutions participate -- in co-operation with European, American and Japanese colleagues -- in studies and applications based on TRMM data analysis and use.**

- **The EuroTRMM project has gained international recognition for its research accomplishments concerning both precipitation retrieval and data exploitation for improving numerical weather and climate models. As a consequence, ESA is presently funding a EuroTRMM 2 Project.**

- **There is a strong European interest in TRMM and GPM –> Two Conferences were organized at the 2000 & 2001 General Assembly of the European Geophysical Society (EGS).**

The interest of the scientific community

- To measure mid-latitude precipitation
- To obtain radar-radiometer coverage of mid-latitude precipitating cloud systems
- To determine the dynamical and microphysical structure of flash-flood producing storms, particularly over Europe's coastal and mountainous regions, through radar-radiometer process studies
- To obtain more frequent and reliable precipitation measurements necessary for Hydrological Predictions
- To develop an effective means for monitoring hazardous storms at the Meteosat rapid update cycle by blending GPM & Meteosat data
- To validate numerical weather prediction models and improve their performance by assimilating the satellite measurements.
- To determine the energy (air-sea sensible and latent heat fluxes & radiative fluxes) and freshwater budget in small sub-basins (such as the Adriatic and Aegean Seas), which are the formation sites for the eastern Mediterranean deep waters

The interest of the meteo-hydrological community

Emergency managers use meteorological inputs to evaluate flooding potential over basins, which enables them to forewarn the public of possible floods. Actually, the risk management process implies a sequence of

- **Long term meteorological forecasting (up to 7-10 days – GCM);**
- **Short term forecasting (up to 72 hours - LAM);**
- **Nowcasting (satellites and radar).**

The outputs of 2) and 3) (rainfall rate), together with other information (e.g., soil moisture, surface characteristics, geographical data on basins) and hydrological river basin models, produce forecasts of the water level at different river sections.

This consolidated information is used to produce warnings and take preventive actions, some of which are expensive and may inconvenience people.

Accurate rainfall observations are necessary to minimize loss of life and economic damage.

Satellite and combined satellite-radar projects

These projects aim at improvements in rainfall intensity estimates for mitigating the risk of flood events using nowcasting techniques (meteorological satellites, combined satellite-radar data and numerical models).

The main objects are to improve:

- **The knowledge of meteorological systems generating different flood events;**
- **The coupling of satellite and radar data with numerical Limited Area Models;**
- **MW and combined MW/Vis-IR precipitation retrieval algorithms;**
- **Weather numerical models (LAM and Cloud Mesoscale Models) that combine surface and upper air measurements, and radar-satellite data;**
- **Nowcasting techniques.**

The EuRainSat project

Consortium

- F.M.A. (I)
- University of Ferrara (I)
- University of L'Aquila (I)
- ISAO – IFA / CNR (I)
- Hebrew University of Jerusalem (Israel)
- DLR (D)
- University of Birmingham (U.K.)

Steering Committe

- M. Schouppe - EC
- P.Bauer – ECMWF
- D.Hinsmann – WMO
- J.Schmetz – EUMETSAT
- P.Baptista – ESA
- E.Smith – NASA
- G.Vicente – NASA
- J.Pourdhom – NOAA
- J. Turk – NRL

Activities in the EuRainSat Project

- Data Collection and Management
- Cloud Multispectral and Microphysical Analysis
- Satellite Rainfall Estimation
- Assimilation of Area Distributions of Satellite Rainfall Estimates into LAM's
- Applications and Operational Tests

Mission Studies related to GPM

- **European contribution to the Global Precipitation Mission (EGPM)**
  - **ESA Study**
  - **1-2 Drones**
  - **Alenia Spazio, Astrium, GMV, RSC/TUD**

- **Italian contribution to the Global Precipitation Mission (IGPM)**
  - **ASI Study (Small Mission Program)**
  - **1 Drone**
  - **Alenia Spazio, Carlo Gavazzi Space, Officine Galileo**

IGPM – Italian contribution to the Global Precipitation Mission

1 drone satellite

- Sun-synchronous orbit
- 470 km altitude
- Microwave Radiometer
  - Conical scanning
  - Baseline: 3 frequencies (18.7, 36.5, 89.0 GHz, VH)
  - Option: 2 additional frequencies (10.7, 23.8 GHz)
  - Fore/aft views

EGPM – European contribution to the Global Precipitation Mission

1-2 drone satellites

- Sun-synchronous orbit
- 470/650 km altitude
- Microwave Radiometer
  - Conical scanning
  - Baseline: 5 frequencies (10.7, 18.7, 23.8, 36.5, 89.0 GHz) @ TMI resolution
  - Option: 1 additional frequency (157 GHz)
- Radar option
  - Possibly dual frequency (14 & 35 GHz)
  - Very small cross-track swath (e.g., 30-50 km) in one frequency

precipitation.org - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss

Address http://www.precipitation.org Go Links

Welcome to the GPM Homepage

- Home
- Contacts
- Schedule
- Search
- Discussion
- What's New
- Questionnaire
- Suggestions
- Download

Introduction

This is the home page for GPM. It was setup by a group of scientists to help in the definition of its scientific, observational and mission requirements. It aims also at the preparation of a proposal responding to the call to the European Space Agency's Earth Explorer Opportunity Missions. This call will probably be issued early this summer.

Take a look at What's New in our web.

Please fill the GPM Science Requirements Questionnaire.

Please use the Requirements Discussion Board to discuss the requirements so that we can quickly define GPM.

The Global Precipitation Mission

Following the scientific success of the Tropical Rainfall Measuring Mission (TRMM) spearheaded by a group of NASA and NASDA scientists, their external scientific collaborators, and scientists within Europe (EuroTRMM), there has been substantial progress towards the development of a new internationally organized, global scale, and satellite-based precipitation measuring mission. The highlights of this newly developing mission are a greatly expanded scope of measuring capability and a more diversified set of science objectives. The mission is called the Global Precipitation Mission (GPM).

Notionally, GPM will be a constellation-type mission involving a fleet of several satellites (see figure). In this fleet, one member is referred to as the "core" spacecraft flown in an ~70° inclined non-sun-synchronous orbit, somewhat similar to TRMM in that it carries both a multi-channel polarized passive microwave radiometer (PMW) and a radar system. The radar

Internet

Avvio | S3 VManager | Microsoft PowerPoint - [GP... | precipitation.org - Mi... | GPMAgenda - Microsoft In... | Jasc Paint Shop Pro | 15.13