



# meteorology

regional weather service and diffusion  
models

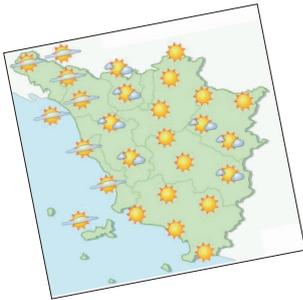
*LaMMA is home to the Tuscany weather forecasting service, which constantly monitors atmospheric conditions and produces daily reports 7 days a week. The dedicated computing centre enables researchers to carry out extremely detailed numerical modelling activities. LaMMA also has an air quality sector that elaborates diffusion weather models to simulate the dispersion of pollutants.*

## products/services

Regional weather service

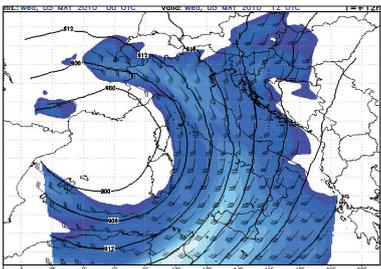
Specific weather reports:  
sea, mountains, events

Weather alert service

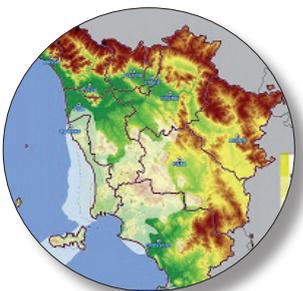


Weather data for Italian localities

Maps of atmospheric and  
marine weather models



Pollutant dispersion models



## weather forecasts and reports

In addition to the regional weather service, LaMMA also provides “customised” weather forecasts with information tailor made to suit the end-users’ needs. The reports provide a high level of localised detail; they are sent personally, thus reaching the end-users directly and punctually; they encourage an exchange of information with different groups of users, to receive direct confirmation of the accuracy of the parameters and to improve forecasting, with positive effects on the weather service as a whole.

- Weather service for the civic safety service
- Bulletins for Tuscany
- Bulletins for mountain safety
- Marine weather bulletins for yachters
- Marine weather bulletins for tourists
- Special events weather bulletins

## modelling

The researchers at LaMMA work to adapt atmospheric and wave motion models to the specific conditions in Tuscany region, so as to provide ever-increasing levels of spatial and temporal detail in numerical forecasts. The output of the models is used both to formulate the weather reports and to provide information to the various regional departments (hydrogeological services, forest fire prevention, civic safety).

## air quality

The Weather/Air Quality section implements weather and diffusion models to simulate the dispersion of pollutants in the atmosphere. Chains of models have been developed with the aim of:

- integrating the measures taken by weather stations, with the creation of a **meteorological archive**;
- the impact of atmospheric pollution (PM10, ozone, primary pollutants, etc.);
- providing support to the region of Tuscany in planning pollutant emission reduction policies (scenario analysis);
- assessing the contribution to the region’s PM10 levels made by **sand blown in from the desert**.



# climate/energy

climatology, energy and reduction  
of climate-altering emissions

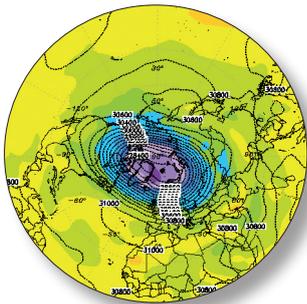
LaMMA analyses the region's climatology from a range of spatial and temporal perspectives in order to better understand the changes taking place. LaMMA is also home to the Region of Tuscany Focal Point Kyoto, a regional support in mitigating and adapting to climate change, proposing a more complete interpretation of local environmental sustainability including the carbon balance (emissions and absorption) with fact-finding tools that can help in decision making for energy and land management and planning.

## products/services

Mapping of anomalies

Monthly weather reports

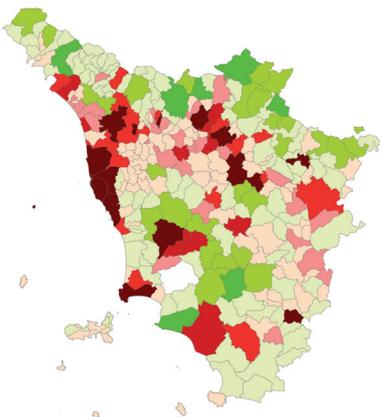
Seasonal forecasts



Wind GIS application

CO2 Balance

CO2 absorption report



## climatology

For a better understanding of Tuscany Climate, LaMMA operates on:

- Analysis of regional climatology based on data acquired from networks of weather stations around the region, at various spatial and temporal levels.
- Mapping of thermal and rainfall anomalies, updated every 10 days, for Italy and Tuscany.
- Monthly reports on weather trends in Tuscany.
- Long-term seasonal forecasts (the next three months), based on the main models currently available, and medium-term forecasts for the winter period, based on "start-warming".

## energy

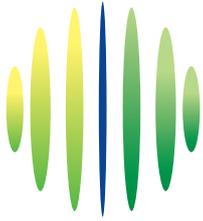
Contribution to the analysis of the region's energy system by organising and supplementing data and developing viewing and management systems.

- Information system dedicated to **renewable energy sources** found in Tuscany.
- Wind GIS to assess the **potential wind power** within the region: wind speed maps and annual energy production capacity.

## Focal Point Kyoto

The Focal Point Kyoto supports the region in matters of mitigating and adapting to climate change.

- Use of models to monitor the capacity of Tuscany's forest **ecosystems to absorb CO2**, and publication of seasonal reports.
- Analysis of greenhouse gas emissions and the **carbon balance** (emissions - absorption) on a regional, provincial and municipal scale.
- **Communication and information** activities on topics relating to the Kyoto Protocol (energy, ecosystems, transport, building, tourism).
- Technical and scientific assistance on specific themes relating to local policies.



# territory

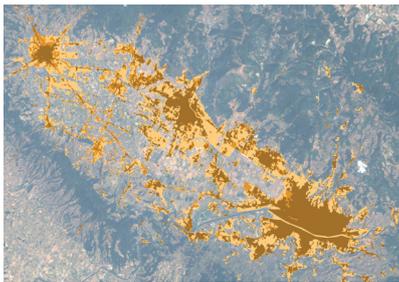
information systems for the management of resources and environmental risks

*LaMMA integrates satellite observation with the use of geographic information systems, thus offering systems and tools to interpret the environment and manage its dynamics and evolution. Nowadays, geographical information products, such as risk maps, geographical databases and thematic maps, are indispensable tools for monitoring natural and man-made changes in the environment, with an eye to sustainable management.*

## products/services

Orthorectification of high-resolution images

Mapping on demand



Index of urban expansion

Forest fire risks

Land use mapping

DB of subsoil and water resources

Landslides and slope stability

Underground Bodies of Water



## remote sensing

LaMMA is the centre responsible for the remote sensing and use of digital data from satellites and/or planes, with a database of multispectral, orthorectified and georeferenced images, from medium to very fine scale.

“Mapping on demand” services provide a real-time operative response to specific requirements and events.

## Thematic mapping

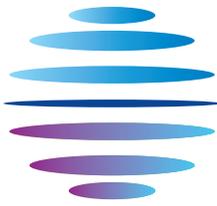
The territorial information services sector provides scientific and technological support to the environmental and territorial sectors in the form of:

- Creation of databases on **land use and cover**;
- Creation of databases on **monumental and landscape heritage**;
- Development of innovative methods for improving forest fire prevention: maps of “structural” and weather-related risks;
- Creation of Tuscan soil database (40% of the territory covered so far - the Arno and Ombrone river basins);
- Permanent network for monitoring the evolution and propensity for **expansion of urbanised areas**;
- Elaboration of complex databases with production and rendering of 3-D maps.

## geology

The geology sector at LaMMA provides scientific and technological support for regional projects relating to geology and soil science, mainly in the following activities:

- Management, implementation and updating of geological databases for the region, online services and metadata.
- Planning and creation of geographical databases for handling and representing **geological, hydrogeological and pedological data**.
- Updating of the landslide and slope deposits database, acquiring new data from the river basin authority and other sources such as research organisations and local authorities.



## sea

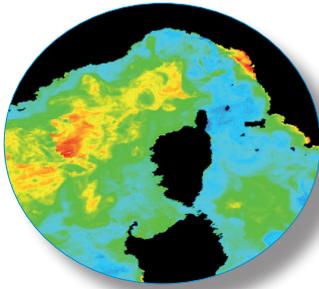
monitoring of marine physical parameters

*LaMMA carries out research in the field of marine environmental monitoring, by collecting and processing measured and remotely gathered data, and applying marine meteorology, hydrodynamic and biogeochemical models. By applying the results of its research locally, LaMMA provides useful tools for the development of policies and strategies to protect and control the marine and coastal environment.*

### products/services

SST from satellite

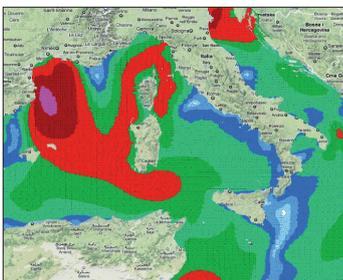
Chlorophyll maps



Inshore sea weather  
bulletin

Offshore sea weather  
bulletin

Wind and wave height  
forecast



Monitoring of fuel  
dumping at sea

### marine parameters

Using integrated measures, remote observations and modelling, LaMMA helps to monitor the fundamental marine parameters on a Mediterranean-wide scale.

- **In situ measures:** measurement campaigns for oceanographic parameters such as sea temperature, or biogeochemical parameters
- **Satellite observations:** real-time estimation of sea surface temperature (SST) from the satellite METEOSAT (MSG); Chlorophyll values and other parameters for the north Tyrrhenian area, with calculations based on data obtained from the MODIS sensor, recalibrated for the Mediterranean.
- **Modelling** of wave motion and sea currents.

### applications

**Marine weather bulletins: coastal report,** forecasts for tourists and seaside facilities; **offshore report,** service consulted by shipping operators in order to plan sailings.

**Forecast of sea conditions:** maps published online with wind and sea conditions, updated every 3 hours, with forecasts up to five days in advance; specific services for marine navigation, including yachting, and ad hoc reports for inshore and open sea regattas.

Support for sea monitoring: **satellite monitoring of fuel dumping** at sea.

### development

**Support for sea monitoring:** experimental measurement systems in the field of marine resources; forecasts of sea level variations in ports and river mouths

**Applications for the sustainable development of the coasts and marine resources:** support systems for handling incidents at sea; monitoring of water quality (satellite and modelling).

**Opportunities for the Tuscan economy:** studies on marine energy potential, information systems to support commercial fishing.