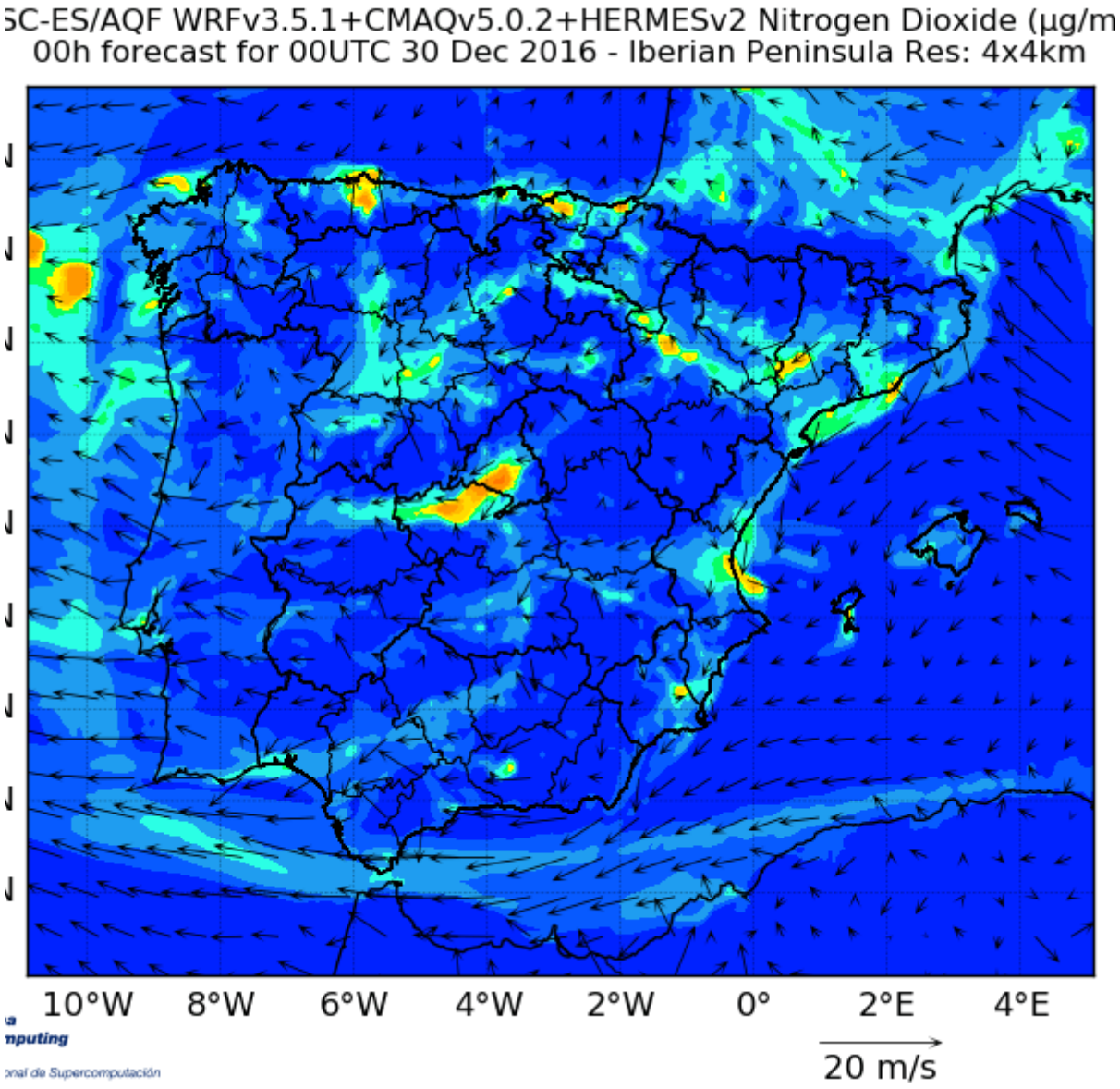
The air quality forecast system CALIOPE, key for the prediction of air pollution



- **CALIOPE, developed by BSC, allows to add air quality management measures into the system in order to forecast the effect in the air quality**
- **In recent air pollution episodes, the CALIOPE system has been used by various Spanish media**
- **Find out more about CALIOPE on the website: www.bsc.es/caliope/**

Air pollution is a trending topic in big cities and also in Spain. This week, cities such as Madrid and Barcelona suffered ofintense air pollution episodes due to the high levels of NO_2 in the air, surpassing sometimes the limits recommended by the World Health Organization (WHO).

To predict air quality pollution episodes two days in advance, the air quality forecast system CALIOPE provides real-time forecasts for Europe and Spain at high spatial (up to 1x1 km_2) and temporal (1h) resolution. The air quality impacts are predicted using the air quality model CMAQ. The meteorological conditions for CMAQ are generated by the WRF-ARW meteorological model whereas the HERMES emission model provides the natural and anthropogenic emissions for CMAQ. The system is complemented with the DREAM-BSC8b model that integrates mineral dust dynamics. The simulations of CALIOPE are carried out in the Mare Nostrum supercomputer. The system is comprehensively evaluated with near-real time observations from air quality stations. Those air quality observations are used at the same time to apply bias-correction techniques to adjust model simulations for the forthcoming 24 and 48 hours for the main air quality indicators described in the air quality Directive (2008/50/EC) and WHO guidelines.

In recent air pollution episodes, the system has been used by different Spanish media such as El Tiempo de Antena 3 (22’33’’), TVE (7’23’’) and La Sexta (13'20") in order to predict the NO_2levels and its duration. CALIOPE predicts not only the air pollution episodes and its evolution in the following days, but it also offers flexible air pollution forecasts. For example, it provides information about the impact of air quality management measures (such as the traffic reduction or the speed limitation in certain zones with dense traffic). This offers the chance to policy-makers to have an air pollution forecast before applying certain management actions, such as the ones implemented in the last days in Madrid.

About the air pollution episodes in Madrid and Barcelona

The tailpipe emissions are the main cause of the high levels of NO_2 in urban areas. The air pollution can, in certain days and locations, reach and also exceed the recommended limits under certain meteorological and emission patterns (such as the persistence of a high atmospheric pressure during various days together with a lack of wind or rain).

The combination of NO_2 emissions with the recent weather conditions have led public administrations to take drastic measures in order to limit the traffic (such as Madrid) or to recommend citizens to use the public transport instead of private cars (as suggested in Barcelona). Further to the traffic recommendations, the reduction of outdoor activities, the intensity of heating and the guarantee of a good filter maintenance have also been recommended.

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