Geophysical Research Abstracts
Vol. 16, EGU2014-11154, 2014
EGU General Assembly 2014

GHG emissions quantification at high spatial and temporal resolution at urban scale: the case of the town of Sassari (NW Sardinia - Italy)

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The European Union has set as priorities the fight against climate change related to greenhouse gas releases. The largest source of these emissions comes from human activities in urban areas that account for more than 70% of the world's emissions and several local governments intend to support the European strategic policies in understanding which crucial sectors drive GHG emissions in their city. Planning for mitigation actions at the community scale starts with the compilation of a GHG inventories that, among a wide range of measurement tools, provide information on the current status of GHG emissions across a specific jurisdiction.
In the framework of a regional project for quantitative estimate of the net exchange of CO_2 (emissions and sinks) at the municipal level in Sardinia, the town of Sassari represents a pilot site where a spatial and temporal high resolution GHG emissions inventory is built in line with European and international standard protocols to establish a baseline for tracking emission trends. The specific purpose of this accurate accounting is to obtain an appropriate allocation of CO_2 and other GHG emissions at the fine building and hourly scale. The aim is to test the direct measurements needed to enable the construction of future scenarios of these emissions and for assessing possible strategies to reduce their impact.
The key element of the methodologies used to construct this GHG emissions inventory is the Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC) (March 2012) that identifies four main types of emission sources: (i) Stationary Units, (ii) Mobile Units, (iii) Waste, and (iv) Industrial Process and Product Use Emissions. The development of the GHG emissions account in Sassari consists in the collection of a range of alternative data sources (primary data, IPCC emission factors, national and local statistic, etc.) selected on the base on relevance and completeness criteria performed for 2010, as baseline year, using top-down, bottom-up or mixed approaches. GPC protocol also defines three standard scopes for downscaling emissions from the national to the community level, that allow to handle the attribution of releases that occur outside the community boundary as a result of activity or consumption within it. The procedures for data processing have simple and concise structure, applicable in different communities that led to the possibility to compare the results with other national contexts.
An appropriate GHG emissions allocation over detailed spatial and temporal scales has been achieved on the basis of specific indicators (population, industrial employees, amount of product, etc.) and of geo-location and size of all buildings, using appropriate models, that enable to properly georeference them respect to their uses. The main advantage of neighborhood-level quantification consists in the identification of the main productive sources and emissive activities within the urban boundaries that mostly contribute to the current GHG emissions and then focus the efforts on possible mitigation.