In the present document we answer point by point according to the following schema:

<u>Comm.</u>: **Comment of Dr. Schernthanner**	<u>Resp</u>.: Responses provided by the Authors

<u>Comm.</u>: **2.2 It's not clear if LULC maps have been acquiered or derived from other geodata?**

<u>Resp</u>.: We obtained LULC maps by means of photointerpretation using aerial photographs and orthophotos as reference material.

We specify this aspect in section 2.2 of our article: "*LULC Changes were analysed using aerial photographs from the Italian Military Geography Institute (IGMI), for years 1955 and 1983, and digital georeferenced orthophotos from the National Geoportal (NG) of the Italian Ministry of the Environment, for years 1994 and 2006. All the aerial photographs were georeferenced by using 20÷30 Ground Control Points (GCP) and orthorectified by using a Digital Elevation Model (DEM) with 10 m x 10 m of spatial resolution*".

Moreover, in section 2.3 we highlighted that "*LULC mapping was conducted by visual photointerpretation*".

Considering that, we think is not necessary to further specify this aspect in our article.

<u>Comm.</u>: **2.3.1 What's the reason for the aggregation of the 44 CORINE Classes to 9 classes?**

<u>Resp</u>.: As reported in Di Fazio et al. (2011)*, the original 44 LULC classes of the CORINE classification system were aggregated in 9 classes (*Land Cover types*) in order to improve the interpretation of the results considering that changes can be seen as change types.

* Di Fazio, S., Modica, G. and Zoccali, P.: Evolution Trends of Land Use/Land Cover in a Mediterranean Forest Landscape in Italy, ICCSA 2011, Part I, Lect Notes Comput Sc, 6782/2011, 284–299, doi:10.1007/978-3-642-21928-3_20, 2011

<u>Comm.</u>: **Which GIS or Remote sensing software did you use to get the LULC information?**

<u>Resp</u>.: We get LULC information exploiting the capabilities of different software packages. In particular, Esri ArcGIS™ has been used to perform visual photointerpretation tasks and to structure and organise LULC maps in a GIS environment. Erdas Imagine™ suite has been used to process WorldView-2 satellite scene.

<u>Comm.</u>: **The use of KDE is quite popular at the moment in the GIScience, alternative analysis techniques to analyse settlement densities should be mentioned.**

<u>Resp</u>.: Analysis of settlement density within GIS environment is generally performed on a discrete basis using areal feature or using a continuous gridding approach. The first method is implemented using standard overlay technique aimed at the calculation of the intensity of phenomena (number of buildings) within specific polygonal features (e.g. municipalities, census zones, watersheds, regular squares). The density is calculated for every areal feature through a simple ratio between the number of occurrences and the total area of the corresponding polygon. The shape (often irregular) of the areal feature inevitably weakens the spatial interpretation of settlement densities. Modern gridding techniques allow a continuous density estimation using moving window methods. In simple density analysis, a circular neighbourhood is defined around each raster cell, and the number of events (associated to known locations) that fall within the circle is summed and divided by the area of the neighbourhood (Smith et al., 2007)**. Generally this kind of approach, although based on a cell by cell calculation, produces discontinuities in the output surface (Lloyd, 2007)***. A very effective alternative is Kernel Density Estimation (KDE, widely explored in the text) by which density is calculated using a kernel function (Gaussian, quartic, triangular) superimposed over each location.

We welcome your observation and in the article we will integrate this issue in the manuscript.

** Lloyd, C.D., 2007. Local models for spatial analysis. CRC Press Taylor & Francis Group, Boca Raton, FL.
*** Smith, M.J., Goodchild, M.F., Longley, P.A., 2007. Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools. Troubador Publishing, Leicester, UK.

Comm.: **Tables and figures should be included in the text.**

Resp.: Generally speaking, we agree with Dr. Schernthanner. But it should be considered that we are at the stage of Discussion paper in which our manuscript has been validated in the typesetting process.
To this end, we followed the manuscript composition rules section where is specified that "*pages should be placed in the following order: title page, abstract, text, appendices, acknowledgements, references, tables and figure captions*" (www.earth-system-dynamics.net/submission/manuscript_preparation.html). At the stage of open discussion (*ESDD - Papers in Open Discussion* www.earth-syst-dynam-discuss.net/papers_in_open_discussion.html) all papers are organised following the manuscript composition in which tables and figures appear after the References section (you can also see the MS word template www.earth-system-dynamics.net/example.doc).

Comm.: **Reconsider Figure 1. Different overlapping areas in the map are confusing. Revise the layout of the map! Color of the bounding boxes is different?**

Resp.: We restructured the Figure 1 taking into account what noticed by Dr. Schernthanner. In this respect, we eliminated the layer of the settlement (actually not clearly visible) as well as the one of the National Natural Reserves "Cropani-Micone" and "Marchesale" considering these two natural protected areas are outside the study-area. Anyway, overlapping is due to the coexistence of different protected areas in the same territory and in some cases their boundaries are not coincident.

About the bounding boxes, we simply used different colours to indicate the extent rectangles. Each extent rectangle, for example the blue one, shows the extent of the data in the other data frame. At any rate, in order to improve the readability of the figure, we also add two rows to show the reading-order of it.
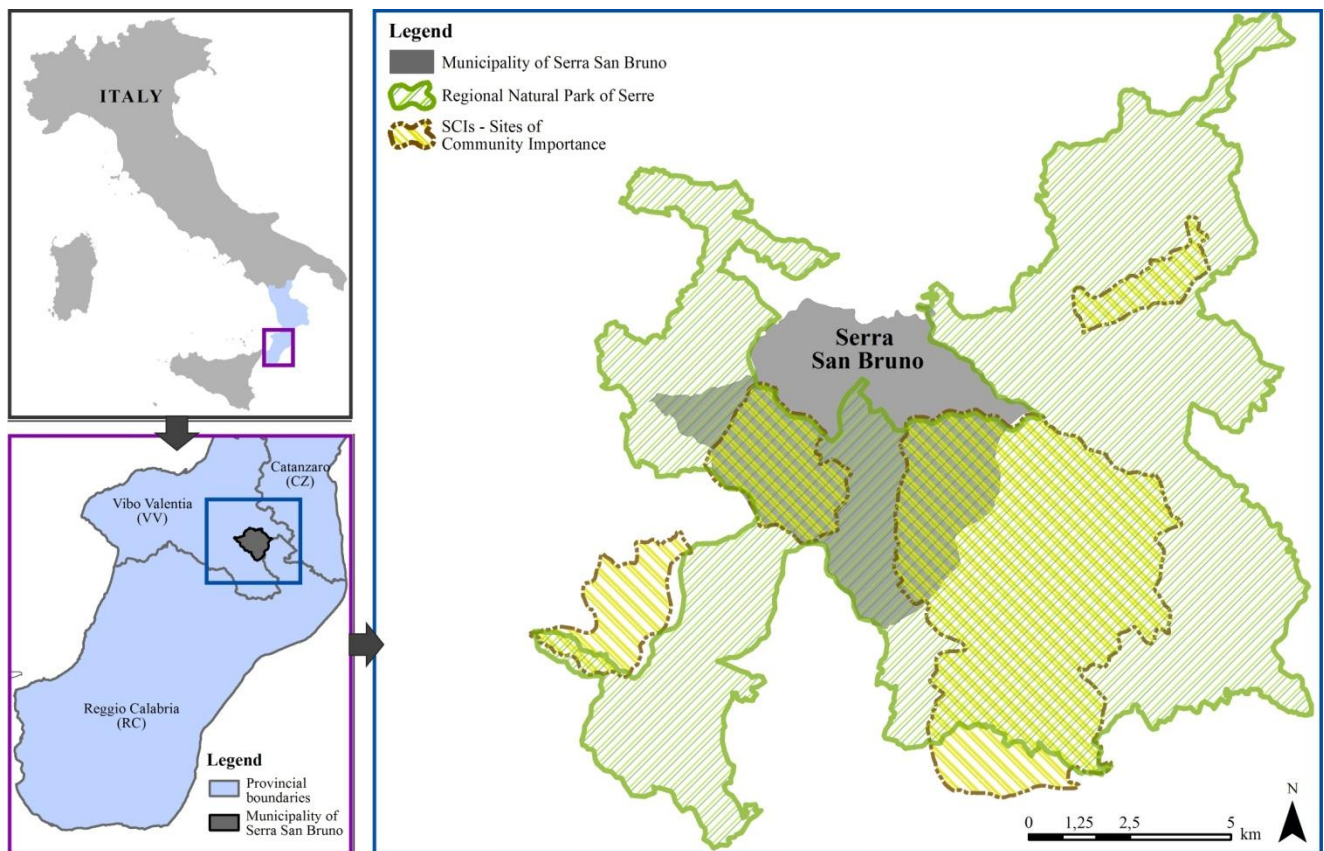

Figure 1. Map showing the geographical location of the study area. In the blue box, the boundaries of protected areas falling in the territory of Serra San Bruno municipality are mapped.