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A new approach to derive solar potential maps based on photogrammetric airborne image analysis and sealed surface run-off data

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Content of this project is the generation of a solar potential cadaster based on data which was gathered for the newly introduced split sewage charge (SSC) in the federal state of Baden-Württemberg (Germany).

The law was established in March 2011 stating that the sewage charge of all buildings is split into two parts: (1) untreated wastewater and (2) precipitable water (JUM, 2010). So far the costs for the sewage disposal were covered by charging every house owner based on their individual consumption of potable water without considering the size of sealed areas on their parcel, and consequently the amount of precipitable water that is discharged to the canalization (Neureither and Schwing 2011). Based on the new law 'Split Sewage Charge' (in German 'Gesplittete Abwassergebühr – GAG') sewage costs are charged proportionally to the sealed parcel area which is resulting in a more fair distribution of the sewage charge.

In order to determine the correct amount of sealed area per parcel, new aerial imagery for all communities in Baden-Württemberg was captured. Based on this aerial imagery, sealed area maps have been created. Sealed areas are represented as polygon shapefiles in thematic maps classified by the type of sealing surface (no sealing, sealed by e.g. asphalt, cobbles, grass paver, soil, roofs or green roofs) (Neureither and Schwing 2011).

On the other hand there is the well-established method for the calculation of solar potential roof cadasters called SUN-AREA (Klärle 2011). So far these calculations were based on laser-scan derived point clouds (Klärle, 2011).

The motivation for this research is now to combine the SSC-framework and the SUN-AREA methodology in order to add value to existing SSC data by using these data sources instead of laser scan data for the calculation of more detailed solar potential maps for sealed areas and roofs. The surface model for the solar calculations will be generated with the method of high density image matching with the existing aerial imagery. The sizes of potential areas are derived from the sealed surface run-off data.

SSC data, i.e. high resolution and overlapping aerial images and sealed area data, are providing several expected advantages as input data for SUN-AREA: (1) The aerial images are available area wide for a great number of communities in Baden-Württemberg. (2) Sealed areas represent the total roof top area whereas the standard SUN-AREA calculation only uses building foot-prints to determine the roof size. This results in a more accurate calculation of the roof-top based solar potential. (3) The sizes of the roofs are not given summarized but every parts of the roof individually which results in a more accurate reflection of the situation. (4) Solar potential can be calculated for all sealed areas (not only for roof tops).

With this research value can be added to both projects in the future. Another federal state of Germany (Hessen) already established the law about the split sewage charge (Lareda 2009) but the communities did not yet realize it. The communities Fulda (Fuldainfo 2011) and Seligenstadt (OP 2011) for example are going to realize the project in 2013, Frankfurt does not yet have a fixed date for the realization. After the current examinations, these communities have the chance to gather data for the split sewage charge in a way that it can further be used for solar potential cadasters, as for example by providing a higher overlap of the aerial imagery or a higher spatial resolution. In this way data can be gathered for two projects at the same time which keeps costs for communities low.

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