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Interactive comment on "Development of a global 30-m impervious surface map using multi-source and multi-temporal remote sensing datasets with the Google Earth Engine platform" *by* Xiao Zhang et al.

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This paper presents a new global 30m impervious surface map produced with multi-source and multi-temporal remote sensing datasets and random forest (MSMT_RF). Compared with the currently available impervious products (i.e., GlobeLand30, 25 FROM_GLC and NUACI), this MSMT_RF-based product has higher overall accuracy and kappa coefficient, which are 96.6% and 0.90, respectively. The superiority of the MSMT_RF-based product stems from two significant innovations of the method proposed in this study. First, multi-source and multi-temporal remote sensing data are

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combined to produce the impervious surface map. The comprehensive information provided by the combined data is useful in classifying land cover types, so the superiority of the MSMT_RF-based product in comparison with the other products is convincing. Second, a novelty method is proposed for selecting training samples based on the available impervious product and VIIRS NTL and MODIS EVI imagery. This method allows for the fully automatic selection of training samples to avoid manual training sample selection, which is time-consuming and laborious, especially at a global scale. This method has significant implications for producing more perfect global data products based on existing data products. I believe this study is a breakthrough over previous works in impervious surface mapping and will appeal to a broad readership. However, there are still some minor issues that should be addressed before final publication.

Line 35, “urban the environment” should be “urban environment”

Figure 1, I cannot see the blue rectangles but only black points, which are supposed to be the blue rectangles. The authors should figure out how to make blue rectangles clear.

Why did the authors select training samples based on Globe30 product but not FORM_GLC, which is also a 2015 product and seems to be more appropriate? Please elaborate.

Figure 5, please provide the label of axes.

Table 2. How the different categories, e.g., high, low, medium, are defined? Are they defined quantitatively or subjectively? Please elaborate.

Figure 6. I suggest the authors to provide the location information (e.g., city name or latitude-longitude grid) of these areas. It will allow readers to check ground truth in Google Earth.

Page 20, the authors found that the importance of Landsat textural features is low, whereas previous studies confirmed the contribution of textural features to impervi-

ous mapping. More explanations can be given on this contradiction. One possible explanation may be the different data sets. Many studies have indicated that textural information is helpful in land cover classification, especially in high-resolution images. Shaban and Dikshit (2001) used the textural information in SPOT images, while the authors used that in Landsat-8 images. The difference in spatial resolution may cause the different contribution of textural features in impervious surface mapping.

Page 20, I agree with that the improvement made by this study is mainly due to the combination of the multi-source and multi-temporal information, but it may be misleading to state that the classification-based method performed better than spectral index-based method since they are performed based on the different data sets. I do not think the classification-based method can achieve a high accuracy only with Landsat data.

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