

4. RESULTS & DISCUSSION

In this study, the condition-based classification approach is applied using total 11 main classes in the both case study areas. As mentioned before, the seasonal effects (i.e. being covered with snow) affected the success of the classification results. Some points to note are outlined as below:

1. Ercis town consists of different variety of complex urban patterns; therefore the detection of the damaged buildings from satellite images is a complex issue. Besides, irregular sizes of buildings also affect the classification results and lead to misclassification in some parts of the study area.
2. Since the spectral characteristics of different features are similar due to being snow covered, hence, it is not sufficient to distinguish many different objects in the image. Especially, snow covered areas are seen as the main challenge in this study. Almost all building's roofs, many open areas, agricultural lands, other vegetated areas, etc. are covered with snow. In the analysis, low spectral variation seen in different objects due to snow cover influence is overcome partly by using their textural properties. The textural properties are also used to minimize the mixing problems come across in the areas, which are darker at all, wavelengths such as shadows of the buildings, snow in the shadows, etc. However, it is observed that the textural properties are still not so adequate due to snow cover effect and are not used efficiently as much as expected.
3. Addition to the snow cover, different snowmelt rates in the building roofs (see Figure 2, Building 2 example) bring into some constraints in the object extraction in terms of spectral and textural properties.
4. Besides, due to having some areas with snow cover in the winter satellite image, some useful data products such as NDVI cannot be used to discriminate the vegetation from the other surface types in the analysis.
5. For the establishment of the relationship between damage categories and the features used in OBIA, the geometry/shape and textural properties of the objects are used to extract the collapsed building damage types (see Table 3). However, the spectral information is not used due to having similar properties observed between many collapsed buildings/debris area and roads/retained buildings.

5. CONCLUSIONS

In this study, it is aimed to see how well remote sensing technologies perform to detect the earthquake-induced buildings using an object-based image classification technique. For this purpose, different geometric and textural features in OBIA are used to detect the collapsed buildings and debris areas in the high-resolution image.

As mentioned in the application part, the object-based approach successfully detects the retained buildings but not efficiently the damaged ones. This is mainly due to having some complex features (i.e., urban patterns) in the area and also seasonal influences such as snow cover in the image.

As a final remark, since this study involve the results of the preliminary ongoing study, the additional pre-disaster information and other textural/spectral features that are not being fully tested, can lead an improved result; hence it is thought that it will be an interesting topic for future investigations.

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