On the interaction of magnetic field with granular morphological properties

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We perform a statistical study of the solar granulation properties, focusing on the morphological characteristics and how they are affected by the presence of magnetic fields. The dataset used in the present work is a high-resolution observational data of the active region NOAA 11768 obtained by the 1-m Swedish Solar Telescope (SST). We analyze blue-continuum filtergrams acquired with a temporal cadence of 5.6-second as well as spectropolarimetric data from the Crisp Imaging Spectropolarimeter (CRISP) with a temporal separation between images of 30 seconds. For the study we apply a two-step segmentation algorithm: the first step applies an initial local minima threshold to identify the solar granules, followed by the application of the second step which performs most of the capabilities included in the Multi-Level Tracking (MLT-4) algorithm for more accurate granulation segmentation, including erosion and expansion to fit the granular shapes. Statistical analysis shows that granulation sizes and shapes are strongly influenced by the presence of magnetic field, i.e. with granules exhibiting reduced dimensions in regions of higher magnetic strengths. These results provide a better look into the relationship between photospheric convective cells and magnetic field properties, improving our understanding of solar plasma dynamics.