Session 2

Unipolar and bipolar magnetic flux appearance in the quiet Sun internetwork

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Small-scale internetwork magnetic fields are considered to be the main building blocks of the quiet Sun magnetism. Thus, it is important to understand how they appear on the solar surface. In this work we employ long-duration Hinode/NFI magnetogram sequences to analyze the appearance modes and temporal evolution of individual internetwork magnetic elements inside a supergranular cell at the disk center. We identify bipolar features by examining the properties of the footpoints and assessing their magnetic connectivity through a magnetofrictional simulation. The rest of features are considered to be unipolar. Magnetic bipoles appear at a faster rate than unipolar features (68 as opposed to 55 Mx cm-2 day-1), and provide about 70% of the total instantaneous internetwork flux detected in the interior of the supergranule. Bipolar features tend to be bigger and stronger than unipolar features. They also live longer and carry more flux per feature. Both types of flux concentrations appear uniformly over the solar surface. However, bipolar features represent new flux on the solar surface, while unipolar features are probably formed by the coalescence of background flux. This may solve the problem posed by studies that reported most of internetwork features to be unipolar.