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A statistical study of plasma composition in solar active regions

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The plasma in the solar corona originates from the photosphere and would, therefore, be expected to have similar elemental composition. However, elements with a low first ionisation potential (FIP) have been observed to have an increased abundance in certain regions of the corona. This phenomenon is known as the FIP effect and the degree of enhancement is measured using the FIP bias parameter. The increased elemental abundance is typically observed in active regions.

In this statistical study, we analyse how the degree of enhancement varies in active regions of different sizes, ages and level of complexity. We explore whether the average FIP bias is linked to the evolution of active regions and the photospheric magnetic field at the scale of an active region. First, by exploring whether there is a correlation between average FIP bias and the total magnetic flux and age of the active region. Second, if there is an average FIP bias dependence on magnetic flux density. Third, if the average FIP bias varies depending on whether the plasma is above the leading or following polarity of an active region.

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