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# Mapping the Solar Wind to Its Source to Compare Coronal and Heliospheric Boundaries

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We aim to understand the relationship between the observational properties of coronal holes, particularly their boundaries, and the composition of their associated solar wind. These are anomalous in that while the coronal boundaries appear sharp, the associated transition in solar wind ionisation and elemental abundance appears quite smooth. To do so we employ the standard two-step solar wind mapping technique; first assuming a constant and purely radial solar wind to map back to the source surface of a potential field source surface (PFSS) model, and then using field lines derived from this to select the likely source region at 1 solar radius. Such mapping techniques are of increasing importance as we approach the launch of Solar Orbiter, which aims to establish an unprecedented link between in situ and remote sensing observations. We find that despite its simplicity this technique maps compositionally cool (low charge-state) solar wind plasma back to the anticipated coronal hole source regions. Further, we test the agreement of features in the solar wind with both structure from EUV coronal images and the modelled magnetic field direction to test the quality of the backmapping and make adjustments to the technique. We directly compare heavy ion charge states observed in situ to coronal properties inferred from EUV data. We will present results and offer explanations for the evolution of solar wind charge state relative to the properties across source regions, in particular for the anomalous coronal hole boundaries. We will also analyse the viability of the chosen mapping technique for this study, and for others with Solar Orbiter.