Understanding our capabilities in observing and modelling Coronal Mass Ejections

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Coronal Mass Ejections (CMEs) are large-scale eruptions of plasma and magnetic fields from the Sun. They are considered to be the main drivers of strong space weather events at Earth. Multiple models have been developed over the past decades to be able to predict the propagation of CMEs and their arrival time at Earth. Such models require input from observations, which can be used to fit the CME to an appropriate structure.

When determining input parameters for CME propagation models, it is common procedure to derive kinematic parameters from remote-sensing data. The resulting parameters can be used as inputs for the CME propagation models to obtain an arrival prediction time of the CME f.e. at Earth. However, when fitting the CME structure to obtain the needed parameters for simulations, different geometric structures and also different parts of the CME structure can be fitted. These aspects, together with the fact that 3D reconstructions strongly depend on the subjectivity and judgement of the scientist performing them, may lead to uncertainties in the fitted parameters. Up to now, no large study has tried to map these uncertainties and to evaluate how they affect the modelling of CMEs.

Fitting a large set of CMEs within a selected period of time, we aim to investigate the uncertainties in the CME fittings in detail. Each event is fitted multiple times by different scientists. We discuss
statistics on uncertainties of the fittings. We also present some first results of the impact of these uncertainties on CME propagation modelling.

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