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Multi-spacecraft observations of solar radio bursts and radio-wave propagation in the heliosphere

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With the current fleet of heliospheric and planetary missions measuring the radio flux in the heliosphere, we are able for the first time to measure radio bursts simultaneously from multiple positions in the heliosphere. We present here how these measurements are used to calculate the directivity profiles and intrinsic radio burst intensity of type III radio bursts for a sample of events observed by four spacecraft: Solar Orbiter, Parker Solar Probe, STEREO-A and Wind. By comparing these observations to the predictions resulting from ray-tracing simulations of radio-wave propagation in the heliosphere, we infer the level of density fluctuations and their anisotropic nature, and show that this is highly variable between different events. We will finally discuss how planetary missions can be used to enhance our set of measurements, with the example of radio bursts measured by the MARSIS instrument on Mars Express.