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Stare and chase of space debris targets using real-time derived pointing data

We successfully ranged to various space debris targets using a Stare & Chase approach: The Graz telescope 'stares' into the sky in a fixed direction. Simultaneously, an analogue astronomy CCD is equipped with a standard objective and piggyback-mounted on the telescope. The CCD records the stellar background within a field of view of 7° . From the stellar X/Y positions on the sensor a plate solving algorithm determines the pointing data of the image with an accuracy of about 15 arc seconds. If a sunlit target passes through the field of view, its declination / right ascension coordinates are solved for, stored, and used to create a CPF file in near-real time. The derived CPF data is used to start laser ranging ('chase') within the same pass. A comparison of Stare & Chase CPFs with standard TLE predictions shows the possibilities and limits of this method. Such a Stare & Chase approach allows for the first time SLR to targets without a priori knowledge of any orbit predictions.