Occultation results for 29P/Schwassmann-Wachmann. M. W. Buie[1,2], [3]J. M. Keller, R. Miles[4], M. Kretlow[5,6], V. Nikitin[7] and the RECON and CanCON occultation teams. [1]Solar System Science & Exploration Division, Southwest Research Institute, 1050 Walnut St., Suite 300, Boulder, CO, 80302, USA; [2]buie@boulder.swri.edu; [3]University of Colorado, Boulder, CO USA; [4]British Astronomical Association (BAA), United Kingdom; [5]Instituto de Astrofísica de Andalucía (IAA-CSIC), Granada, Spain; [6]International Occultation Timing Association - European Section (IOTA/ES), Germany; [7]RECON and International Occultation Timing Association – North America Section (IOTA/NA)

Introduction: The object known as 29P/Schwassman-Wachmann (hereafter referred to as SW1) has long been classified as a comet due to its long recognized activity. It has a nearly circular orbit beyond Jupiter with a perihelion distance of 5.7 AU and an aphelion distance of 6 AU. Ignoring its activity, it would otherwise be classified as a Centaur and stands apart from objects normally called comets. SW1 is also orbiting in the transitional "gateway" region between the Centaur and Jupiter-family comet region[1].

Comets are notoriously difficult to observe via occultation methods due to the difficulty of relating the opto-center of the coma to where the physical body lies. SW1 has a large variation in activity that is quasi periodic[2]. At its times of minimum activity, one can get very close to a direct measurement of the body. Many opportunities were recently published with a few of them visible from the western USA and British Columbia, Canada[3]. This area is where RECON (Research and Education Collaborative Occultation Network) and CanCON (Canadian Collaborative Occultation Network, acting as an extension of RECON) are located and operate. We report on observations from three separate successful campaigns.

Observations: Most of the systems we use are 28-cm telescopes from RECON[4]. Normally, we operate from fixed community locations but the systems are portable. For these campaigns, we invited members of RECON and CanCON to move to the occultation zone for a higher density set of observations provided by those that live the closest to the area of interest. We have useful data from three separate events.

SW20221219, southwest US: 5 stations were deployed with 28-cm telescopes. 4 stations collected useful data with 4 positive solid-body detections. The prediction from [3] was very close enabling the high success rate. No obvious signs of extended structures around the body were detected.

SW20221227, western US: Weather strongly affected the effort and most interested teams never deployed. Only 1 station attempted the event with a 28-cm telescope and was successful. A clear solid body event was seen with a chord length of 61 km. No obvious signs of extended structures around the body were seen. This observation was 18.8 ± 1.7 hours after a significant outburst was seen. There is a noticeable level of residual flux seen during the occultation that may prove interesting.

SW20230128, northwest US: 8 stations deployed in central Washington. Of these stations 7 were able to collect useful data. There were 5 positive solid-body detections and no indication of extended material.

Results: The elliptical fit to the data from SW20221219 gives axial diameters of 67.9 x 53.3 km. The fit from SW20230128 gives 78.2 x 48.2 km. These sizes are individually well determined but difficult to reconcile with each other, especially since the position angle of the ellipses differ by 81°. Further work is required to understand the three dimensional shape of the body and further observations are encouraged.

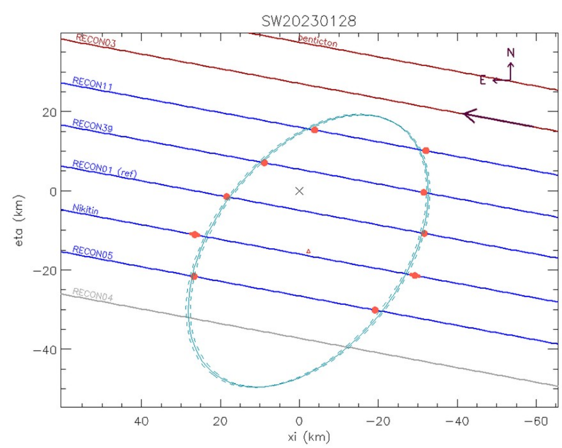

Figure 1: Sky-plane profile of SW1 from PO20230128. Blue lines show detections, red are negative, and gray are for no data. The formal elliptical fit is shown.

References: [1]G. Sarid et al. (2019) ApJL, 883, L25. [2] Miles R. (2022) BAAS, 54, 414.03. [3] Miles R. and Kretlow M. (2021) JOA, 11, 3. [4] Buie, M. W. And Keller, J. M. (2016) AJ 151, 73.