

Wavefront Guided Scleral Lenses In the Management of Severe Keratoconic Aberrations

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BACKGROUND

Patient Demographics: 26 yo M Caucasian

Chief Complaint: Improve monocular diplopia and ghosting, both exacerbated at night

Ocular History:

- Keratoconus OU
- Corneal Crosslinking OD 3 years prior
- H/o scleral lens wear, discontinued due to poor comfort

Clinical Findings: BCVA of 20/20-2 OD and 20/20 OS looking through spectacles of power PI – 3.50 x 066 OD and PI – 1.50 x 085. Normal Worth 4 dot. Cover test orthophoric at distance, 3 exophoria at near. Slit lamp examination demonstrated moderate inferior corneal thinning OD; OS was relatively unremarkable.

Topography values: (Pentacam)

- OD: thinnest pach of 480 μm , Kmax of 58.0 D
- OS: thinnest pach of 524 μm , Kmax of 47.9 D

CASE DESCRIPTION

Due to the patient having good visual acuity through spectacles, but noticing monocular diplopia and ghosting OD>OS it was suspected that higher order aberrations were the root of the problem. Keratoconus is known to create large amounts of coma and cause monocular diplopia. Other causes of monocular diplopia such as cataract and dry eye were both ruled out on exam. Aberrometry showed root mean square (RMS) values of 2.37 μm OD, 0.83 μm OS. Scleral topography was obtained and 15.8 mm scleral lenses were fit with the intent to add higher order aberration correction. Following lens adjustments and the addition of HOA control optics over the course of three months, the patient's symptoms improved and he stated much improved lens comfort compared to prior trials. Aberrometry RMS values at conclusion were 0.55 μm OD (a 76% improvement from baseline), and 0.46 μm OS (a 44% improvement from baseline); both demonstrating a significant improvement in optical quality. Of note, OD vertical trefoil decreased from 1.886 μm to 0.069 μm (a 96% improvement), and OS vertical coma decreased from 0.617 μm to 0.106 μm (an 82% improvement).

CONCLUSIONS

Higher order aberration control scleral lenses have started to gain more popularity over the past decade. Good candidates typically have symptoms that are consistent with residual HOAs and quantifiable on aberrometry such as comet tailing, starbursts, halos, and diplopia. An initial scleral lens fit that is rotationally stable is paramount to success. HOA corrective optics greatly changed this patient's acuity from 20/20 to 20/happy. Consider wavefront guided lenses for your visually motivated patients.

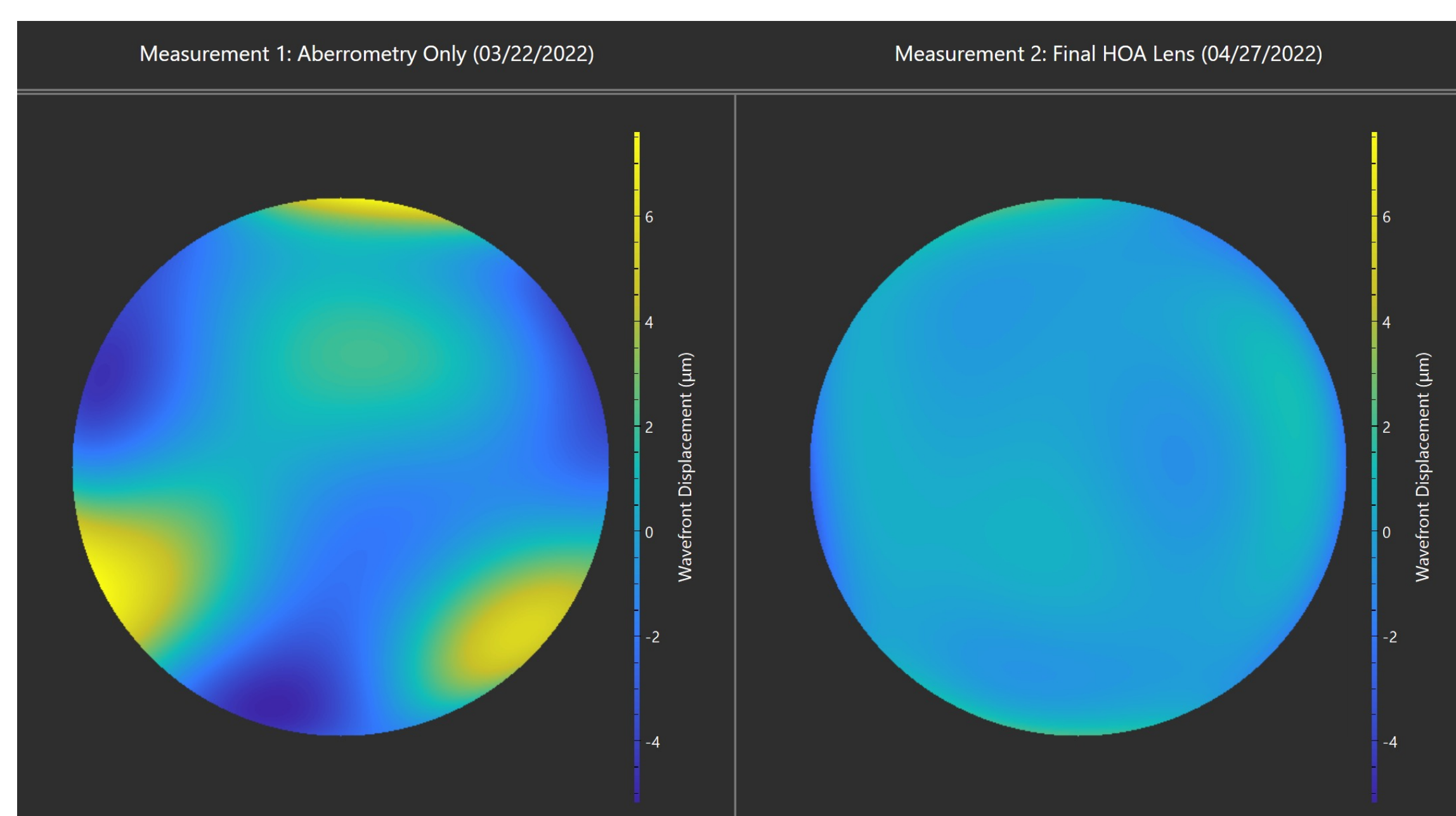
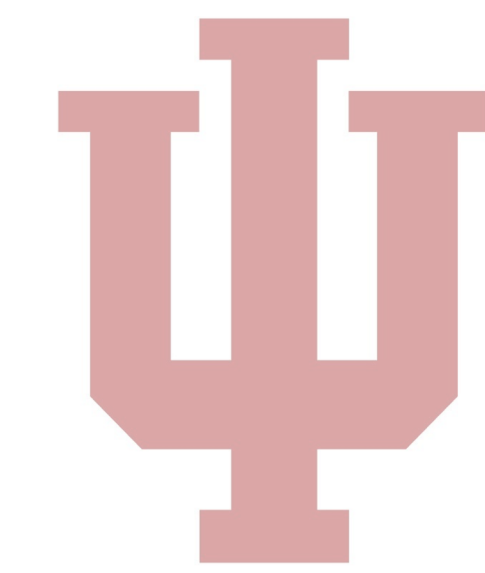


Figure 1: OD Wavefront Map Comparison

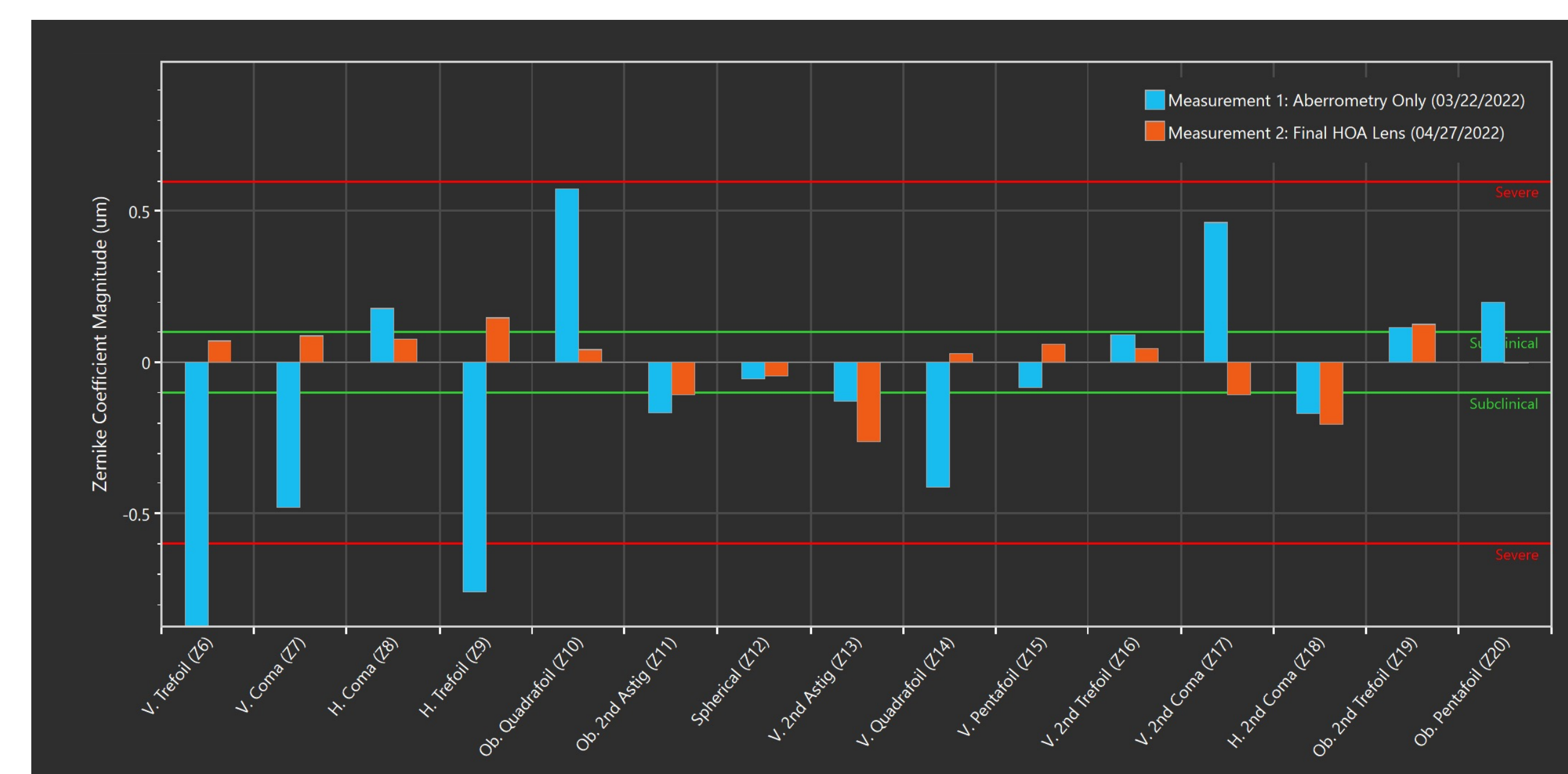


Figure 3: OD Zernike Plot Comparison



Figure 5: OD Vision Simulation Comparison

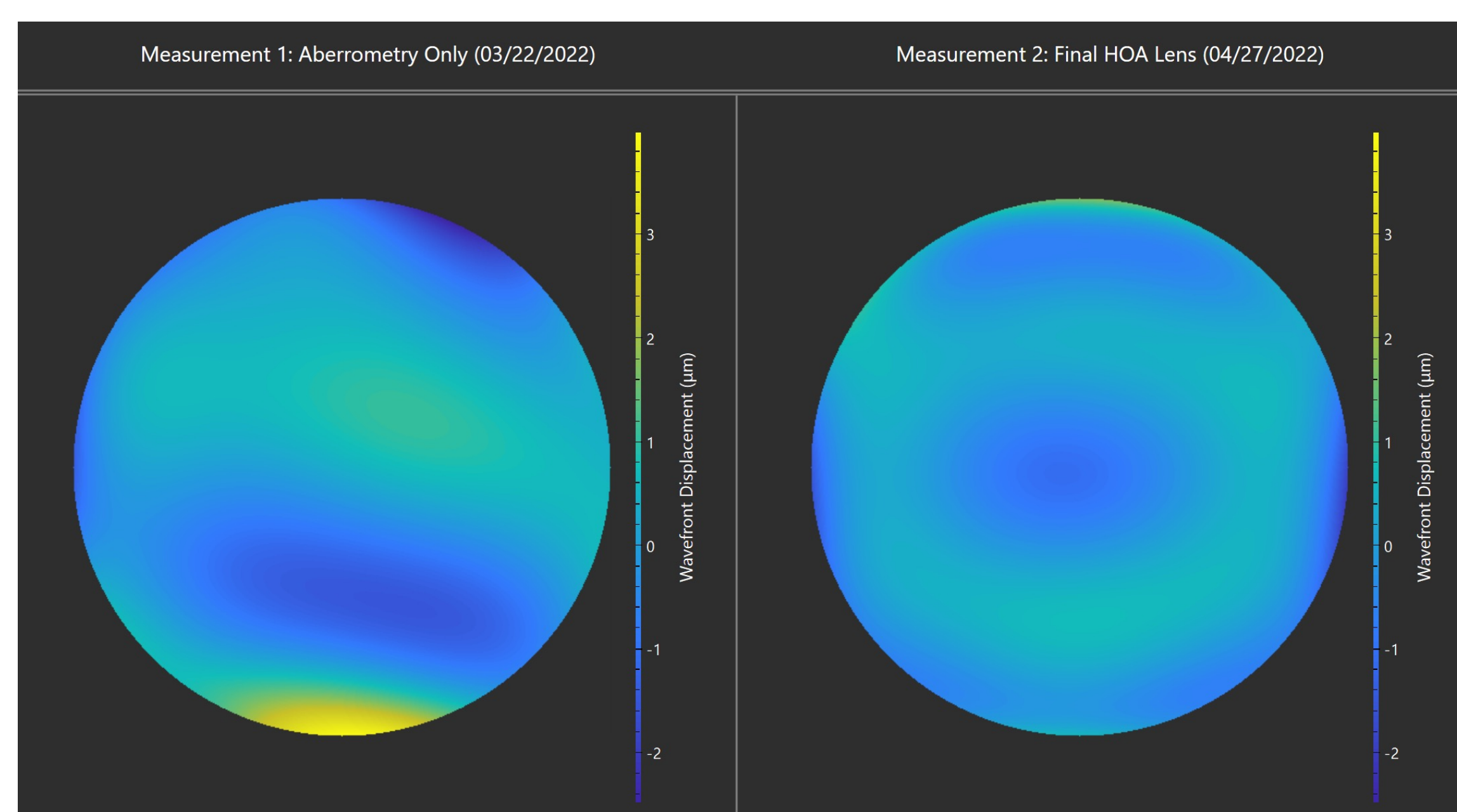


Figure 2: OS Wavefront Map Comparison

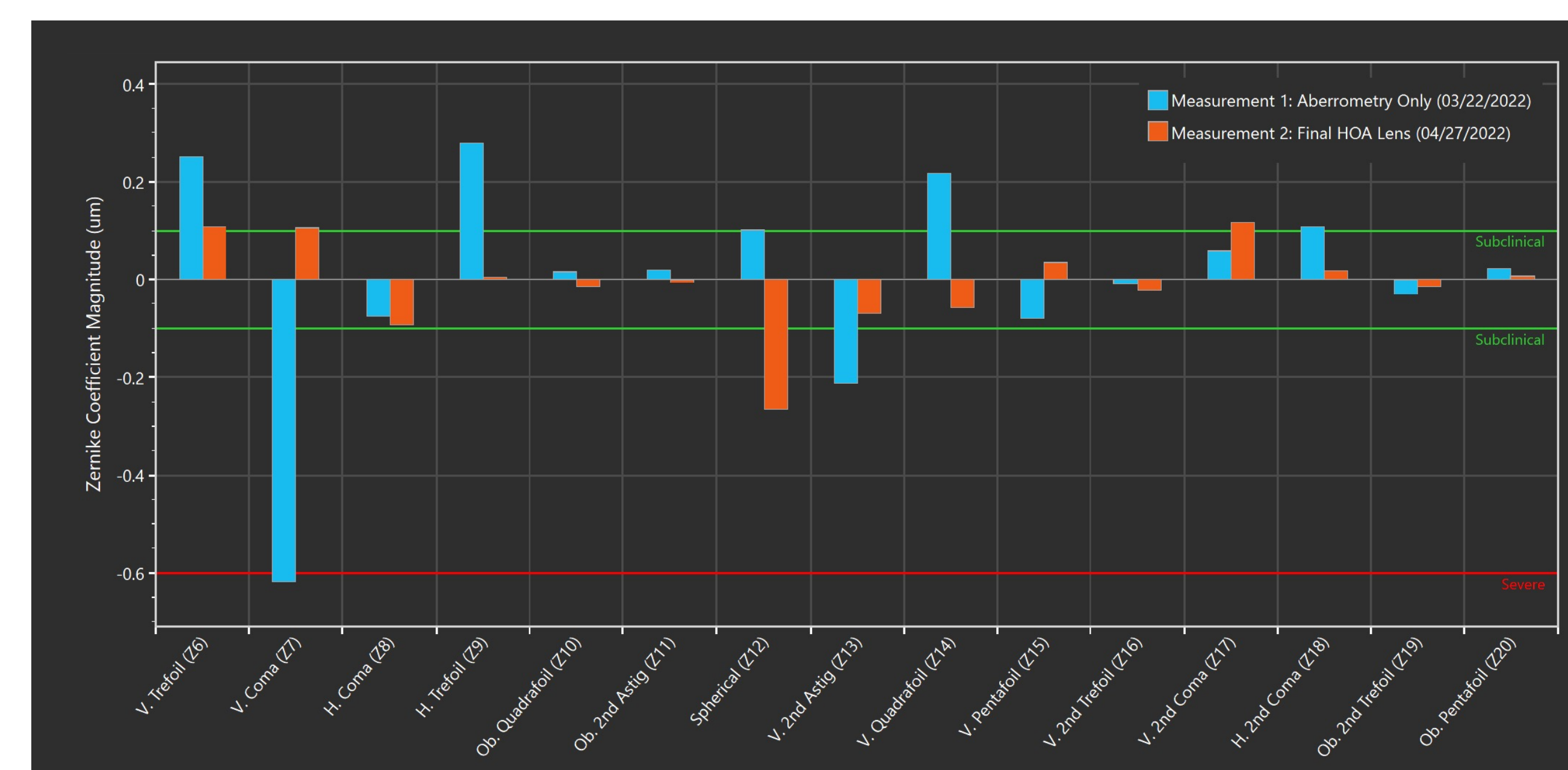


Figure 4: OS Zernike Plot Comparison

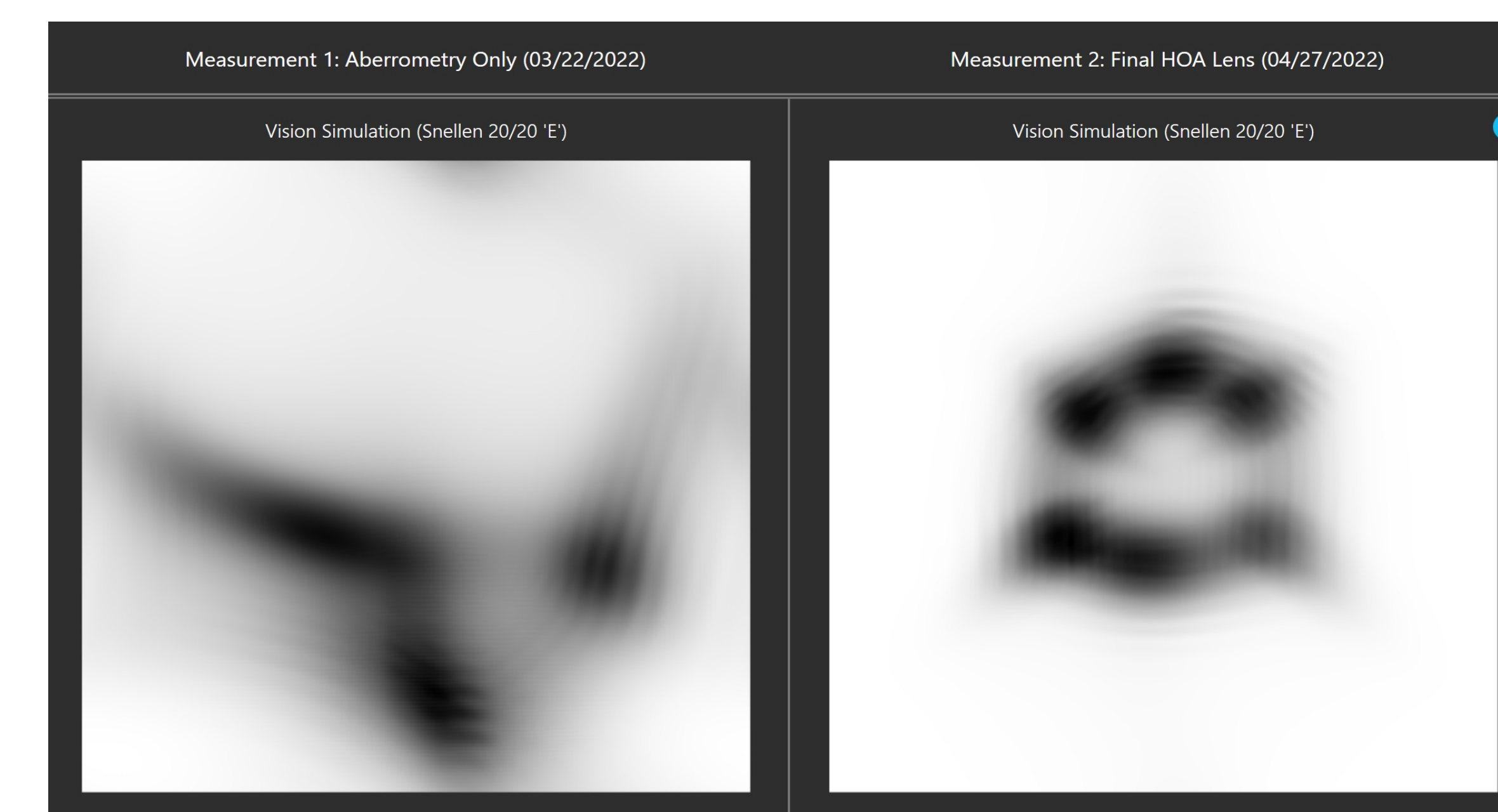


Figure 6: OS Vision Simulation Comparison