The New Solar Shape and Oscillations Telescope (NSSOT) Experiment for SOLARNET

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The diameter was observed to be constant over the solar cycle and, as such, will never be a "proper" solar-terrestrial "climate" indicator (ground measures with small telescopes are spurius, the Maunder Minimum ones of Picard during the XVII century not being an exception). Large instruments (like the 45 cm Gregorys of Axel Wittmann in Locarno and Tenerife) which average seeing cells see no variations ($\ll 40$ mas) as well as the space instrument (MDI/SOHO) naturally not affected by turbulence either. We present the 4 approaches, Wittmann on ground with large telescopes, Emilio *et al.* (2000) and Kuhn *et al.* (2004) whom used the 6 pixels limb data of MDI, Antia (2003) with a completely different method since using the ultra-precise frequency variation of the f-modes, and our approach (Damé and Cugnet, 2006) using the complete 7 years of filtergrams data (150 000 photograms and magnetograms) of the SOHO/MDI experiment. These 4 careful analysis converge towards the same insignificant (below 15 mas) variations (or even less: 0.6 km, 0.8 mas in the helioseismology approach!). Following Antia, we can conclude that: "If a careful analysis is performed, then it turns out that there is no evidence for any variation in the solar radius." There were no theoretical reasons for large solar radius variations and there is no observational evidence for them with consistent ground and space observations.

This being stated and admitted, the radius measure keeps interest through the solar shape that might change along the cycle (sub-surface convective flows?). Radius oscillations (but higher in the atmosphere, further in the UV: 220 nm) might also bring up low order p-modes and, eventually, g-modes if ever accessible. At the level of formation of the 220 nm continuum there is the maximum magnification of the p-modes and intensity oscillations. The 220 nm is also the Lyman Alpha absorption region and ozone formation layer. The New Solar Shape and Oscillation Telescope (NSSOT), proposed for SOLARNET and designed along the non-degraded UV imaging concept early developed for SODISM/PICARD (Damé *et al.*, 1999, 2000, 2001), is optimized for these measures of the solar shape and oscillations at 220 nm. It has a carbon-carbon structure, SiC mirrors, no window and no spurious optics affecting thermal behavior and scattered light. A model of simplicity and precision. Lyman Alpha and UV images, in selected wavelengths, will complete these measurements. We present the experiment, its design and breadboarding (SiC thermally controlled mirrors), and its scientific revisited scientific objectives.