Satellite Mega-Constellations and Astronomy
14/10/2021 - Olivier Hainaut (ESO)

Abstract:
In 2019, SpaceX Starlink launched its first batch of 60 telecommunication satellites, which appeared for a few weeks as a bright "string of pearls" stretching over the twilight sky. This stunning view, combined with the plans by Starlink, OneWeb, Amazon's Kuiper and a few other satellite operators to launch many thousands of satellites over the coming years, have caused some worries that the sky would soon be littered with tens of thousands of satellites outnumbering the stars and blinding telescopes.

ESO, and the astronomical community as a whole, started various studies to evaluate the impact of these satellites on astronomical observations. The outcome is that, while by far not as bad as originally feared, some observations would indeed be affected. While our understanding of the problem improved, discussions between the astronomers and Starlink have resulted in the operator changing the satellite design and the way the spacecrafts are operated, leading to a significant decrease of their brightness (no more string of pearls). The Starlink example will hopefully serve as the basis for "best practice" standards for the whole industry.

While the problem for visible and IR astronomy is getting under control, other issues are that of radio astronomy -fortunately protected by international treaties- and of orbital crowding. The various space agencies are closely monitoring this, as collisions in low-Earth orbit would have disastrous effects on the whole space industry. I'll discuss the various ways that are being considered to reach a successful co-existence between the astronomers, space industry and its societal impacts.