How GPS systems uncover mysteries of time and light

Voice-over 1:

To talk of precision means the correction of errors. At the National Centre of Space Studies in Toulouse, we look at EGNOS, a system for correcting GPS signals developed by ESA, the European Space Agency.

Voice-over 2:

The EGNOS system constantly analyses the signals of the GPS Constellation. In particular, it corrects the phenomena that we call ionospherics because the atmosphere can delay the signal and provoke errors. The role of the control centres is to quantify the GPS errors and those due to the atmosphere and tell users, 'The GPS functions well, but it's necessary to correct it in this or that way'.

Voice-over 1:

The signals emitted by the GPS satellites are received by stations on the ground whose location is known with great exactitude. The errors of positioning are also calculated with precision. Paradoxically, those errors and corrections open new horizons for the scientists.

Voice-over 2:

The scientists work on what we call time frequencies. EGNOS gives a very precise signal time which uses Universal Time as its reference. We also find application for it in the domain of geodesy. The EGNOS receiver stations permit us to study the evolution of tectonic plates. These are just a few scientific examples.

Voice-over 1:

ESA organised a conference, the first of its kind, involving some one hundred and forty international researchers at the Cité de l'Espace in Toulouse in the south of France. The objective: to lay out its new applications and enhance its future development.

Voice-over 3:

Three big scientific communities are represented here: we have the community of Earth Sciences. Then we also have another big community, the one concentrating on measuring time. And then we have another large community, that of fundamental physics which focuses on the fundamentals of our universe: relativity and quantum mechanics.