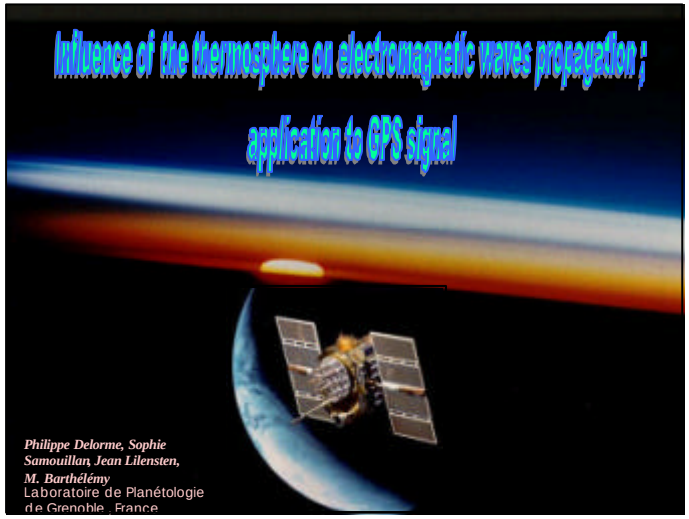


The question we adress is :

Is there an influence of the thermosphere on the positioning through GPS signal ? On TEC measurements ?

Indeed, there are many corrections made on the GPS signal. The thermosphere has always been considered as negligible. With the improvement of the thermospheric models, this assumptions merits a new consideration.

This influence could only be through the varying optical index

In a collisionless plasma $n = \sqrt{1 - \frac{w_p^2}{w^2}}$

In a collisionnal plasma $n(z) = \sqrt{1 - \frac{w_p^2(z)}{w_{GPS}\left(w_{GPS} - i n_{en}(z)\right)}}$

… Influencing the GPS wave

Optical path: $Dr = \int_P^S n(r).ds - \int_P^S n_{\tilde{A}}(\omega_{GPS}, r).ds$

Dephasing : $\Delta j(z) = (n(z) - n_{\tilde{A}}(z)) \frac{w_{GPS}}{c} z$

Amplitude : $D(z) = 1 - e^{n_{\tilde{A}}(z)} \frac{w_{GPS}}{c} z$

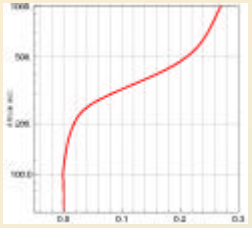
… and the TEC measurement

$$DTEC = \frac{8 . p^2 . m . f^2 . p^2 e_0 Dr}{e^2}$$

Δr = optical path variation

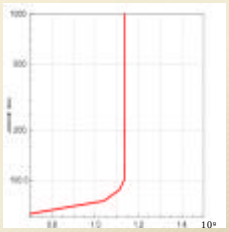
Results

Verification



Différence between the ITEC from our GPS simulation and IRI (TECU)

Influence on the TEC : none



Difference between the ITEC with and without collisions (10^{-9} TECU)

So … don't go to this poster, you know the answer !!!