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## **Coupling modeling and optical observations to reconstruct the precipitating particle fluxes and the ionosphere dynamics: new observations and uses of RGB images.**

Optical observations of the aurora from space and from the ground give key information for auroral physics studies. They however often need to be coupled with simulations to give their quintessence. In our works, we use imagery, spectroscopy and polarimetry instruments to observe the auroras and combine these observations with a 1D kinetic code of the ionosphere thermosphere named Transsolo to get both the precipitation particles characteristics and the dynamics. Recent developments allow to get the full synthetic spectra of the aurora both in the FUV (120-200 nm) and in the visible (380-900 nm). By running the code at different locations on a grid it is then possible to map the precipitation using different parameters of the particle distributions, especially the total flux, the mean energy of the distribution(s) and their widths. By integrating over RGB filters bandpass, it is also possible to use RGB images to reconstruct these precipitating characteristics. This last activity being done in the frame of the ISSI ARCTICS group.

In this presentation, we will review these optical developments and their potential applications for auroral physics.