Pitch angle and energy diffusion coefficients due to wave particle-interaction calculated using WAPI code and a new wave data base

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It is well known now that the acceleration and losses caused by the interaction between energetic particles and waves present in the environment contribute significantly to the large flux variations observed in the radiation belts during magnetic storms and other disturbances. Consequently, it is important to better understand this physical process in order to develop better models to specify and predict the radiation belts. To do this, two areas of study are required: first, it is essential to have a good model of wave-particle interaction using quasi-linear theory and secondly to better define the characteristics of waves from the surrounding environment (intensity, frequency, and direction of propagation). For this purpose, the SPace Environment Department (DESP) of ONERA has developed, first, a code, WAPI (Wave Particle Interaction), based on quasi-linear theory, to calculate pitch angle, energy and mixed diffusion coefficients for resonant wave-particle interaction, whatever the frequency (from Hiss to VLF) and the direction of propagation. On the other hand, DESP has developed a wave data base based on data from several spacecraft. From this wave data base, the intensity of the waves is used in WAPI code to compute pitch angle and energy diffusion coefficients due to interaction between waves and particles from the radiation belts.