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Review of recent results on the plasmasphere by the CLUSTER and IMAGE missions

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Plasmaspheric exploration got a major boost since 2000, when the CLUSTER and IMAGE spacecraft were launched. ESA's four CLUSTER satellites continue to orbit Earth in a coordinated constellation until today, visiting the plasmasphere on each perigee pass and returning correlated multi-spacecraft measurements. NASA's IMAGE spacecraft ceased operations after almost 6 years of discovery by pioneering global imaging and radio sounding techniques. These missions offered a new and different view of the plasmasphere. The past years have therefore been fruitful, and the body of scientific knowledge about the plasmasphere has grown significantly. The workshop "The Earth's plasmasphere: A CLUSTER, IMAGE, and modeling perspective" organized at the Belgian Institute for Space Aeronomy in the fall of 2007 lead to the writing of a book reviewing recent results on the plasmasphere provided with the help of the CLUSTER and IMAGE missions. The first chapter reviews old and new techniques for exploring the plasmasphere. The second one concerns plasmaspheric structures at different scales. The magnetic and electric fields are described in the third part and plasmaspheric waves in the fourth one. The final two chapters present physics-based and empirical models of the plasmasphere.