



## **Addressing the key problems of magnetospheric dynamics**

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The Earth's magnetosphere is the only 'natural laboratory' where regular and comprehensive in situ measurements made by the spacecraft systems (of increasing complexity) are regularly available to study the fundamental problems of space plasma physics. It is also a very complicated and open natural system, with extreme spatial structuring and elements of multi-scale behavior, which result in surprisingly variable dynamics, so that many important key issues still stay open. The only approach to study such a system is to combine the in situ spacecraft observations with the adaptive magnetospheric modeling, with the global imaging of precipitation and convection (including various optical and ground-based systems), and with global plasma simulations. We briefly illustrate how the elements of such a synthetic approach work together on the recent example of 'identification of the near-Earth reconnection', and discuss their implementation in the current THEMIS project. A one particular and important problem waiting to be solved with such an approach in the coming years - may be to test the concept of entropy conservation in the Earthward convecting plasma tubes as a guiding principle, which can be applied to explain such diverse phenomena like the steady convection, bursty flows and sporadic plasma injections into the inner magnetosphere.