

## Preface

### Double Star – First Results

This special issue of *Annales Geophysicae* presents the mission, the instruments and the first results of the Double Star programme. Double Star is the first mission in collaboration between China and ESA. Double Star has been a great opportunity for the European and Chinese scientists to enhance the knowledge of the Sun–Earth connection. Double Star, together with Cluster, brings six coordinated spacecraft to study small-, medium- and large-scale plasma processes in geospace. This is the first time that European instruments have been flown on a Chinese spacecraft as part of the payload.

The cooperation on Double Star is a model of efficiency: the cooperation agreement was signed in July 2001 and the two satellites were launched according to the original plan, in 2003 and 2004. The last launch was even more impressive, as the launch date was advanced by 24 h – something never seen before.

The Double Star programme was a human adventure which has brought, for the first time, Chinese and European engineers together, to build, launch and operate two spacecraft. The programme did not follow a simple route and had to overcome some difficulties. The first major difficulty was to make sure that International Traffic in Arms Regulations were fulfilled by the European instruments. Out of the eight European instruments a few could be flown without modifications but many had to change some key components, such as memory chips or pyros. The instrument teams had to spent huge efforts to fulfill this task and should be greatly acknowledged. The second main problem was the Severe Acute Respiratory Syndrome (SARS) epidemic in 2003 that coincided with the first integration tests. The test was delayed for a few weeks but then the project team, which included the

ASTRIUM support team, decided to travel to China after obtaining special permission from their agency. This was the only way to avoid long delays that could have jeopardised the mission. Other difficulties were surmounted by the great dedication and innovation of Chinese and European engineers and scientists.

This book collects a few examples of the great science that is just emerging from Double Star. Its complementarity with Cluster is shown at best in examples of plasma sheet oscillations measured at small- and large-scales simultaneously, in the flux transfer events (FTEs) analysis, which confirmed their generation by magnetic reconnection around the sub-solar point, with the occurrence of component reconnection when the magnetosheath magnetic field is not anti-parallel to the magnetospheric field, and finally, with the first images of the ring current taken simultaneously from the South and North Poles.

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*Special Issue Editors*