2590755

SMOS CAL/VAL in China--Dragon-2 Final Results

Zhang, Weiguo[1]; *Wu, Ji*[1]; *Liu, Heguang*[1]; *Liu, Hao*[1]; *Li, Dihui*[1]; *Kerr, Yann*[2]
[1]*National Space Science Center;* [2]*CESBIO/CNES*

SMOS is an earth exploration opportunity satellite aiming at retrieving soil moisture and sea surface salinity globally with a newly adopted technology (2D interfermetry) at 3 days' revisiting time. The single payload MIRAS has alleviated payload weight and size engineering difficulties while also put forward calibration and validation problems to science community. Water management is a more and more important issue in the world taken into account global change background. It is particularly interesting to conduct calibration and validation activities in China considering its large area, various kinds of landscape and influence on global climate. For example, the Takelahmakan desert provide a good opportunity to check how the instrument is well operating and how accurate the model of science team has developed. Tibet plateau on the other side can give clues on freeze/thawing transition that SMOS can monitor. During the past 4 years when Dragon-2 programme is carried out, the project has done much to contribute both the European satellite and science users in China. The principle investigators and their team, prof. Yann Kerr and Dr. Zhang Weiguo, had visited each other for fruitful discussion and in-situ observing. Data analysis and science modeling show in-depth works can improve relative knowledges on L band radiometry and soil moisture monitoring. Two times of field experiments was conducted in 2010 and 2011 aiming at verify specification of newly built ground based L band radiometer-LETAK. These experiments had been designed to check the possibility on real works in the near future. Different kind of calibration methods have been tested for this all power radiometer as well as auxilliary data been collected for analysis. In the frameword of Dragon-2 programme, the team also contribute to coordinate SMOS radio frequency interference (RFI) issues in China. These actions has grasped eyes on radio spectrum regulation and gradually get feedback from view of SMOS data. According to radio frequency allocation, SMOS is using astronomy protected band, ie. 1400-1427MHz to sense earth emission which is the most sensitive band to soil moisture change and also sea surface salinity variation. Relative science research has been kept hot for nearly 30 years. But the first spaceborne L band radiometer, ie. SMOS has suffered from heavy RFI problems both over European and Asian continents. According to configuration on SMOS, the negative influence of the interferences will not be solved completely unless the hardware interference sources are switched off. Fortunately, the radiation environment is getting better and better since this issue was handed in. Looking forward to the near future, the team will continue to stick on calibraion and validation issues on SMOS which will pave the way to acquire accurate, coherent map of L band radiometry and global soil moisture field.

Dragon project id
18 SMOS CAL/VAL (ID. 5252)

SMOS卫星在中国区域的定标和真实性检验——龙计划二期总结

张卫国1 吴季1 刘和光1 刘浩1 李涤徽1 Yann Kerr2

1. 中国科学院国家空间科学中心(NSSC/CAS)
2. 法国航天局生物圈空间研究中心(CESBIO/CNES)

SMOS卫星是一颗地球探索类卫星，它采用了新技术(即二维干涉仪)以三天的重访时间来获取全球土壤湿度和海面盐度的信息。其单一载荷MIRAS从工程上减轻了仪器尺寸大而重的难题，但如何对它定标和真实性检验则是对科学界不小的挑战。从应用上说，在全球变化的背景下，水资源的管理越来越重要。从全球角度看，在中国进行SMOS卫星的定标与真实性检验具有特别的意义：首先中国地域广大，其次土地利用众多并对全球气候具有影响力。例如，塔克拉玛干沙漠的唯一性可用于检验星载仪器的运行状态和科学模型的准确性。青藏高原可用于显现SMOS类卫星对土地冻/融状态转换的监测能力。

在过去四年，龙计划二期项目的执行过程中，本项目致力于开展多方面的工作并为欧洲卫星和国内科学用户做出贡献。项目负责人Yann Kerr教授和张卫国博士及其团队对彼此进行了访问交流，对试验地进行了联合考察。数据分析和科学模型显示深入的工作能够提高L波段微波辐射和土壤湿度观测方面的知识。在2010和2011年利用L波段地基微波辐射计LETAK开展了两次地面试验。这些试验检验了在近期开展进一步工作的可能性。

在龙计划二期的框架内，本项目还在帮助SMOS卫星协调中国无线电干扰的解决方面开展了有益工作。根据无线电频率分配的规定，SMOS卫星是使用天文保护频段，即1400－1427MHz来观测从地球发射出来的此频段内的微波辐射。通过近30年的科学研究，认为这些微波辐射对于土壤湿度和海面盐度最敏感，相关研究在学术界是持续热点。但是第一颗此频段内的卫星即SMOS卫星上天后遭受了严重的无线电干扰(RFI)问题，在欧洲大陆和亚洲地区尤其严重。根据目前SMOS卫星的配置，这种干扰的负面影响只有将干扰源关掉才能彻底解决。好在自从这个问题被正式向中国无线电管理单位提出后，此频段内的电磁环境已经越来越好了。

展望近期工作，本项目将继续在SMOS的定标和真实性检验方面坚持工作，并为准确而有效地获取全球L波段微波辐射图和土壤湿度场铺平道路。

龙计划二期项目编号： SMOS CAL/VAL(ID. 5252)