

## InSAR Experiments for the analysis of ground changes within the ESA DRAGON V GREENISH initiative.

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人类活动和自然灾害加剧了沿海地区和特大城市的风险。气候变化导致的海平面上升（SLR）、相关的潮汐演变和当地陆地地下沉共同影响着沿海风险。此外，世界低洼沿海地区日益增长的城市化也引起了人们对相关沿海灾害（如建筑区的洪水）的日益关注。在此背景下，欧空局-DRAGON V GREENISH 项目 (<https://dragon5.esa.int/projects/>, [1])对欧洲和中国受气候变化诱发（如海平面上升、洪水和城市气候威胁）和人为灾害（如填海造地平台地面沉降）影响的地区进行了广泛的研究和开发分析，目的是增进知识和开发新的遥感方法。项目的主要目标是：i) 利用传统和新型干涉合成孔径雷达方法研究沿海/三角洲地区的地表变形；ii) 通过相干和非相干变化探测分析监测城市化地区的变化；iii) 利用高分辨率光学和合成孔径雷达卫星图像研究洋流与海岸之间的相互作用，如海岸侵蚀；iv) 评估城市沿海地区的可持续土地退化和干旱、潮汐演变和水文地质风险；最后 v) 培训青年科学家。一些计划开展的活动已经完成，一些与新的改进有关的进一步分析也已经完成。

具体而言，我们将介绍以下研究的主要相关成果：

### 1) 沿海地区长期地表形变与洪水风险分析：

在这项研究中，通过将 SBAS 技术应用于 X 波段 COSMO-SkyMed（下降轨道）和 C 波段欧洲哥白尼哨兵-1（上升轨道）传感器采集的两组独立合成孔径雷达图像，得出了上海及其沿海地区 2018 年至 2021 年的地面位移时间序列。利用最小加速度多轨合成孔径雷达方法，为两个合成孔径雷达数据集共同的每个相干点计算出了东西向和上下向的形变时间序列。为了研究选定区域的洪水风险，使用 LISFLOOD-FP 进行了多次模拟。此外，还利用 2007 年至 2020 年期间收集的 ALOS-1、RADARSAT-2 和 Sentinel-1 SAR 卫星数据集研究了崇明岛过去十年的长期地面变形情况。

### 2) 利用合成孔径雷达合成参数评估建筑物差异移动造成的风险：

在本研究案例中，我们初步处理了在上海地区收集的 Sentinel-1A SAR 数据档案，以检索单视尺度的地面变形时间序列[2], [3], [4]。然后，我们测试了一些基于 InSAR 的潜在风险条件描述符[5]的有效性，这些描述符主要与单个建筑物/基础设施的差异运动有关[6]、[7]。特别是

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