Quality of the ATOVS-derived precipitation amount over Poland during the flood event in September 2024

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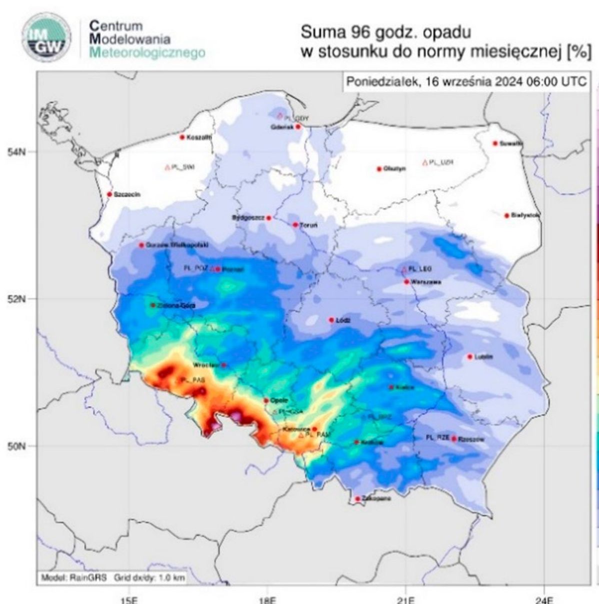
Introduction

Detecting and estimating rainfall amounts based on satellite data is a challenging task, especially when dealing with stratiform rainfall in moderate latitudes. At the same time, prolonged stratiform precipitation can cause flooding and waterlogging, as was particularly vividly demonstrated in September 2024 in southern Poland. This underscore the importance of accurate detection and monitoring of such events within meteorological and hydrological forecasting systems. The satellite derived precipitation estimates may serve as a complement to ground-based and radar precipitation data when its quality is known. In the poster we will show the results of an analysis aimed at evaluating the accuracy of precipitation products derived from ATOVS data using different methods during flood event in Poland in September 2024. The algorithms implemented in the frame of EUMETSAT Satellite Application Facility on Support to Operational Hydrology and Water Management (H SAF) and in the CSPP MIRS package were considered. For the comparison, the radar SRI data from Polish ground network were used as ground reference data.

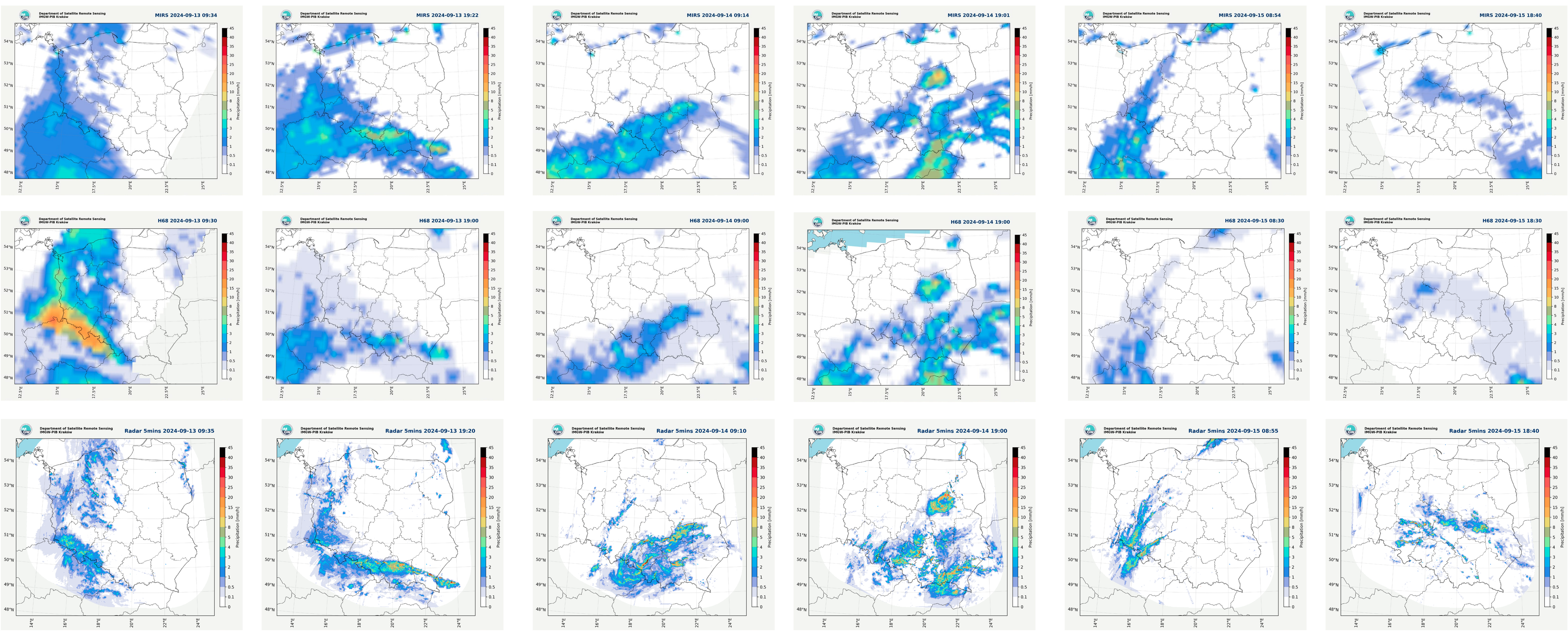


Rainfall totals from 12 September, 6 UTC to 16 September, 6 UTC from RainGRS data in relation to the monthly rainfall norm for September in %

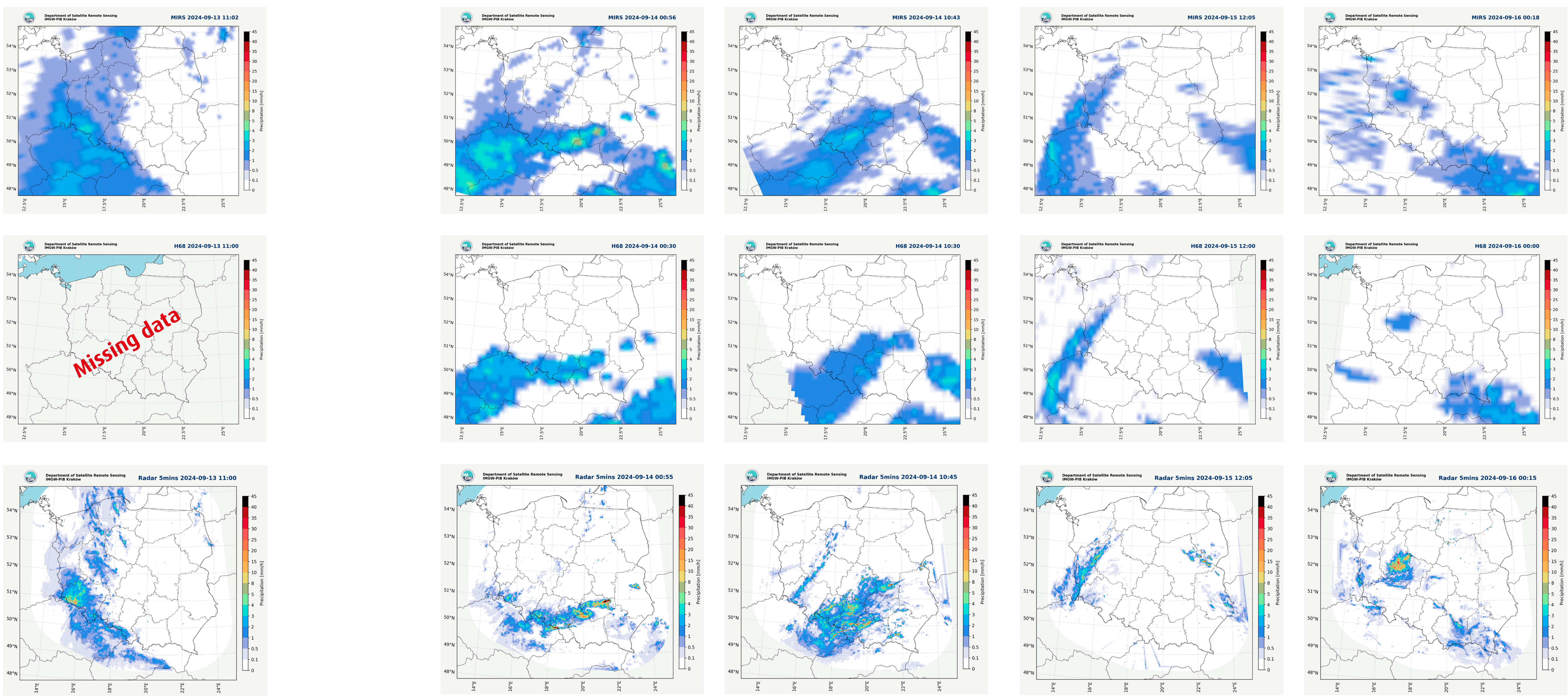
Summary

- Lasting for almost 3 days, the almost continuous rainfall over a large area provides a case for looking at the quality of rainfall products generated from microwave data from AMSU-A, MHS and ATMS sensors. A qualitative comparison with radar data was carried out for two algorithms (CSPP/MIRS and H-SAF/H-68), separately for the Metop (AMSU-A and MHS) and JPSS (ATMS) satellite set.
- For both sensor types, the precipitation determined with CSPP/MIRS is larger compared to that of H-SAF/H-68 in terms of both extent and intensity. This is particularly evident for the weak precipitation generated from AMSU-A/MHS data. In the cases of precipitation generated from ATMS data, these differences are smaller but still evident.
- Comparison with radar data shows that both algorithms rather overestimate the range of precipitation, but it should be borne in mind that part of the precipitation detected by satellites is outside the range of the Polish radar network.
- The CSPP/MIRS algorithm better estimates the maximum precipitation values than the H-SAF/H-68 algorithm in the analysed case. The differences in the distribution of maximum precipitation values are mainly due to differences in spatial resolution between microwave and radar data.
- The results presented here show that precipitation generated by the CSPP/MIIRS algorithm using data directly received from a satellite can complement ground-based information beyond the range of the radar network.

AMSU-A/MHS



ATMS



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