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Single-Receiver Ambiguity Resolution for Precise Orbit Determination of the Copernicus Sentinel Satellites at the Copernicus POD Service

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Single-receiver GPS ambiguity resolution methods are started to be deployed for precise orbit determination (POD) of the Copernicus Sentinel satellites. Previous analyses from other groups showed the improvement of the orbit results of Sentinel-3A when applying ambiguity-fixing. Prerequisite for these methods are dedicated information and products providing the necessary information to perform the single-receiver ambiguity resolution, e.g., the GPS wide-lane bias product together with the corresponding orbit and clock products. Currently, these necessary inputs are and will be made available from different analysis centres of the International GNSS Service.

The Copernicus Sentinel-1, -2, and -3 orbit products delivered from the Copernicus POD Service to the PDGSs (payload data ground segment) of the individual missions are not yet based on fixed carrier phase ambiguities. Effort is taken to develop and implement corresponding interfaces and ambiguity fixing strategies. Aim is to be able to deliver ambiguity-fixed Sentinel orbits in the operational environment of the Copernicus POD Service in future.

The impact of the ambiguity-fixed carrier phases on the resulting Copernicus Sentinel orbit products is analysed. Due to the different latencies of the orbital products it has to be carefully investigated for which product lines dedicated bias products are available in time. Backup procedures for the case that the necessary information is missing have to be developed as well. Additionally, Sentinel-1 and -2 do not provide observations at multiples of 10 seconds. This might complicate the applicability on those missions.

This study will give an overview of the work done at the Copernicus POD Service to follow up recent developments in the frame of single-receiver ambiguity resolution for POD of the Copernicus Sentinel satellites. It also includes the assessment of current and potential future sources of the clock and biases needed.