

Shadow Toolbox

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Shadow is a Matlab toolbox written to detect the GNSS satellite at shadow of the earth and remove them from the RINEX observation file.

The main toolbox performs the following tasks:

- 1- Reads Rinex observation file
- 2- Reads precise ephemeris file (SP3)
- 3- Detect the satellite at shadow of the Earth
- 4- Remove the observation of the satellite and create a refined Rinex

Release info:

NOTE: This part of toolbox which is now open source, determines the GNSS satellites at shadow of the Earth. The rest of toolbox will be released in the future.

For more information read the following paper:

- Allahverdi-Zadeh, A., Asgari, J. and Amiri-Simkooei, A.R., 2016. "Investigation of GPS draconitic year effect on GPS time series of eliminated eclipsing GPS satellite data". Journal of Geodetic Science, 6(1). <https://doi.org/10.1515/jogs-2016-0007>

The fundamentals of the shadow detection models provide in this toolbox are used in the following studies:

- Allahviridi-Zadeh, A., "Evaluation of the GPS Observable Effects Located in the Earth Shadow on Permanent Station Position Time Series", (2013), MSc thesis, Isfahan University, <https://doi.org/10.13140/RG.2.2.28151.32167>

- Wang, K., Allahviridi-Zadeh, A., El-Mowafy, A. and Gross, J.N., 2020. "A sensitivity study of POD using dual-frequency GPS for CubeSats data limitation and resources". Remote Sensing, 12(13), p.2107. <https://doi.org/10.3390/rs12132107>

- Allahviridi-Zadeh, A., Wang, K. and El-Mowafy, A., 2021. "POD of small LEO satellites based on precise real-time MADOCA and SBAS-aided PPP corrections". GPS Solutions, 25(2), pp.1-14. <https://doi.org/10.1007/s10291-020-01078-8>

- Allahviridizadeh, A. and El-Mowafy, A., 2021. "Precise Orbit Determination of CubeSats Using a Proposed Observations Weighting Model". In Scientific Assembly of the International Association of Geodesy (pp. 1-3). <https://doi.org/10.13140/RG.2.2.20619.62244/1>

- Allahviridi-Zadeh, A., Wang, K. and El-Mowafy, A., 2022. "Precise Orbit Determination of LEO Satellites Based on Undifferenced GNSS Observations". Journal of surveying engineering, 148(1). [https://doi.org/10.1061/\(ASCE\)SU.1943-5428.0000382](https://doi.org/10.1061/(ASCE)SU.1943-5428.0000382)

- Allahviridizadeh, A., 2021. "Phase centre variation of the GNSS antenna onboard the CubeSats and its impact on precise orbit determination". In GSA Earth Sciences Students Symposium-WA (GESSS-WA). <http://dx.doi.org/10.13140/RG.2.2.10355.45607/1>

- Allahviridi-Zadeh, A., Awange, J., El-Mowafy, A., Ding, T. and Wang, K., 2022. "Stability of CubeSat Clocks and Their Impacts on GNSS Radio Occultation." Remote Sensing, 14(2), p.362.
<https://doi.org/10.3390/rs14020362>

How to cite this toolbox?

- Allahviridi-Zadeh, "Shadow Toolbox": Detecting GNSS satellites in the shadow of the Earth and removing from their observations from the RINEX file, <https://doi.org/10.13140/RG.2.2.15323.08482>

- Allahviridi-Zadeh, Amir (2022): Shadow toolbox. figshare. Software.
<https://doi.org/10.6084/m9.figshare.19085546.v1>

How to use?

Run main.m and select the your sp3 file (a sample of sp3 file is provided: igs21385.sp3).