**RAPID NRT flood maps**

**Product Info, Background, and Data Structure**

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**Outline**

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**Product Info**

RAPID NRT flood maps is an inundation dataset, delineated based on the Synthetic Aperture Radar (SAR) imagery from Sentinel-1 and multiple ancillary data, including high-resolution topography, high-resolution water occurrence, land cover classification (LCC), and river width, hydrography, and water type databases. It labeled inundated and dry areas in each binary flood maps, no further process is required before using the data.

**Backgroud**

High-resolution water mask of flooding is a fundamental data source for hazard assessment and relief organization. Here we introduce RAPID NRT flood maps, an unprecedented high-resolution (10 m) flood inundation dataset over the Contiguous United States (CONUS), derived from the Sentinel-1 SAR imagery using an automated Radar Produced Inundation Diary (RAPID) system. We developed a triggering mechanism to separate images with flooding from the entire Sentinel-1 record based on the U.S. Geological Survey (USGS) flood gauge measurements and accumulated precipitation from the Integrated Multi-satellitE Retrievals for GPM (IMERG). Take the advantage of the acquisition intervals of Sentinel-1 (3 days average), RAPID NRT flood maps have the capacity to capture middle to large inundation events lasting from several days to months. See Shen et al. (2019a) for more information about the detail algorithm used to generate these data.

**Data Types and Structure**

**Data Types**

The data product is raster data containing open water mask delineated from flood and non-flood SAR images (Shen et al, 2019a) at a 10m resolution across the CONUS.

**Data Structure**

Data are group by flood and non-flood water masks, located in a unique run path. The structure of the run path is: date/flooding\_<SAR\_image\_name>. The format of the date is YYYYMMDD representing the date of flood occurrence. The structure of the SAR\_image\_name is: MMM\_BB\_TTTR\_LFPP\_YYYYMMDDTHHMMSS\_YYYYMMDDTHHMMSS\_OOOOOO\_DDDDDD\_CCCC. A full explanation of the SAR image convention can be found in the Sentinel program at this url: <https://sentinel.esa.int/web/sentinel/user-guides/sentinel-1-sar/naming-conventions>. Note that there could be multiple flood SAR images in the same date.

For each individual water mask, the data are structured in the following way:

/<run\_path>/flood\_WM\_<SAR\_image\_name>.tif

/<run\_path>/non\_flood\_WM1\_<SAR\_image\_name>.tif

…

/<run\_path>/non\_flood\_WMn\_<SAR\_image\_name>.tif

**Projection**

The GeoTIFFs use the WGS 1984 projection, is ideal for both analysis and mapping.

**Raster Layer Descriptions**

|  |  |
| --- | --- |
| **Type** | **File Name** |
| Flood Water Mask | flood\_WM\_<SAR\_image\_name>.tif |
| Non-flood Water Mask | non\_flood\_WMn\_<SAR\_image\_name>.tif |

Flood Water Mask

This layer represents the binary inundation water mask delineated from flood SAR image.

Non-flood Water Mask

This layer represents the binary water mask delineated from non-flood SAR image. Non-flood water mask here act as the dry time reference to the flood water mask for the purpose of change detection (Shen et al, 2019a & 2019b). One non-flood water mask is the minimum require, 3 to 5 are expected in most of the case.

**References**

[1] Shen, X., Anagnostou, E. N., Allen, G. H., Brakenridge, G. R. & Kettner, A. J. Near Real-Time Nonobstructed Flood Inundation Mapping by Synthetic Aperture Radar. Remote Sensing of Environment 221, 302-335, doi:10.1016/j.rse.2018.11.008 (2019a).

[2] Shen, X., Dacheng W., Kebiao M., Anagnostou, E.N. and Hong Y.: Inundation Extent Mapping by Synthetic Aperture Radar: A Review, Remote Sensing, 11, 879, (2019b).