poster presentation

7th Sentinel-3 Validation Team Meeting 2022

18-20 October 2022 | ESA-ESRIN | Frascati (Rm), Italy

Evaluation of Sentinel 3 fire radiative power (FRP) for monitoring of gas flaring at natural gas liquefaction (LNG) plants
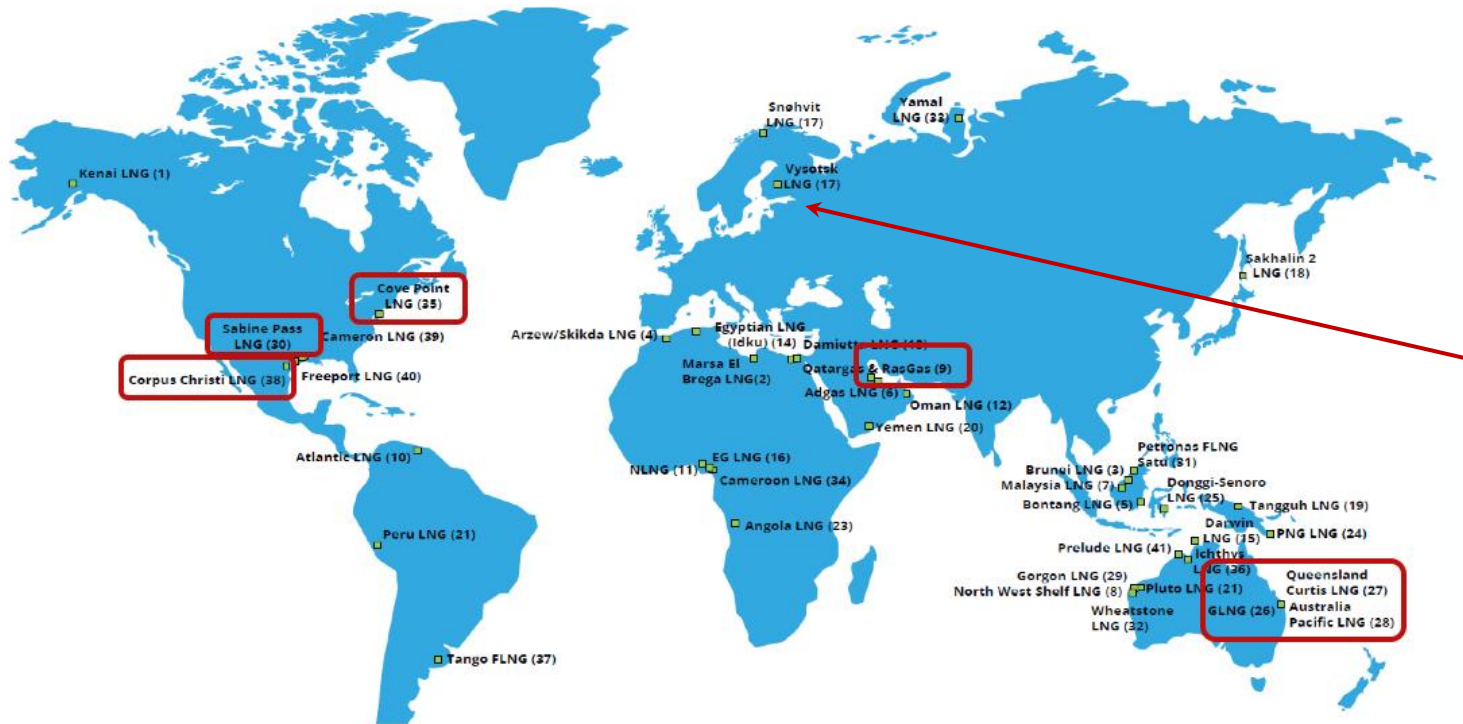
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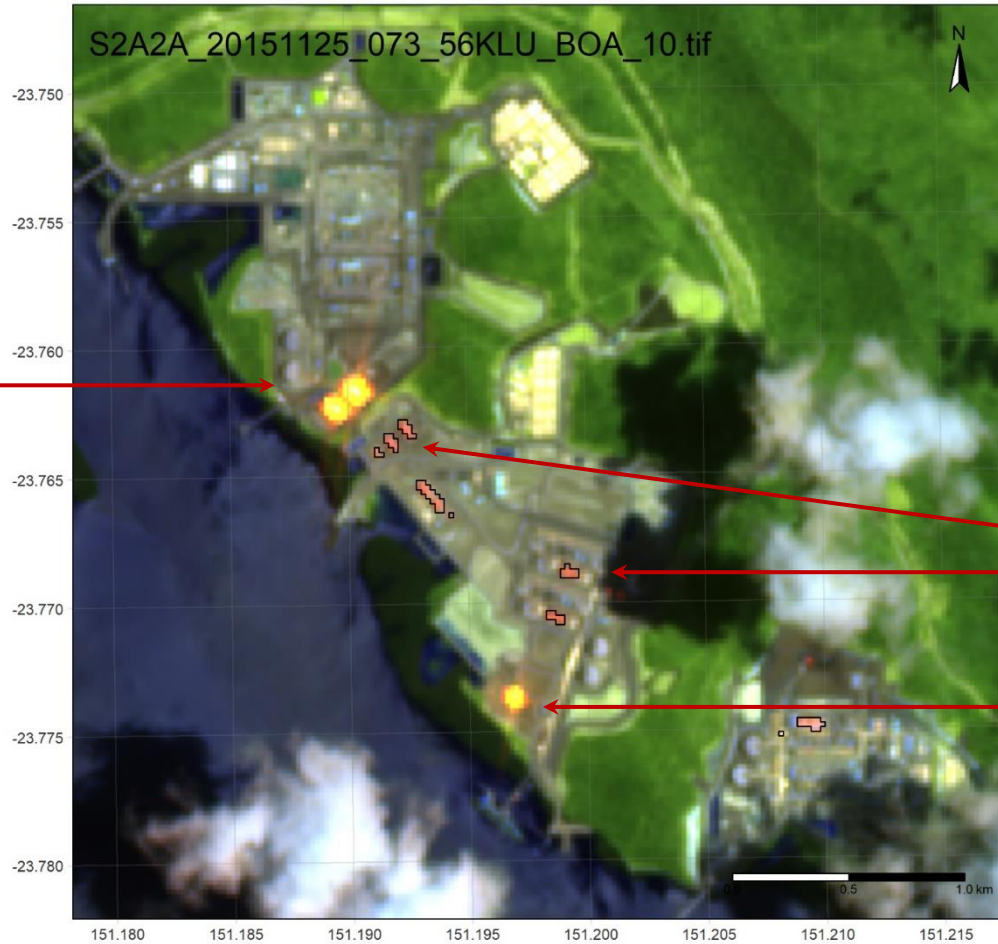
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Background

Overview of worldwide LNG plants with our study sites highlighted with red rectangles. Underlying map from IGU World LNG report 2020 edition.

Photo by Finnish citizen Ari Laine on 24 July at a distance of around 38 km from the Portovaya facility
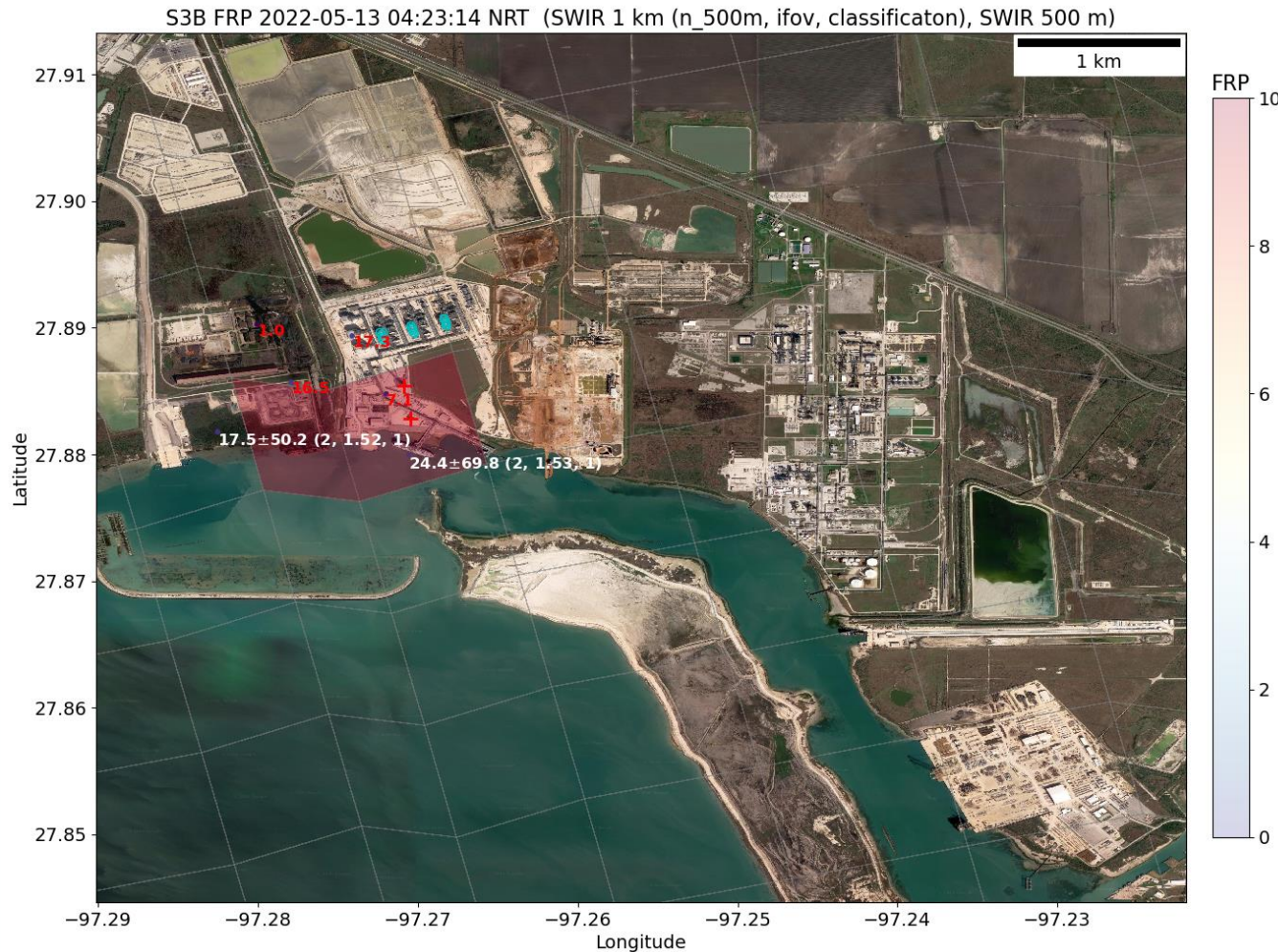
Background

Sentinel 2 RBG (B12,B11,B4) Queensland LNGs

Sentinel 3 NRT SWIR at Corpus Christi LNG

S3B FRP 2022-05-13 04:23:14 NRT (SWIR 1 km (n_500m, ifov, classificaton), SWIR 500 m)

First impressions:

- Hotspot location frequently matches the flares

- Apparently, the **500 m FRP (red numbers)** better coincides with the flare locations compared to the 1 km FRP (**white numbers**).

- FRP uncertainties (only for 1 km FRP) seem unreasonable large

- Frequently the classification is «1» (vegetation fires), at Ras Laffan LNG, the classification is more frequent «2» (on shore-flare)

- Pixel geometry information desirable

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Sentinel 3 NTC SWIR at Corpus Christi LNG

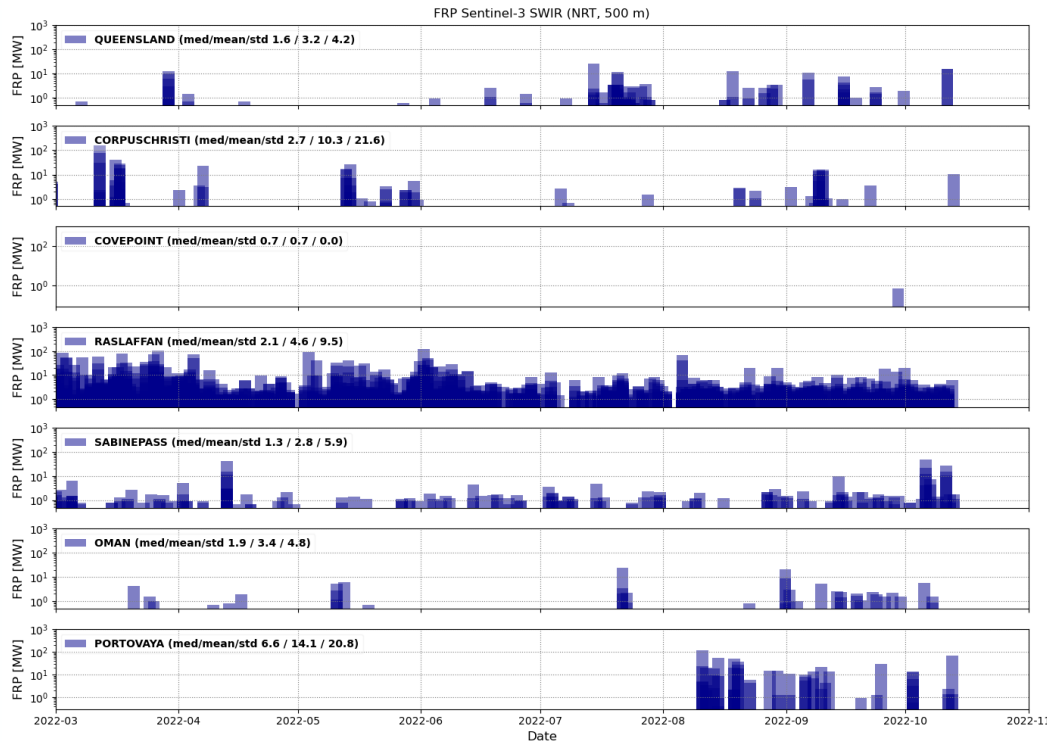S3B FRP 2022-05-13 04:23:24 NTC (SWIR (ifov, classificaton))
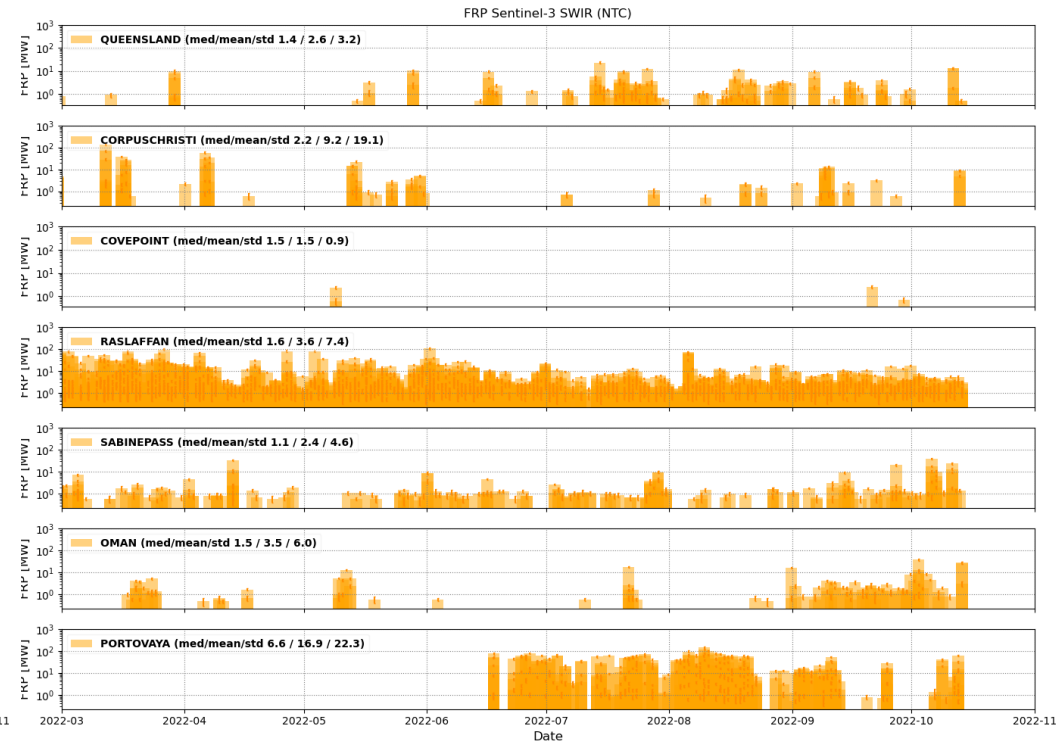
First impressions:

- SWIR data only from 28 February onward

- SWIR FRP data only FRP_AN (not _BN)

- Hotspot location frequently matches the flares

- FRP uncertainties 10 - 40%

- Classification «1» (vegetation fires) «4» (off-shore gas flares), at Ras Laffan LNG, the classification is frequent «2» (on shore-flare)

- Pixel geometry information desirable

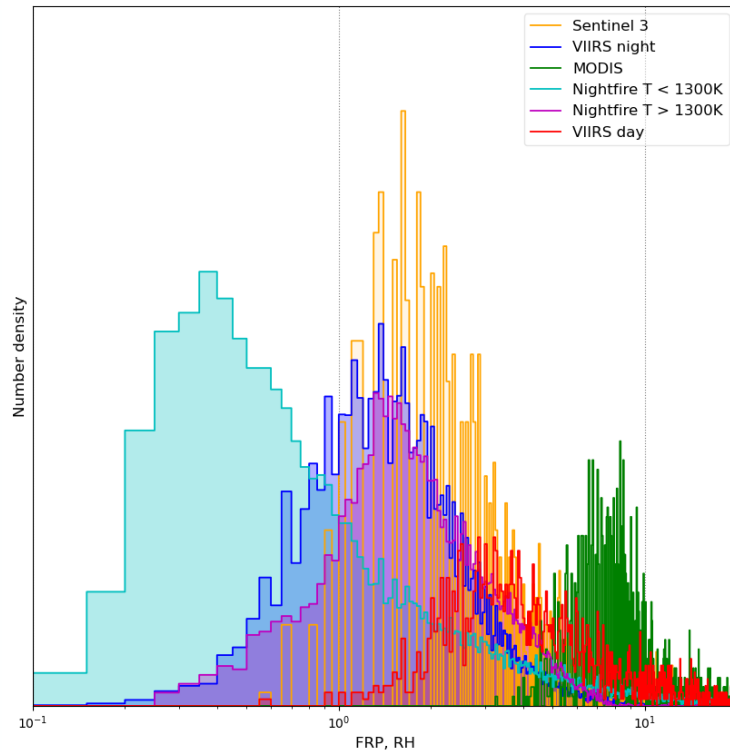## Time series NRT FRP 500 m   NTC FRP (SWIR)

First impression:

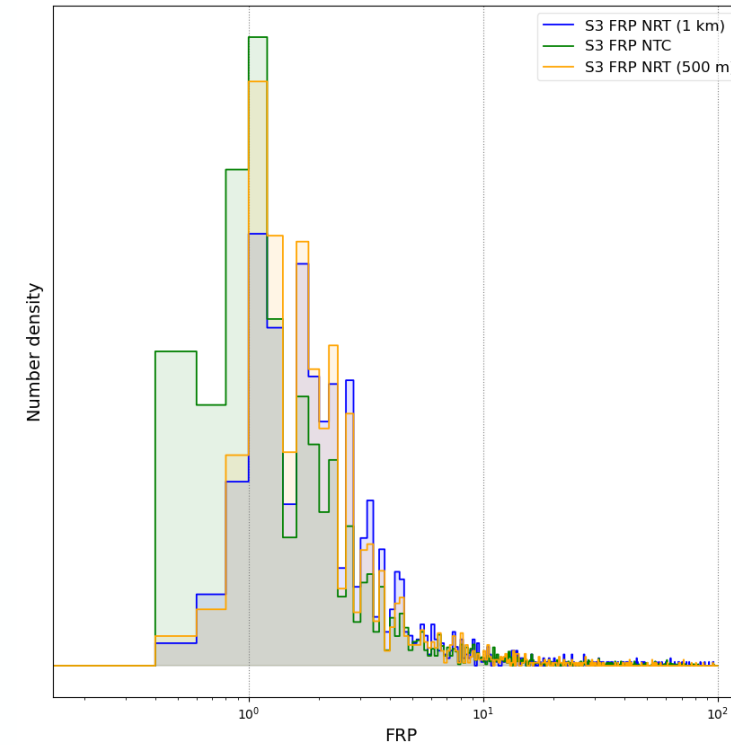- General agreement, but apparently more and smaller values in the NTC data

Histogram distribution
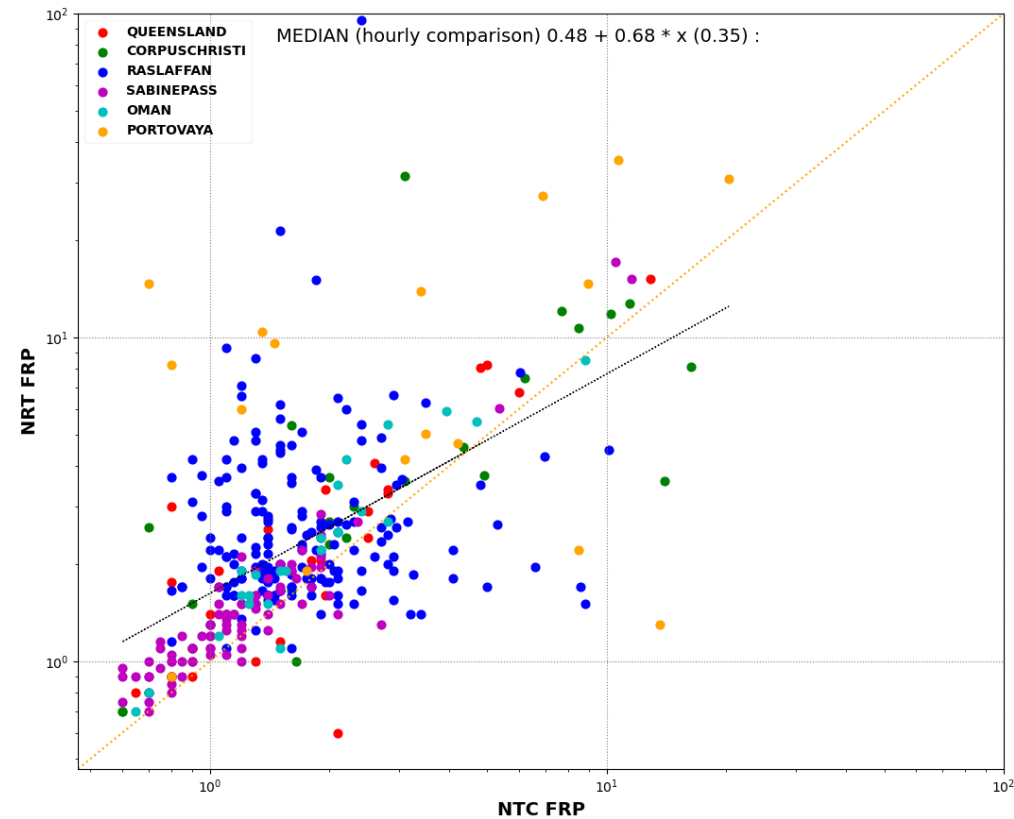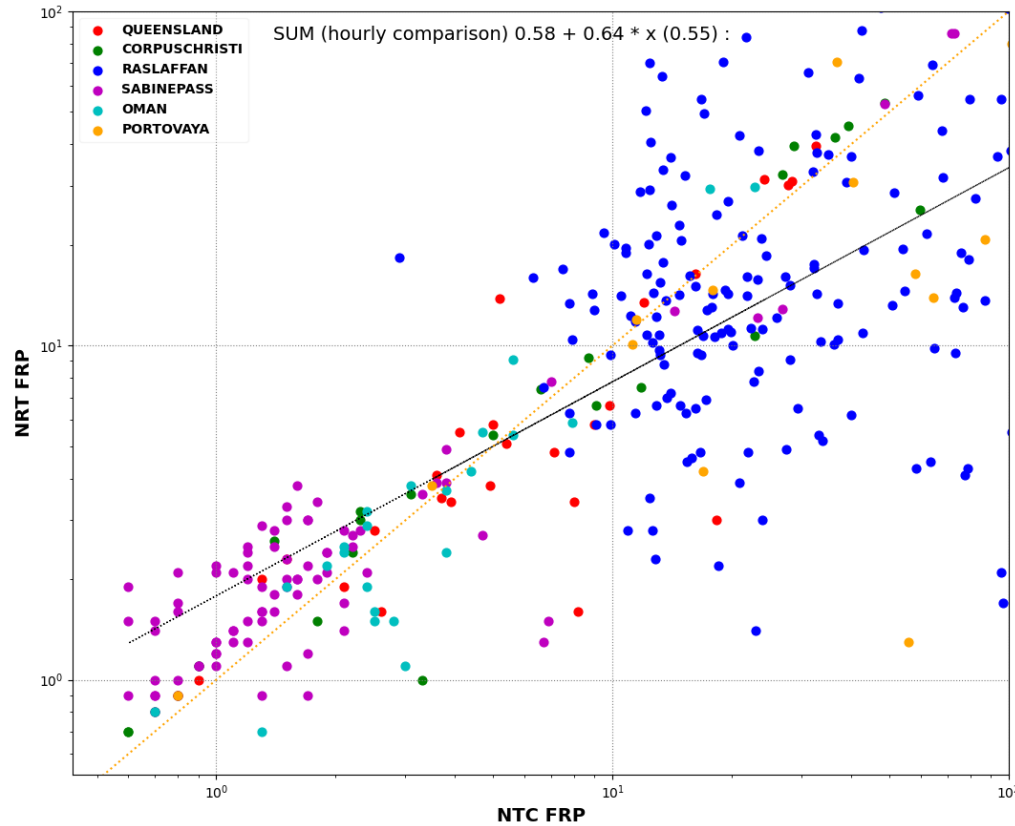## FRP NRT 1 km vs FRP from other instruments

Histogram distribution
FRP NRT 500 m, NRT 1 km and NTC FRP

First impression:
- Expected sensitivity (related to pixel size), and more small values in the NTC data set

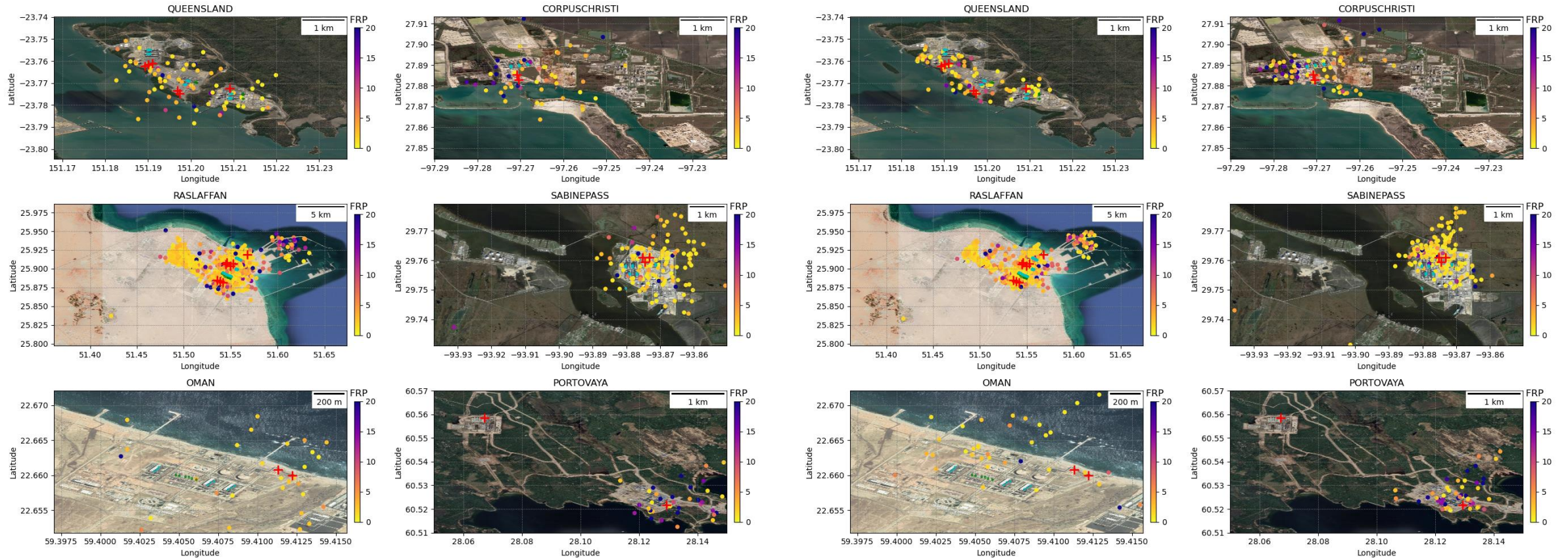# Correlation between Sentinel 3 NRT FRP 500m and NTC FRP

First impression:
- Comparably large scatter between NRT and NTC FRP values – NRT with generally larger FRP

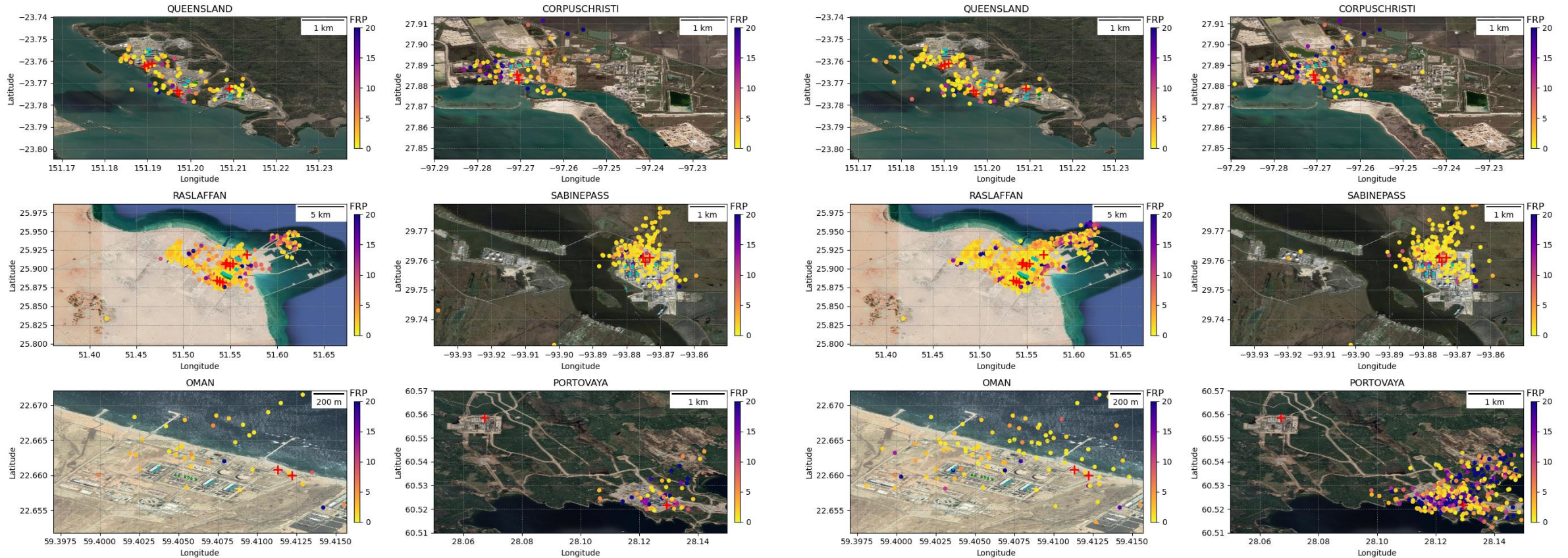## Sentinel 3 NRT FRP 1 km   FRP 500 m

First impression:

- Flare detected, NRT FRP 500 values closer to flare location compared with the 1 km FRP

Sentinel 3 NRT FRP 500 m   NTC FRP (incl. all categories)

First impression:

- NRT and NTC detect flares, NTC has some more detections, and potential some commissioning errors

Summary

- Initial evaluation of the NTC and NRT FRP for flares at LNG sites
- LNG flares are detected by both data products
- FRP values from NTC apparently lower than FRP from NRT; more NTC than NRT hotspots; FRP 500 m geo-location better than FRP 1 km geo-location; some commissioning errors can be seen; categories are not always correct

Wish list

Science:
- Reprocessed time-series with consistent retrieval (including past datasets)
- Information on uncertainties for all products
- Information on pixel geometry for all products (for comparison of various satellite instruments, we need to access cloud-cover information)

Application:
- Simple CSV files with time, latitude, longitude, FRP, flag