



HR Level-2 Hydrology Products: Lakes

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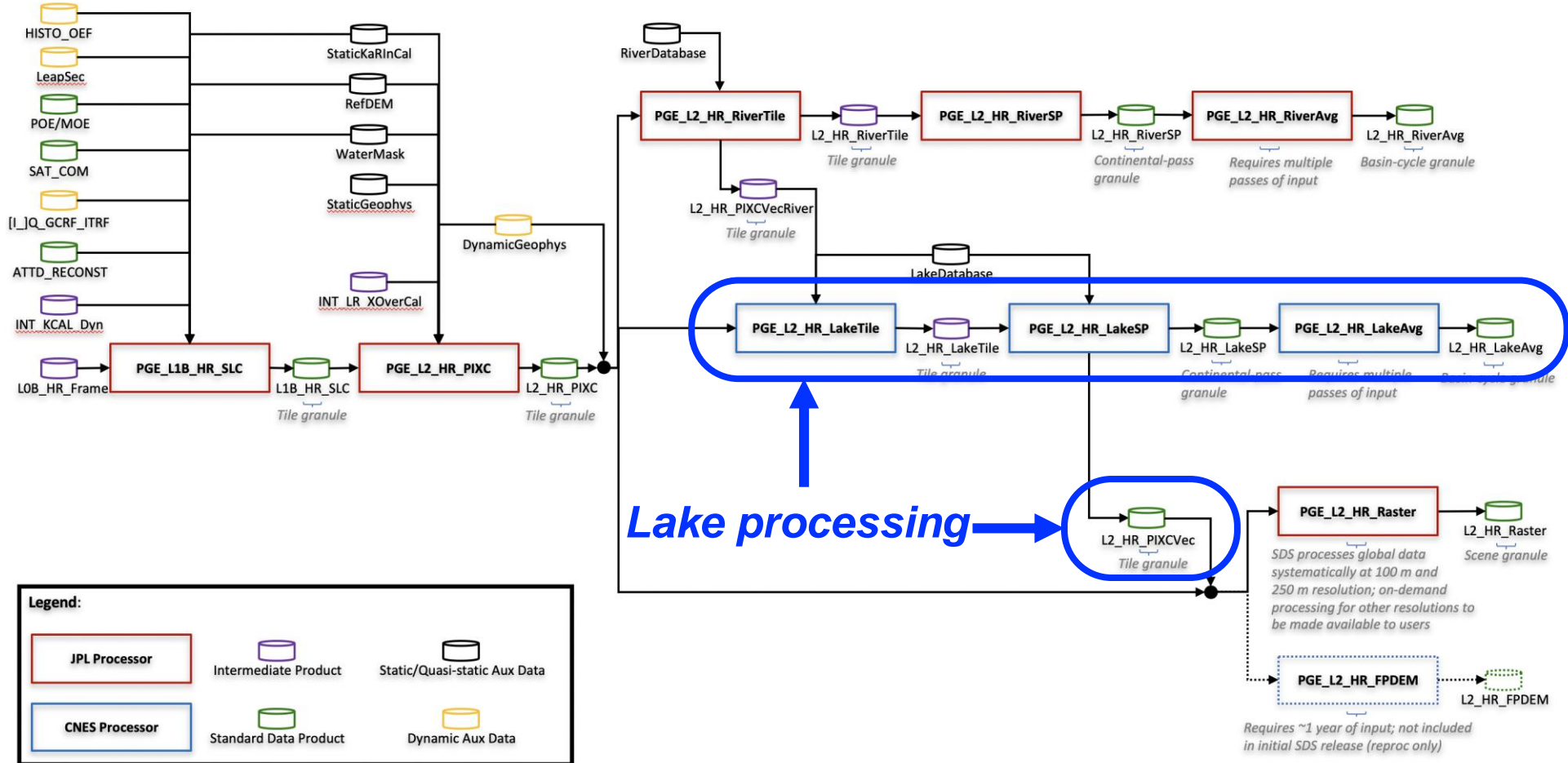
JPL
Jet Propulsion Laboratory
California Institute of Technology



SWOT Science Team meeting
June 19, 2019



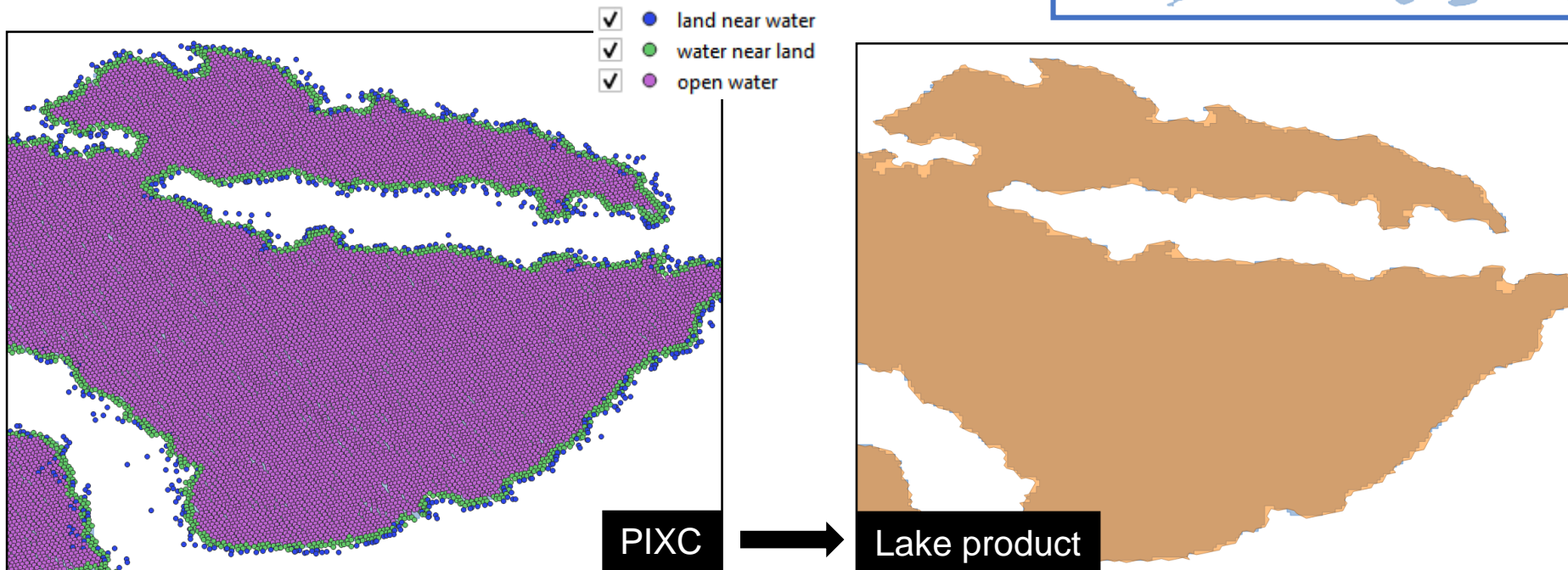
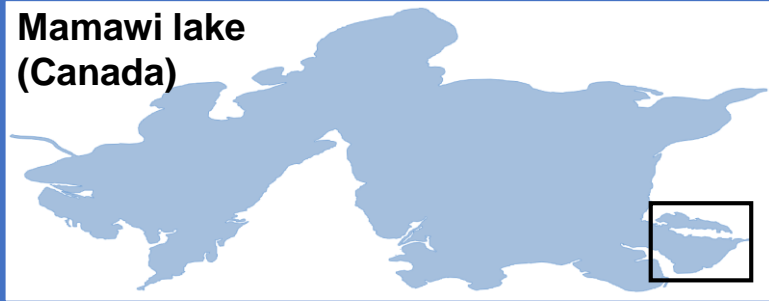
KaRIn HR Processing Flow



From PIXC to Lake Vector Products

The role of the lake vector tile and single pass (SP) processors is to aggregate the PIXC medium pixels at the lake scale, into continent-pass granules

Mamawi lake
(Canada)



(Credits: University of Sherbrooke)

Lake Vector Products

Output format: Esri shapefiles

- ❖ Object = Detected water body not attributed to rivers, i.e. lake/reservoir in prior database (possibly observed only partially), and unknown water bodies
- ❖ Shape = Polygon delineating lake boundary and inner island boundaries
- ❖ Difference from river product: link to Prior Lake Database is not systematic

Temporal representation:

- ❖ Single Pass (**LakeSP**): Lakes observed on either side of the swath for a single pass. Distributed as one shapefile per continent pass.
- ❖ Cycle average (**LakeAVG**): median state over one cycle of all lakes listed in the Prior Database, distributed as one shapefile per basin
 - Basins are based on HydroBASINS
 - Basins do not cross continent boundaries
 - Basin definitions are shared between river and lake products

Lake Vector Products

Lake Product attributes are divided into 9 categories, in a way similar to River Product:

- ❖ Identifiers (observation + from Prior Lake Database)
- ❖ Time
- ❖ Measured Hydrology Parameters (and Uncertainties)
 - water surface elevation, area
- ❖ Storage change
- ❖ Quality Indicators
- ❖ Geophysical References
- ❖ Geophysical Range Corrections
- ❖ Instrument Corrections
- ❖ Copy of various Prior Lake Database attributes

Prior Lake Database (see Monday presentation for more details)

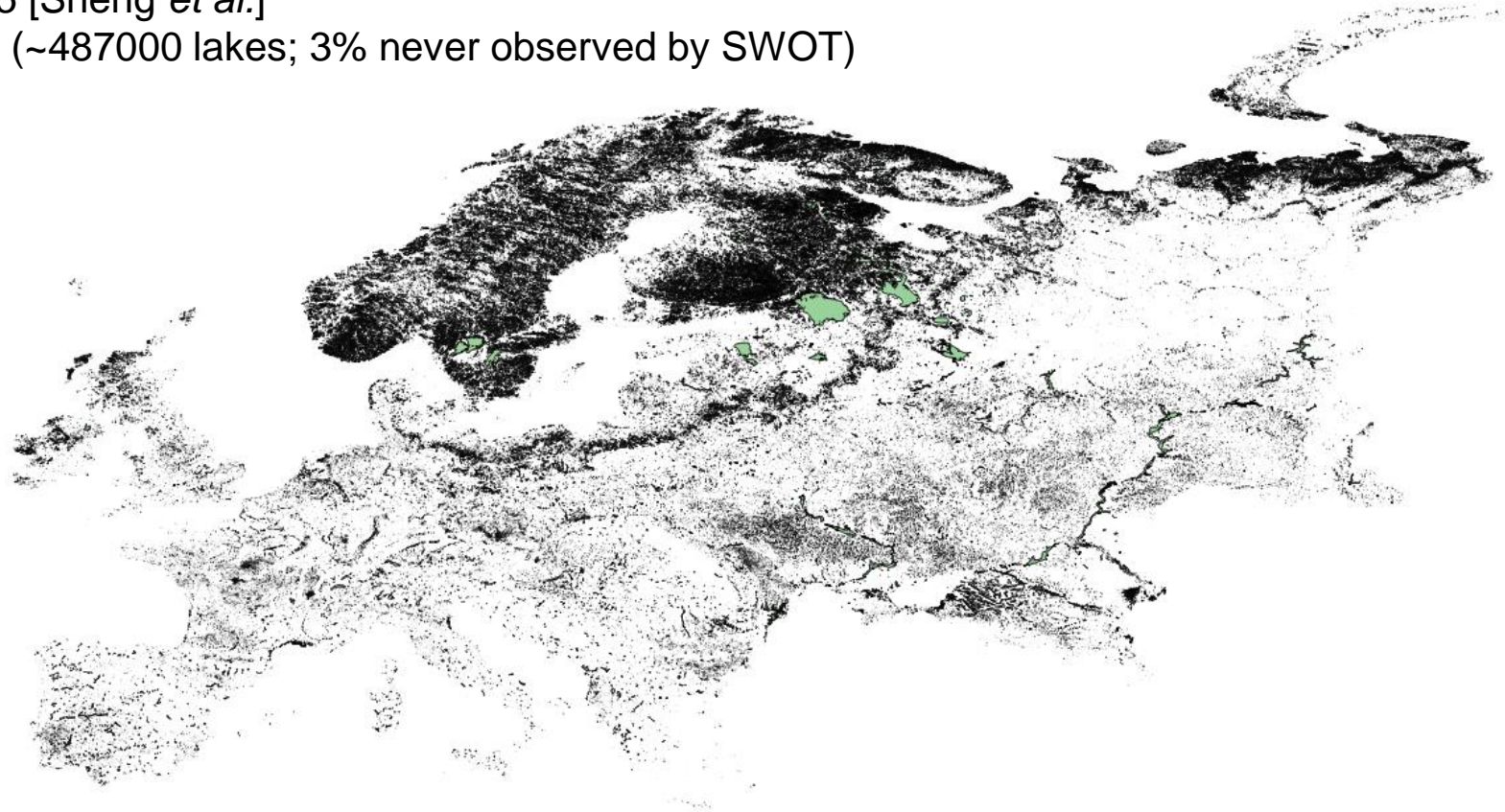
Spatialite format (<https://www.gaia-gis.it/fossil/libspatialite/index>)

Polygons from CIRCA-2015 [Sheng *et al.*]

Currently only over Europe (~487000 lakes; 3% never observed by SWOT)

Tables:

- Lake names, GRanD ID, ref height/area, hypsometric curve, influence area
- Basin regions from HydroBASINS
- Link to Prior River Database (over reservoirs)



Status

- ❖ LakeSP PDD written and under review at JPL and CNES; expected to be released for SME review by July 2019
- ❖ Pixel Consideration
 - Kept: all pixels not processed by the River Processor + those associated to reservoirs/lakes over a river
 - Connectedness in radar geometry
- ❖ Initial ice flag will be climatology-based
 - Subsequent reprocessing will implement a second, dynamical ice flag
- ❖ Current lake prior river database: based on CIRCA-2015 [Sheng *et al.*]
- ❖ Storage change will not be distributed during the first year of SWOT data

- ❖ LOCNES available in the SWOT Hydrology Toolbox:
 - <https://github.com/CNES/swot-hydrology-toolbox>

Near-Term Plans

- ❖ Release LakeSP PDD along with sample dataset
- ❖ Prepare ATBD
- ❖ Further improvement of pixel attribution for lake processing
- ❖ Integrate random uncertainties attached to hydrological attributes and systematic uncertainty components
- ❖ Prior Lake Database: integrate other continents of CIRCA-2015 when available
- ❖ Storage change: integrate complex cases
- ❖ Set up a complete validation plan with large scale simulations and finer simulations using JPL SLC simulator