High-Rate land mask

Summary of the work done by the SDT working group (2013-2015)

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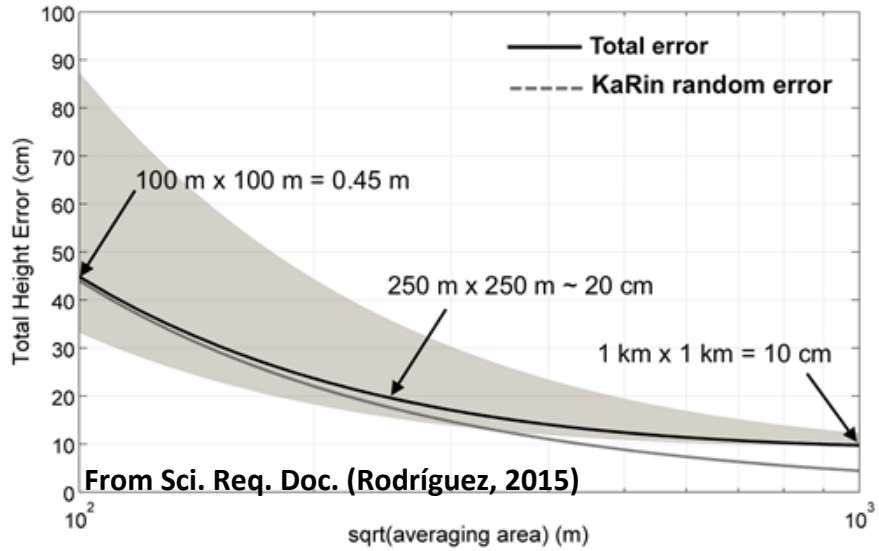
ST meeting, 13 June 2016

Context

- High Rate (HR) mode = 10m-60m (range) x 5m (azimuth) spatial resolution -> presuming of 2.1 on-board
- HR mode needed for hydrology (SAR Interferogram computed on the ground because of land topography issue)
- Low Rate (LR) mode = $(1km)^2/(500m)^2/(250m)^2$ spatial resolution computed on-board
- LR mode downloaded everywhere (oceans+lands)

Context

- HR mode height and geolocation errors can be very important (improved after averaging)



- After averaging **HR mode** data to LR mode spatial resolution, **vertical accuracy** will be **degraded by 40% compared to LR mode accuracy** (because presuming=low pass filtering azimuth spectrum and then down-sampling it)

Context

- With the current HR and LR modes resolutions, on-board processing for these 2 modes, on-board storage capacity, downlink capabilities and orbit ground tracks, **all continental surfaces cannot be sampled in HR mode**
- Working group created in March 2013 to define a HR mask compliant with current constraints

Working group roles

- Serve as the interface between the JPL/CNES mission systems and SDT/community
- Facilitate discussions and refinement of the HR mask
- Provide science rationales for the selected HR mask
- Develop hydro/oceano communities consensus on the HR mask
- Provide HR mask to JPL/CNES mission systems (who will be owners of the HR mask under configuration management)

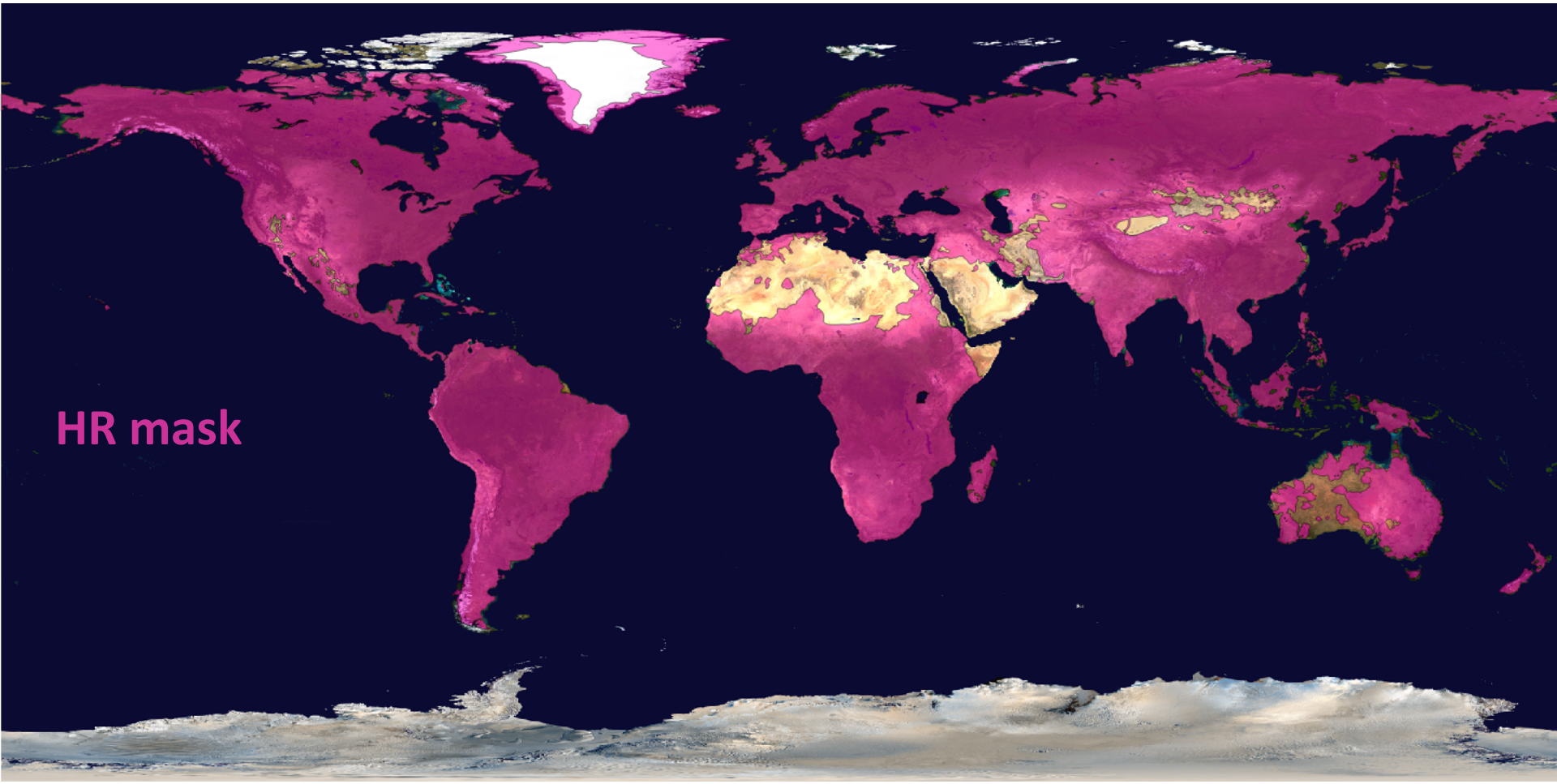
HR mask creation (1/2)

- All river basins from “GRDC Major Basins drainage boundaries” have been included
- Lake/reservoir watersheds: Hydro1k basins containing a lake from the “Global Lakes and Wetlands Database” (GLWD, area>0.1km^2)
- Wetlands not considered (but most, if not all of them already included in main river basins).
- For Australia and Gobi desert regions, Hydrosheds basins are used. Hawaii and Corsica added, other “small” islands removed
- Greenland mask, from coastline to ablation zone (provided by L. Smith)

HR mask creation (2/2)

- Small islands and some Canadian/Siberian regions above 74°N have been removed.
- Big lakes (Great lakes, lake Victoria…) have been removed
- Taklamakan desert, North of Lake Chad basin, few coastal zones South West of South America
- Manually added: river estuaries, eastern end Papua New Guinea, all equatorial sub-basins, Small basins with water bodies on Google earth, Tensift watershed…
- 3km buffer from coastline (for coastal ocean)

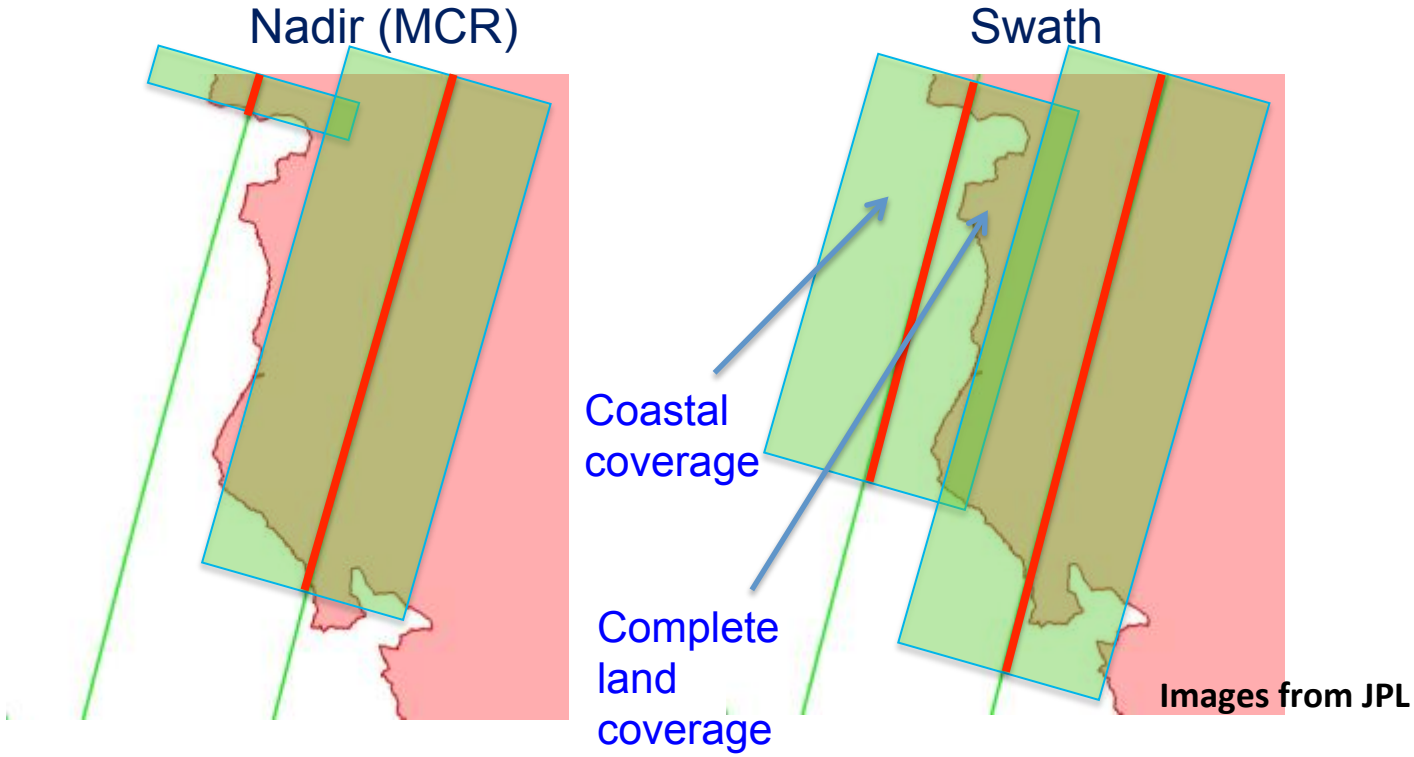
Current HR mask (March 2014 version)



Explore it at: http://west.rssoffice.com/SWOT/hrmask.jsp

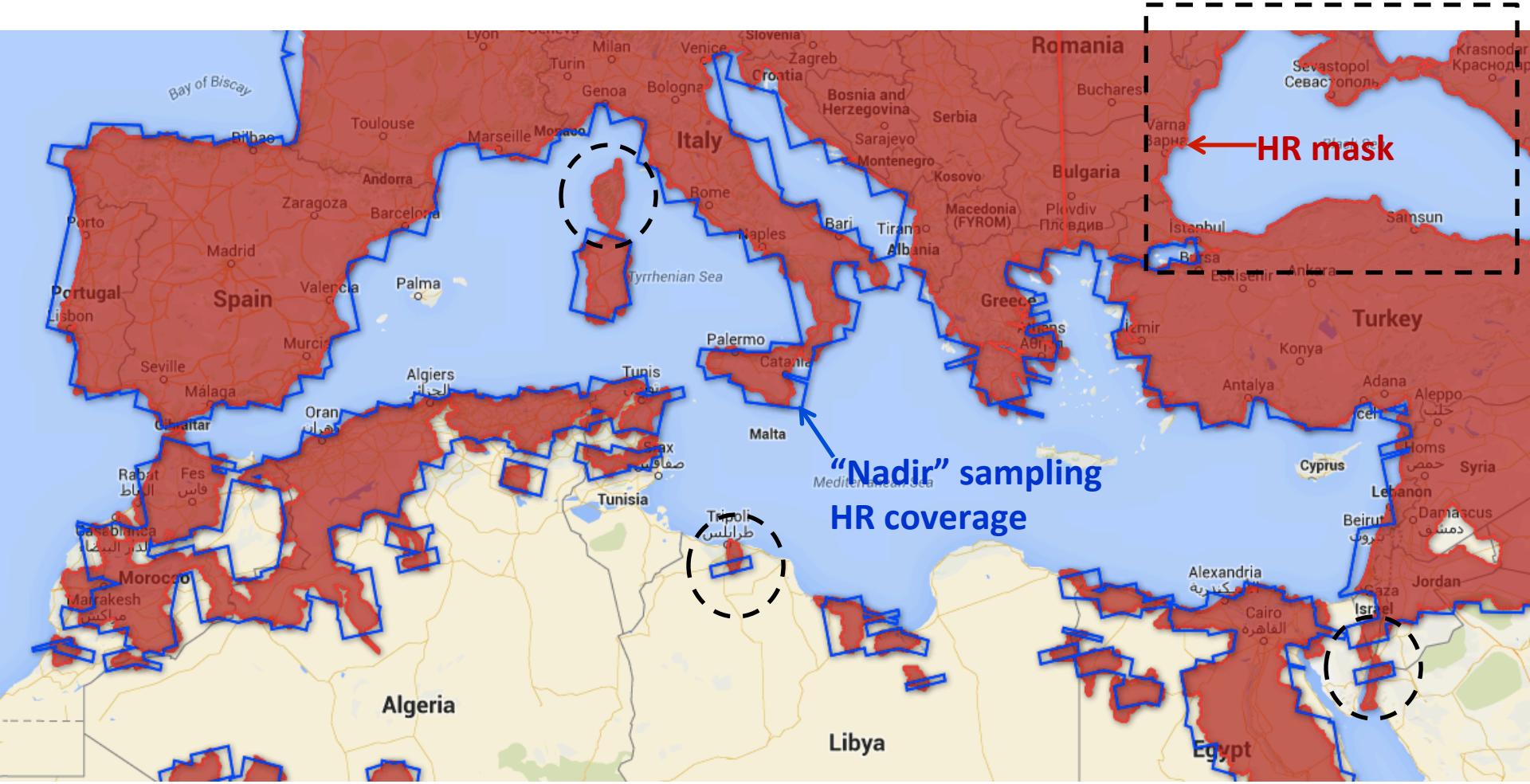
HR mask and SWOT

- 2 ways to activate HR mode: “Nadir” vs “Swath edges” (no partial coverage of the swath in HR mode)



- **“nadir” selected as baseline** during June 2013 SDT meeting

Impact of “Nadir” mode



Explore it at: http://west.rssoffice.com/SWOT/hrmask.jsp

Statistics on current HR mask

- **HR mask covers 86% of continental surfaces** between 78°S and 78°N Antarctica excluded (87% if Greenland is excluded)
- **HR mask + SWOT coverage holes** (from nadir gap and orbit intertrack distance) = **83%** (84% without Greenland)
- The impact of turning the HR mask on when the nadir touches the HR mask has NOT been considered

Interaction with NASA/CNES project teams

- **Current HR mask is compliant** with the ground capacity and the on-board storage given the baseline products
- **No more than 4 (ocean) patches** (120kmx120km to increase margin by 1%) can be added to the current HR mask
- But adding regions to HR mask must require removing others -> no other locations can be removed on continents…
- HR mask can be changed seasonally (4 times/year).
- A winter season mask needed (to do):
  - Include Great Lakes during winter (to catch the freezing period)
  - Remove (few) region(s) covered by snow in Canada to compensate inclusion of Great Lakes
- July 2015 SDT meeting: **HR mask for 1-day fast sampling phase** is the **responsibility of the Cal/Val group** not the HR mask group

The end…