

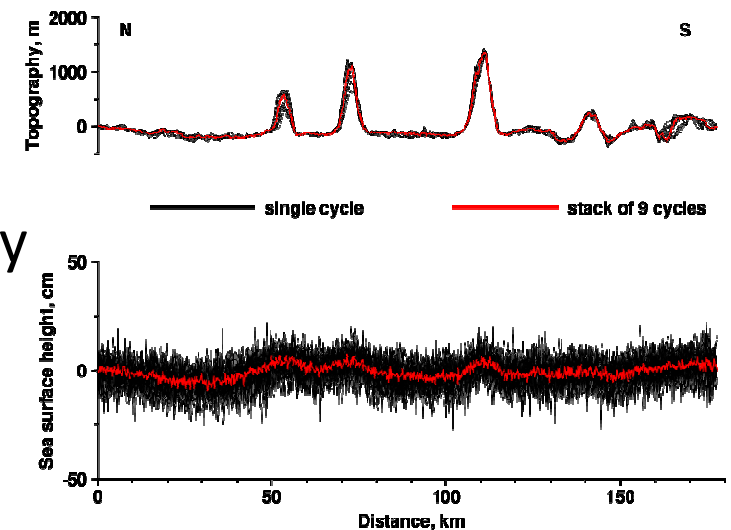
Answers to posed questions, 1

- The IP Measurement/Retracking splinter takes no position on the Geodetic Mission EoL for Jason-2 or SARAL, or the COP21 statement.
- We do note that Geodetic Mission EoL data are needed to improve the marine geoid at sub-mesoscale (30 – 150 km) and shorter scales. At these scales, LRM retracking issues are important.



Answers to posed questions, 2

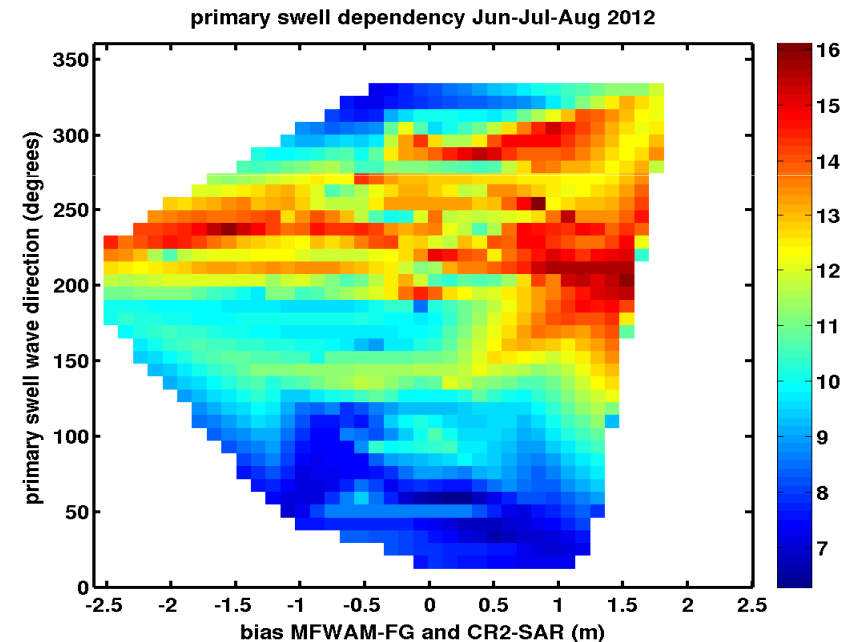
- Sub-mesoscale (30 to 150 km) SSH is measured. Retracking can introduce correlated errors (LRM; “spectral bump”) or remove them (specialized retracking and editing; SAR processing).
- Geoid in this band is correlated with bathymetry, and improving geoid:bathymetry coherence provides a quasi-validation.
- Improving the geoid at these scales requires new Geodetic Mission altimeter data.



Sea State Bias and Long Swell

- CryoSat SAR mode has not sampled all the oceans. We look forward to complete coverage from Sentinel-3.
- Studies of SAR-mode SWH resolution and Sea State Bias are ongoing and will benefit from S-3.

Global wave model forecast skill improves when assimilating Cryosat data, except where very long-wavelength swell propagates along-track. (L. Aouf, Meteo France)



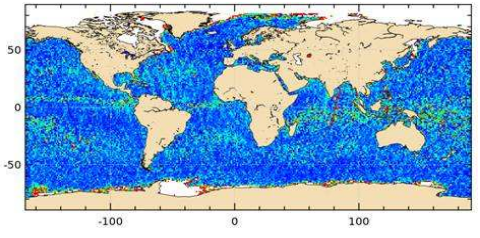
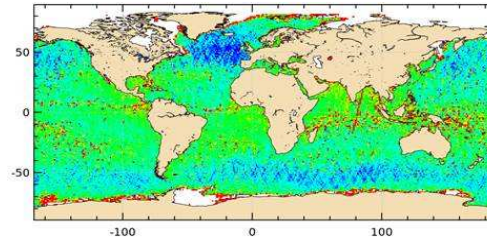
Retracking

- Improved retracking, particularly over coastal regions, is an area of active research effort.
- TOPEX RGDR (retracked GDR) product has been upgraded again in 2015. Some issues will continue to be worked between JPL and CNES.
- Global, full-mission, within 50 km of coast, coastal retracker product (“ALES”) is available from PO-DAAC for Jason-2. [J-1 & Env to come.]



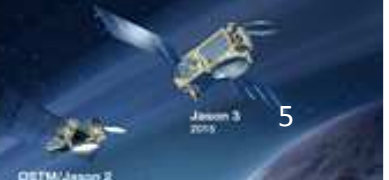
LRM processing continues to improve

- Antenna pattern corrections are particularly important for Ka band. (AltiKa is beam limited as well as pulse limited)
- Numerical retracking
- Fast convolution retracking



Simple retracking(MLE-like) intrinsically introduces correlation in errors in geophysical retrievals. Simple averaging to 1 Hz has side lobes that leak errors.

The goal is that the retracker should not produce errors that must then be compensated in the SSB correction. The SSB should become more physical, less retracker-dependent.



New ways of processing SAR data

- Modifying the stack (reduced stack, antenna gain compensation of the stack, others).
- Increased along-track sampling (“84 Hz”, 80 m along-track), shows benefit in coastal zone. [The “20 Hz” notion is now artificial. Should future processors provide data at 84 Hz or some other rate?]



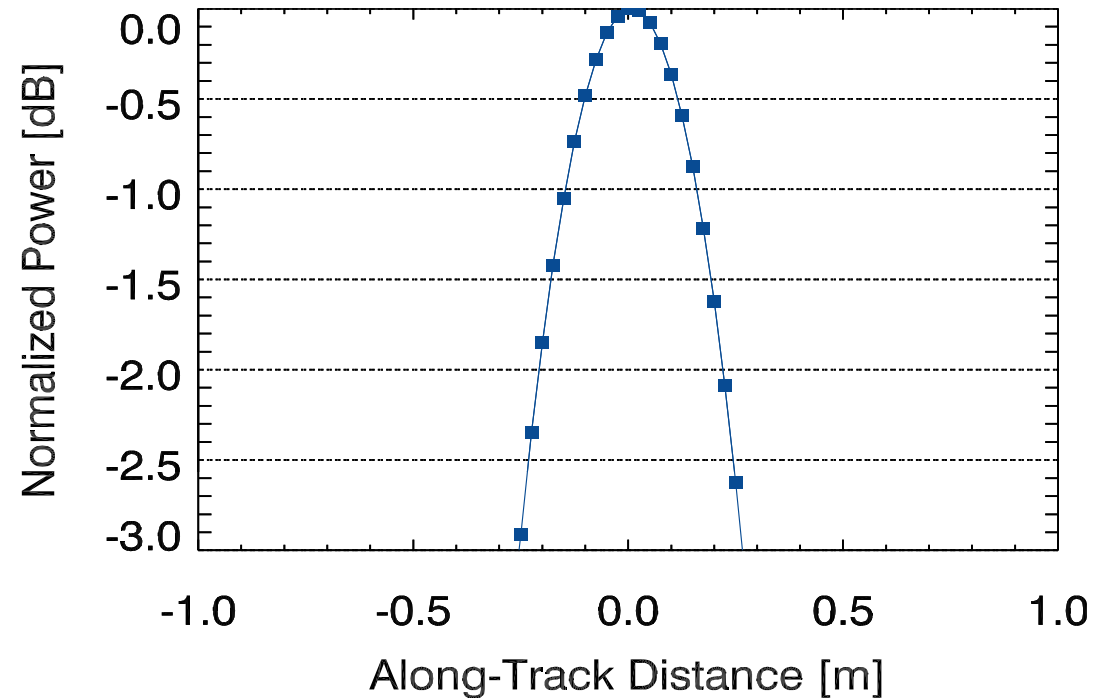
SAR sensitivity to mispointing

- The impact of uncertainty in pointing knowledge on SWH and range retrieval can be made very small (sub mm in range) [C. Ray]
- However this needs to be independently assessed. [Recommendation for further and independent study.]



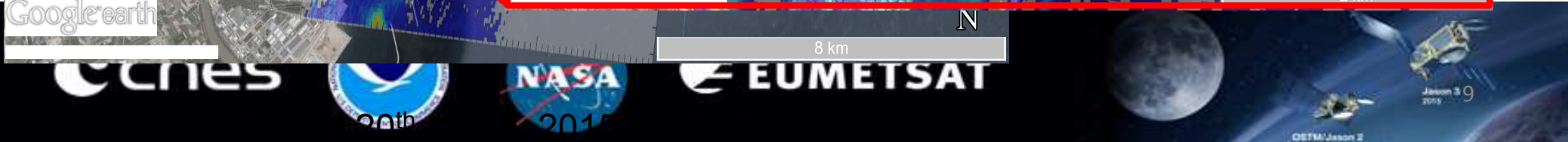
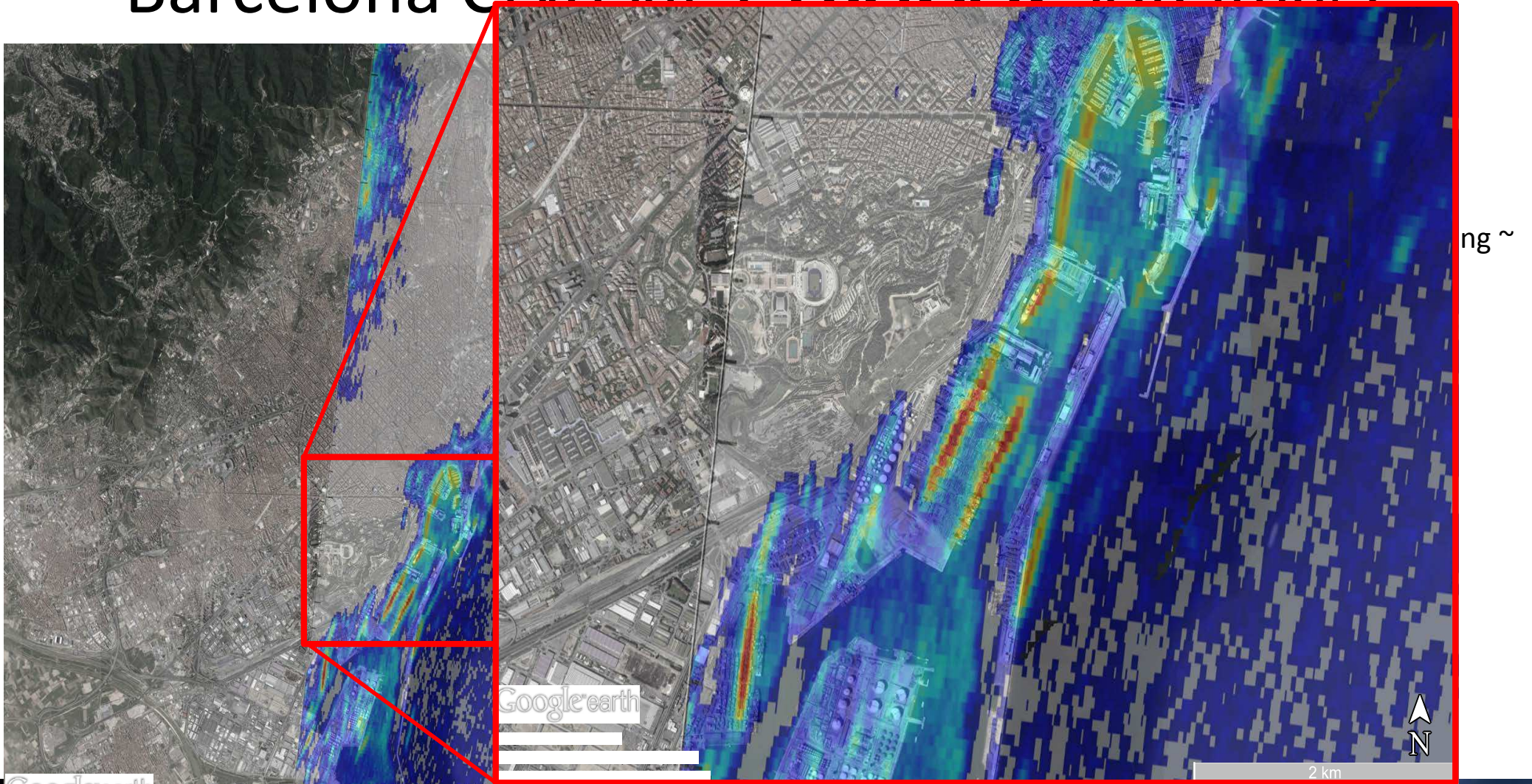
Fully focused aperture synthesis

- Standard “SAR” mode processing creates unfocused beams about 300 m wide.
- The same radar echoes can also be processed to focus on a strip 0.5 m wide (along-track only).



This processing also increases the effective number of independent looks (signal to noise) by approximately a factor of 2.

Barcelona CryoSat-2 *Focused* SAR Image



Recommendations

- Algorithms, including calibration, need to be open and documented, to facilitate climate studies.
- TOPEX had a requirement for no geographically correlated errors. Other missions haven't made this an explicit requirement. Should they?
- Sentinel-3 commissioning phase should make a specific effort to collect and analyze data to calibrate biases in pitch and roll. Due care must be taken not to rush this process. (Collect data both at beginning and end of commissioning phase, both in LRM and SAR?)
- CryoSat attitude biases need to be re-analyzed with Baseline-C and discordant results need to be understood.



Recommendations, 2

- The dependence of σ_0 on Sea Surface Temperature (because of reflection coefficient) needs to be included for Ka band and considered for other cases. (see IP Corrections summary)
- The perennial question of whether SSB should use σ_0 or wind speed came up again.
- Can the Crete transponder be used to make an absolute calibration of σ_0 ? [Should do if possible.]

