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# Instrument Processing Splinter Summary

OSTST

October 2011

October 21, 2011

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# Main Topics

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- General Comments (“parenthood”)
- CryoSat Processing
  - Methods
  - Results
  - Conclusions
- Sea State Bias
- Radiometer Processing
- Recommendations and Plans
- .....

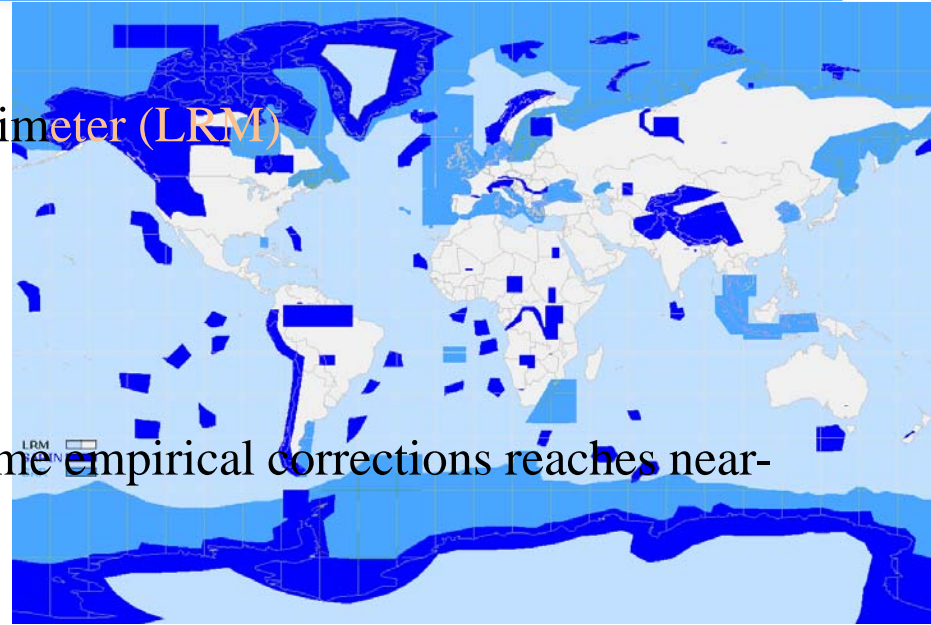
# General Comments

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- SAR is the wave of the future
- Disappointing not to have Hy2A results
- Processing requires full, correct model of system – instrument, propagation, surface
  - Essential for SAR processing of CryoSat (elliptical beam, 2D Att)
- Don't solve for things known well enough a priori, e.g., if attitude is well controlled, known, plug it in and use MLE3 not MLE4
  - BUT, then need to insure “consistency” between Jason-1 that needs MLE4 and Jason-2 done with MLE3
  - CNES recommends MLE4 for open ocean
- See Recommendations
  - We know how to improve Sea State Bias, but implementing it will be messy
  - We know how to improve Radiometer processing – GDR-D

# CryoSat-2 Processing

- LRM, SAR waveforms (WF) on L1B
  - Make SAR into WF like standard altimeter (LRM)
  - Stack, align
  - CLS Numerical retracking
- Results
  - Reduced noise, but can be bias
  - Generally good agreement – with some empirical corrections reaches near-Jason accuracy
- Conclusions, comments
  - Need to understand some discrepant results
  - Most problems have been identified, fixes known. Many will be corrected in Feb 2012 software delivery
- (Not directly addressed in Instrument Processing) To make fully usable for SSH, SSHA needs consistent corrections
  - Tropo, Iono, SSB
  - Time Tag issue
  - Cal/val



# Sea State Bias Highlights

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- Ngan Tran: 3D model with wave period ( $T_m$ ) from WaveWatch-III (1 deg, 6 hr, ECMWF winds)
  - Improves along-track RMS by  $\sim 1.25 \text{ cm}^2$ , especially in stormy or strong current areas (even though mean model diff is not large) and near coasts.
  - Improvement in Jason crossover  $\sim 0.2 \text{ cm}^2$ , but not in EnviSat (other problems in data?)
  - Changes Jason-1 (1-293) sea level trend from 2.56 to 2.25 mm/yr. Regional changes -1 mm/yr in some areas, especially southern ocean
- Ole Andersen: Long Term Trend
  - CLS non-parametric model from RADS shows -0.76 mm/yr from 1993-2010
  - Shows up to -2.5 mm/yr in southern ocean: south of -40 about half of sea level trend could be attributed to SSB trend
  - Lower coherence of sea level change with thermosteric effect when SSB applied

# Radiometer Highlights

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- Calibration remains crucial – “assisted” for I/GDR; long-term, multi-sensor analysis essential for full accuracy ( 1 mm/yr)
  - Built-in calibration could be crucial for climate mission
- Significant improvements have been made for coastal processing
- Large-scale CLS project to compare data to SSMI
  - EnviSat MWR has good agreement
- Rain, ice flagging can be important in comparisons

# Recommendations and Plans

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- CryoSat-2 provides excellent data, but it needs consolidated processing, product for general use
  - IGDR needs MOE in a couple of days (who will do it?)
  - Who will pull all the pieces together to get good SSHA?
  - Need additional cal/val
- Investigate next step in retracking: numerical/non-parametric retracking (models: full convolutional; tabularized model (derivatives); parametrized)
  - Can it be made efficient for operational processing?
  - Are errors understood?
- Sea State Bias Model
  - Improved models understood; implementation somewhat messy but should be done by ?? (Will not be possible in GDR-D)
  - Need to look at long term trend (also recent paper claiming large trend in wind speed)
- Radiometer processing
  - Improved processing will be implemented for GDR-D
  - Continued multi-sensor analysis is important
  - Intercomparison of coastal algorithms should be done

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# BACKUP



# Processing Highlights

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- **Methods**
  - Residuals
  - External data
- **Results**
  - Improvement
- **Conclusions, comments**
  - Models understood; implementation relatively straight forward
- **Other**
  - Other