# Take home messages from the 7th Coastal Altimetry Workshop

Paolo Cipollini, National Oceanography Centre, UK

**Organizing committee:** J. Benveniste (ESA), P. Cipollini (NOC), L. Miller (NOAA), N. Picot (CNES), R. Scharroo (EUMETSAT), T. Strub (OSU), D. Vandemark (UNH), S. Vignudelli (CNR)

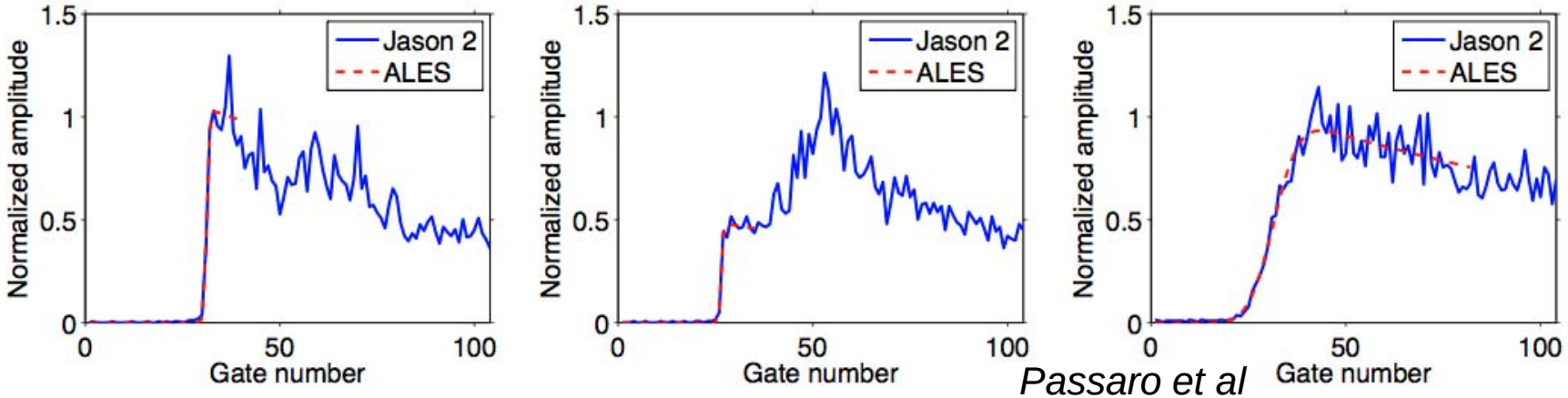
**Session Chairs:** L. Bao (Chinese Acad. Sci), F. Boy (CNES), P. Callahan (JPL), R. Cullen (ESA), K. Ichikawa (Kyushu U), S. Mertikas (Tech U Crete), N. Picot (CNES), R. Scharroo (EUMETSAT), F. Shillington (U Cape Town), T. Strub (OSU), J. Wilkin (Rutgers U), D. Vandemark (UNH), S. Vignudelli (CNR)

**+ the many scientists who contributed papers & posters**

# These are exciting times for coastal altimetry!

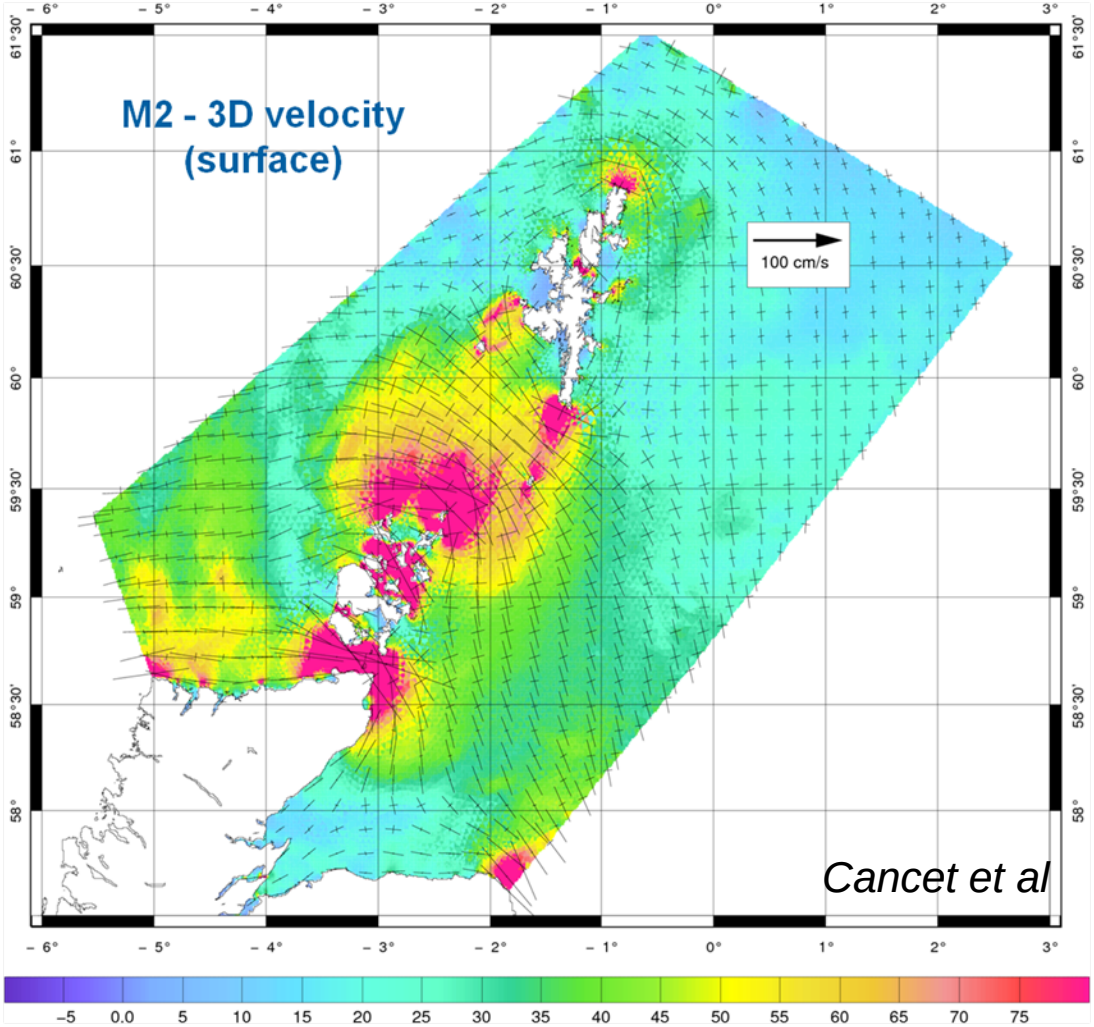
# 1. Continuing improvements in retracking (both LRM and SAR) and corrections

- more attention to waveform perturbations
- specialized retrackers: adaptive sub-waveform, BAGP, modified threshold → we get closer to the coast




*Passaro et al*

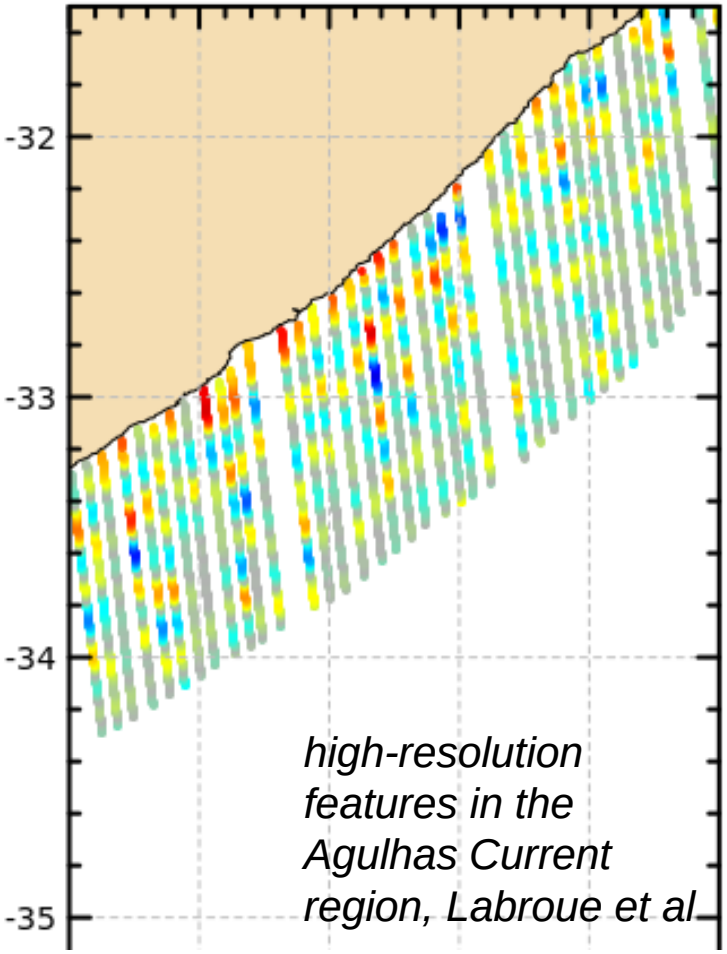
- significant improvements in atmospheric corrections (also for inland waters, and especially wet tropo) and regional tidal models



# 2. SAR fast-growing towards maturity

- Very fruitful joint CAW/OSTST session on SAR altimetry
- processing is converging, data coming out (for example one full year of CNES C-2 SAR product)
- lots of technical aspects are being explored
  - resolution; coherent vs incoherent averaging; use of 80 Hz data; Processing done to specific ground points

**SAR 25- SAR 50 km**



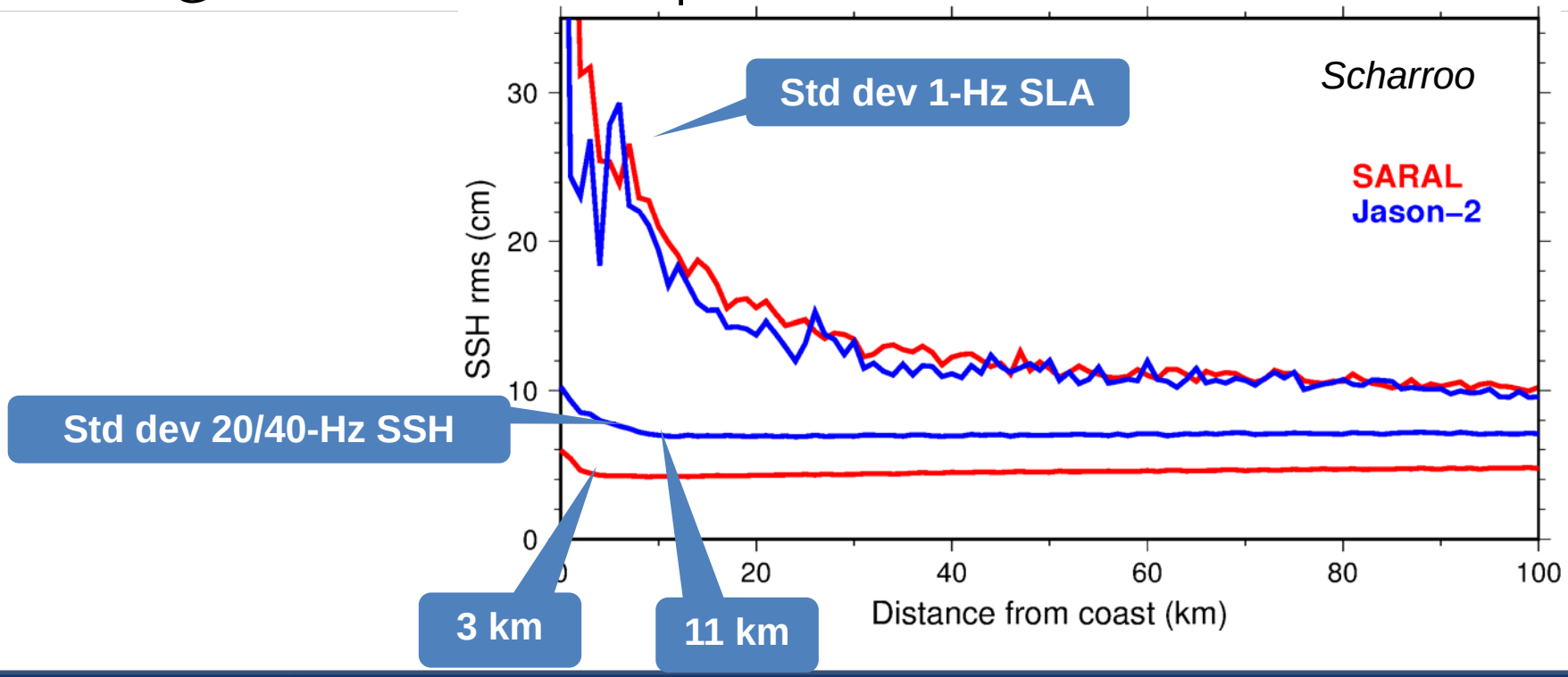

*high-resolution features in the Agulhas Current region, Labroue et al*

- The community is adamant that **we continue to want SAR everywhere over the ocean for Sentinel-3**
- …however in the meantime operations of CryoSat-2 could be adjusted such that we start to address long-standing issues like the recovery of low wave heights, sea state bias in SAR mode, and many others.

The coastal altimetry community requests ESA to explore the feasibility of creating crossing tracks between LRM and SAR mode data in the large Pacific SAR mode box, by running CryoSat-2 alternatively in LRM/SAR mode on ascending/descending tracks, and vice versa, during at least two consecutive subcycles

# 3. AltiKa works a treat!

- reduced range noise and SWH noise and finer spatial resolution (3db beam narrower than range gate limit) all promise a significant refinement of coastal altimetry (when matched by improved corrections)
- std@40Hz is flat at ~5cm up to 3-5 Km from coast

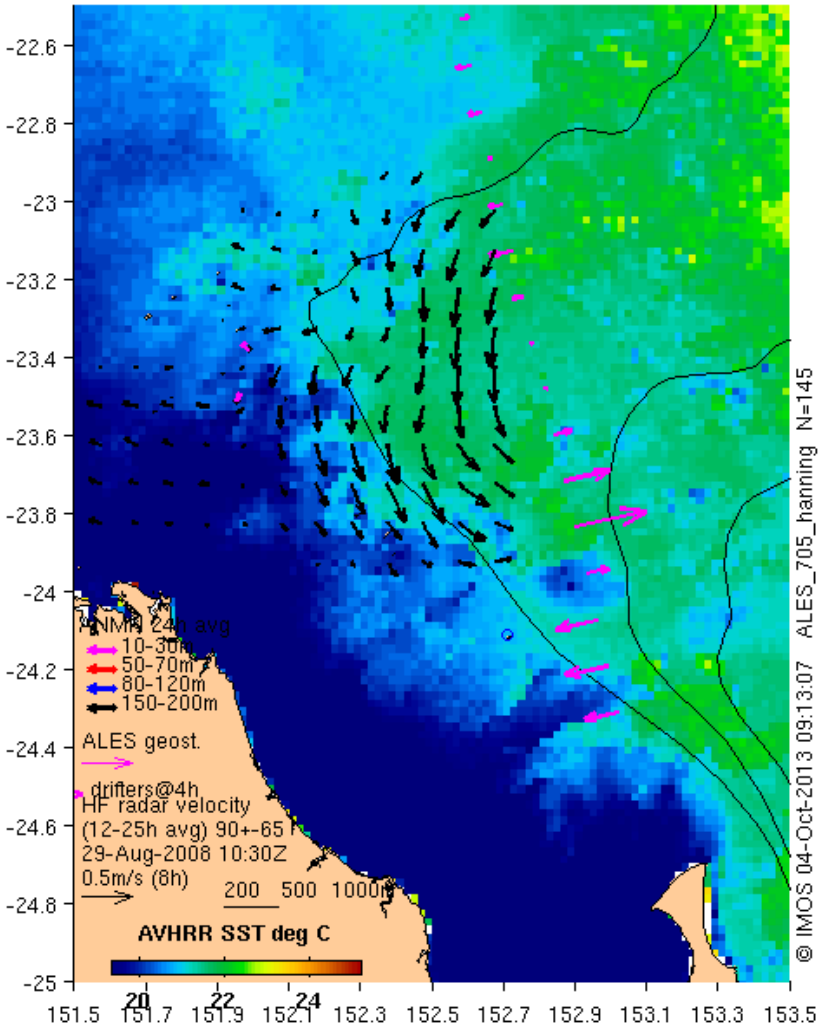


# Coastal altimetry is fully recognized

- “more/better coastal data” now systematically spelled out as a mission objective (AltiKa, Jason-3, Jason-CS, SWOT, COMPIRA…)
- Sentinel-3: first operational coastal altimeter!

# Several diverse applications

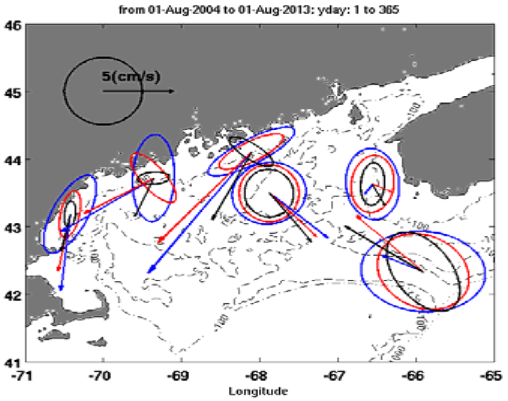
- **DATA** are now available from multiple sources (CTOH, PISTACH, PEACHI, COASTALT/eSurge) so we now see how they are being used…
- **Currents**, for instance

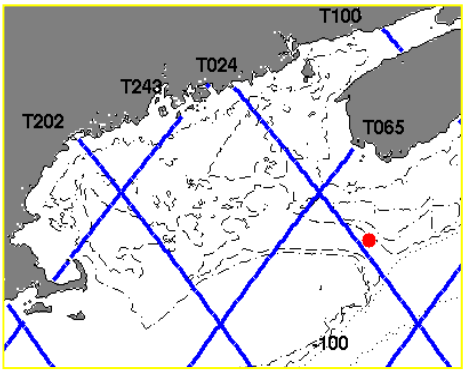


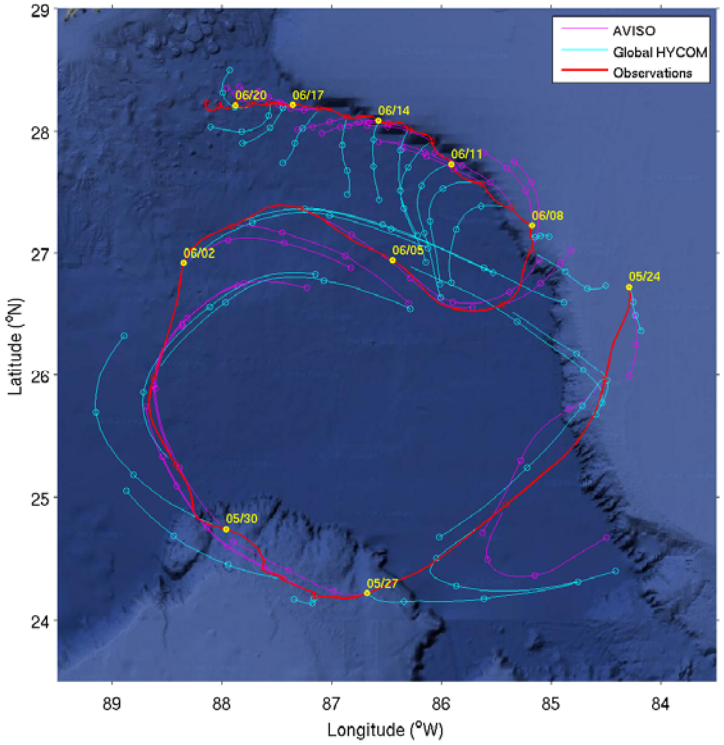

*Cahill et al - Ocean Currents over Great Barrier Reef, from reprocessed Altimetry and HF Radar*

*Hui Feng et al. –*
*Circulation from Altimetry on NW Atlantic shelf and the Gulf of Maine*

Geostrophic current correlation of 0.58 and difference RMSE of 3.3 cm/s for >70 day LP

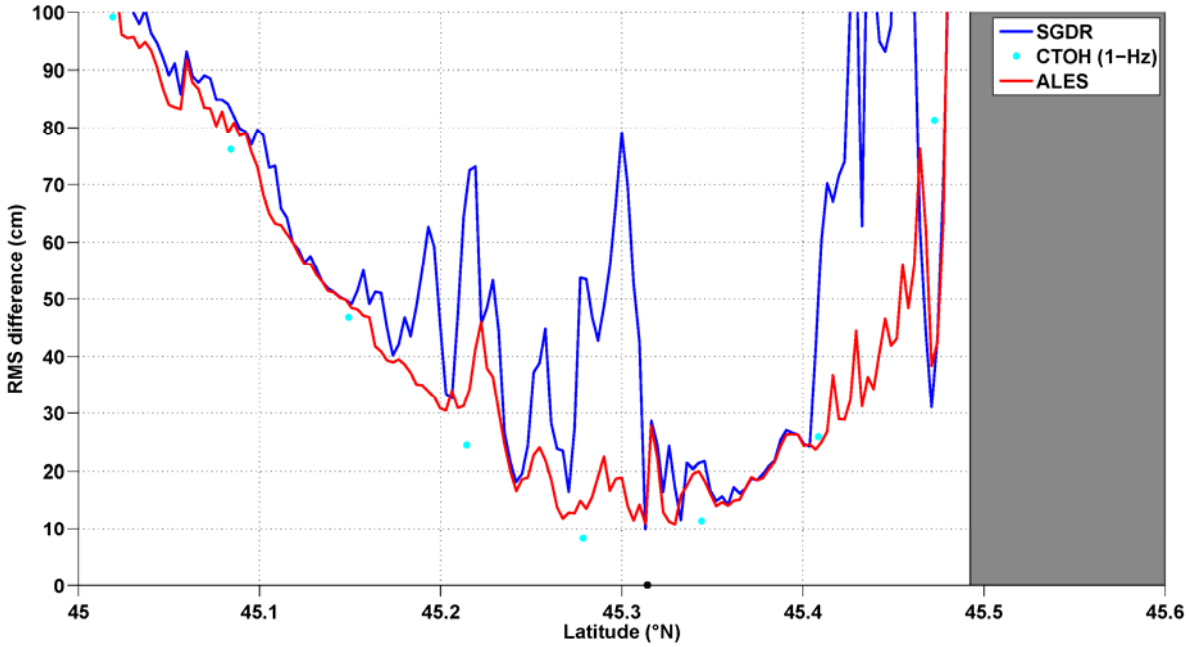


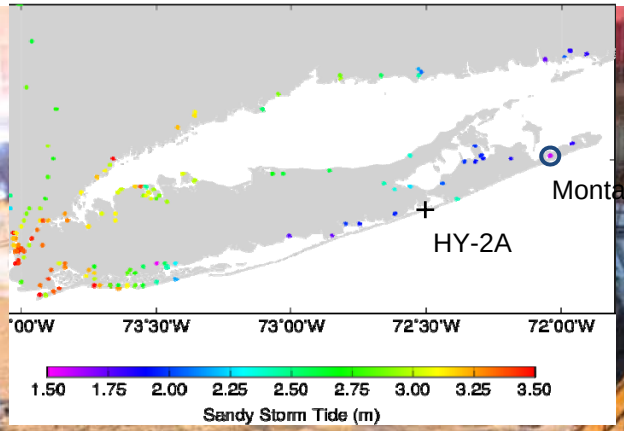

*Liu et al*
*Evaluation of Altimetry-Derived Surface Current Products Using Lagrangian Drifter Trajectories in the Eastern Gulf of Mexico*

*Vignudelli et al. –*
*Cal/Val in N Adriatic*



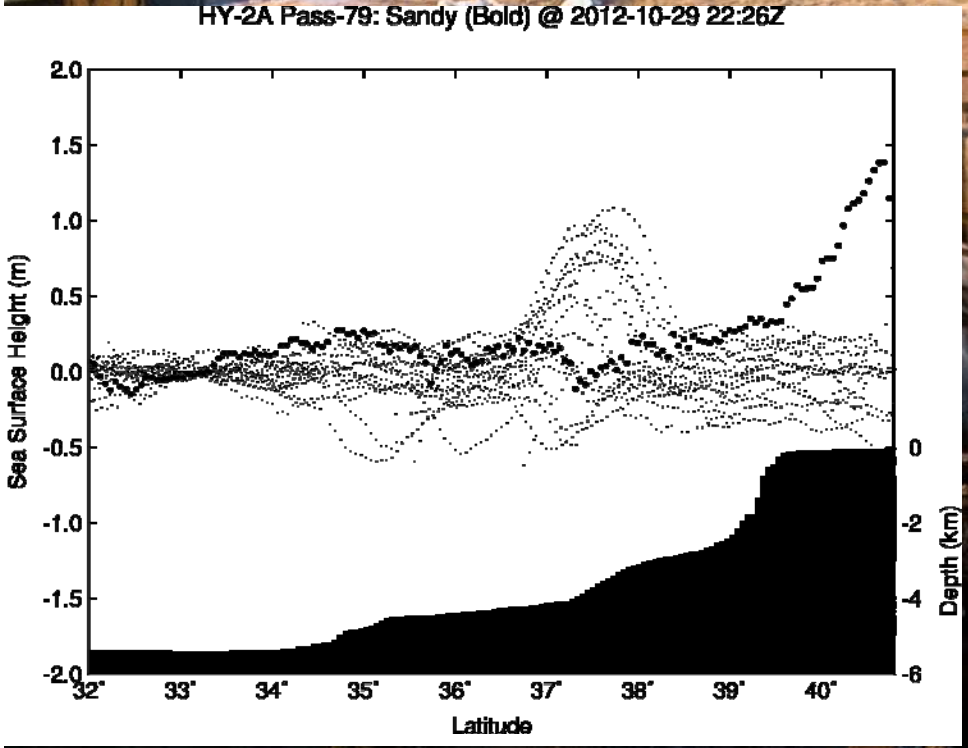

Absolute RMS difference between "Acqua Alta" tide gauge off Venice and Env 543 for 3 altimetric datasets

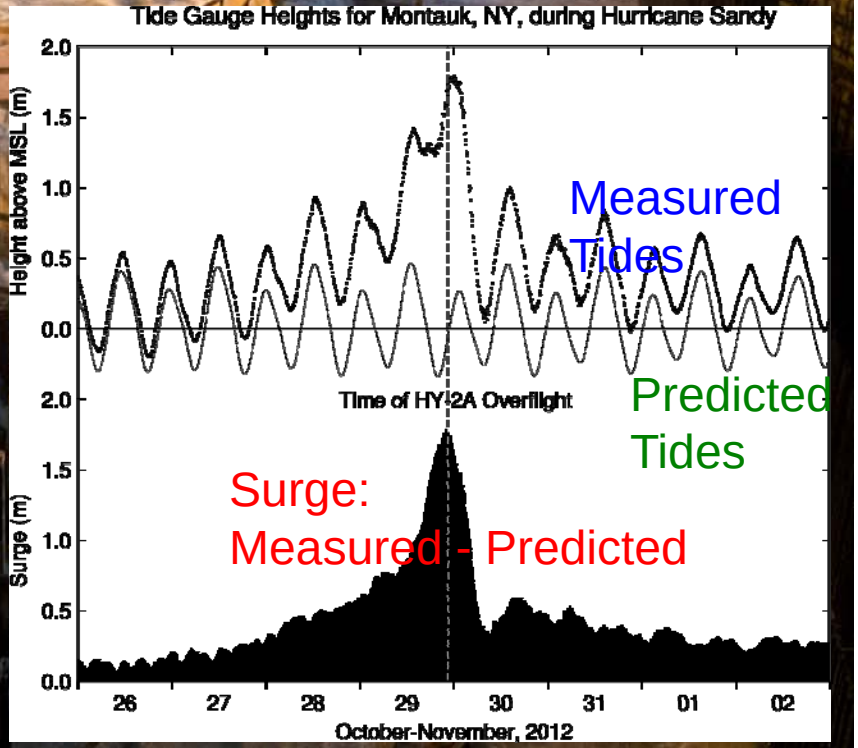
# Storm Surges




*Lillibridge et al - Hurricane Sandy storm surge*

HY-2A only altimeter to capture surge < 12 hr duration




Hurricane Sandy storm surge flooding the World Trade Center construction site

# Many stimulating open issues

- There is a strong interest in
  - best (re-)tracking methods and corrections in this nearshore region
  - methods for calculating geostrophic currents with least filtering
  - the need for MSS and/or MDT that include realistic small scale structure due to mean currents, bathymetry and the geoid in order to estimate absolute heights and currents
- we had extended discussion of the way in which altimeter data can be used for more operational and applied uses.
- high-res data challenge our knowledge of the ocean!!
- full **integration with models** is essential
- **cal/val** remains crucial and must be supported

**The techniques we develop in the coastal zone feed back into open-ocean applications** (non-Brown waveforms, sigma0 blooms, slick, submesoscale, sharp fronts, better corrections…)

# In summary: a vibrant science forum

- 115 participants, 30 talks, 24 posters
  - contributions to go online on www.coastalt.eu/community
- Community review of science and applications, lots of ideas and passionate discussion, but still very friendly and informal
- Keep in touch and send feedback!
  - Mailing list COASTALT-SWT (250+ subscribers); if you are not on this list yet, but would like to, tell me: cipo@noc.ac.uk


Thank you!