

Acoustic Interference

INMARTEC 2014
Corvallis, OR

(on ADCP data)

- ADCP data requires averaging (inherently noisy)
- NOTE: interference from other instruments MIGHT NOT degrade ADCP data (“seeing interference” does not necessarily mean damage)
 - Must check carefully (not just look at signal strength)

Acoustic Interference on ADCP data

- Possible approaches:
 - (1) determine what ACTUALLY causes problems
 - (2) Triggering (Synchronized ping)
 - (3) Free-running (no sync) and single-ping editing

Pulse Synchronization (Triggering)

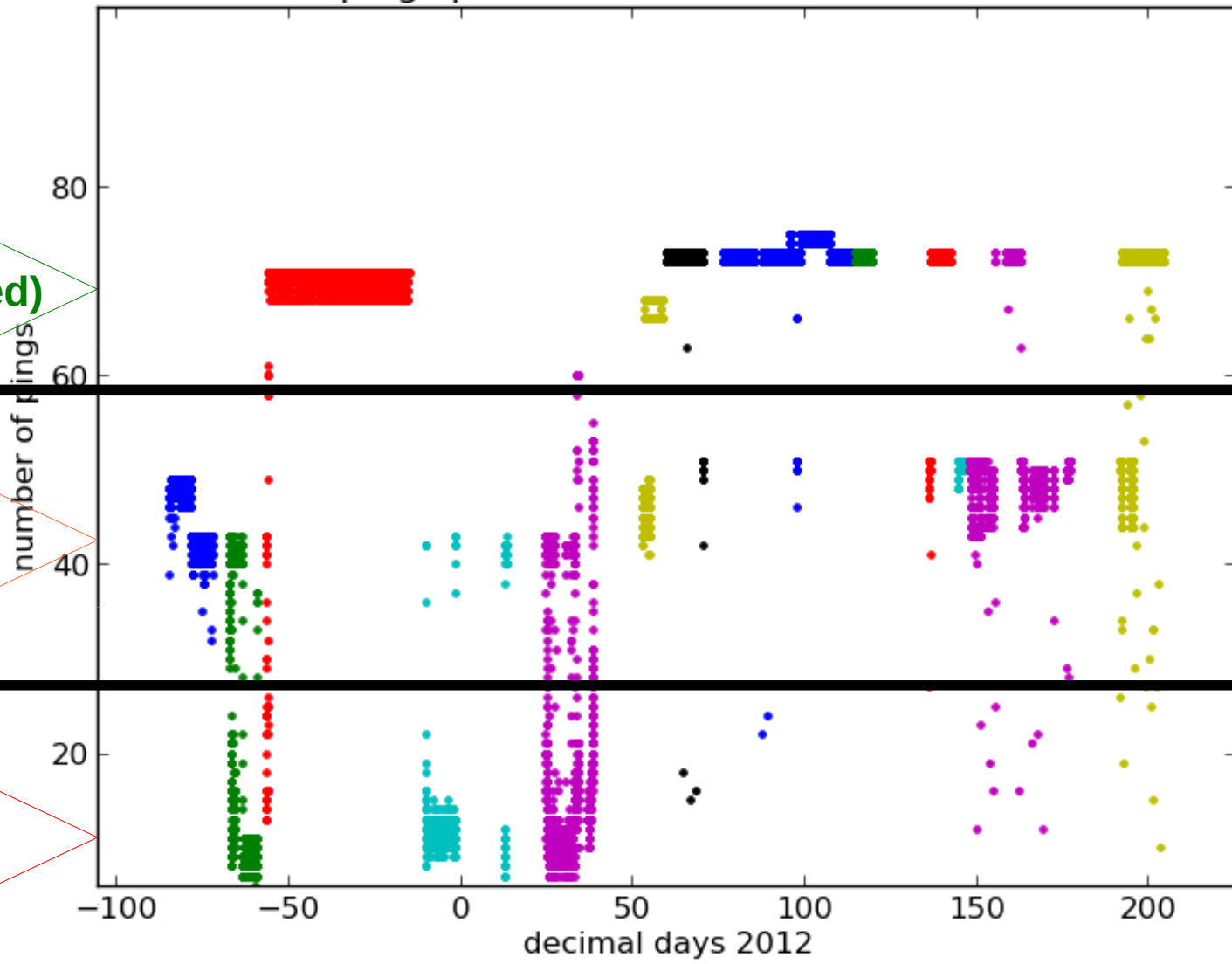
- can reduce ADCP ping rate (increase random error)
 - ONLY USE ONE TYPE OF PING if Synchronized
- can damage the data (where the other ping hits)
- makes it nearly impossible to edit out (single-ping)
- **if “lucky”:**
 - ocean currents have lower resolution
- **if unlucky:**
 - too few pings to be useful
 - damage the pings that remain

Reduced ping rate due to triggering

pings per 5-min ensemble: OS75NB

70 pings

expected (for interleaved)



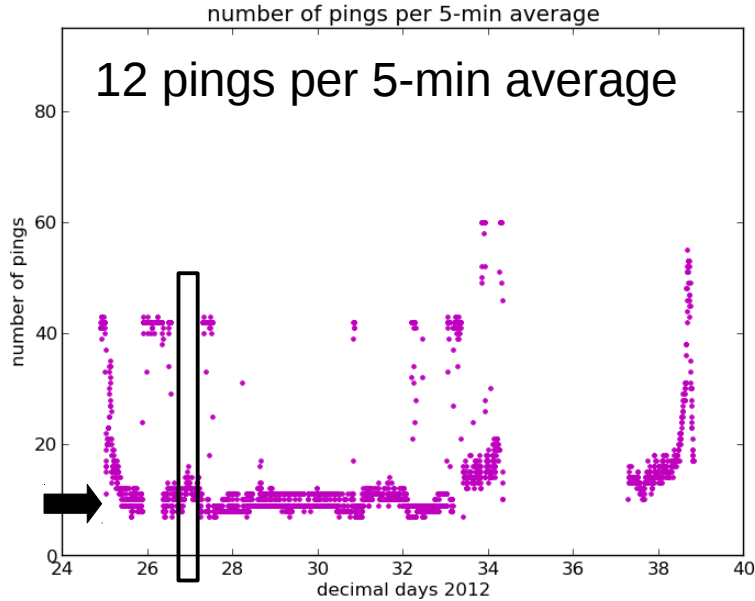
40-45 pings

BARELY MARGINAL

10-15 pings

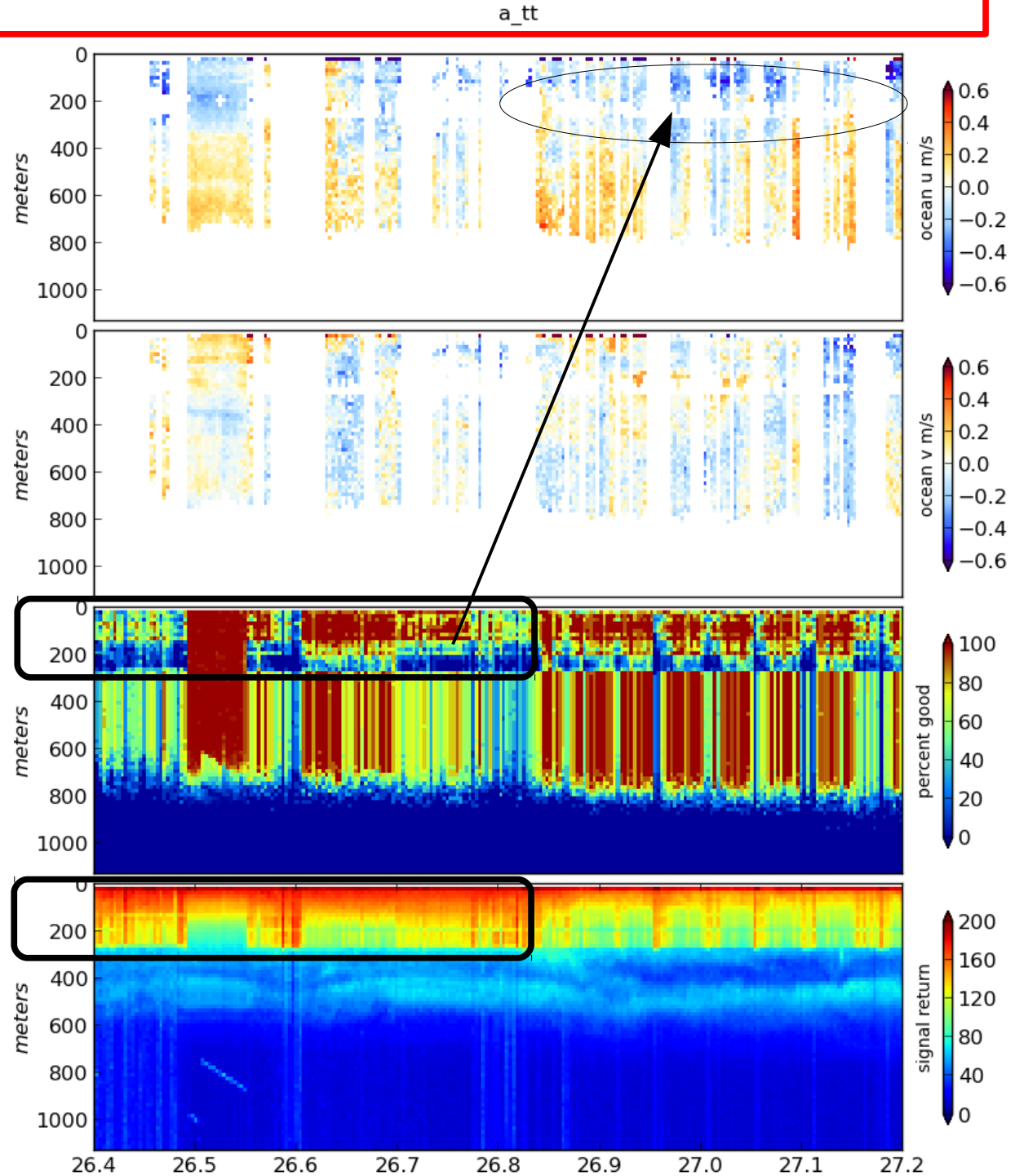
UNACCEPTABLE

Reduced ping rate and damage to 150m-250m range



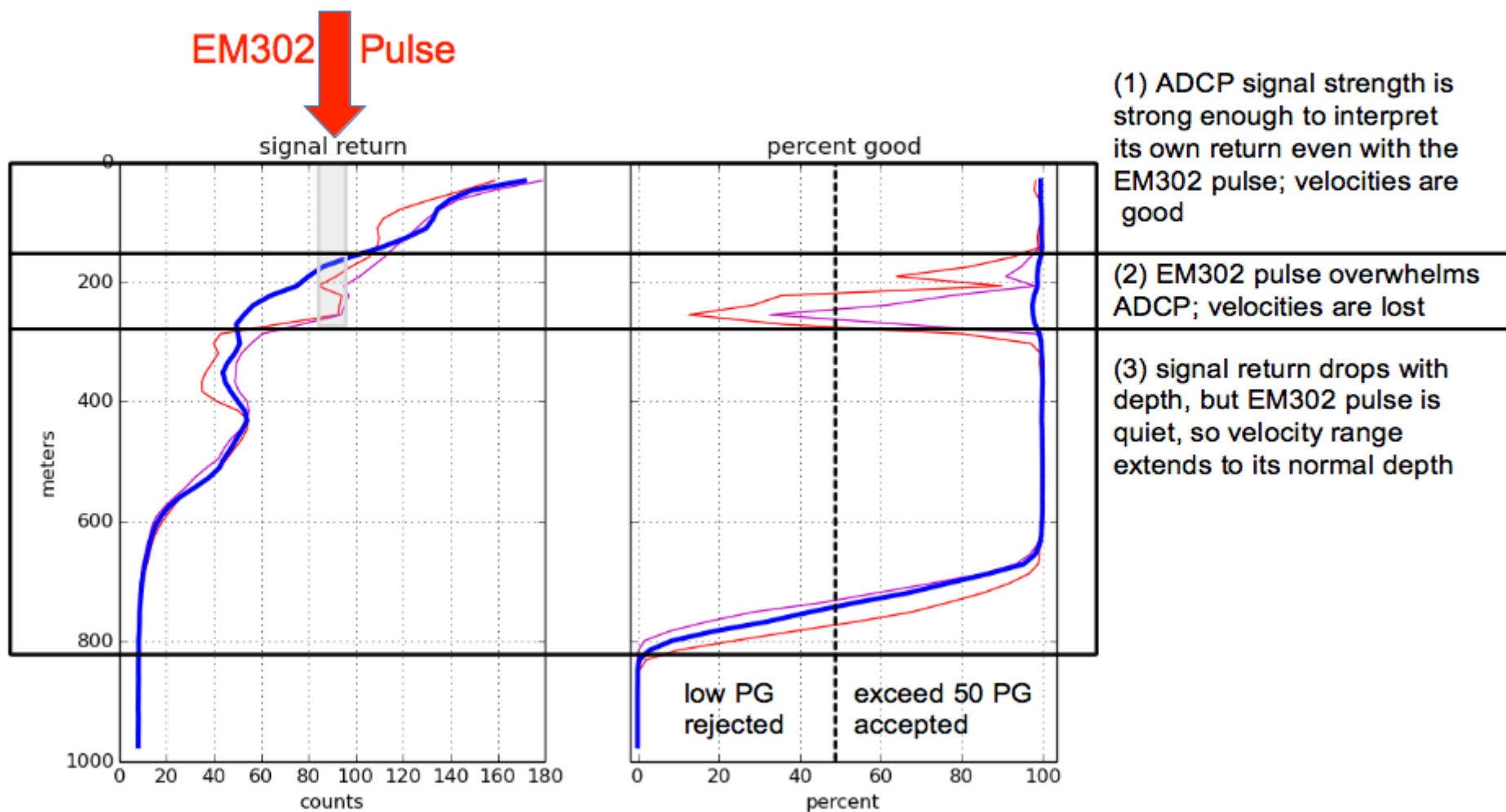
“hole” in ADCP data 150-250m

long pulse extends to 250m



Simultaneous ping, long pulse → Damage to a chunk of ADCP data

Effect of EM302 pulse on ADCP data (OS75 narrowband) – simultaneous ping



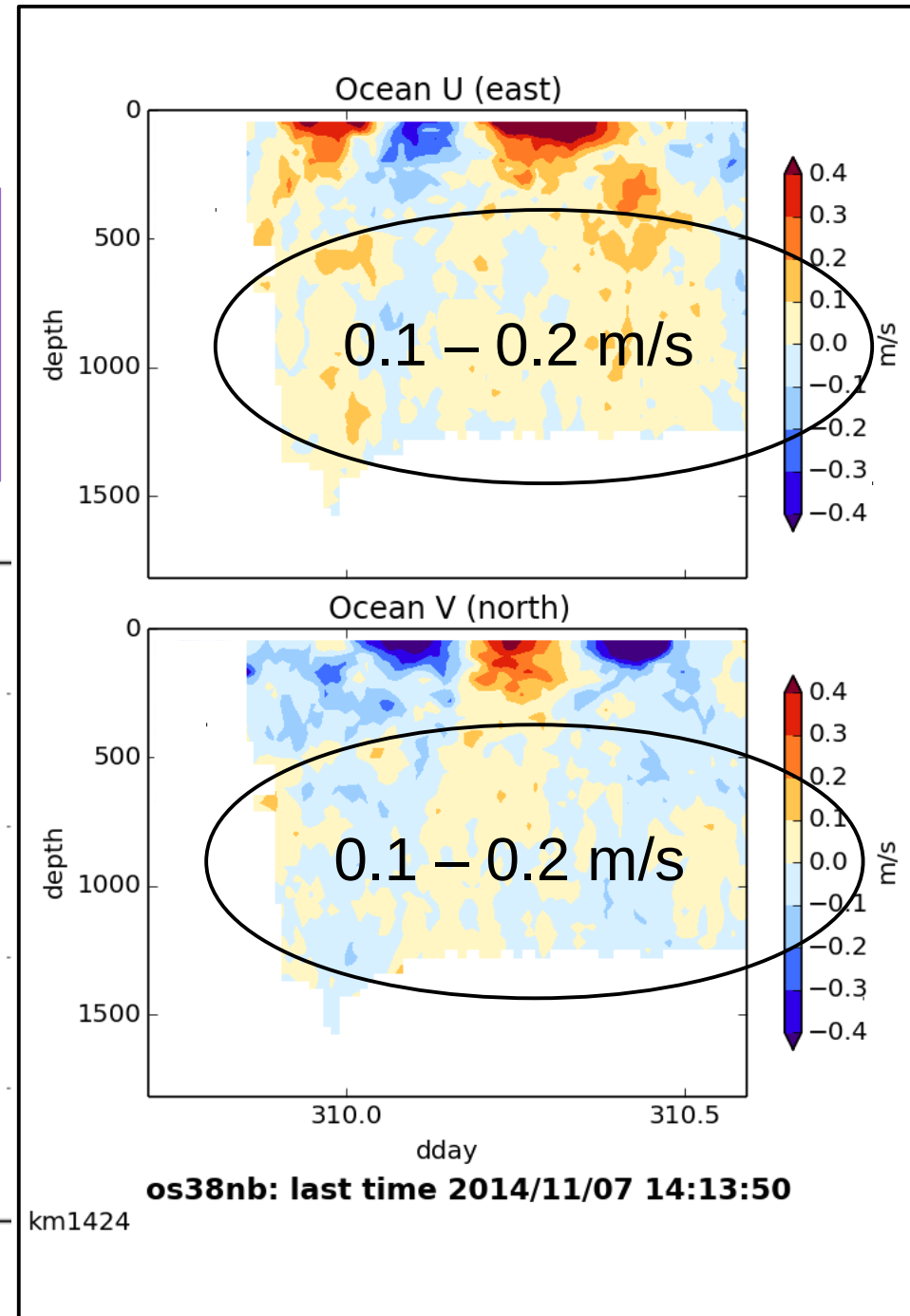
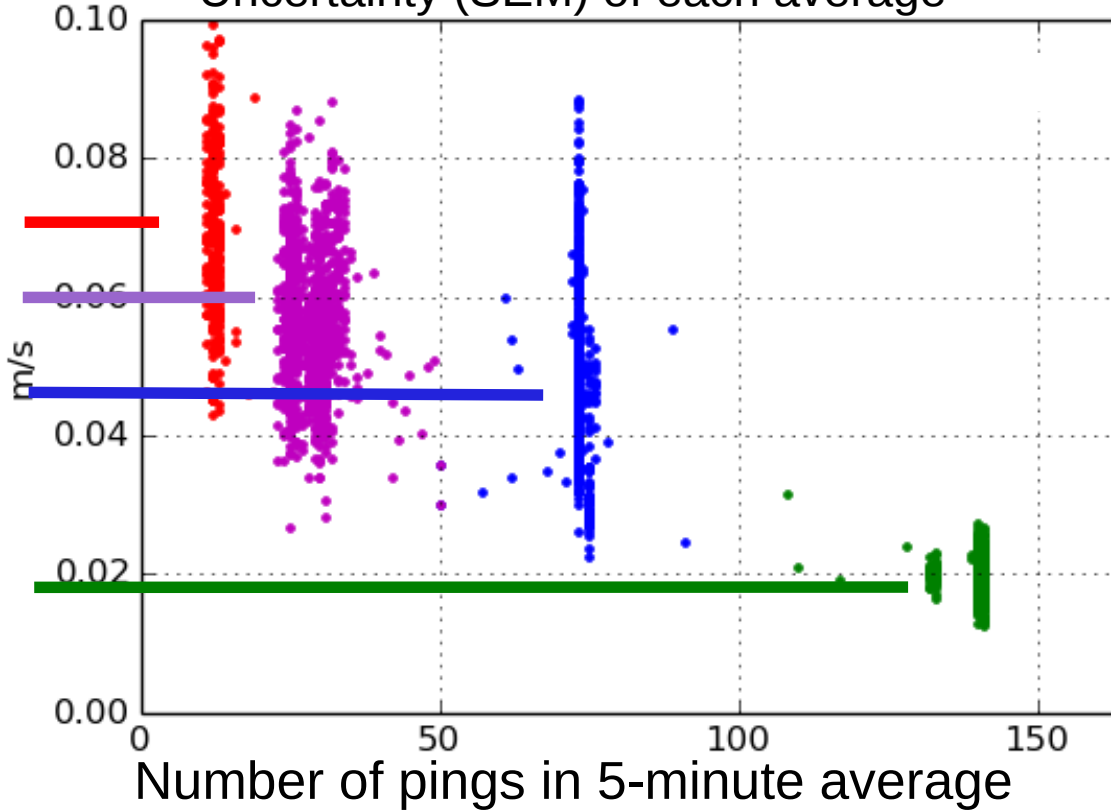
Effect of Reduced Ping Rate:

- fewer pings means more uncertainty
- too few pings: error is similar to signal

example:

- 1 ping per 10 seconds
- 30 pings per 5-min average
- uncertainty is about 50% of signal

Uncertainty (SEM) of each average



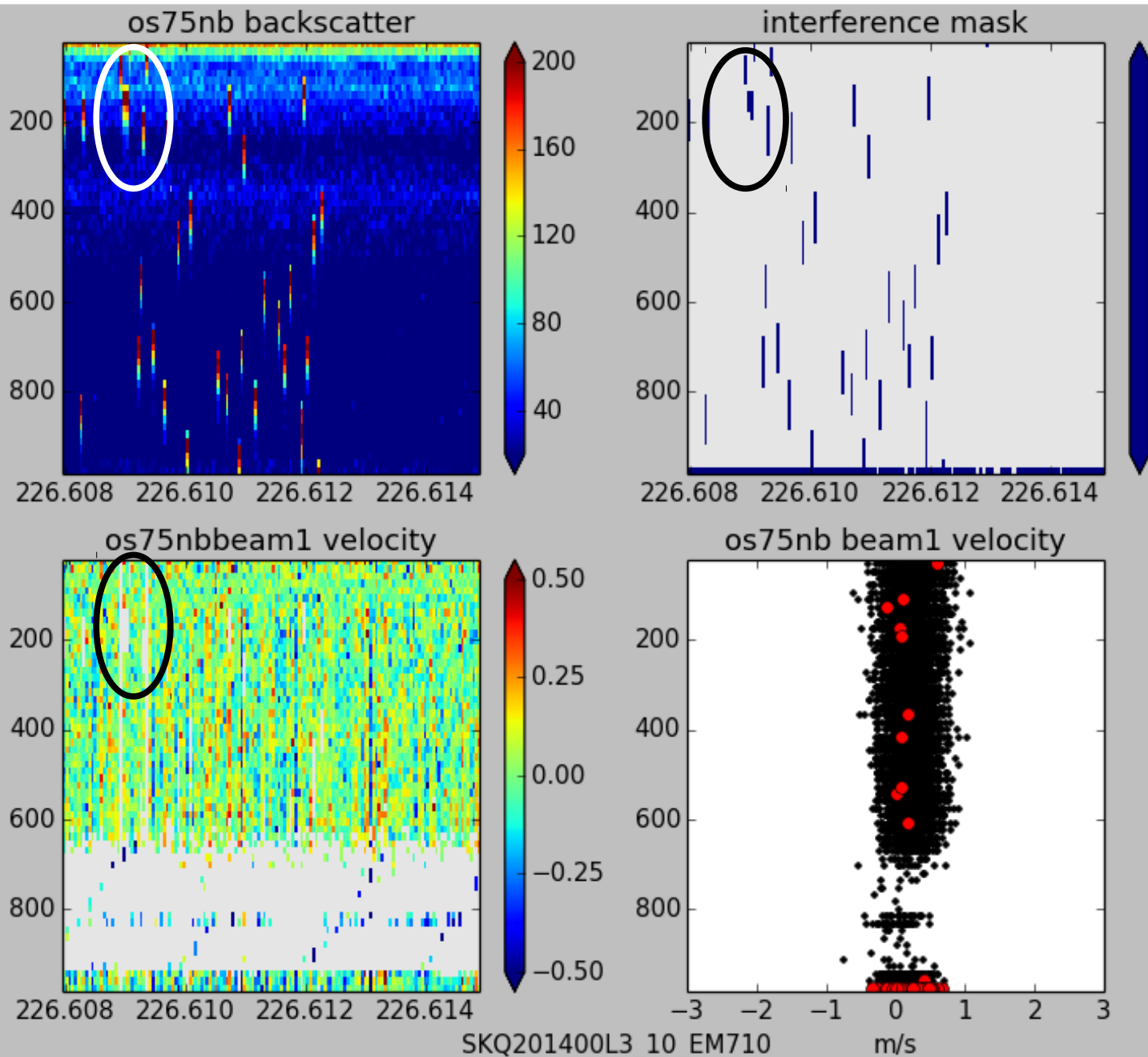
Free-running (asynchronous)

- maximizes ADCP ping rate
- interference from other instruments appears in signal return as random hits
- interference from other instruments can usually be edited out by CODAS single-ping algorithms

Example....

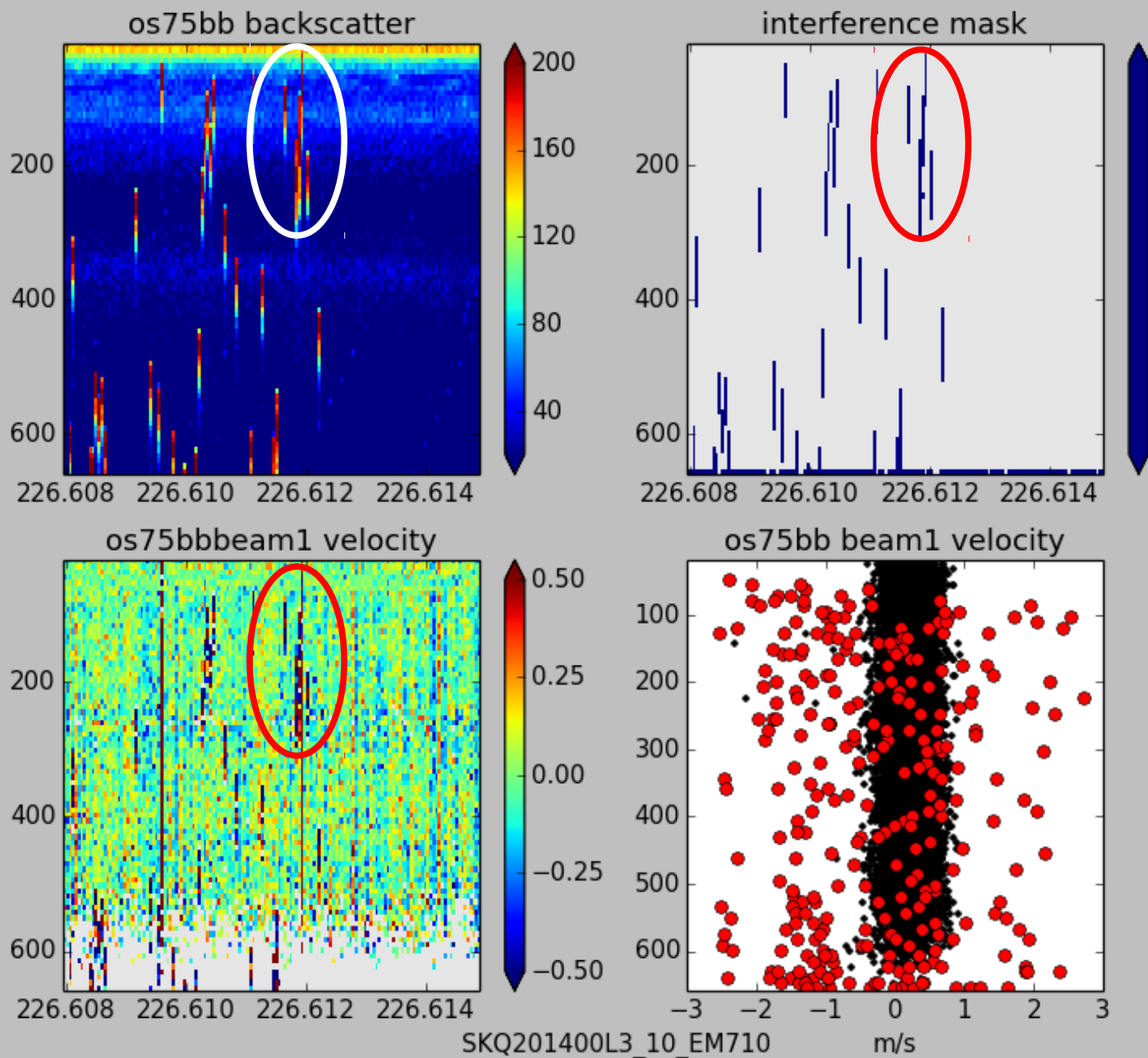
Free-running OS75(NB) and EM710

“Footprints” in backscatter cause **missing (not “bad”)** velocities



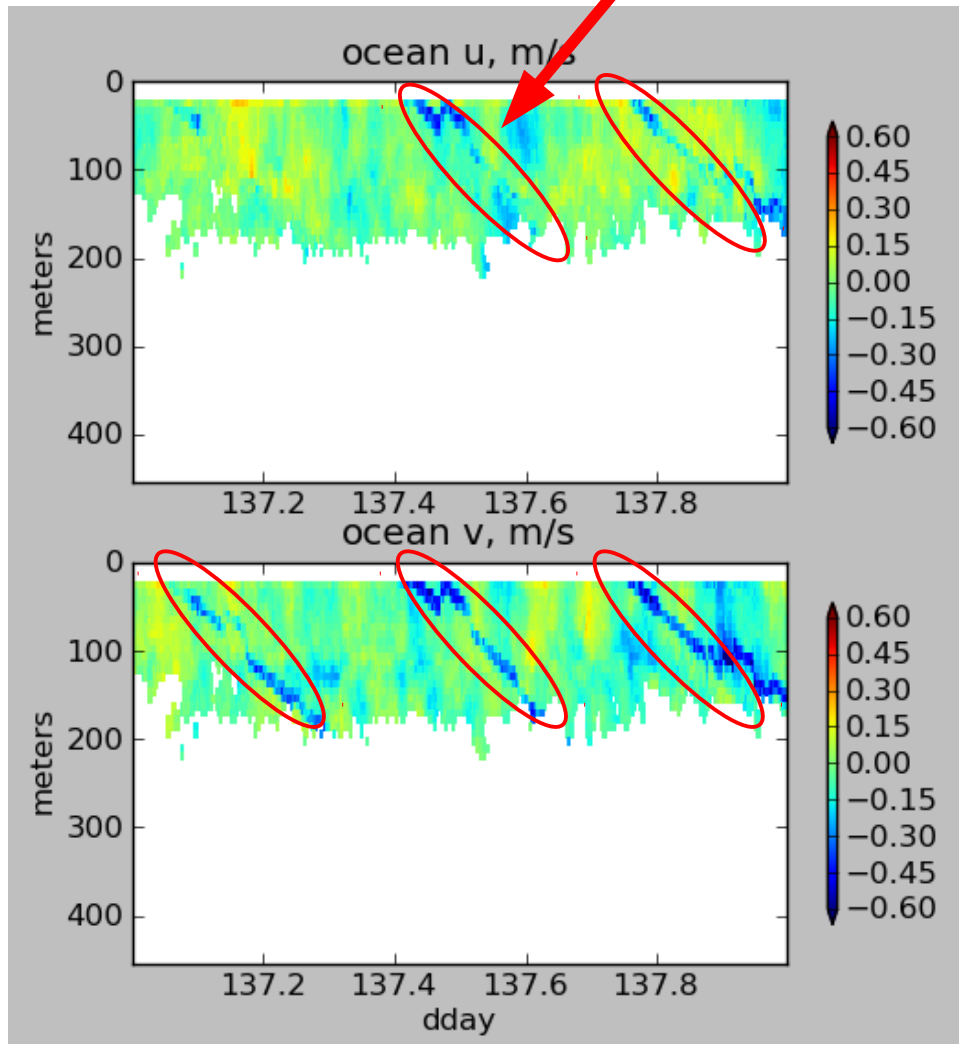
Free-running OS75(BB) and EM710

“Footprints” in backscatter **DO cause bad velocities**



Acoustic Interference caused bias in the along-track direction

(OS75NB visible on OS150B data)



Single-ping editing BEFORE averaging results in unbiased ocean velocities

NOT visible

