

A satellite, the CryoSat-2, is shown in orbit above a vast expanse of sea ice. The satellite is covered in gold thermal blankets and has solar panels extended. The Earth's horizon is visible in the background.

# Precision measurement of the ocean surface topography with the CryoSat-2 synthetic aperture altimeter.

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European Space Agency

# Data location and processing

Data

Vk 1.0 Level  
1B processor

Model

Fit

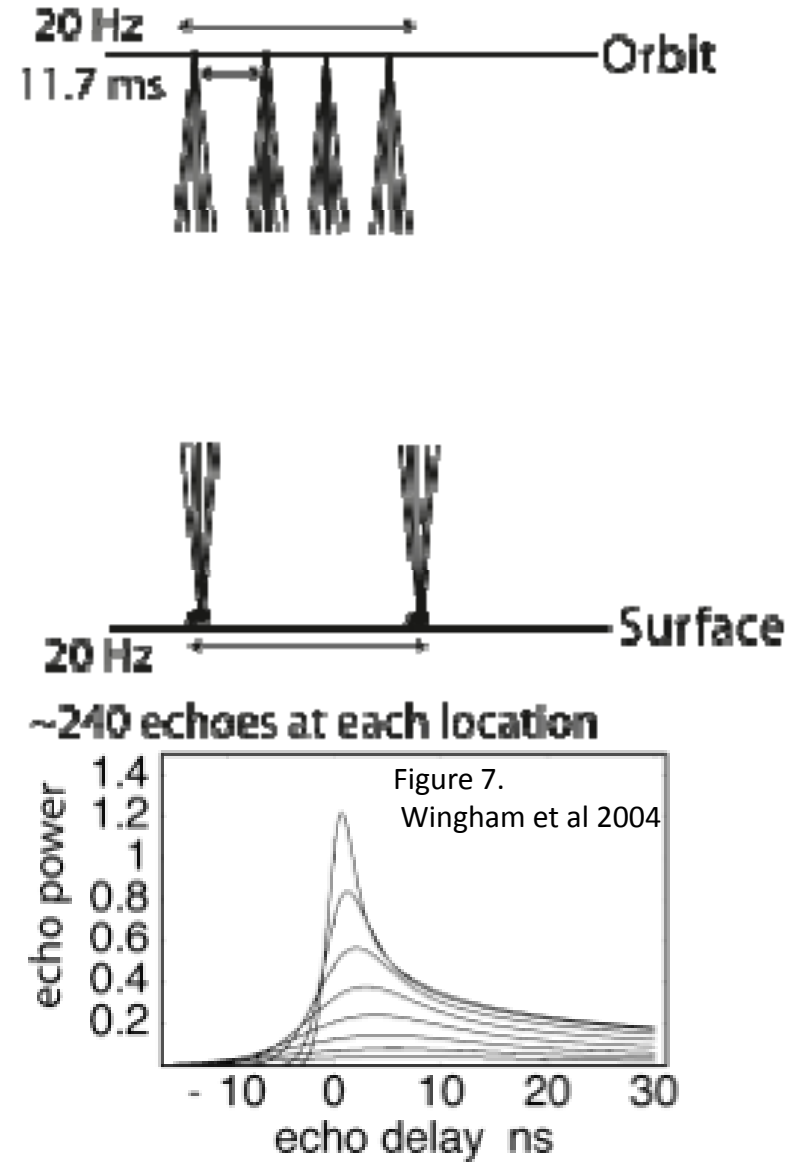
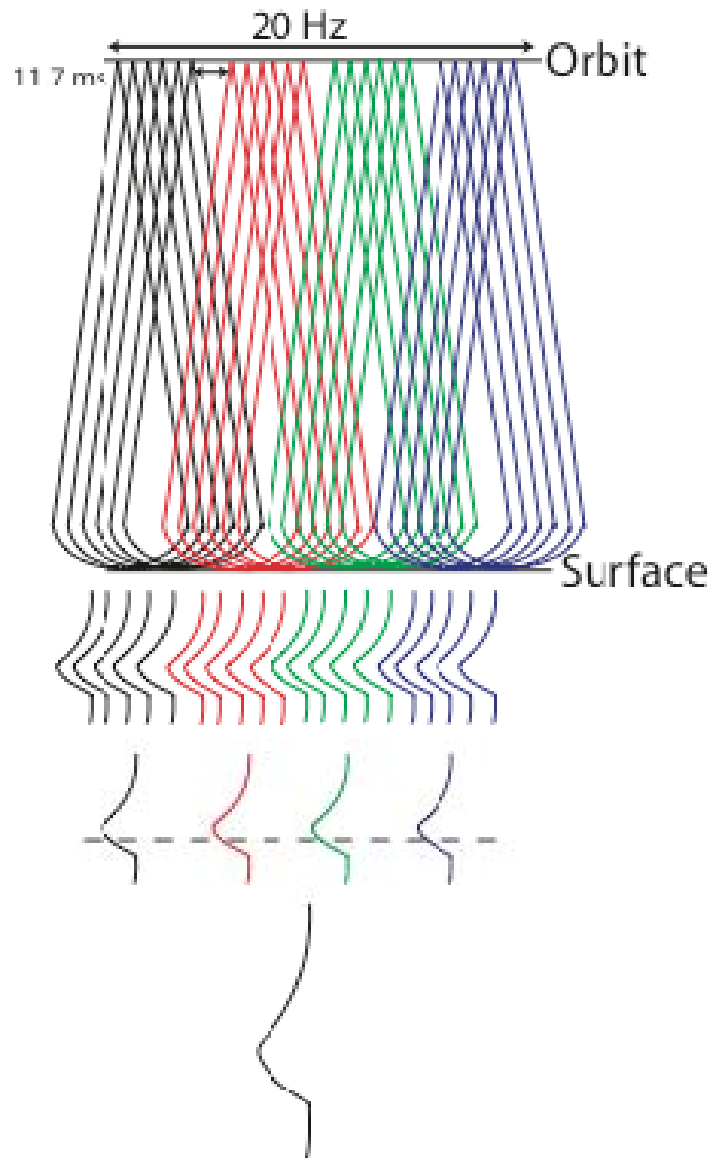
Parameters

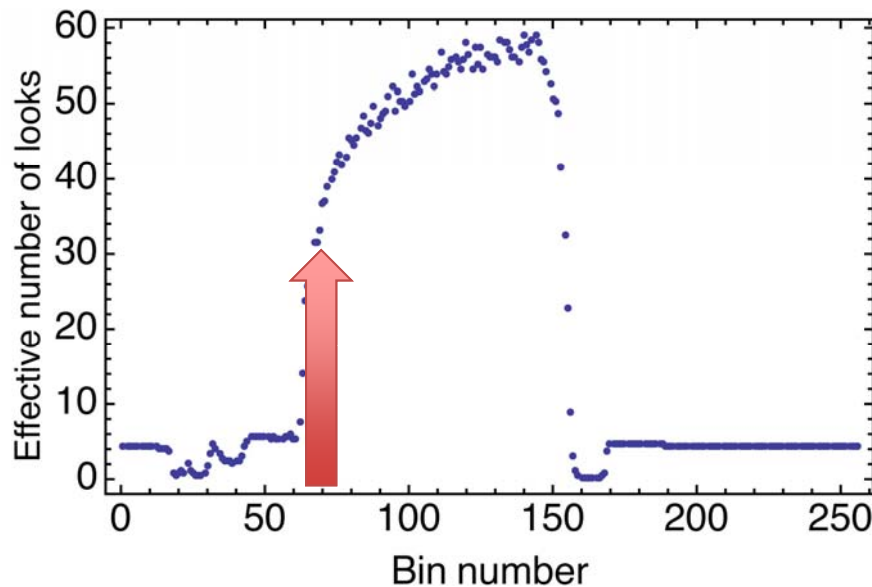
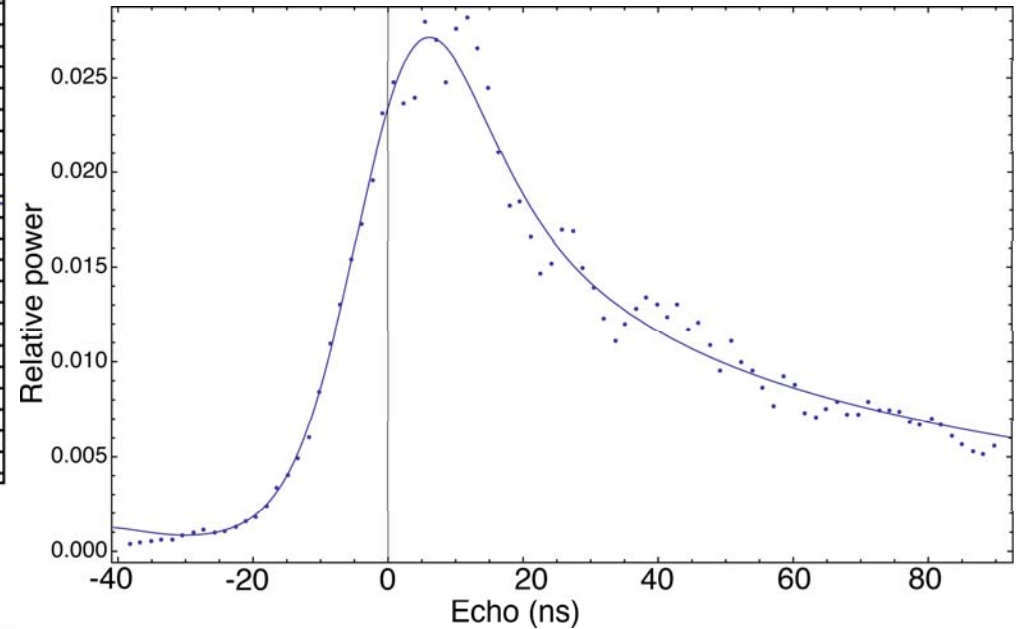
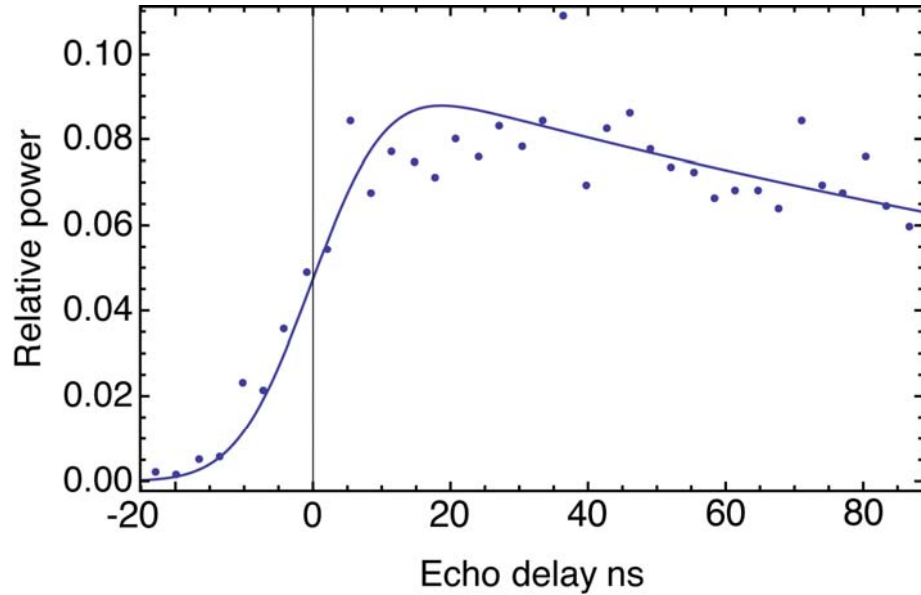
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US Dept of State Geographer  
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38°43'24.01" N 10°56'28.05" W elev 0 m

Eye alt 8713.57 km

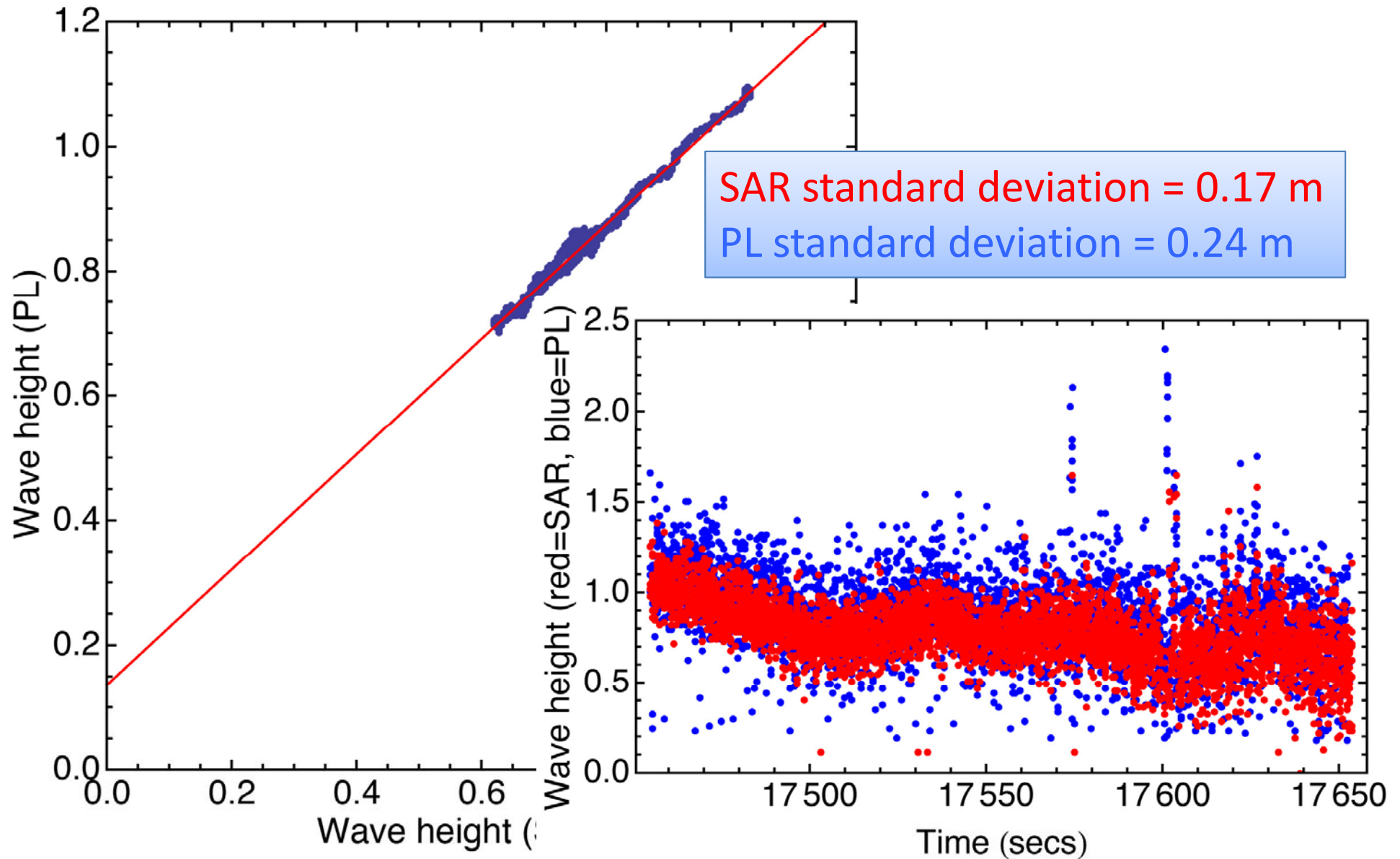


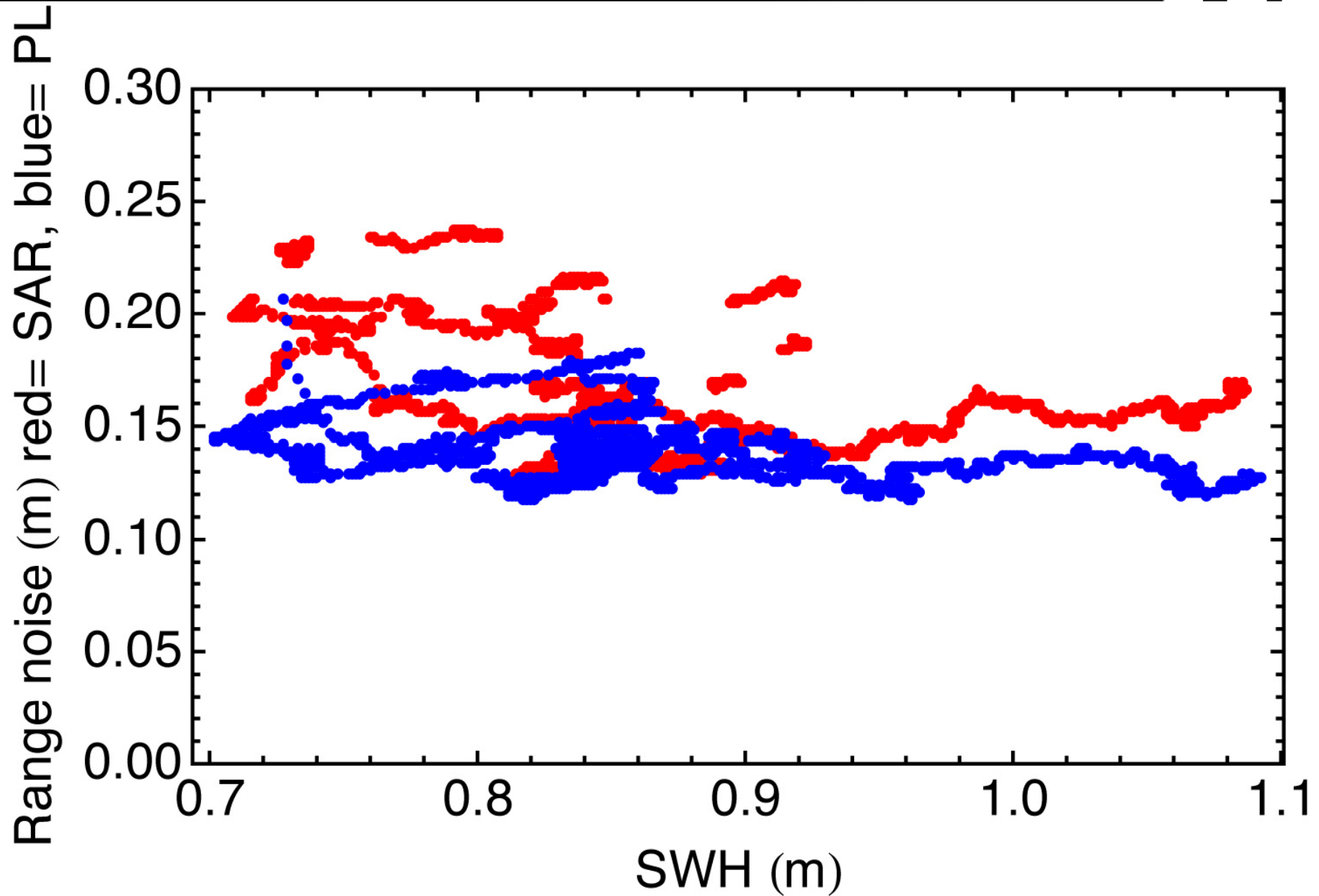


- **PL** altimeters de-correlation length  $\sim 3.5$  m (for leading edge)

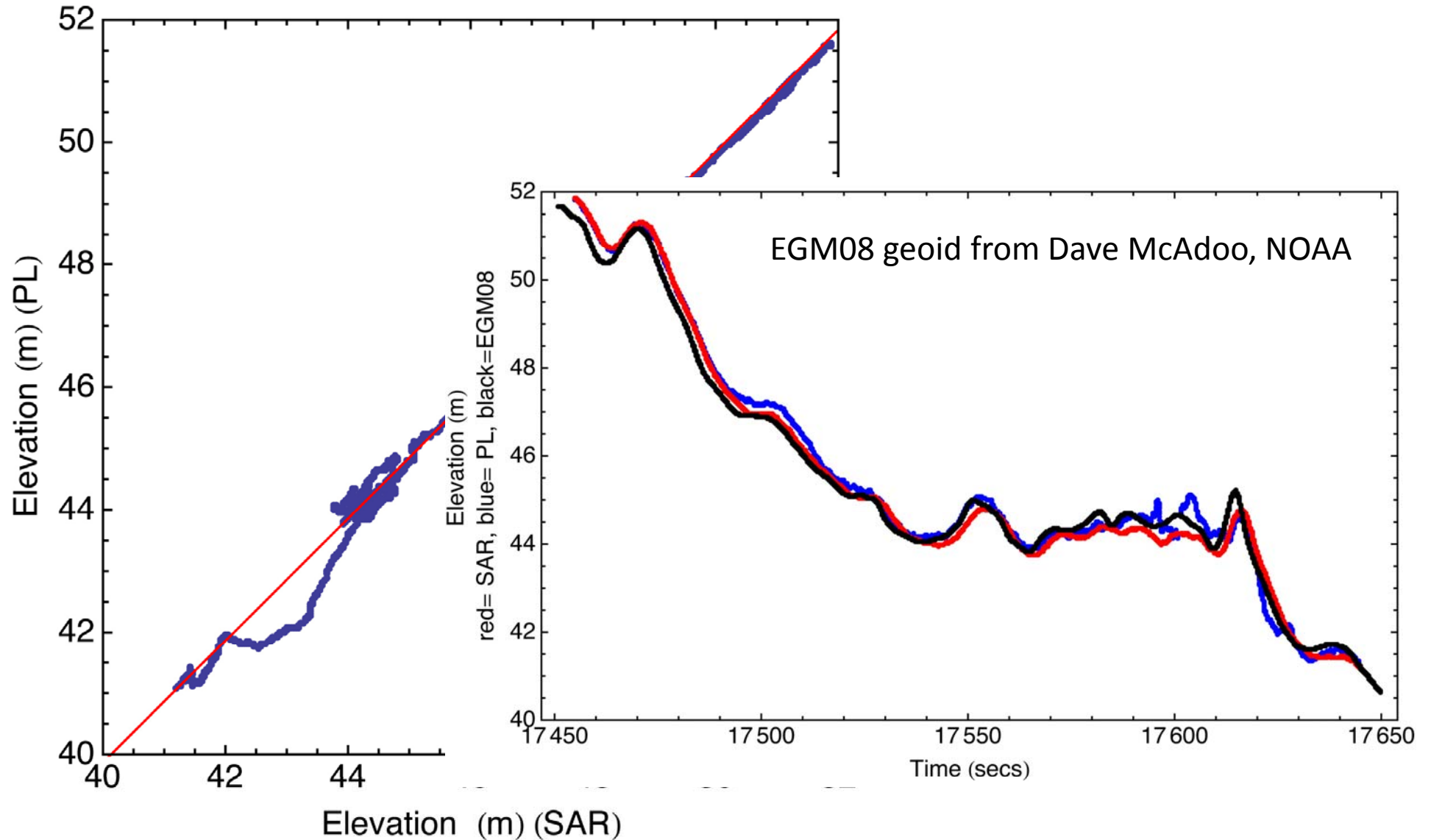
### CryoSat-2:

- PRF 18 KHz,
  - satellite velocity  $\sim 7500$  m/s,
- Therefore, it will take  $\sim 8$  pulses before the echoes de-correlate, giving us  $\sim 30$  looks  $(64 \times 4) / 8$  for our 20 Hz averages



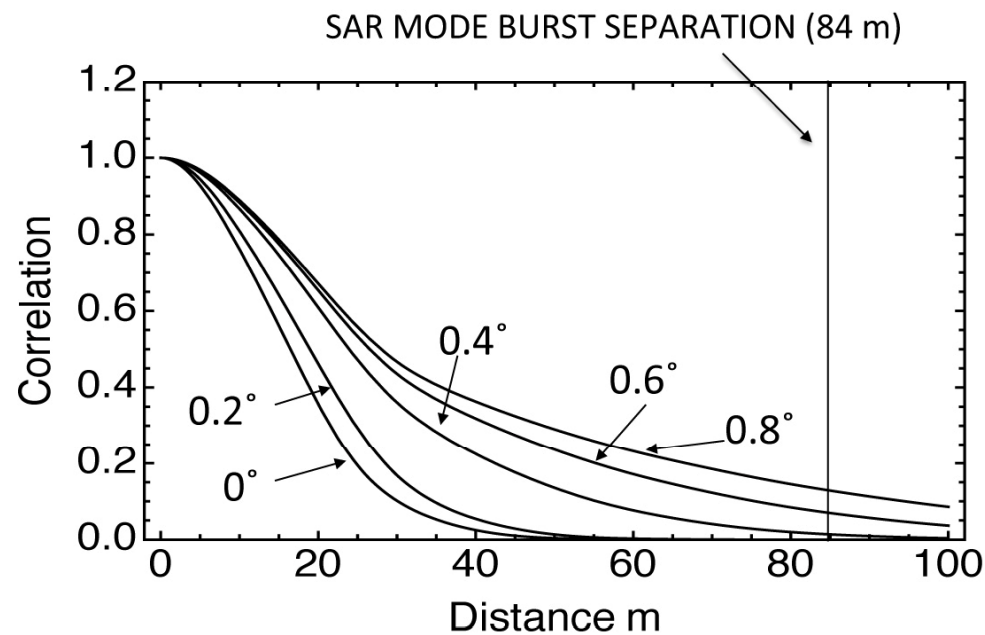


Is this deviation to do with SAR mode being sensitive to the directivity of the waves?

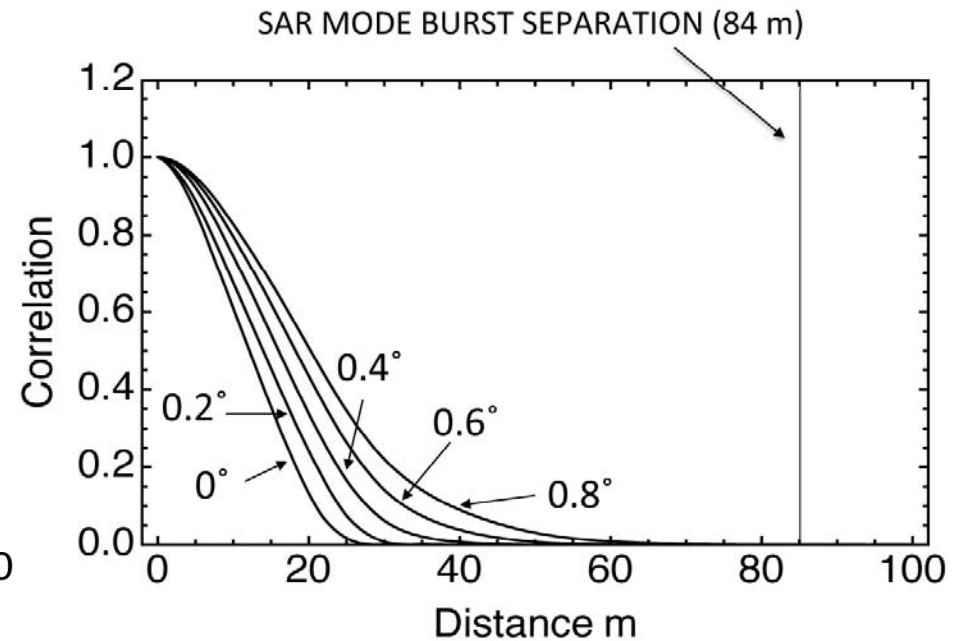


# Why do we not see an improvement in the height precision in SAR mode?

Do off nadir beams, used to form the stack data, not de-correlate ?



Correlation functions for a range of look angles at 0 m wave height



Correlation functions for a range of look angles at 4 m wave height



# Conclusions

- Why do we not see an improvement in the height precision in SAR mode?
- Why is there is a small bias between the two wave heights?
- Can comparison of the pulse limited and SAR modes provide information on the direction of the waves?
- Should CryoSat-2 use different SAR processing over the ocean to that used over the ice?