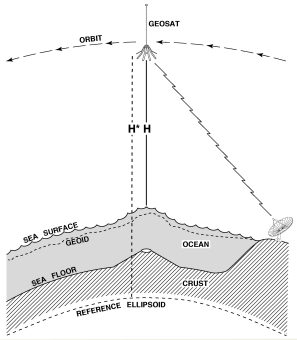

Marine Geophysics

David Sandwell - PI
Dan Bassett - Postdoc
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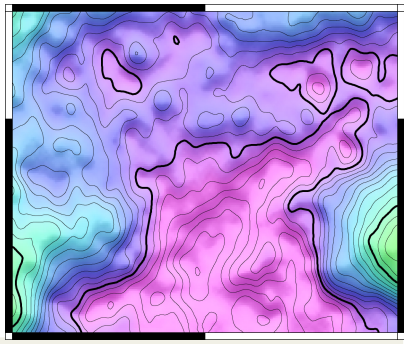


Objective:

Improve the resolution and accuracy of the global marine gravity field for seafloor mapping and tectonic investigations.

Tasks:

Use all available pre-SWOT altimetry to construct global sea surface slope grids at 6 km resolution for SWOT baseline CAL/VAL.

Use large-area multibeam seafloor surveys to construct 1 km sea surface slope maps for CAL/VAL of SWOT slope measurements.

Work with the SWOT science team to extract sea surface slope measurements at 2 km lengths scales at an accuracy of < 3 microradian.

Spend funds at a proper rate so they are not “harvested”.

Major error sources:

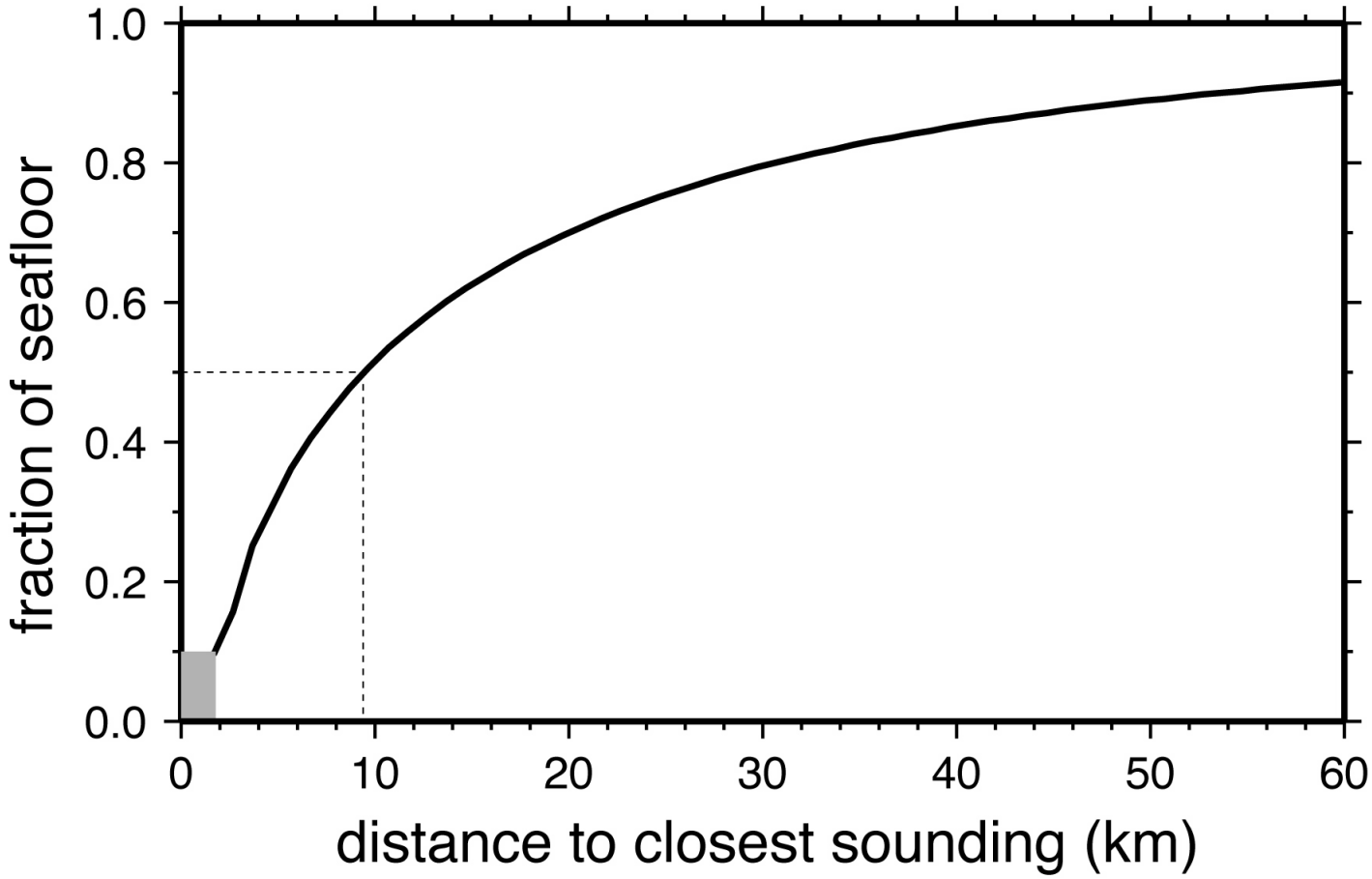
Ocean waves

Ocean mesoscale and sub-mesoscale variability

Coastal tides

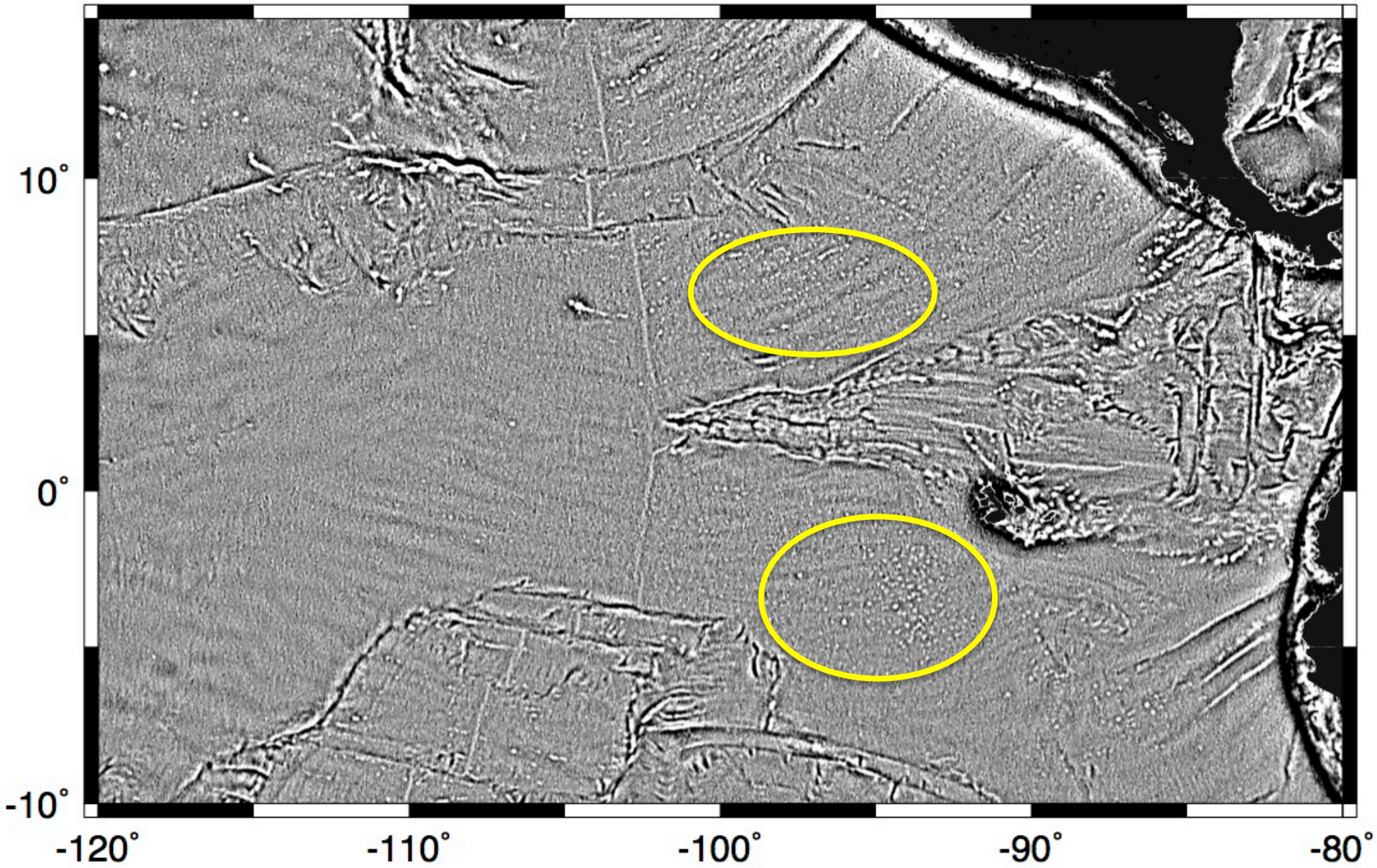
Suboptimal waveform retracking (see poster)

1/2 of global seafloor bathymetry not resolved at 10 km

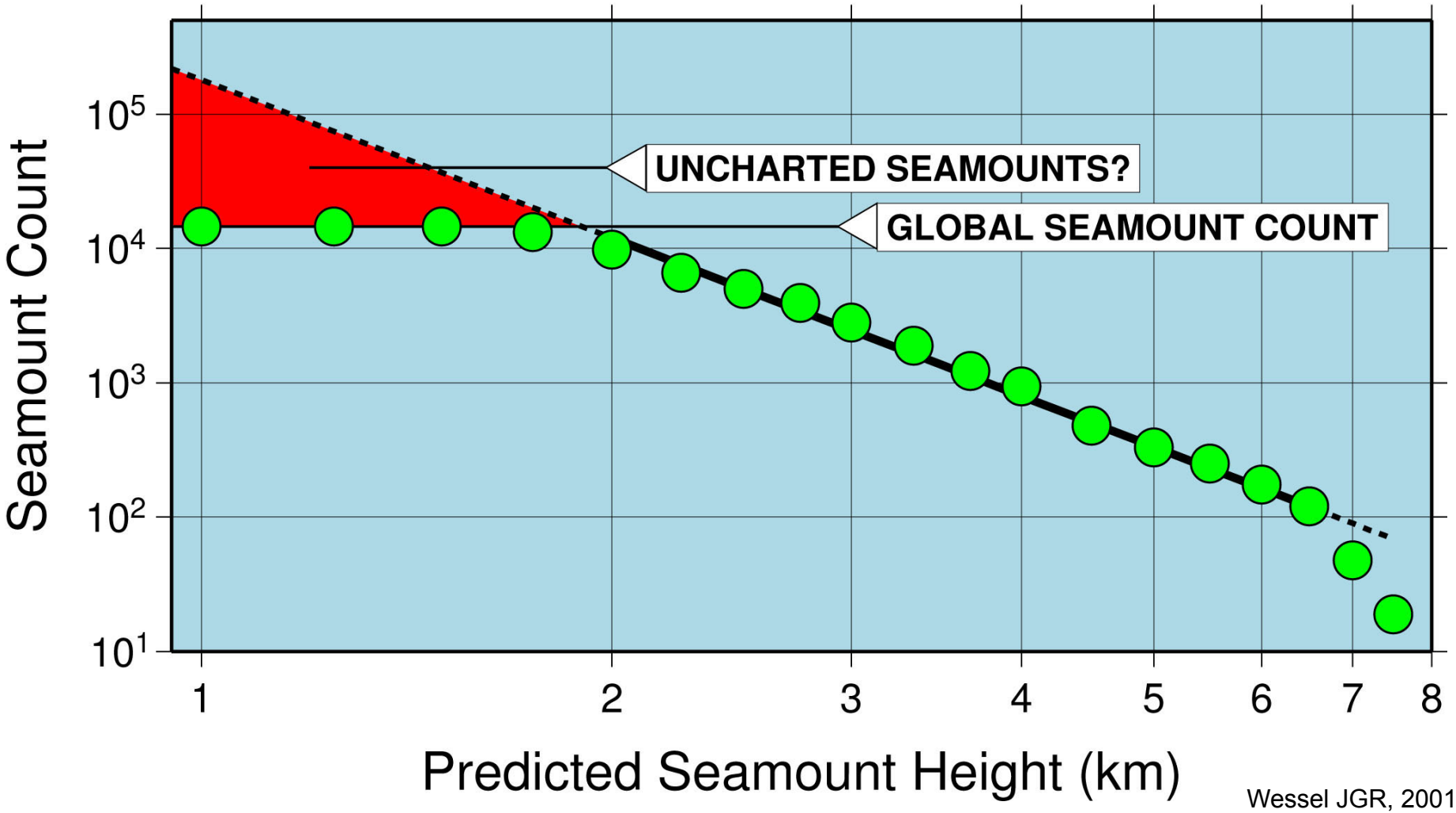


[Smith and Marks, 2009]

small seamounts



size distribution of seamounts

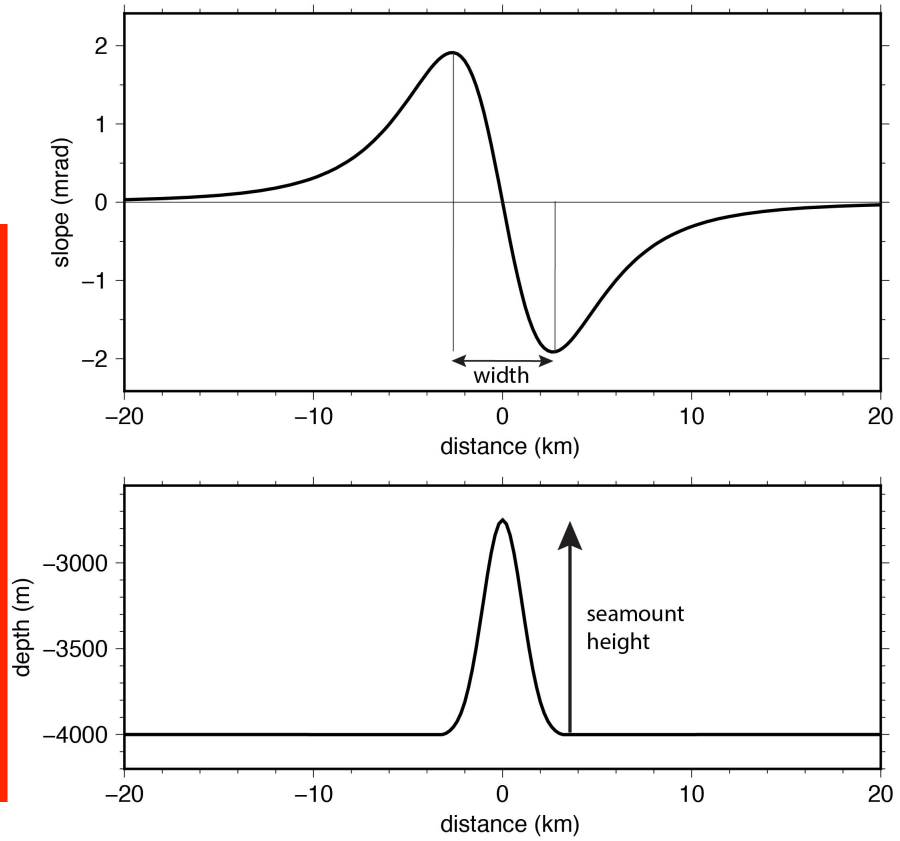


Wessel JGR, 2001

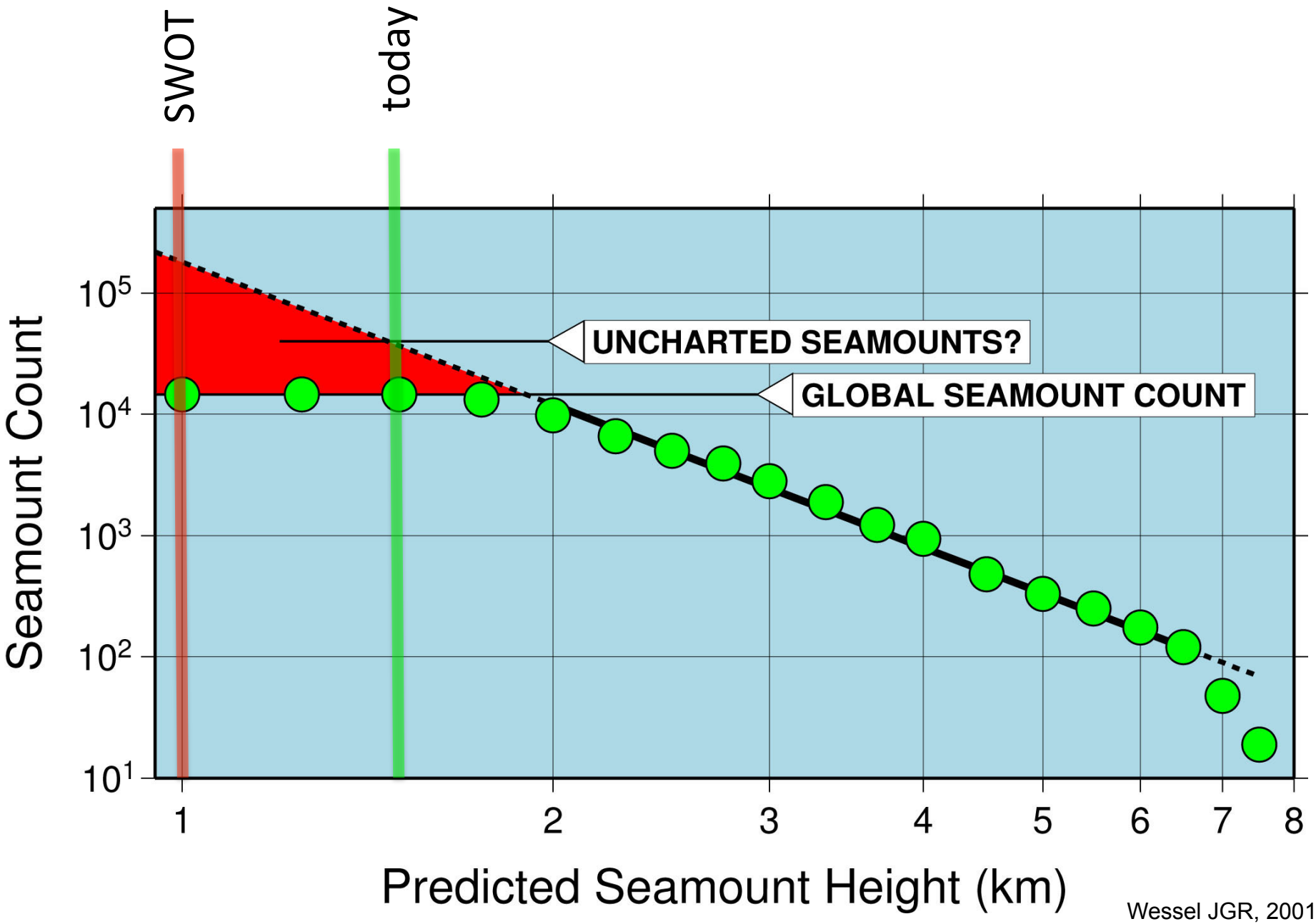
Signal of Gaussian Seamount

SWOT could resolve
all seamounts if slope noise
is less than 1 μrad at ~6 km
resolution or 3 μrad at ~2 km
resolution.

Need <500 m postings

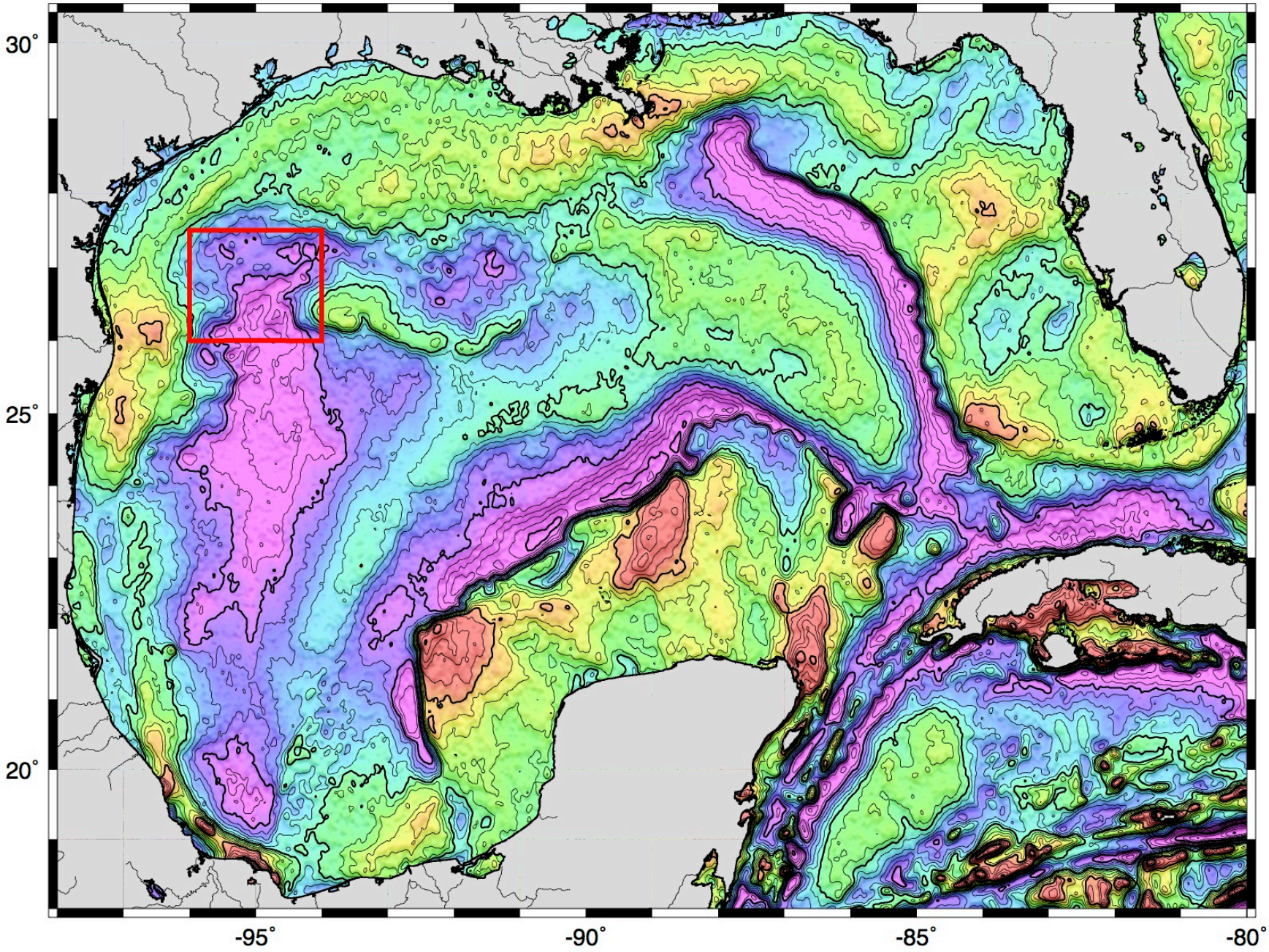


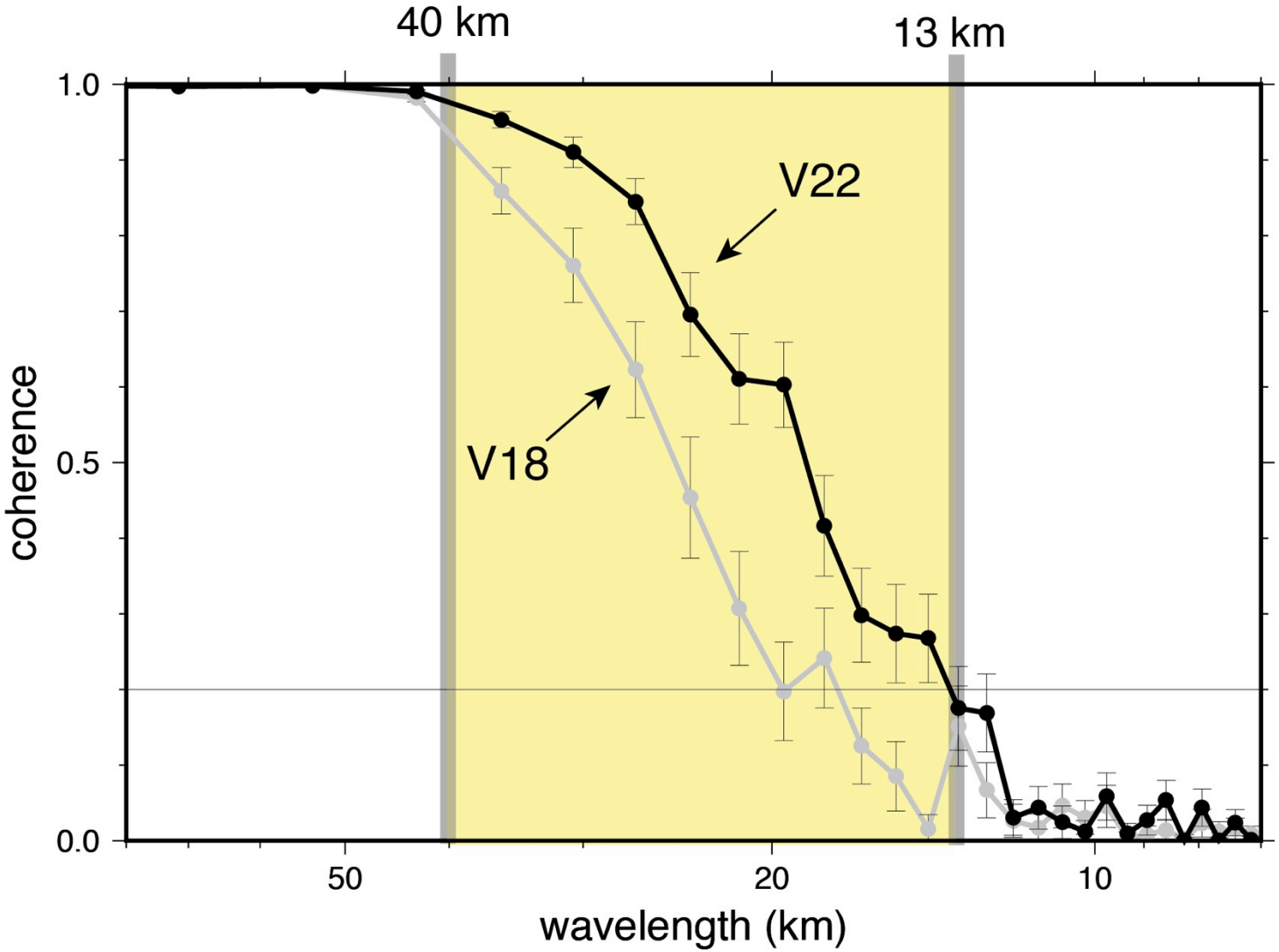
	seamount		sea surface		
	height (km)	radius (km)	slope (μrad)	width (km)	Δheight (mm)
after SWOT	**1.00**	**2.50**	**1.0**	**5.2**	**5.2**
	1.25	3.13	1.9	5.3	10.1
today	**1.50**	**3.75**	**3.2**	**5.4**	**17.3**
	2.00	5.00	7.3	5.6	40.9
	2.50	6.25	13.3	5.7	75.8
	3.00	7.50	21.7	5.8	125.9



Wessel JGR, 2001

Gravity Anomaly V22.1 (10 mGal contours)



spectral comparisons in the Gulf of Mexico

(V22 includes Jason-1 and CryoSat)