"Testing Kolmogorov on Russian Ships"

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KIPJ room E 7:55 to 8:45 am

Catastrophic Equatorial Icing Proof

45. Catastrophic Equatorial Icing events Crash Aircraft with Increasing Fr
Trieste, Italy, updated June 5, 2016, following comments of Referees. pp 13787

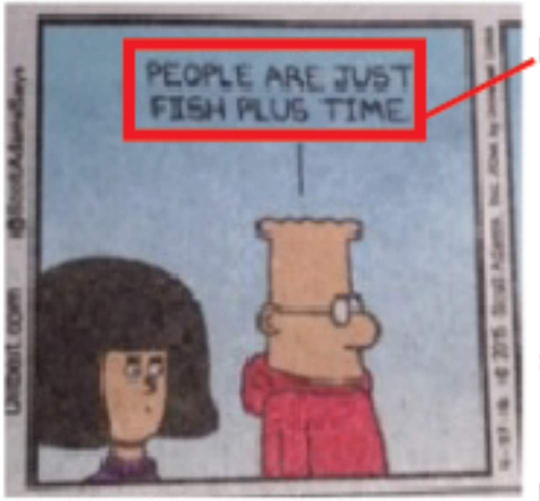
Figure 1. Catastrophic Equatorial Icing (CEI) events are shown by red stars. The cause is a rare combination of Equatorial hot water evaporation and intermittent surface winds.

Proof of fluid mechanical cosmology

Hot big bang turbulent combustion under Planck conditions: 10^{32} K, 10^{-35} m, 10^{-43} s creates universe in time of 10^{-27} s, mass 10^{97} kg.

Plasma epoch from $t > 10^{11}$ s when mass exceeds energy, until $t \sim 10^{12}$ s, when proto-galaxies fragment along vortex lines of the second turbulence: mass 10^{44} kg, size 10^{20} m, 10^{5} K to 10^{4} K.

Dilbert, LA Times, April 27, 2016



HGD Cosmology Precursor

Fish are just diatoms plus time in salt water oceans of dark matter planets seeded with life by cometary panspermia.

Gas epoch begins from $t > 10^{13}$ s when dark matter planets form in PGC clumps of a trillion, until today with $t \sim 10^{17}$ s. Cartoons like Dilbert likely began soon after the beginning of the biological big bang at 2 My, or 10^{14} s, when T decreased to ~ 300 K, comfortable to humans living on the ~ 10^{80} big bang dark matter planets that were most lucky.

No stars, planets, or Dilbert cartoons are possible from ΛCDMHC cosmology until $t > 10^{16}$ s. Try HGD.

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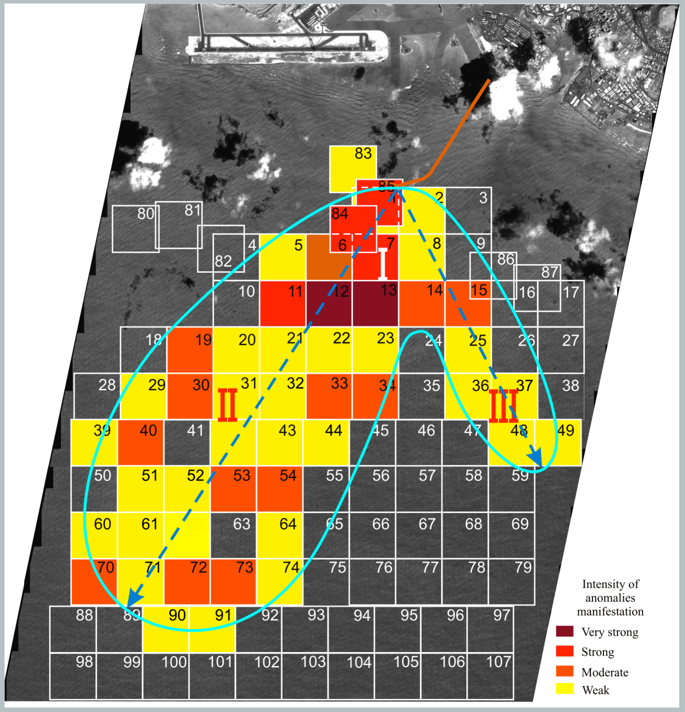
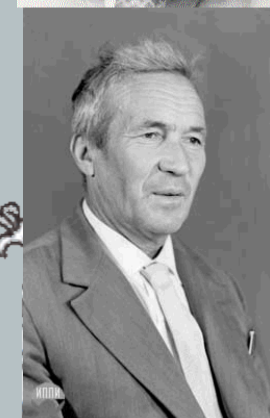
OUTLINE

- *Background*
- *Experiments*
- *Results*
- *Interpretation*
- *Conclusions*

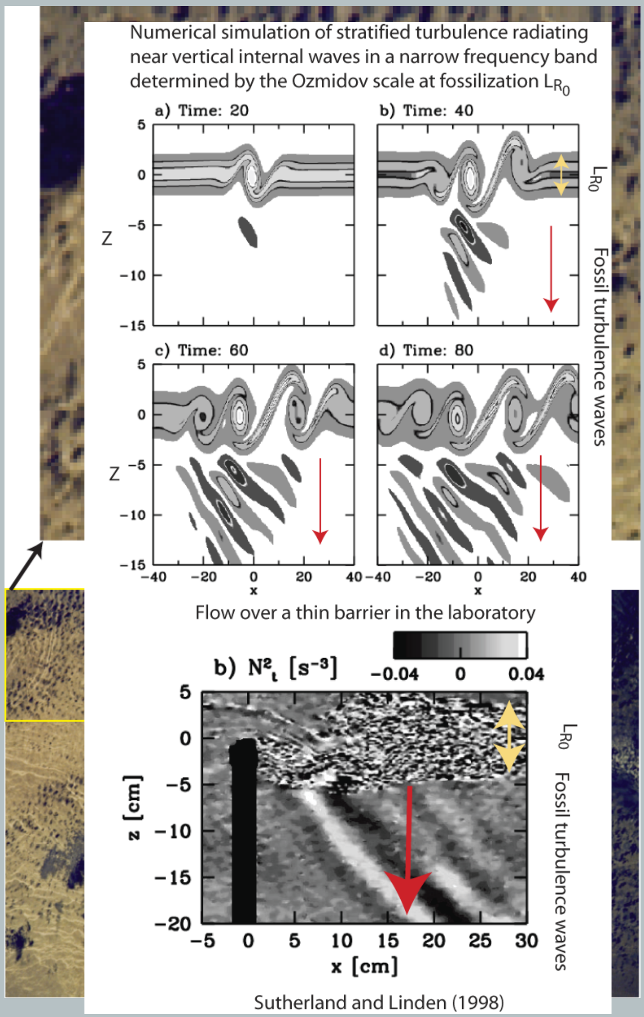


The Russian Team

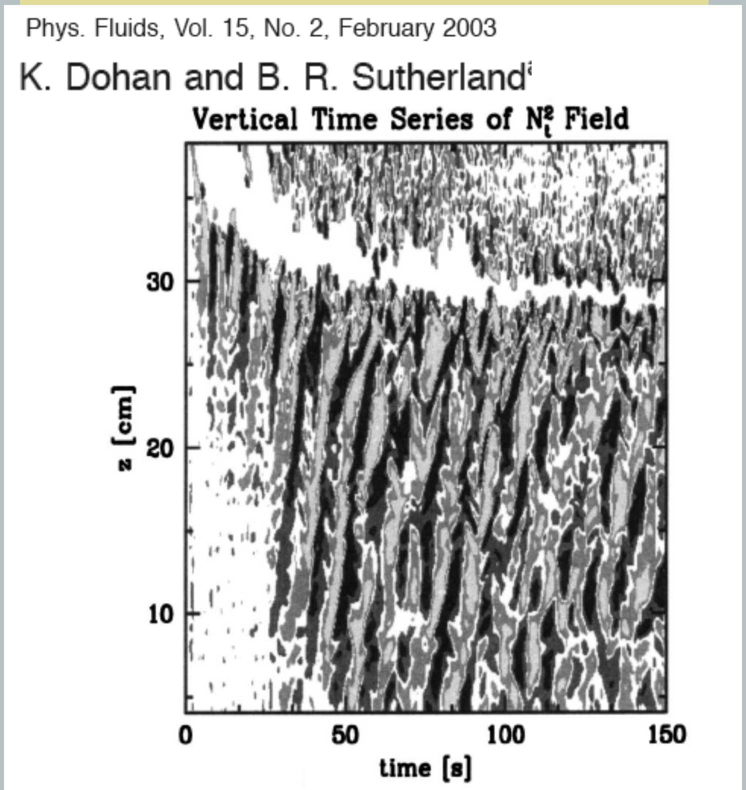
- *Academician Anatolii Ivanovich Savin (KOMETA)*
- *Academician Valerii Grigorievich Bondur (ISINTECH)*
- *Academician Walter Heinrichevich Munk (SIO)*



Optical and Radar Remote Sensing of Waves and Turbulence



Synthetic Aperture Radar Image of Eddies

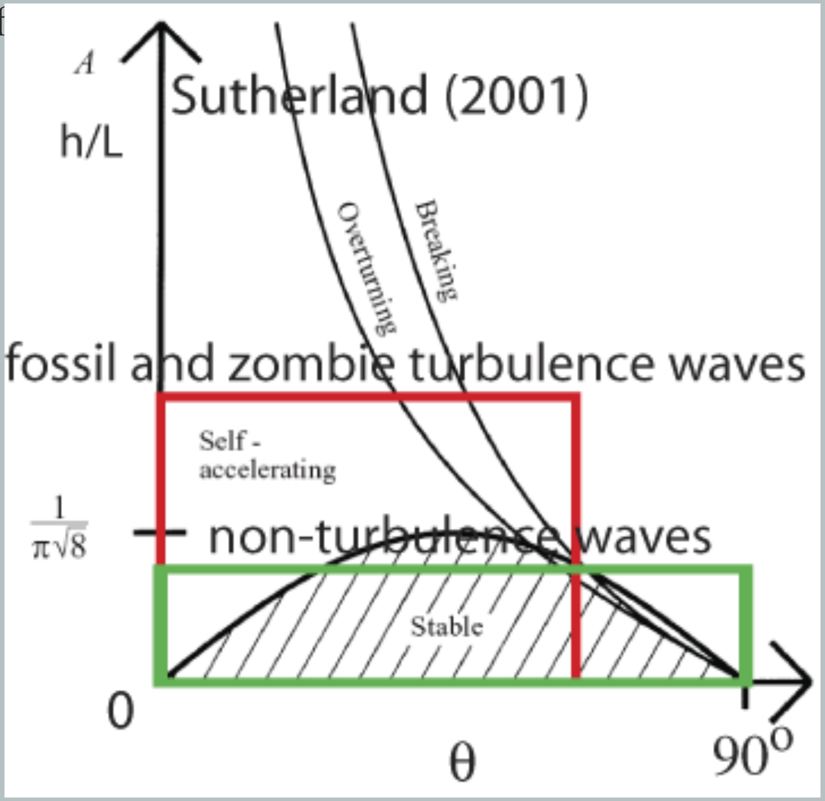


http://www.asf.alaska.edu/daac_documents/cdrom_docs/30420.html

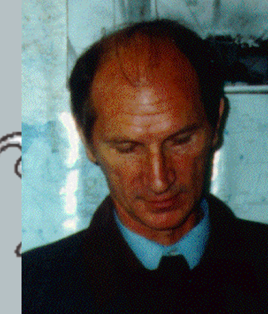
The wind is from the left (East, 4.1 m/s). Surface manifestations of atmospheric internal waves with 1-2 km wavelength are seen over the open sea eddies and the sea with < 50 % ice. 73 N 164 W, Aug. 24, 1992.

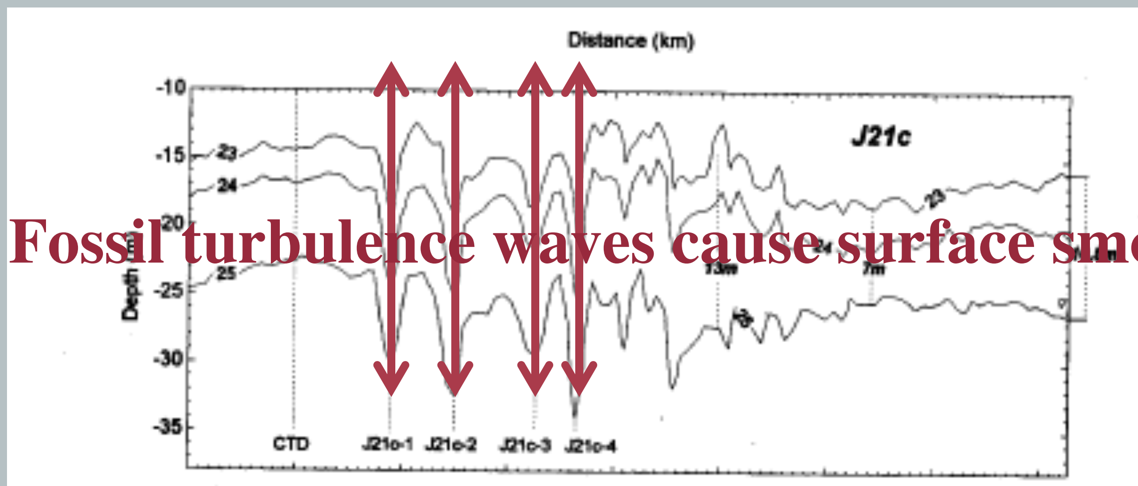
Linden-Sutherland Waves

- Linden, P. F. 1975, The deepening of a mixed layer in a stratified fluid, J. Fluid Mech. 71, 385-405
- Sutherland, B. R. and Linden, P. F. 1998. Internal wave excitation from stratified flow over a thin barrier, J. Fluid Mech. 377, 223-252
- Sutherland, B. R. 2001, Finite-amplitude internal wavepacket dispersion and breaking, J. Fluid Mech. 429, 343-380
- Dohan, K. and Sutherland, B. R. 2003, Internal waves generated from a turbulent mixed region, Physics of Fluids 15, 488-498



Solitons radiated by topography

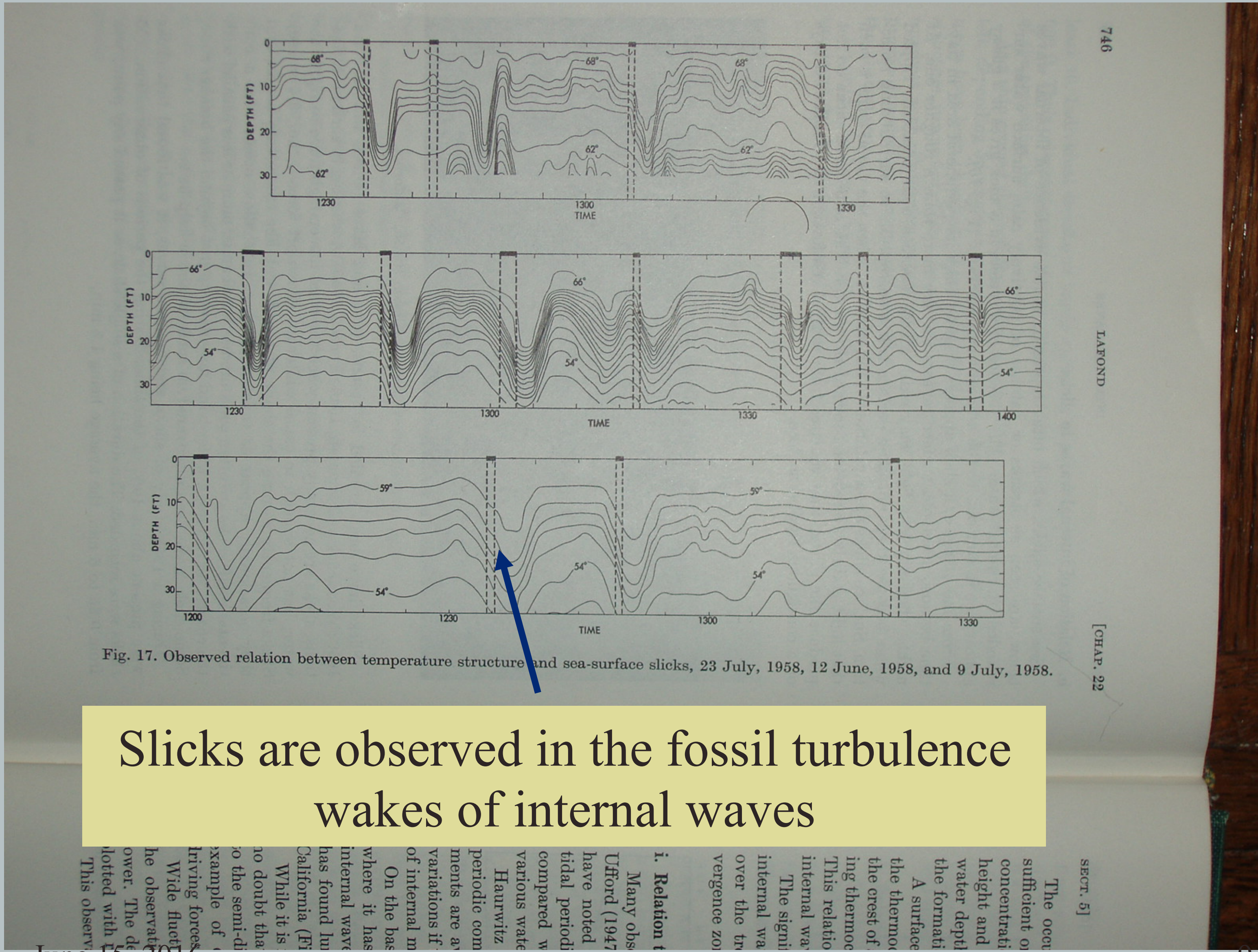




Fossil turbulence waves cause surface smoothing

Intermittent narrow-frequency-band soliton wave packets were radiated by tides interacting with continental shelf features. Remote sensing was used to direct **Vadim Paka** and the Akademik Ioffe to get sea truth.

Internal waves and sea surface smoothing



Slicks are observed in the fossil turbulence wakes of internal waves

Structure and Generation of Turbulence at Interfaces Strained by Internal Solitary Waves Propagating Shoreward over the Continental Shelf

J.N. Moum[1], D.M. Farmer[2] , W.D. Smyth[1], L. Armi[3], S. Vagle[4]

[1]College of Oceanic and Atmospheric Sciences, Oregon State University
[2]Graduate School of Oceanography, University of Rhode Island
[3]Scripps Institution of Oceanography
[4]Institute of Ocean Sciences, Sidney, B.C.

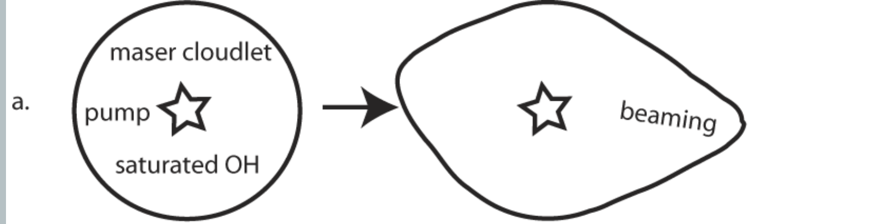
revised J. PHYS. OCEANOGR.

February 27, 2003

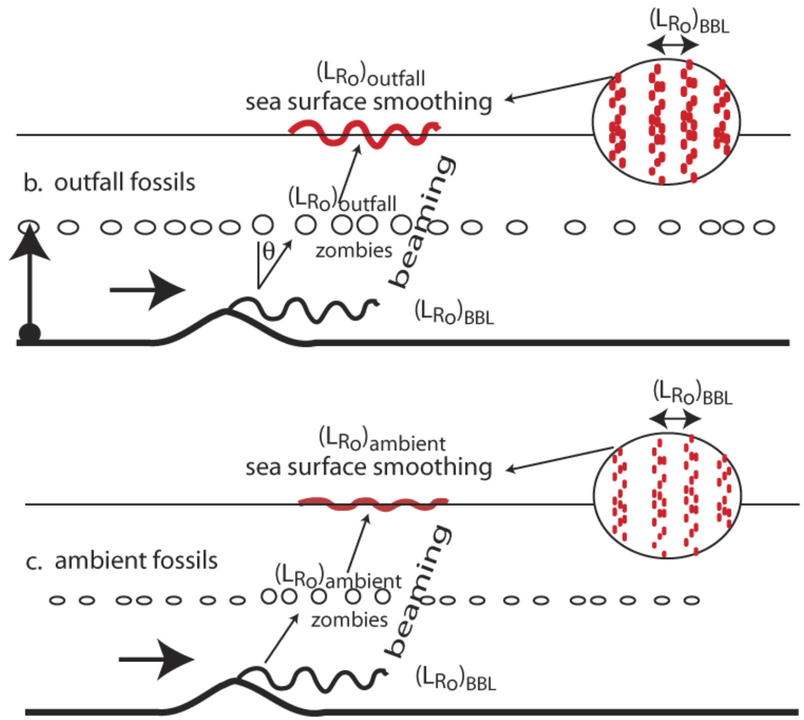
Beamed Zombie Turbulence Maser Action Mixing Chimneys

- *BZTMA internal wave beaming by outfall fossil patches to sea surface is closely analogous to astrophysical maser beams*
- *Bottom topography intermittently produces fossil-turbulence internal waves at 30-250 m scales determined by $(L_{R0})_{BBL}$*
- *RASP-ISINTECH detection of turbulence results from outfall zombie turbulence waves vertically beaming $(L_{R0})_{BBL}$ patterns at $(L_{R0})_{Outfall}$ scales < $(L_{R0})_{Ambient}$*
- *Mechanism is non-linear, intermittent in space, intermittent in time, and involves fossil and zombie turbulence processes*
- *Microstructructure sea truth requires horizontal and vertical profiling to detect anomalies in mixing rates and patch hydrodynamic phase diagrams*

June 15, 2016



Saturation and beaming in astrophysical masers, Alcock and Ross (1985ab,1986)



Intermittent near vertical internal wave radiation from bottom topography turbulence

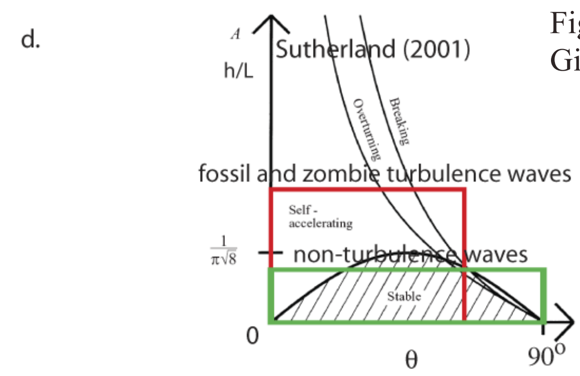
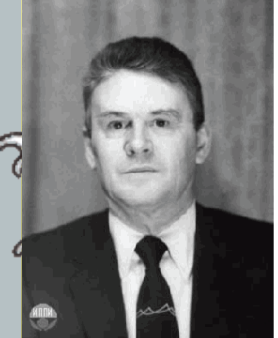
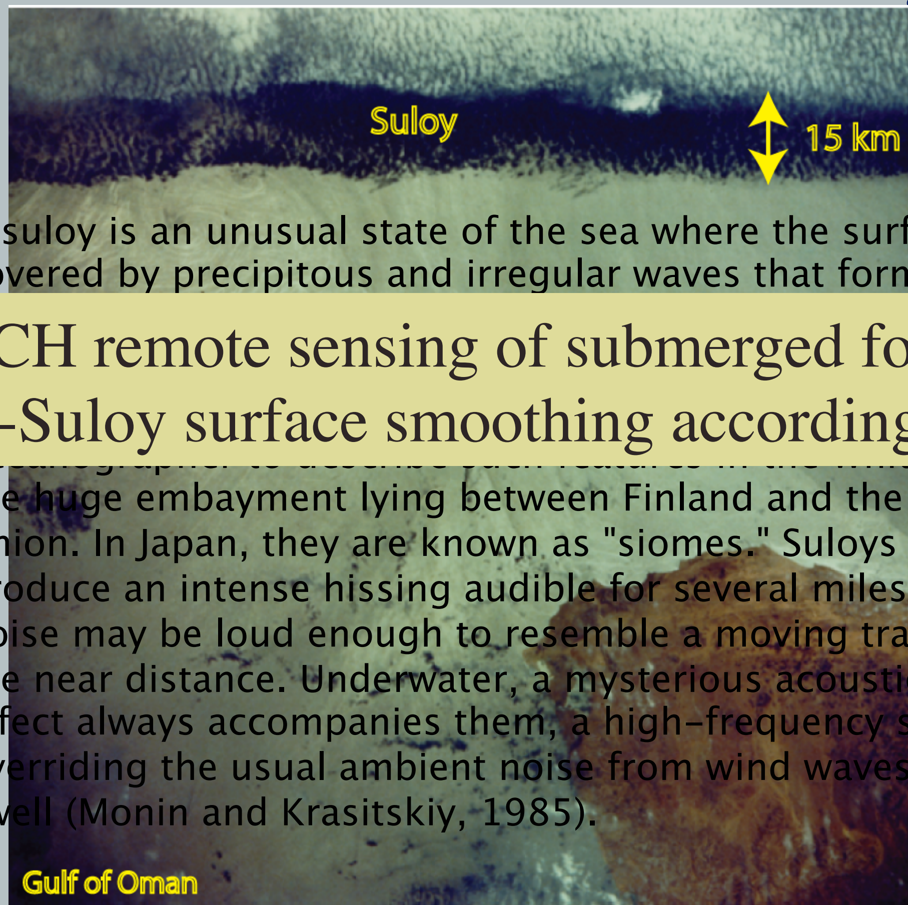


Fig. 3 Keeler, Bondur, Gibson (GRL, 2005)



Non-linear internal wave surface effects…Suloys



A suloy is an unusual state of the sea where the surface is covered by precipitous and irregular waves that form …

The ISINTECH remote sensing of submerged fossil outfall turbulence is due to mini-Suloy surface smoothing according to the BZTMA model

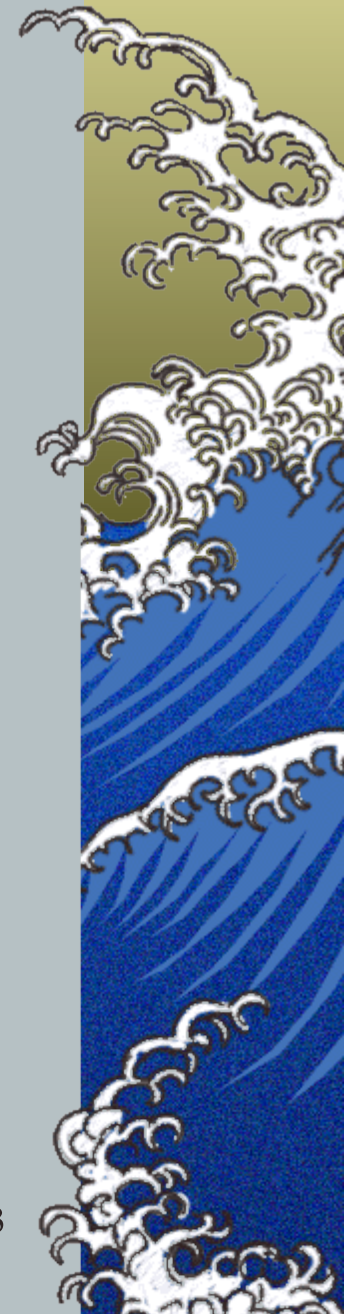
… the huge embayment lying between Finland and the Soviet Union. In Japan, they are known as "siomes." Suloys produce an intense hissing audible for several miles. The noise may be loud enough to resemble a moving train in the near distance. Underwater, a mysterious acoustic effect always accompanies them, a high-frequency sound overriding the usual ambient noise from wind waves and swell (Monin and Krasitskiy, 1985).

What is turbulence? What is fossil turbulence?

Turbulence is defined as an eddy-like state of fluid motion where the inertial-vortex forces of the eddies are larger than any other forces that tend to damp the eddies out.

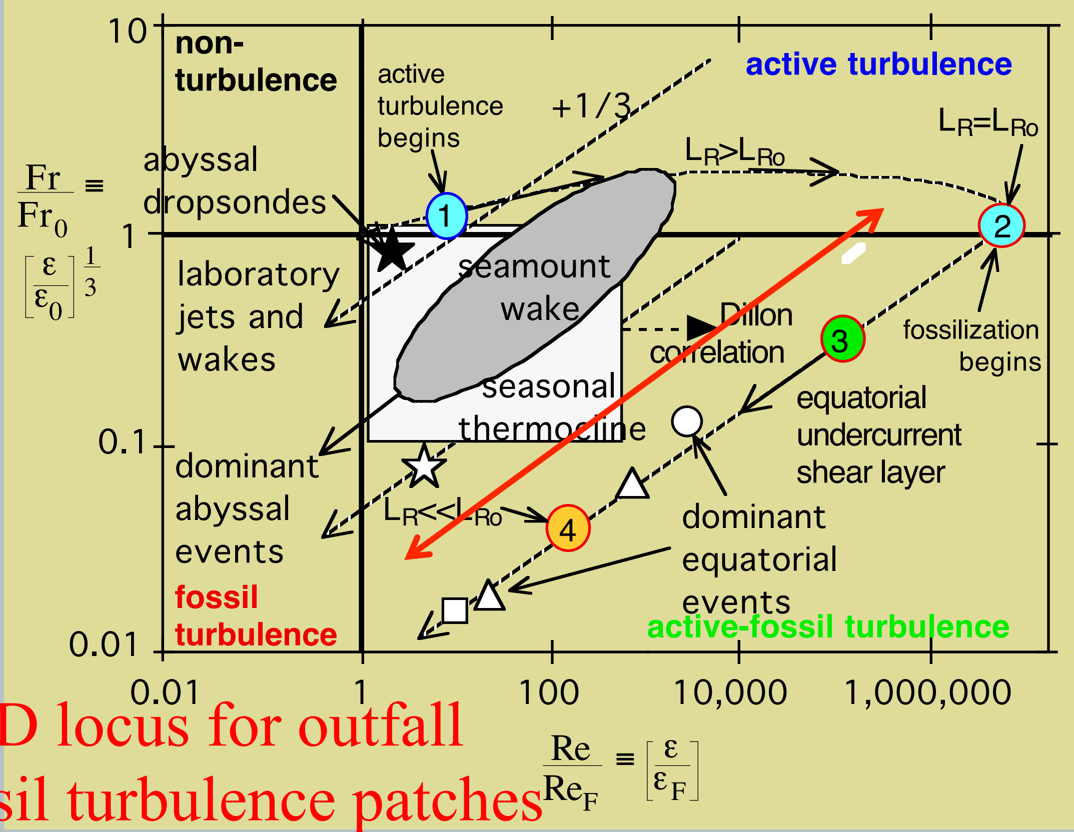
$$\vec{v} \times \vec{\omega}$$

Fossil turbulence is defined as a perturbation in any hydrophysical field produced by turbulence that persists after the fluid is no longer turbulent at the scale of the perturbation.



Oceanic Fossil Turbulence

Hydrodynamic Phase Diagrams show most oceanic microstructure patches are partially fossilized



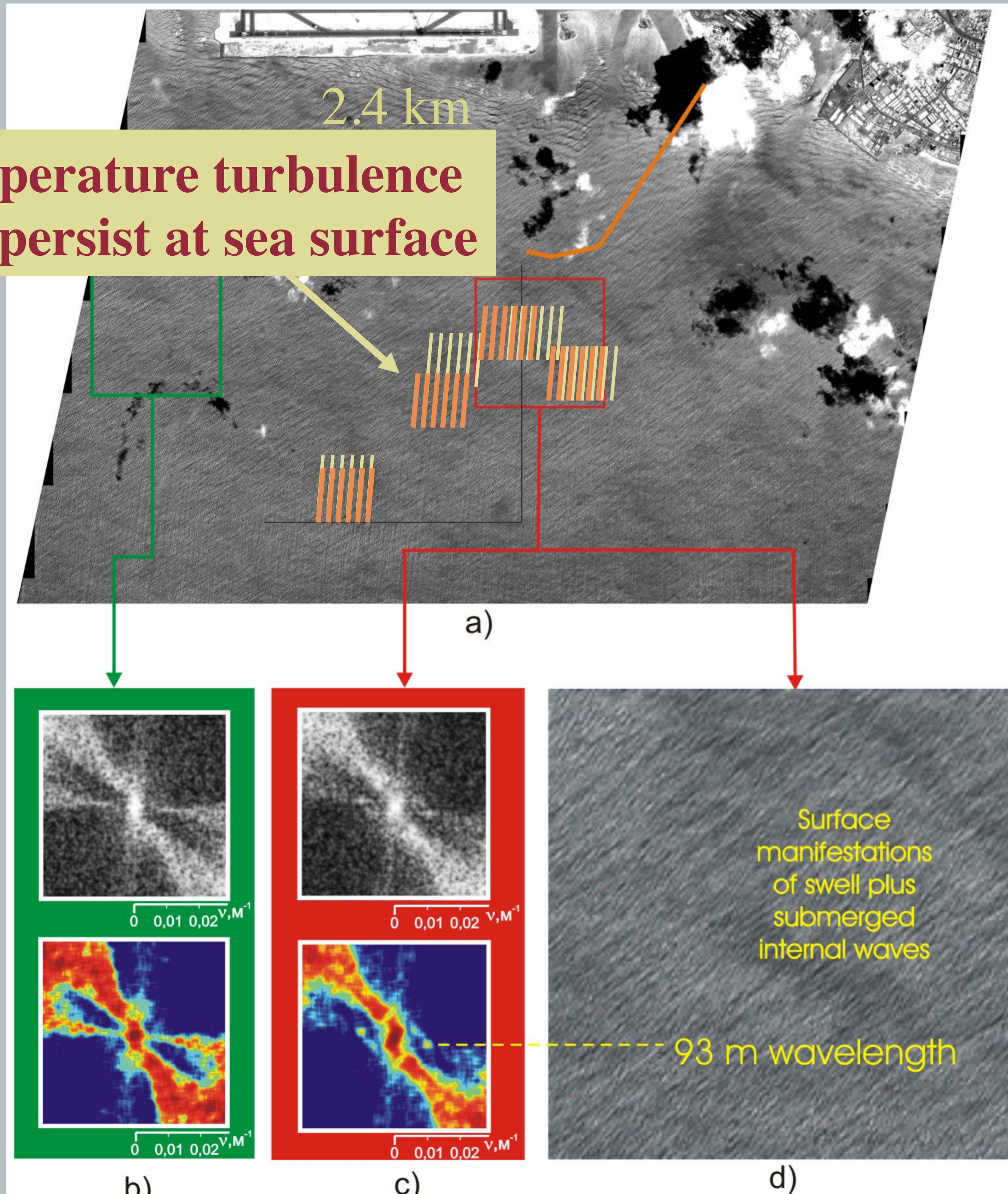
HPD locus for outfall fossil turbulence patches

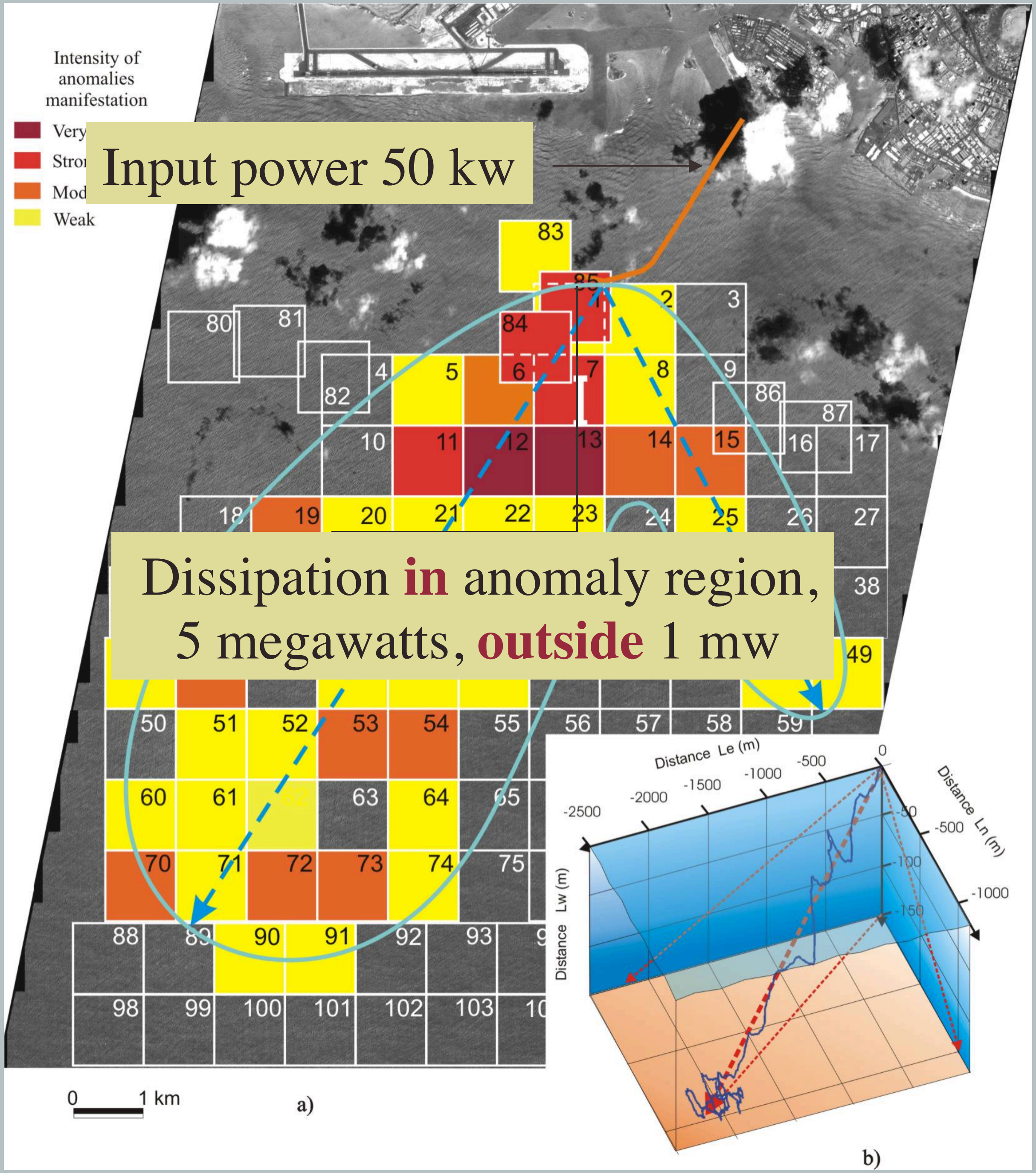
The RASP Microstructure Team

MSS09 (foreground) and MSS13 (background) MSS12 (catamaran) on HAPA

Catamaran Tow Body

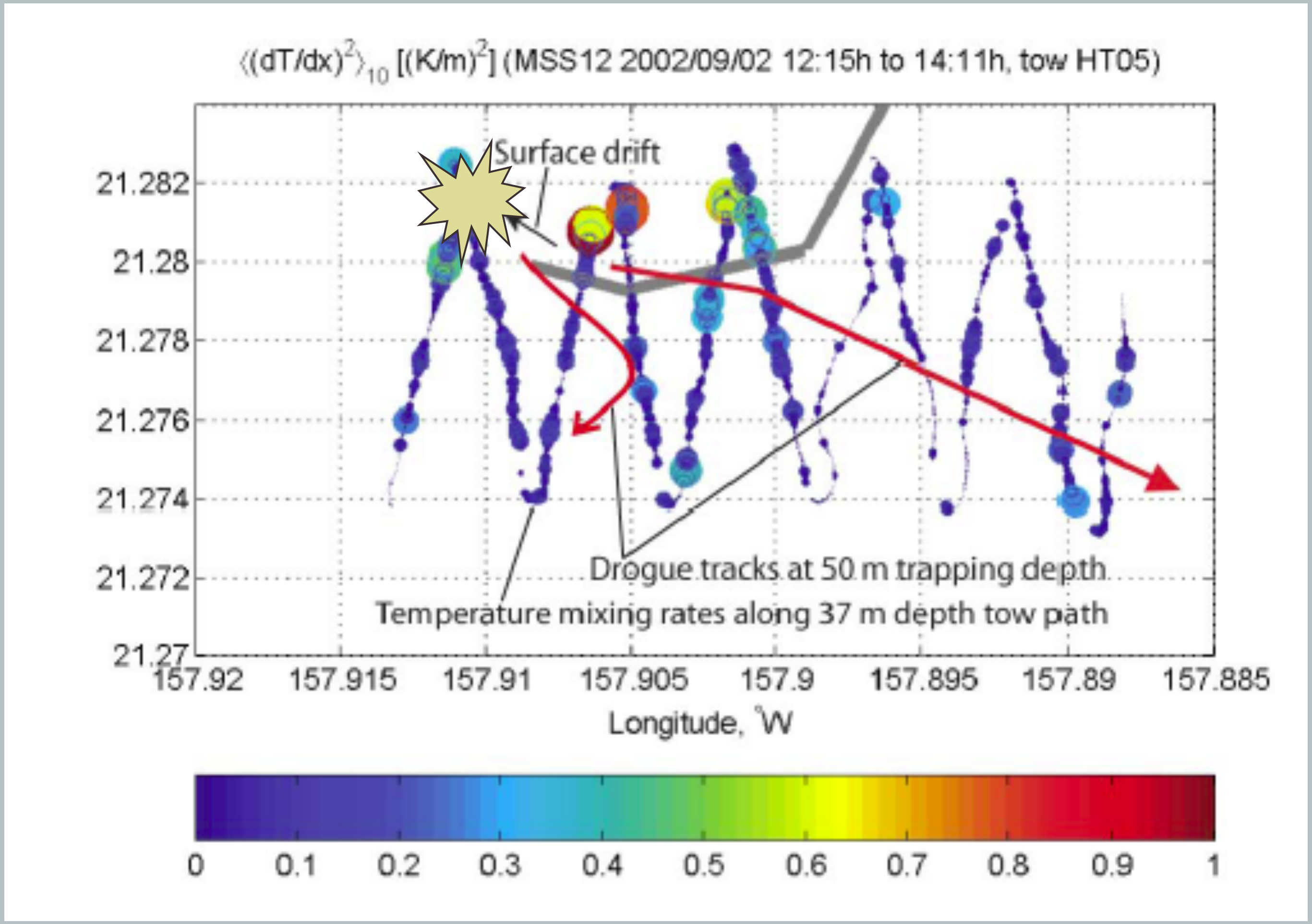
Fossil temperature turbulence remnants persist at sea surface



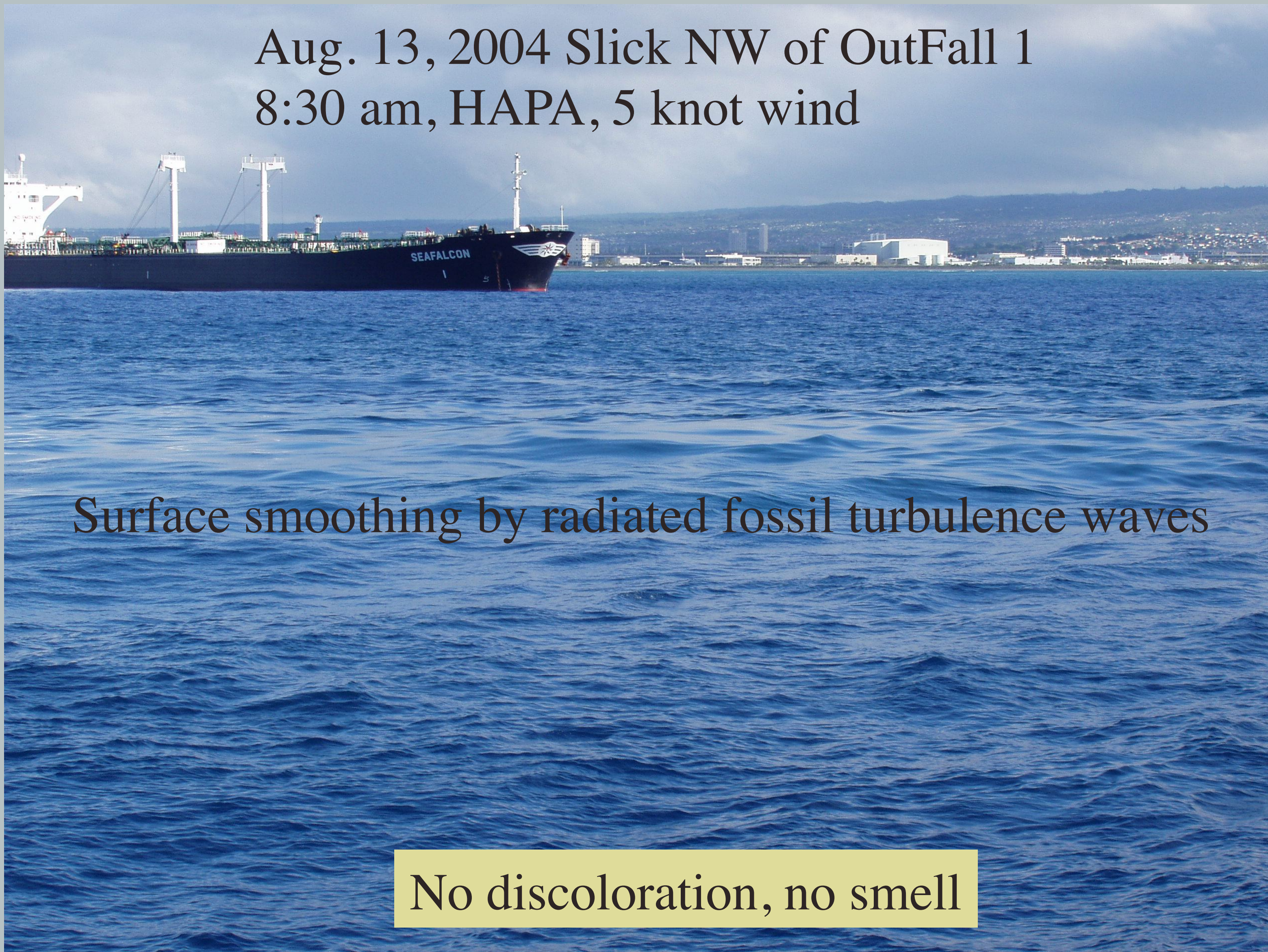


Intensity of anomalies manifestation
Very
Stro
Mod
Weak
Input power 50 kw
Dissipation **in** anomaly region,
5 megawatts, **outside** 1 mw
0 1 km
a)
Distance Le (m)
Distance Ln (m)
Distance Lw (m)
b)

Enhanced temperature mixing above trapping depth



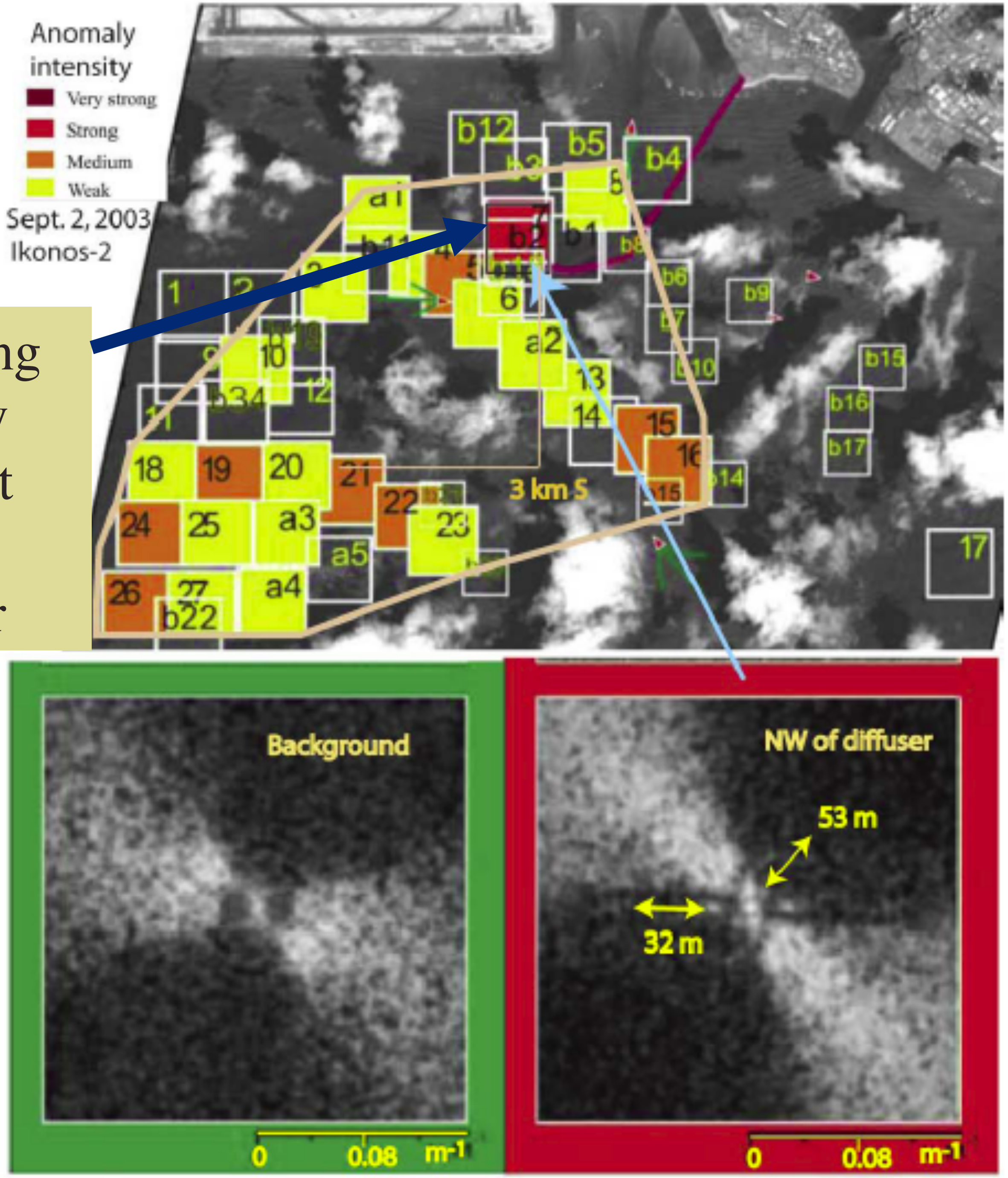
Aug. 13, 2004 Slick NW of OutFall 1
8:30 am, HAPA, 5 knot wind

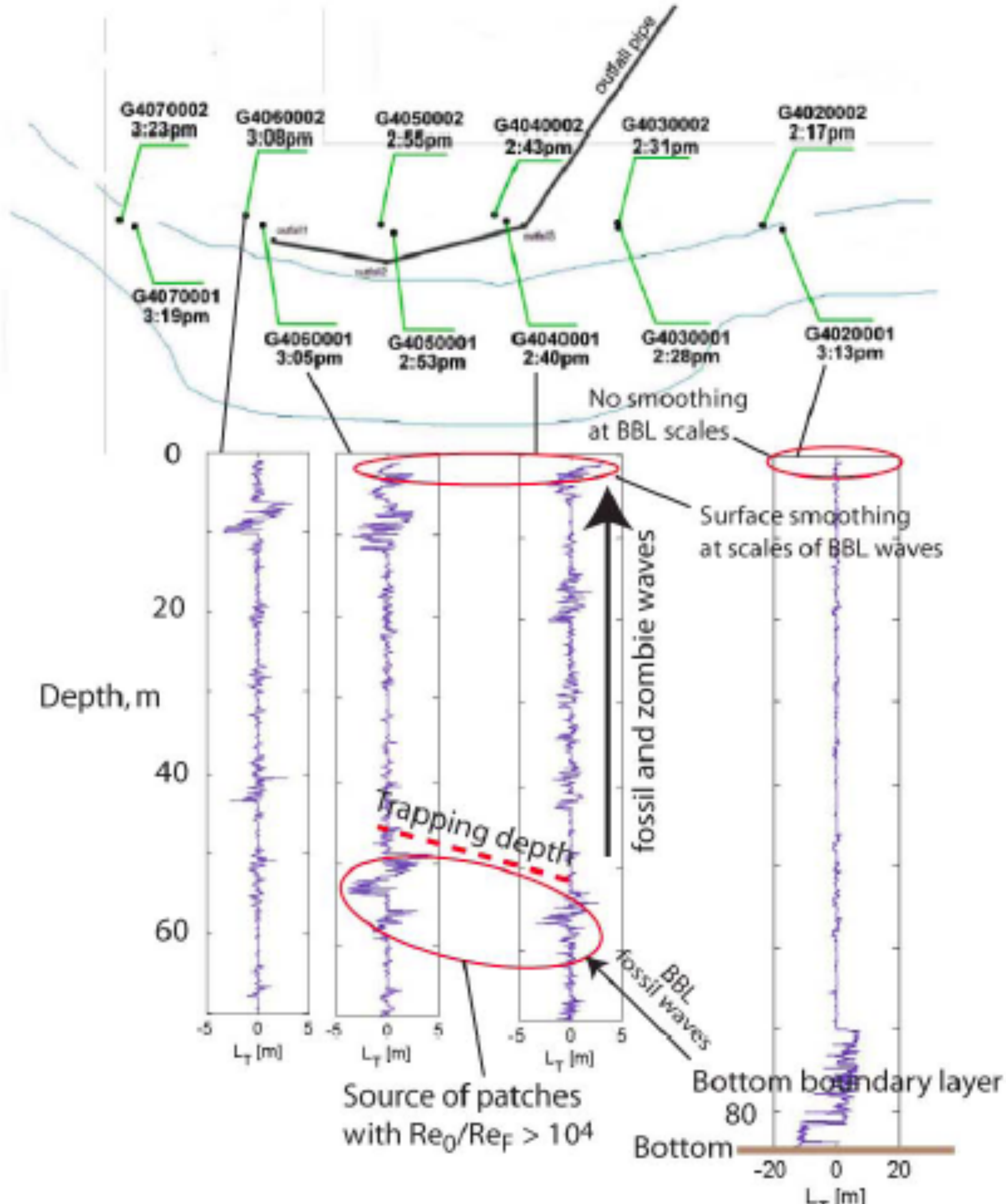


Surface smoothing by radiated fossil turbulence waves

No discoloration, no smell

Very strong anomaly fragment NW of diffuser





outfall pipe
G4070002
3:23pm
G4060002
3:08pm
G4050002
2:58pm
G4040002
2:43pm
G4030002
2:31pm
G4020002
2:17pm
G4070001
3:19pm
G4060001
3:05pm
G4050001
2:53pm
G4040001
2:40pm
G4030001
2:28pm
G4020001
3:13pm
No smoothing
at BBL scales
Surface smoothing
at scales of BBL waves
fossil and zombie waves
Depth, m
0
20
40
60
80
Trapping depth
BBL
fossil waves
Source of patches
with $Re_0/Re_F > 10^4$
Bottom boundary layer
Bottom
L_T [m]
-5 0 5
-20 0 20

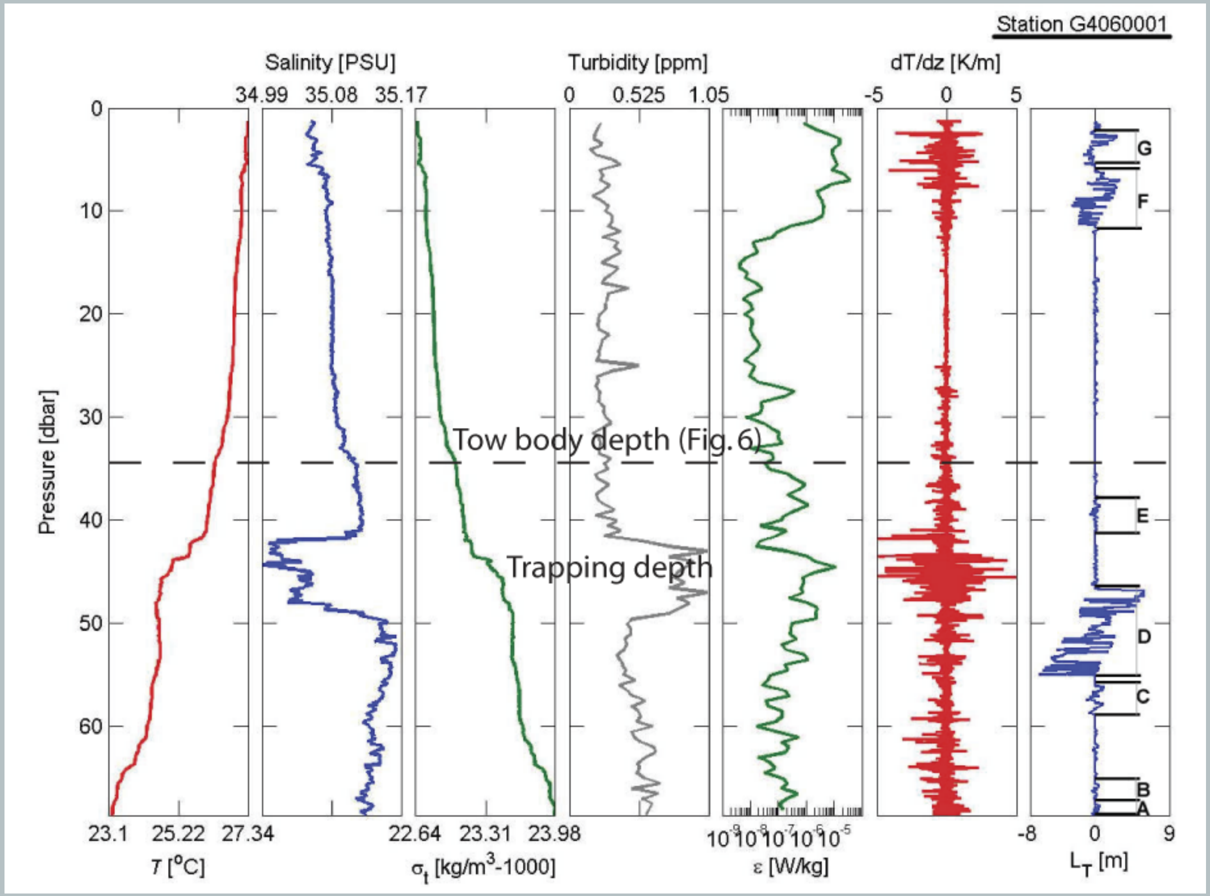
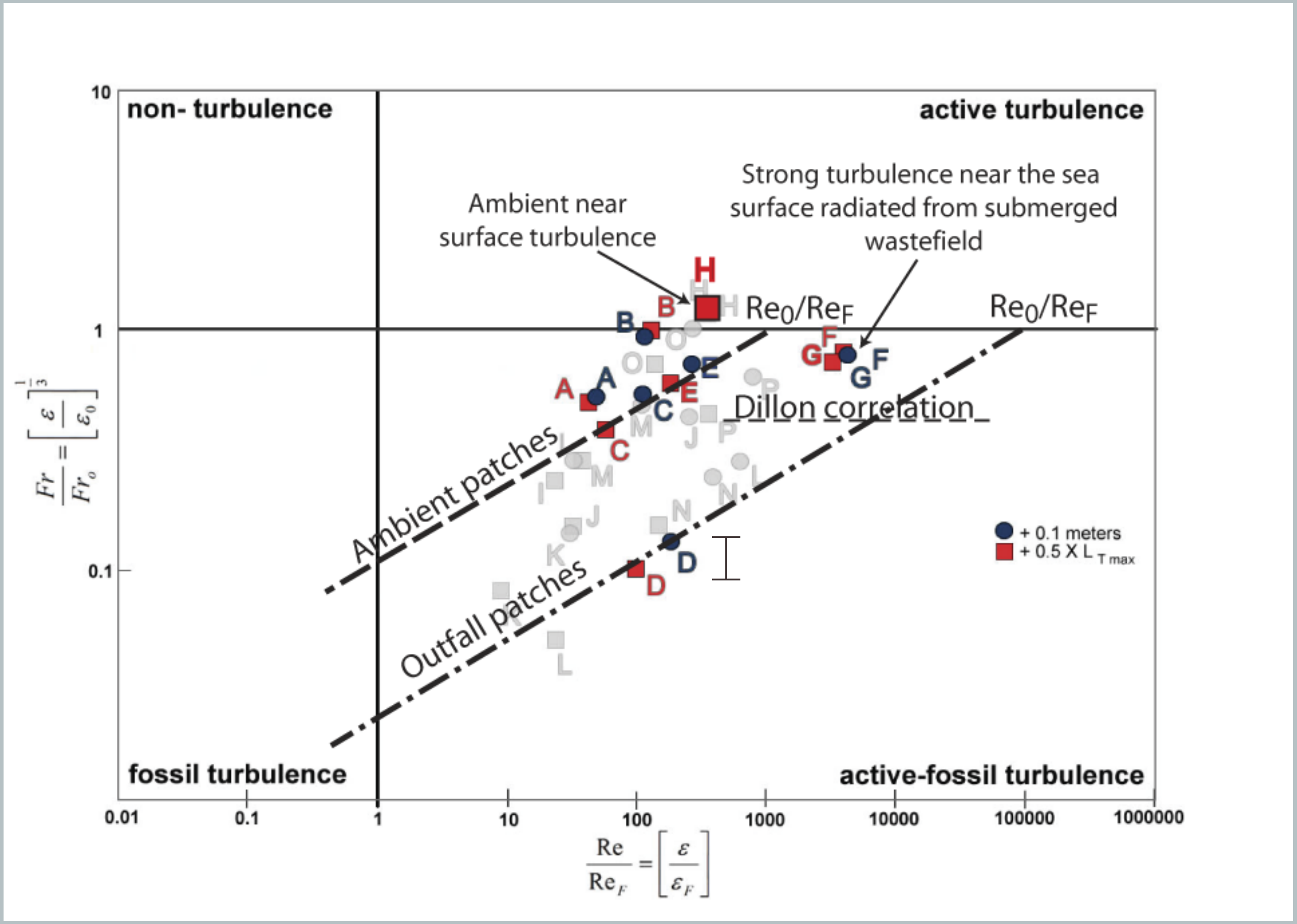
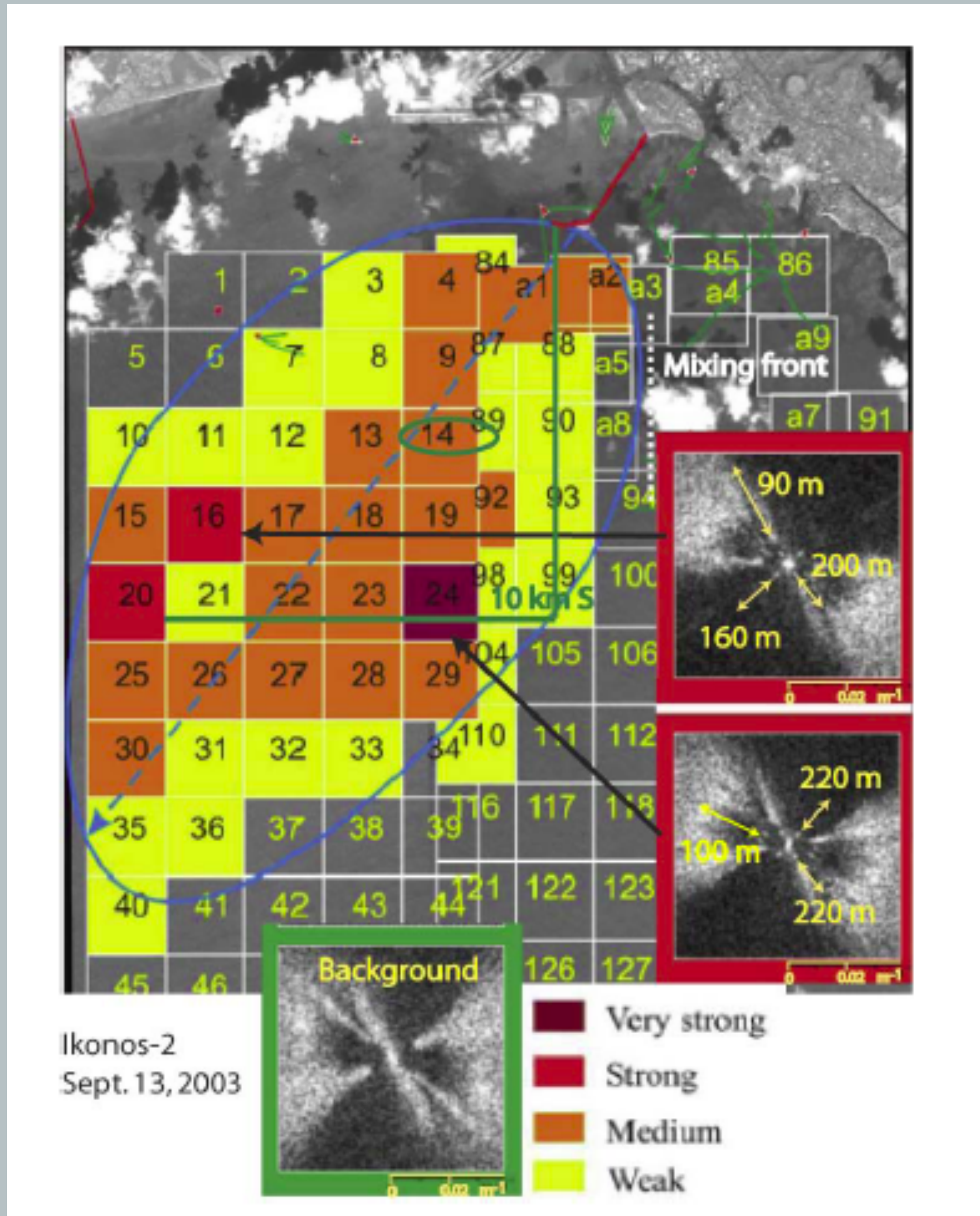
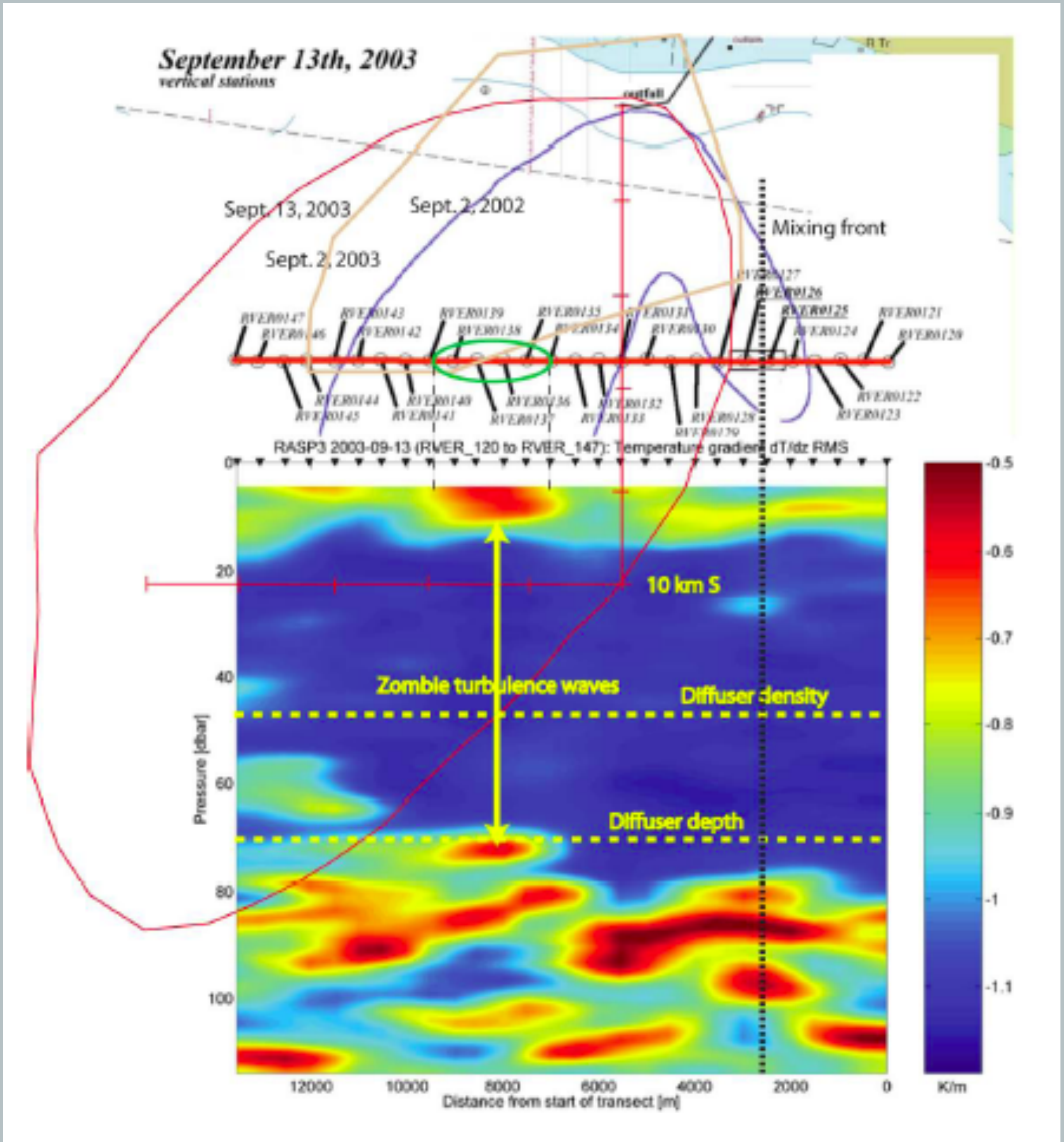


Figure 4. Vertical profiles of temperature T, salinity S, density σ, turbidity, viscous dissipation rate ε, temperature gradients, and Thorpe density displacement scales L_T near the end of the diffuser, on 09/02/2002. The low salinity, high turbidity signature of the trapped wastefield is seen at 42-50 meters depth. Microstructure patches with density overturns A, B, C, D, E, F, and G were identified for analysis from the Thorpe displacement profile on the right. The strong turbulence activity of F and G (compared to ambient near surface turbulence patches) is taken as evidence of near vertical radiation (45 degrees) of internal waves by fossil turbulence patches like D.

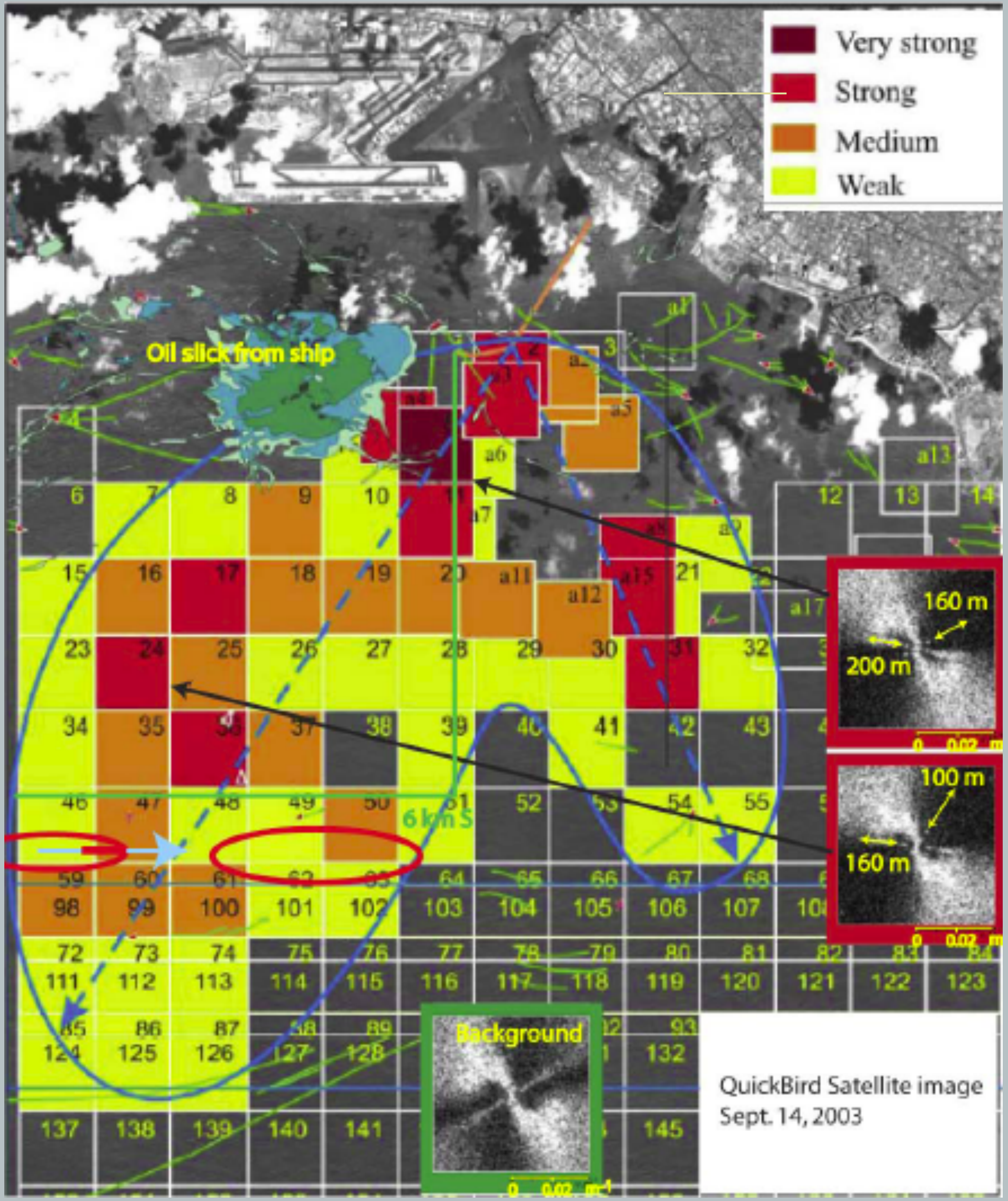
Hydrodynamic Phase Diagram for outfall and ambient patches

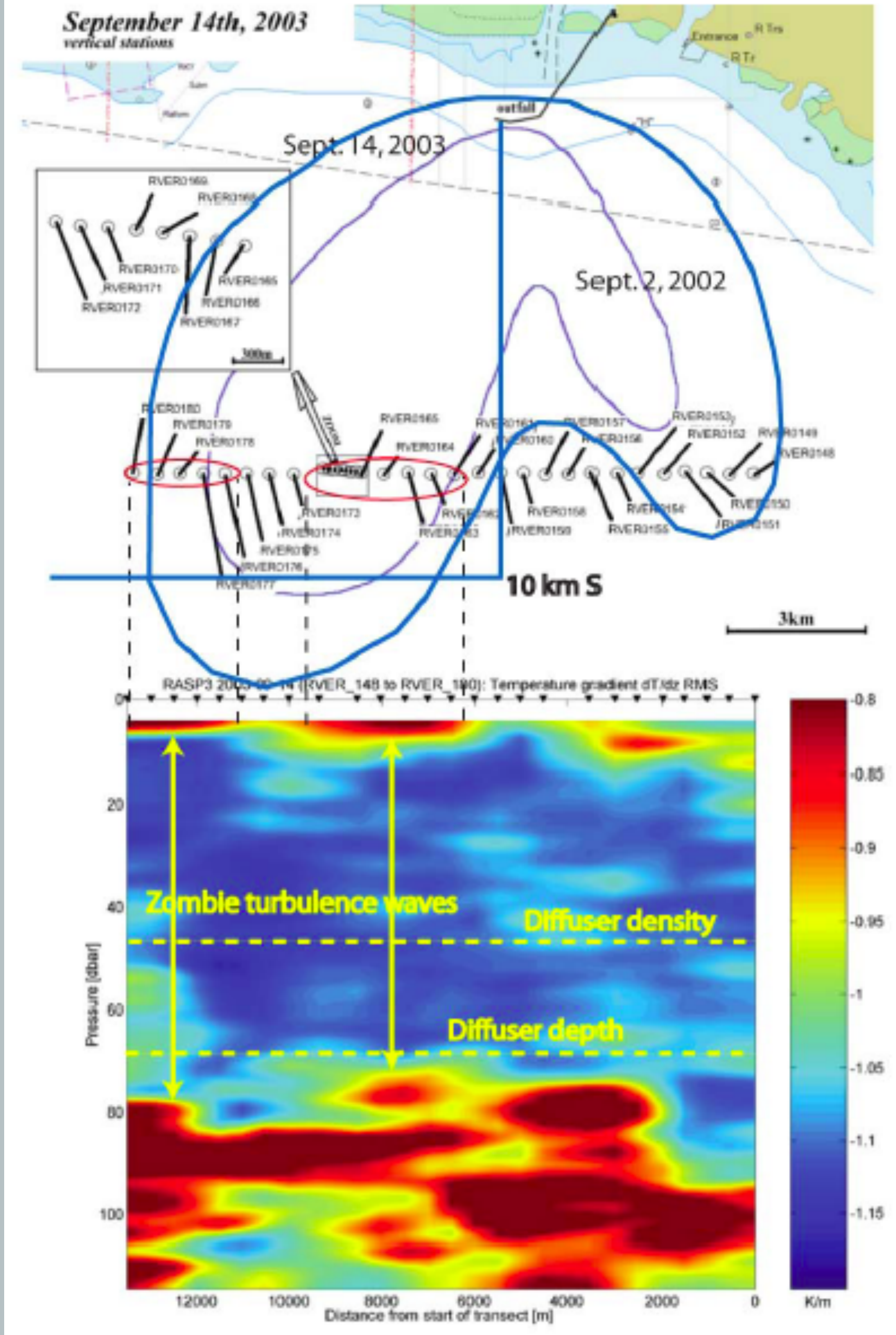


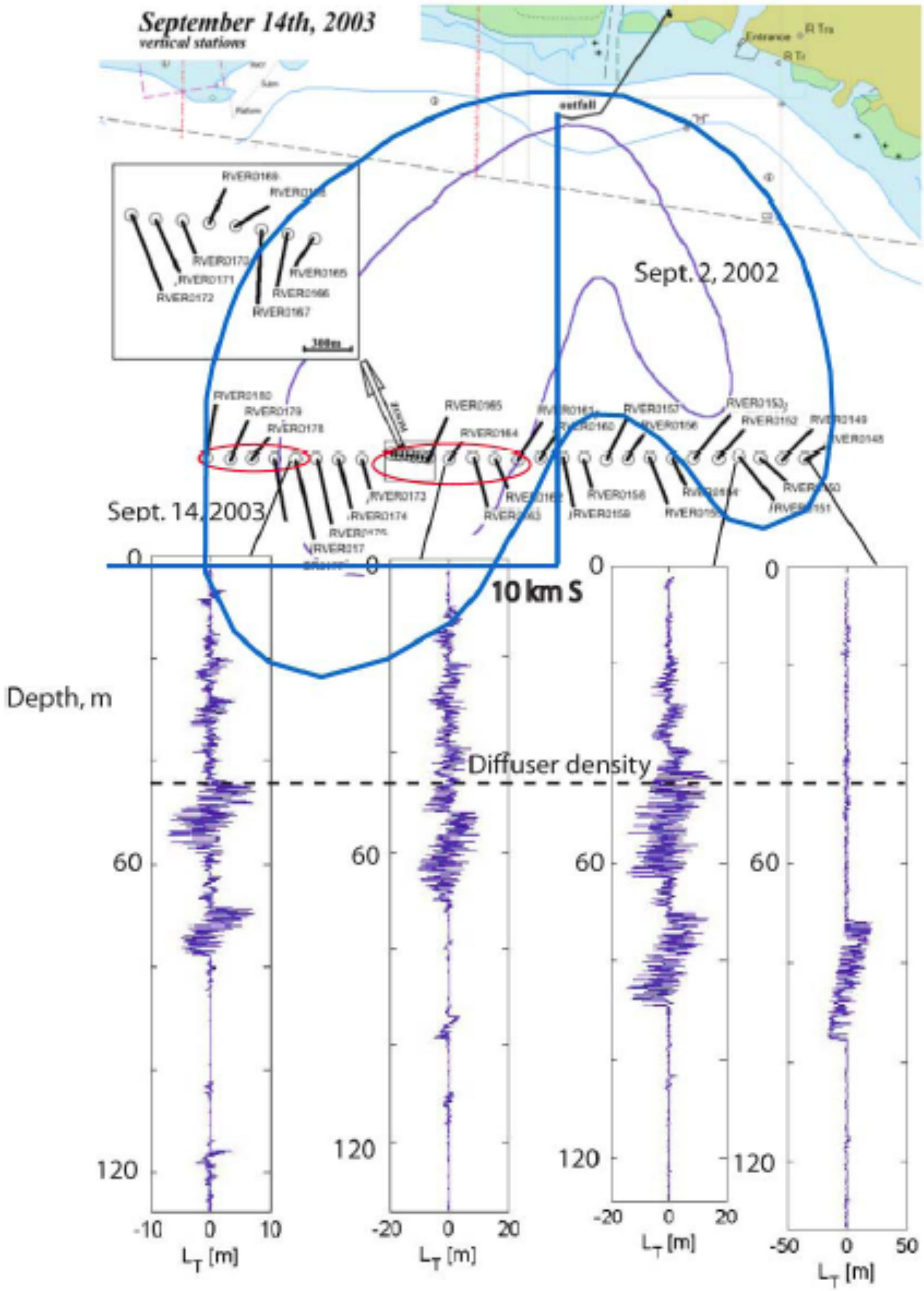

Mixing front
10 km S
90 m
200 m
160 m
220 m
100 m
220 m
Background
Very strong
Strong
Medium
Weak
Ikonos-2
Sept. 13, 2003



September 13th, 2003
vertical stations
outfall
Sept. 13, 2003
Sept. 2, 2002
Sept. 2, 2003
Mixing front
RASP3 2003-09-13 (RVER_120 to RVER_147): Temperature gradient dT/dz RMS
10 km S
Zombie turbulence waves
Diffuser density
Diffuser depth
Pressure [dbar]
Distance from start of transect [m]
K/m


Very strong
Strong
Medium
Weak
Oil slick from ship
160 m
200 m
100 m
160 m
6 km S
Background
QuickBird Satellite image
Sept. 14, 2003

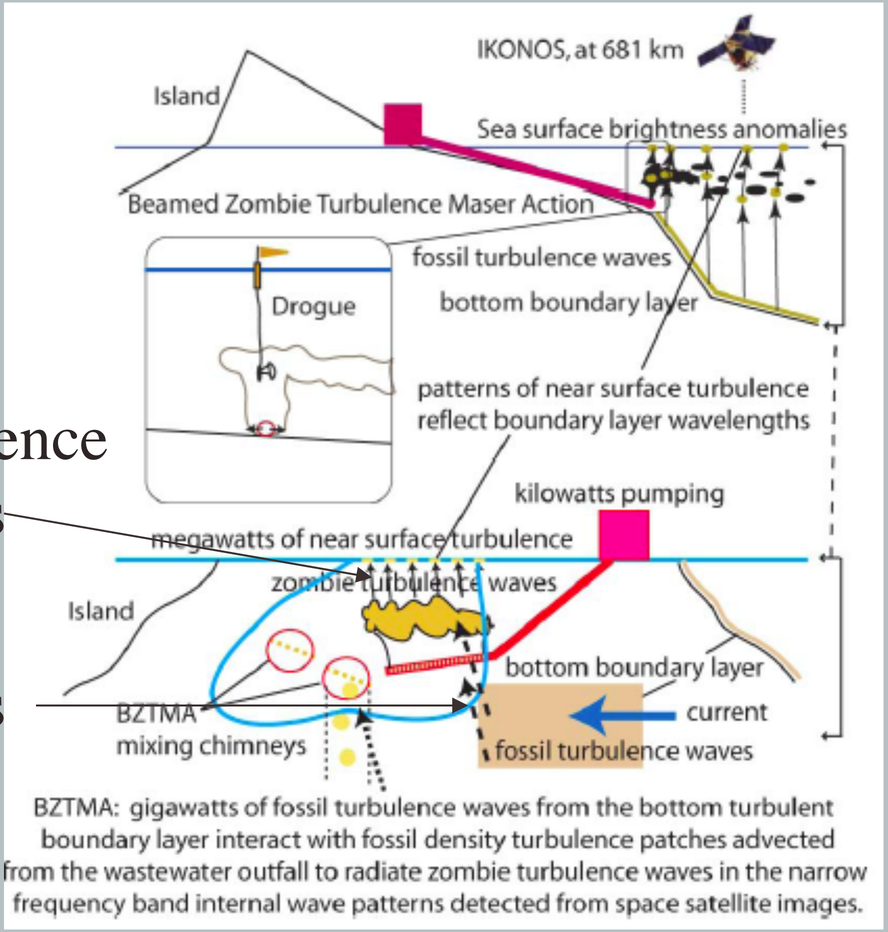

September 14th, 2003
vertical stations
outfall
Sept. 14, 2003
Sept. 2, 2002
10 km S
3km
RASP3 2003-09-14 (RVER_148 to RVER_180): Temperature gradient dT/dz RMS
Zombie turbulence waves
Diffuser density
Diffuser depth
Pressure [dbar]
Distance from start of transect [m]
K/m


September 14th, 2003
vertical stations
outfall
Sept. 2, 2002
Sept. 14, 2003
10 km S
Depth, m
Diffuser density
0
60
120
-10
0
10
-20
20
-50
50
L_T [m]

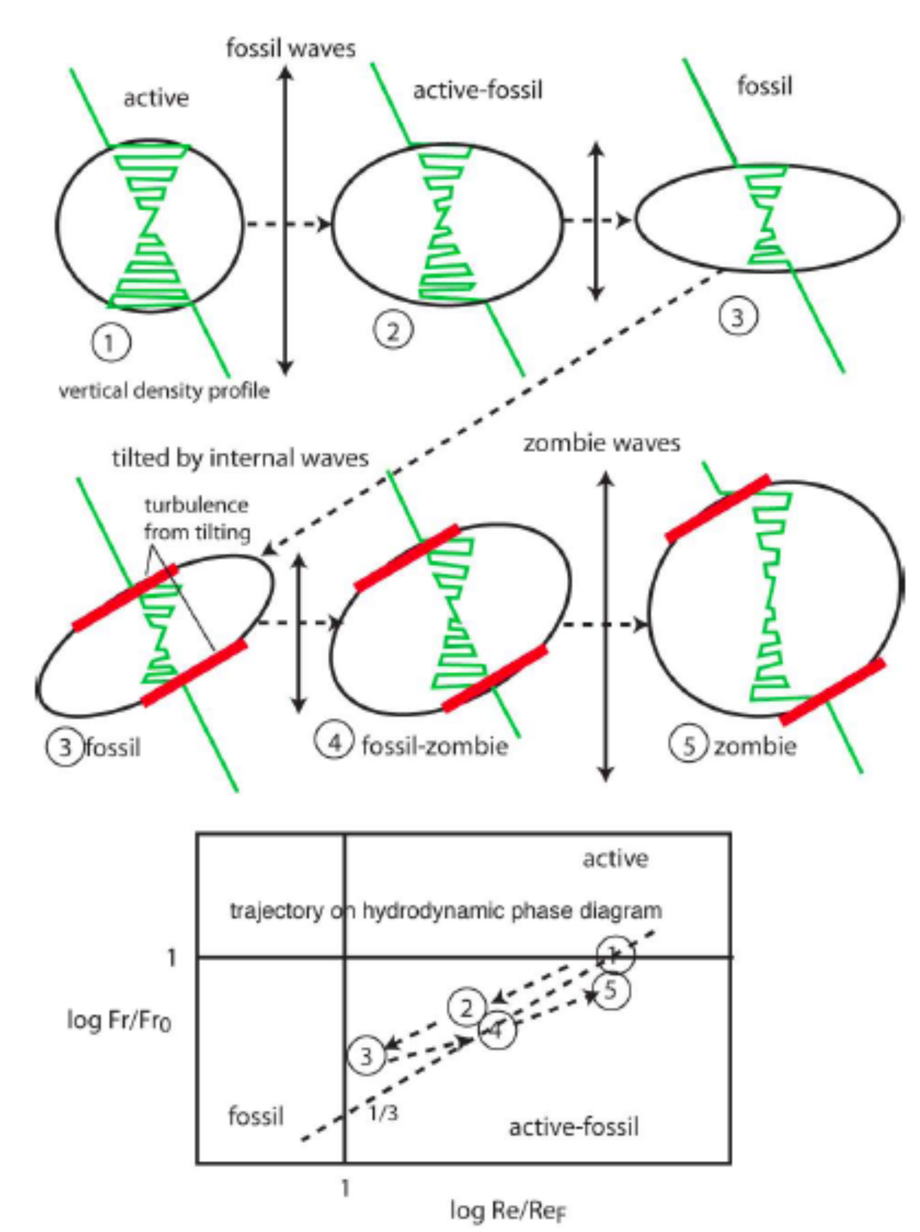
BZTMA mechanism

Zombie turbulence Internal Waves

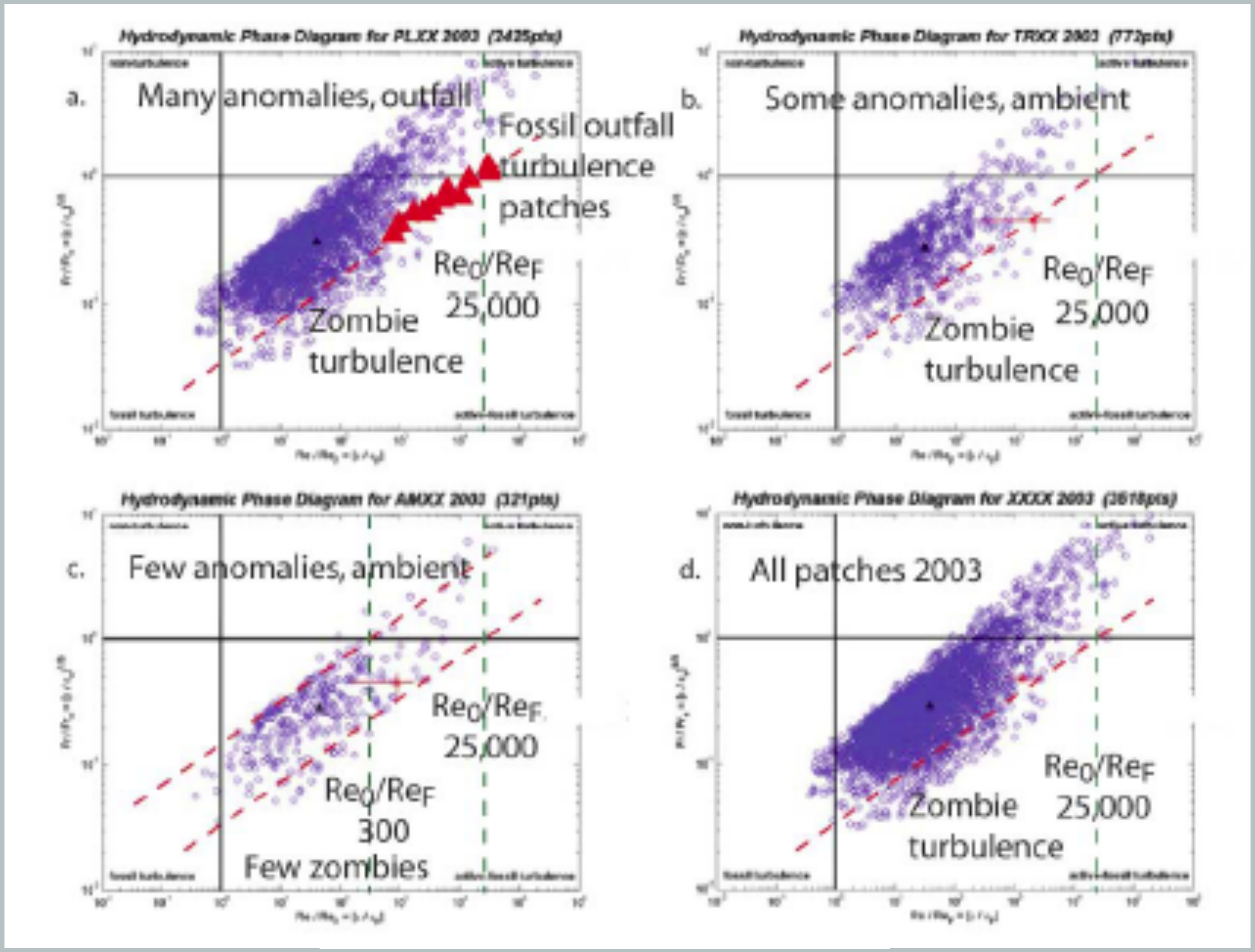
ISINTECH Internal Waves



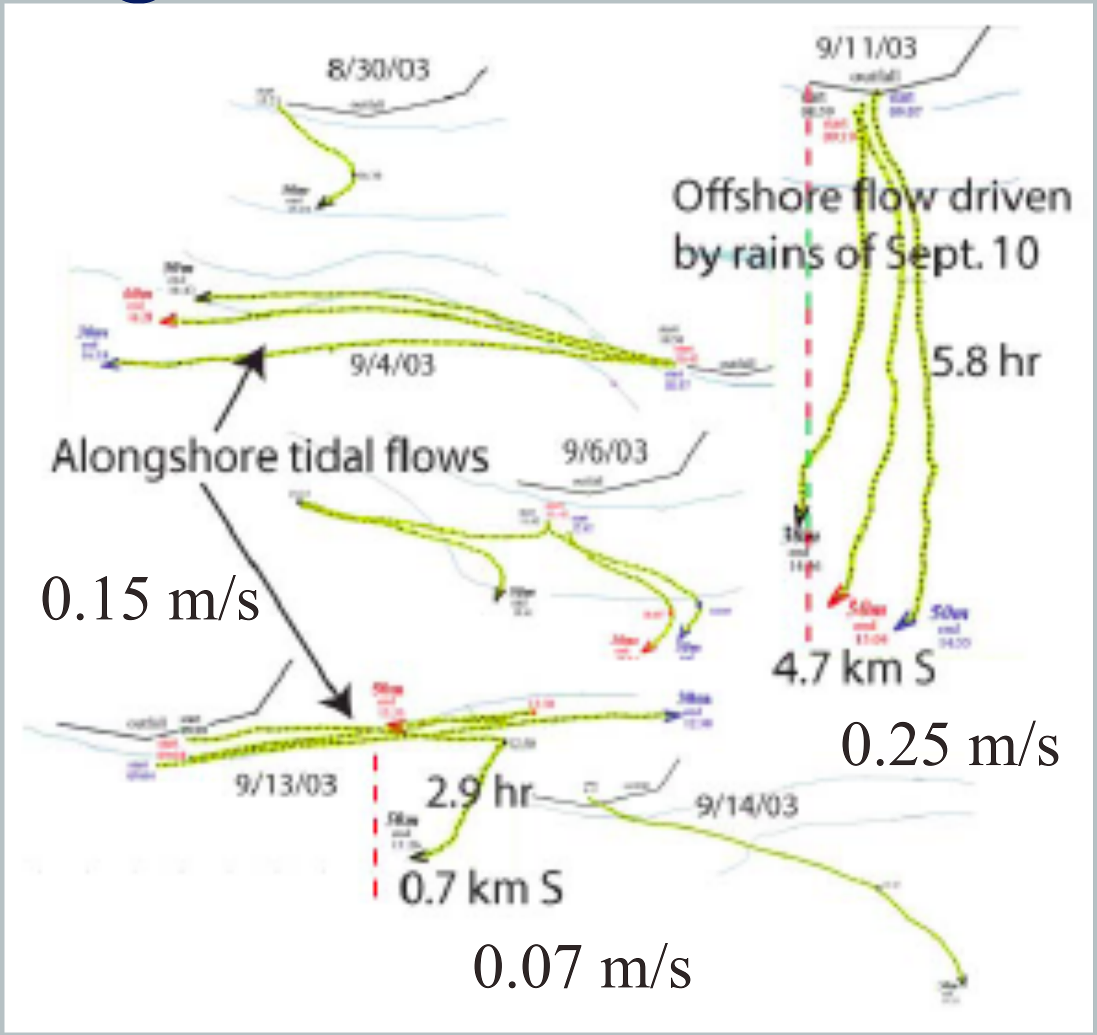
Zombie turbulence formation from fossil turbulence



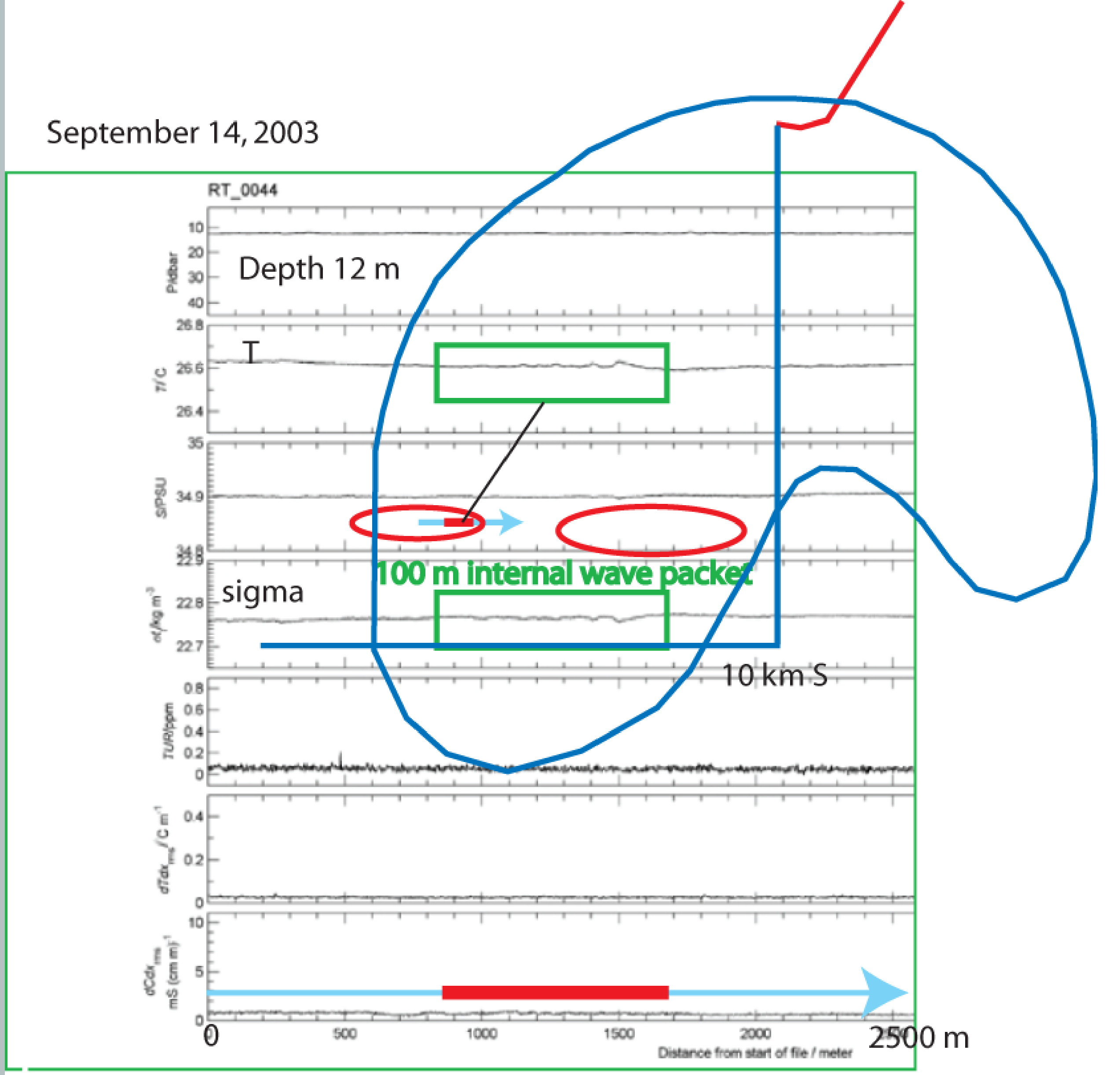
Require more samples of microstructure at outfall since HPD plots show undersampling

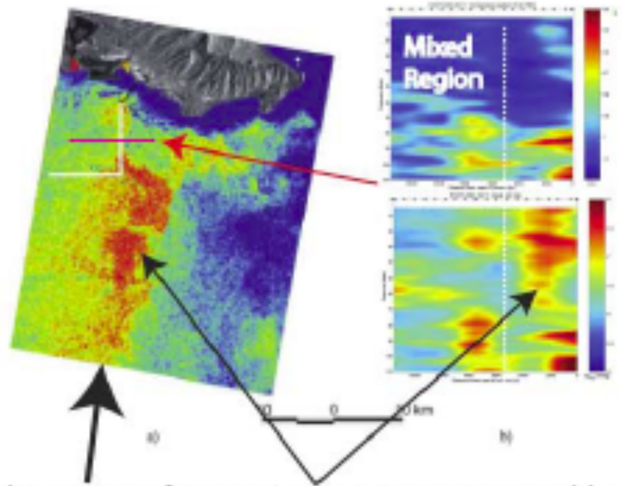


Drogues, Tides, and Rainfall



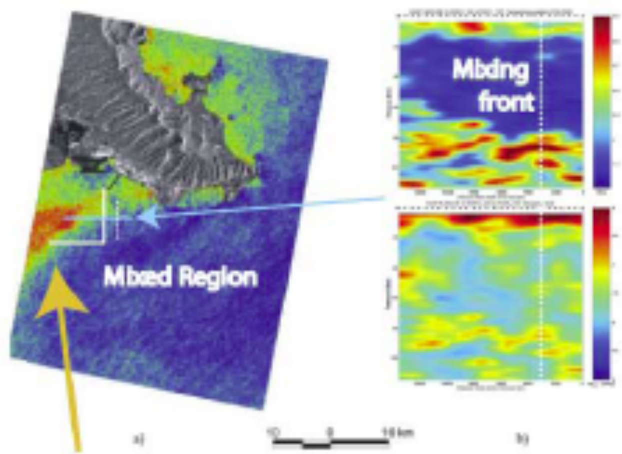
September 14, 2003





BZTMA chimneys of estuarine mixing, triggered by fossils of Sand Island outfall turbulence advected by alongshore tidal motions and strong offshore flows from Sept. 10 rains

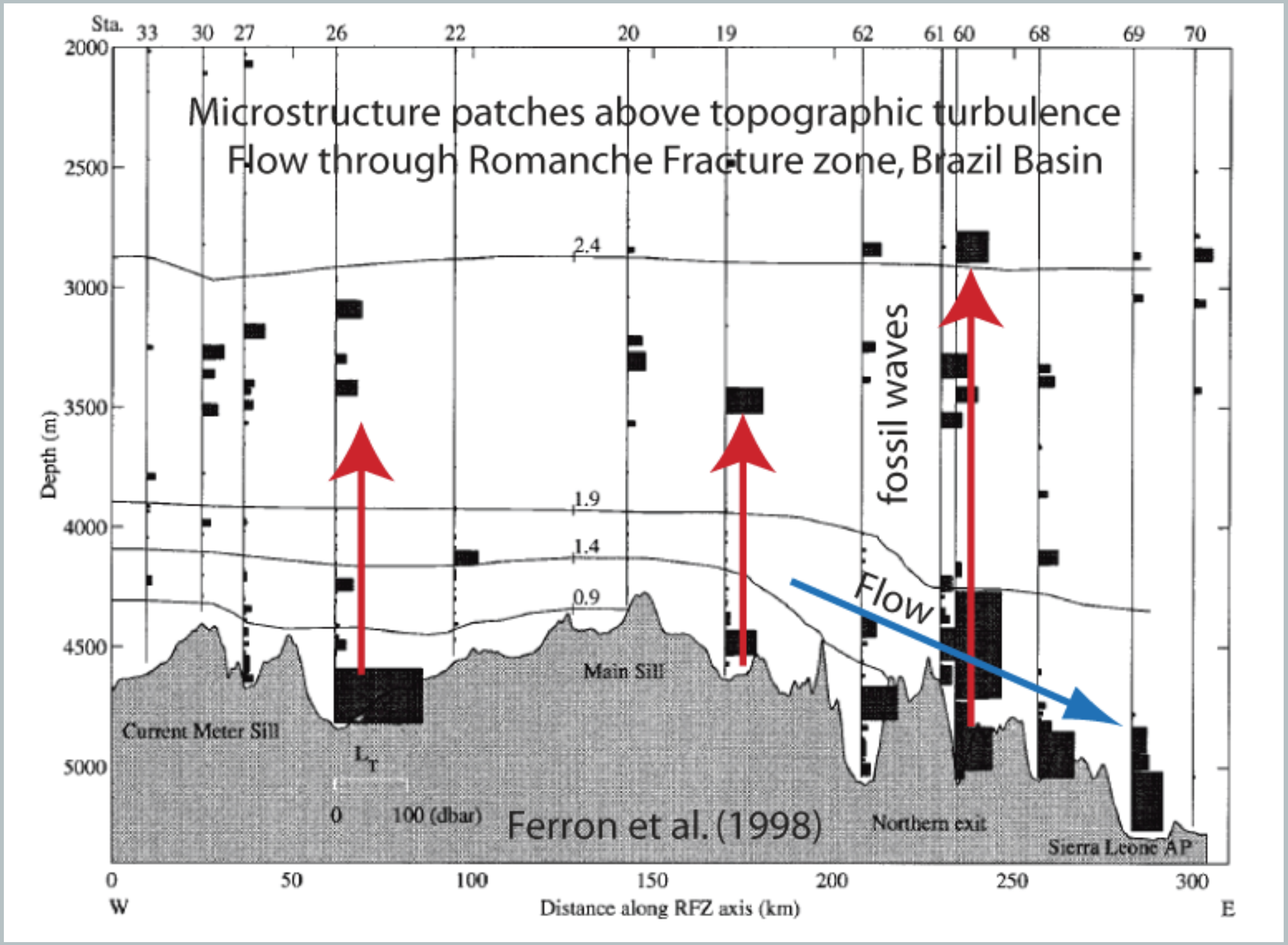
Sept. 11, 2003 RADARSAT radar image



BZTMA waves from fossils of Sand Island outfall turbulence rise in mixing chimneys and break at the surface in patterns that reveal the narrow band wavelengths of the internal waves that power the zombie turbulence patches. The mechanism fails in the mixed regions.

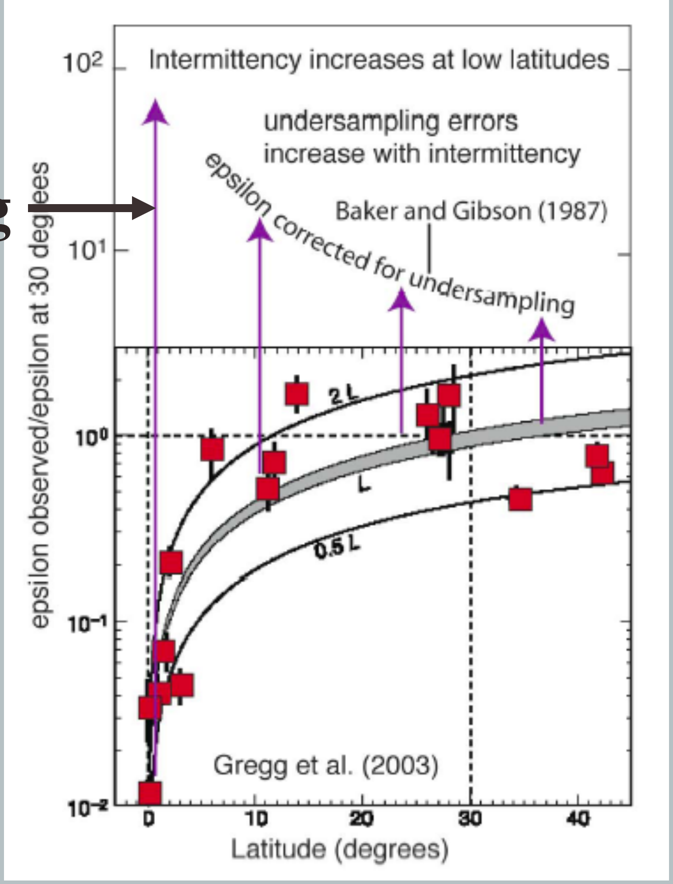
Sept. 13, 2003 ENVISAT radar image

Brazil Basin Topographic Turbulence

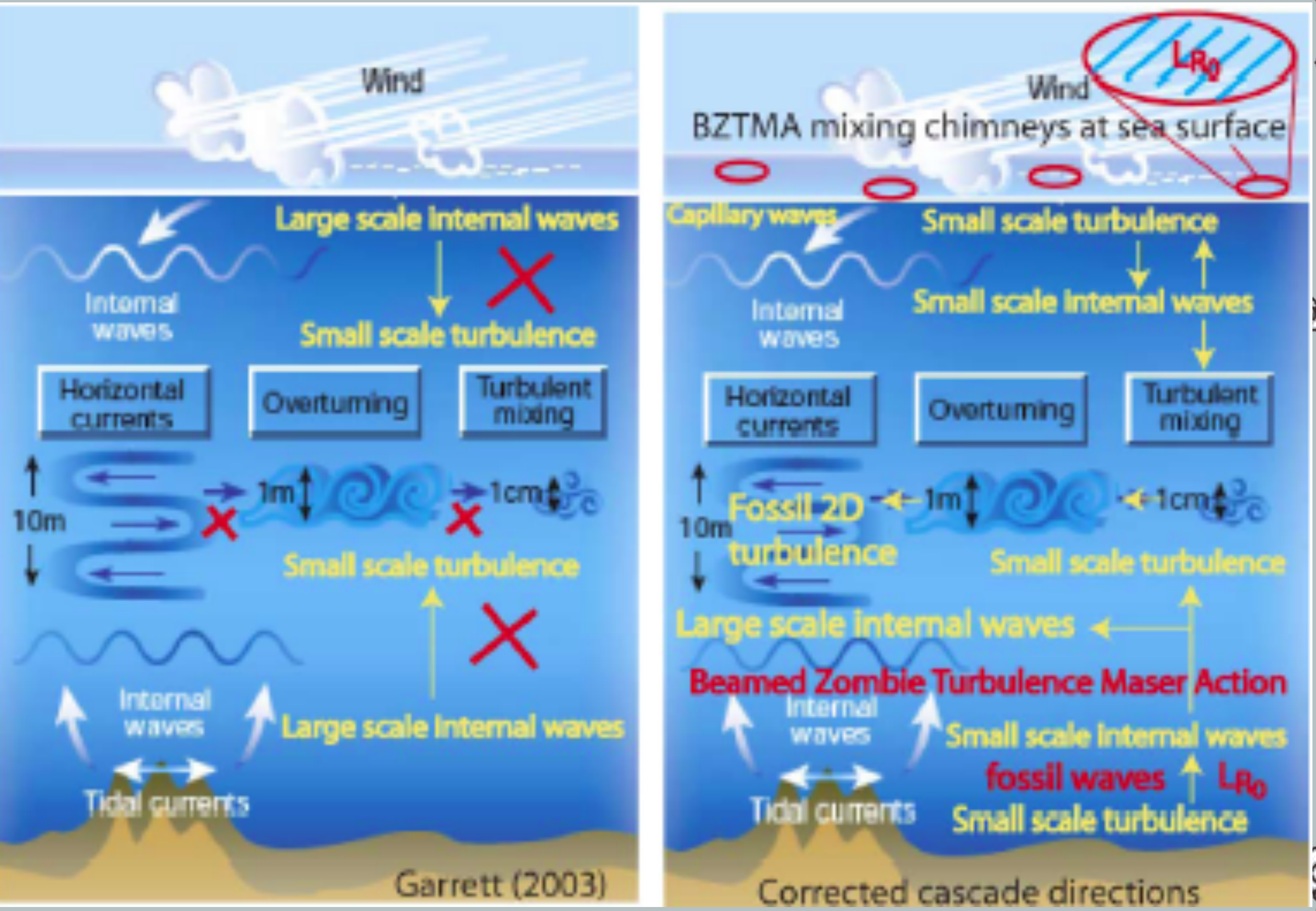


Arithmetic mean ε values require many samples

Large undersampling error



Vertical information transport and mixing are highly nonlinear in the BZTMA model, leading to intermittent mixing chimneys



Power estimates

- *Diffuser hydraulic power g dρ h V =* $10 ms^{-2} \times 23 kg m^{-3} \times 70 m \times 3 m^3 s^{-1}$ *= 50,000 W =* **50 kw**
- *Surface viscous power =* $\delta_s \rho V = 10^{-5} m^2 s^{-3}\ 10^3$ *kg* [illegible]

Energetics of the beamed zombie turbulence maser action mechanism for the remote detection of submerged oceanic turbulence, Gibson Bondur Keeler 2005

$kg\ m^{-3}\ 0.5\ (0.5 ms^{-1})^3\ 10^8 m^2 = 5\ 10^9\ W \sim$ **5 gw**

- *Bottom (rough) power radiated vertically as fossil turbulence waves ~* **2.5 gw***; Linden JFM 1975*

*Completely rough bottom…otherwise intermittent

Linear internal wave models

- *Maximum power for internal waves is 50 kw but 10 mw is required.*
- *Linear waves alone have little effect on surface motions. They require fossil-zombie turbulence waves to produce surface smoothing and fossil turbulence-surface wave interaction to preserve the patterns.*
- *Linear waves do not have the narrow frequency bands observed by ISINTECH.*
- *Linear waves are uniform in space and time, not intermittent as observed.*

Conclusions

- *Remote submerged turbulence detection is permitted by fossil-zombie turbulence internal waves (large amplitude LS waves) that are dual-band non-linear, vertically propagating, and intermittent.*
- *Persistent outfall fossils (ages >300 N^{-1}) extract and re-radiate zombie power and patterns from soliton wave packets in BZTMA mixing chimneys to the surface.*
- *Patterns are preserved by near-surface fossil turbulence. These smooth the surface.*
- *RASP 2005 should focus on testing BZTMA mixing processes using drogue tracking of effluent and adequate, coordinated, vertical and horizontal MSS profiling near the outfall.*
- *HPD patch values for RASP 2002-2005 are critical, and should be computed and cataloged.*