

An underwater perspective on the significance of mass- movement processes

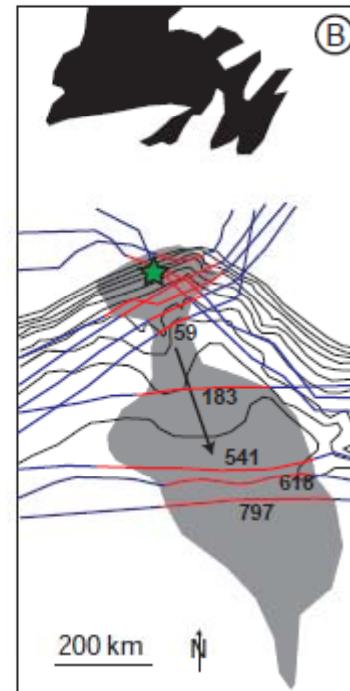
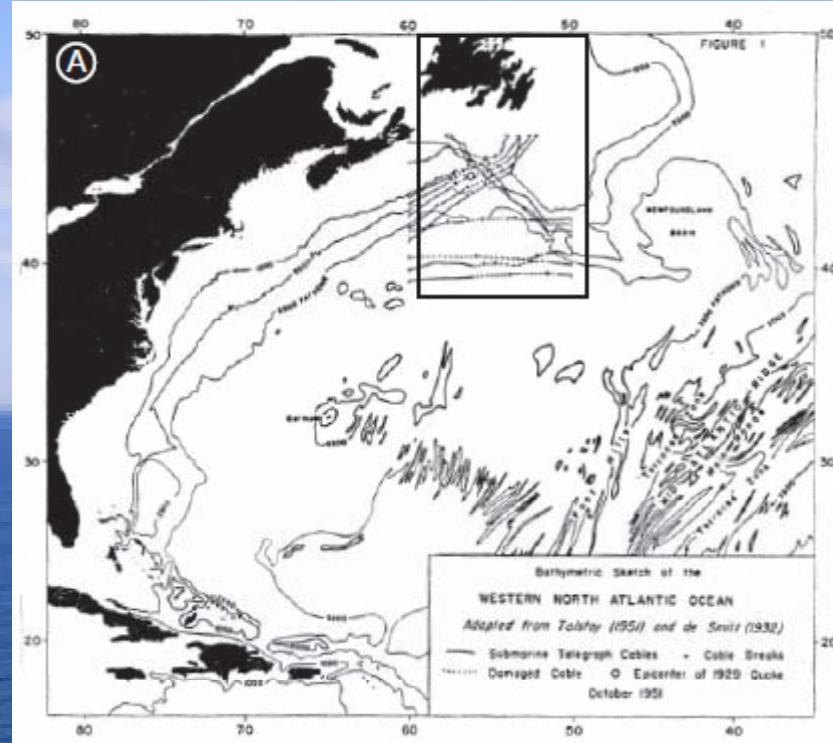
*Michael Strasser
(MARUM, University of Bremen)*



European Geosciences Union
General Assembly 2011
Vienna | Austria | 03 – 08 April 2011

GM6.1: The geomorphic
significance of mass wasting
processes

The 1929 Grand Bank Earthquake and submarine mass-movements event



Heezen & Ewing (1952)

Submarine vs. subaerial mass-wasting

submarine

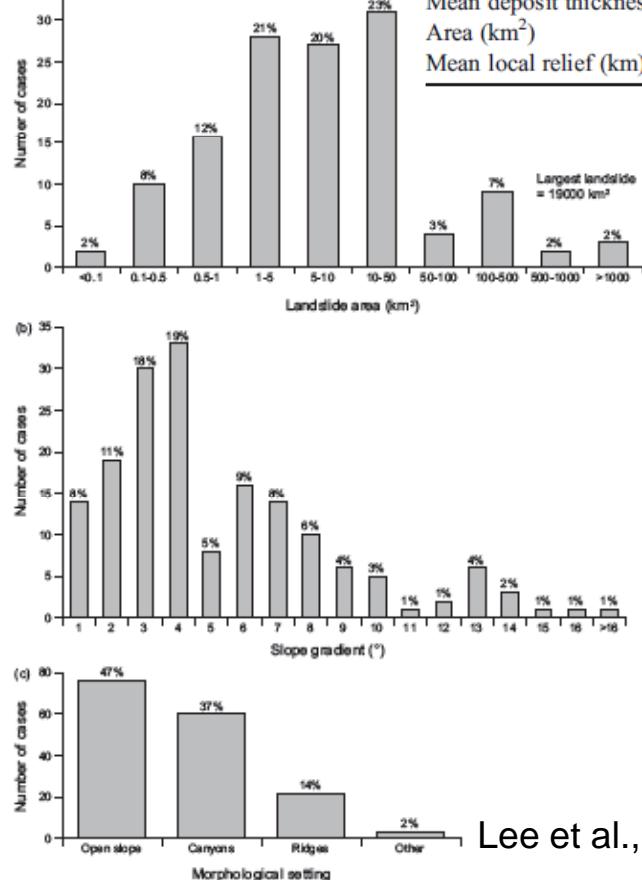


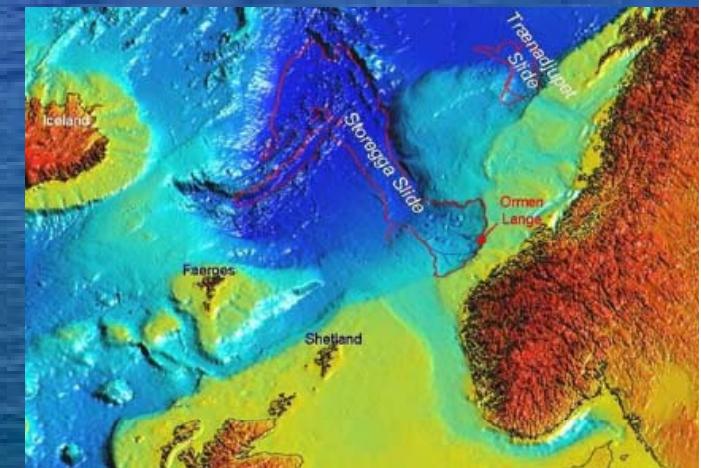
Fig. 3 (a) Distribution of submarine-landslide area on USA Atlantic margin. (b) Distribution of bathymetric gradients at these sites. (c) Distribution of landslide locations for the same sites. (After Booth et al., 1993.)

Table 1
Descriptive statistics of worldwide inventory of over 300 giant ($V > 10^8 \text{ m}^3$), catastrophic landslides

Parameter	n	Min.	Max.	Mean ($\pm 1\sigma$)	Median	5% quantile	95% quantile
Volume (10^9 m^3)	343	0.1	81	3.08 ± 8.04	0.57	0.1	14.8
Age (ka)	133	0	350	15.8 ± 50.1	3.3	0.02	43.4
Maximum height (km)	232	0.3	4.5	1.6 ± 0.9	1.5	0.5	3.4
Runout (km)	249	0.8	120	12.1 ± 16.0	6.8	2.1	41.8
Mean deposit thickness (m)	147	5	1000	135 ± 142	97	14	350
Area (km^2)	236	1	2200	83.8 ± 248.1	10	1.7	455
Mean local relief (km)	262	0.37	2.96	1.44 ± 0.58	1.35	0.57	2.43

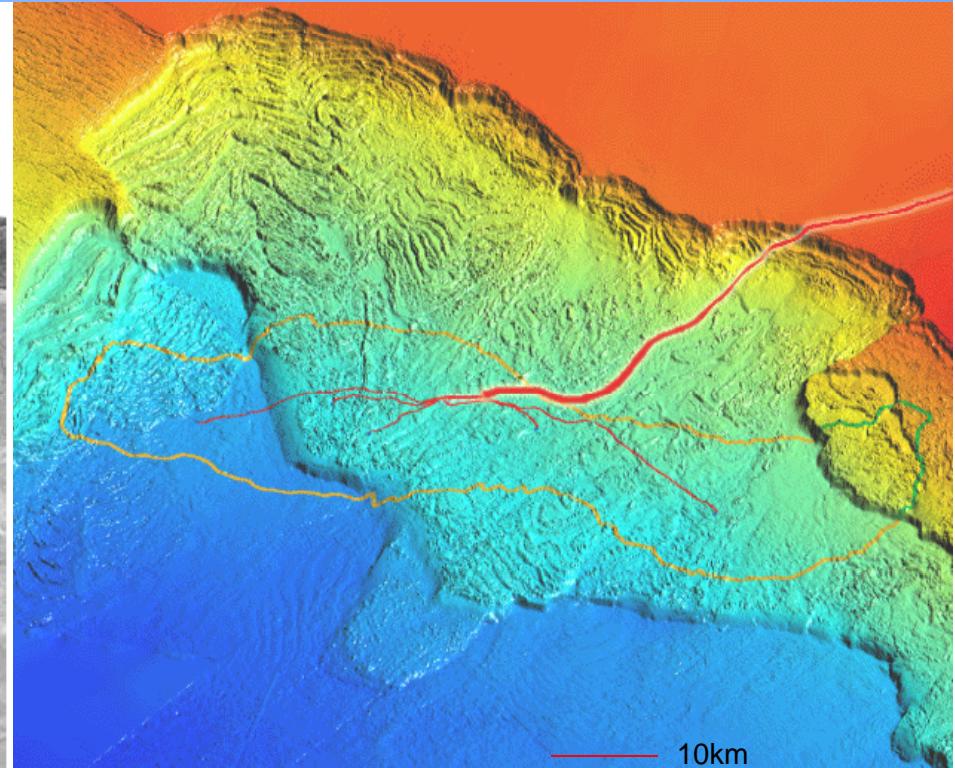
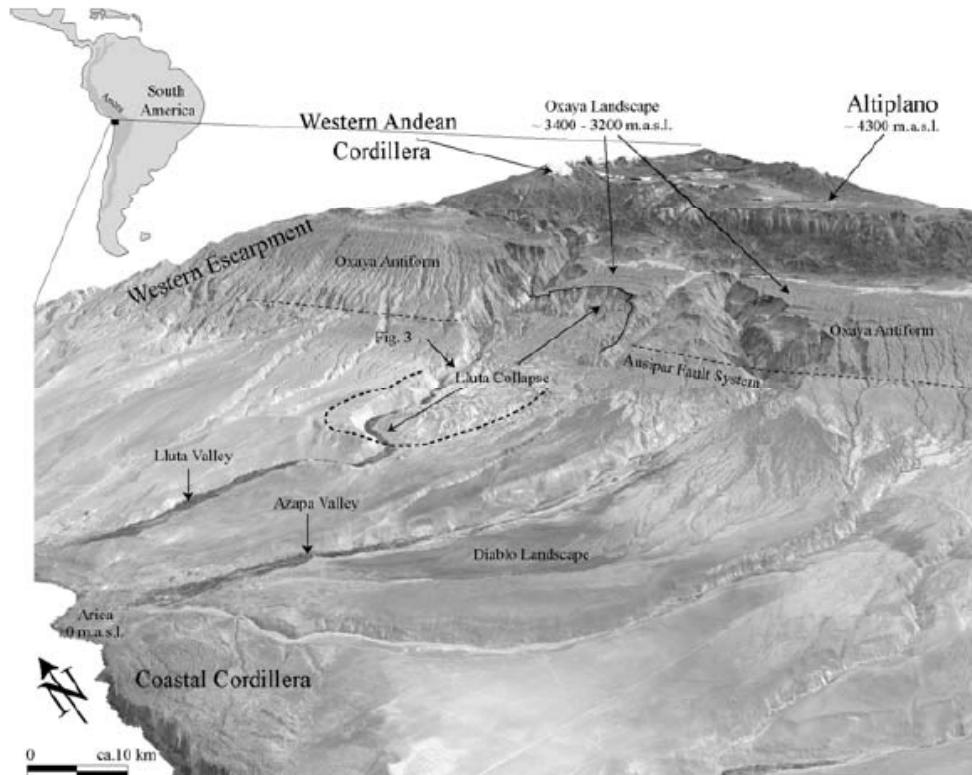
Korup et al., 2007

Area: 2'200 vs. 19'000 km^2
 Volume: 81 vs. 3500 km^3
 Run out: 120 vs. 800 km



The Storegga Slide (e.g. Solheim et al., 2005)

Submarine vs. subaerial mass-wasting



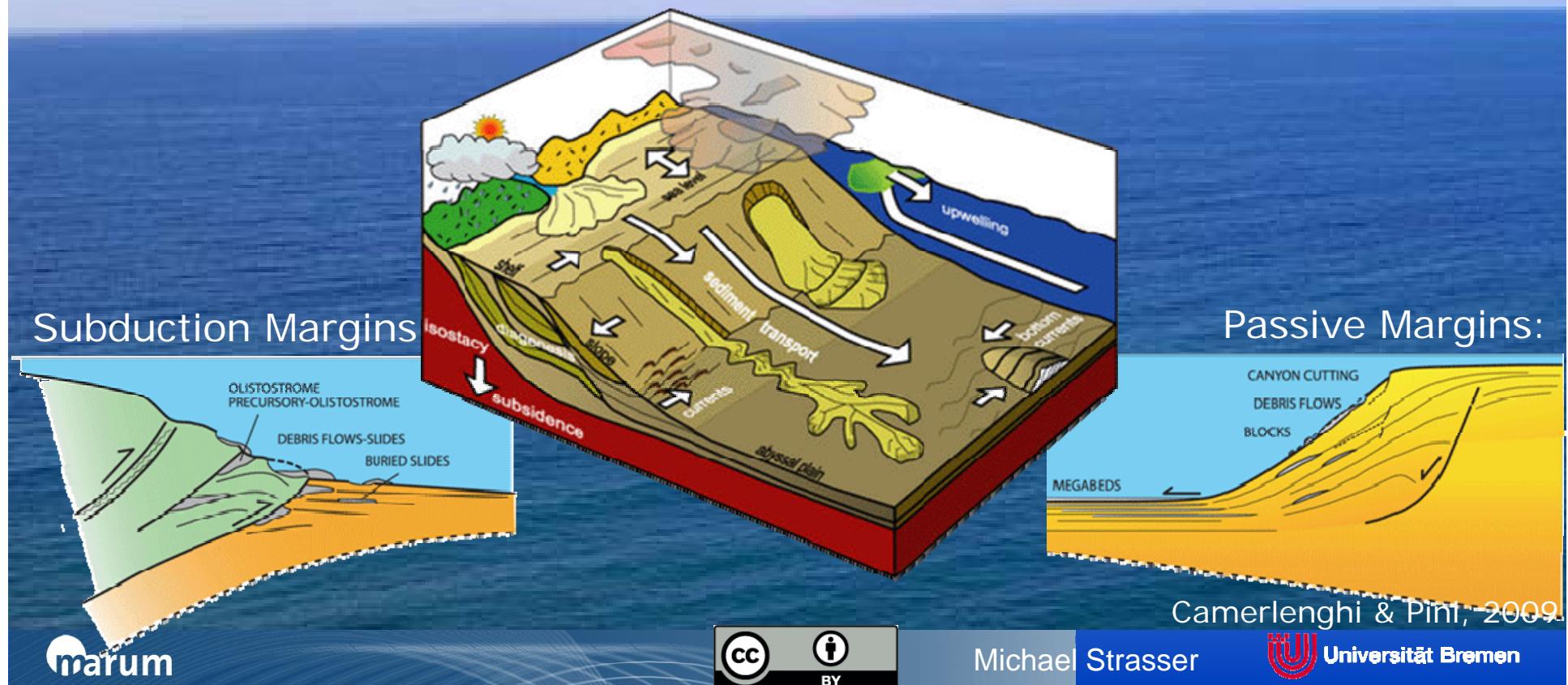
Lluta Collapse,
Northern Chile
26km³
Strasser et al., 2005

Storegga Landslides,
offshore Norway
Volume: 3'500 km³
Solheim, 2005

Submarine Landslides

are

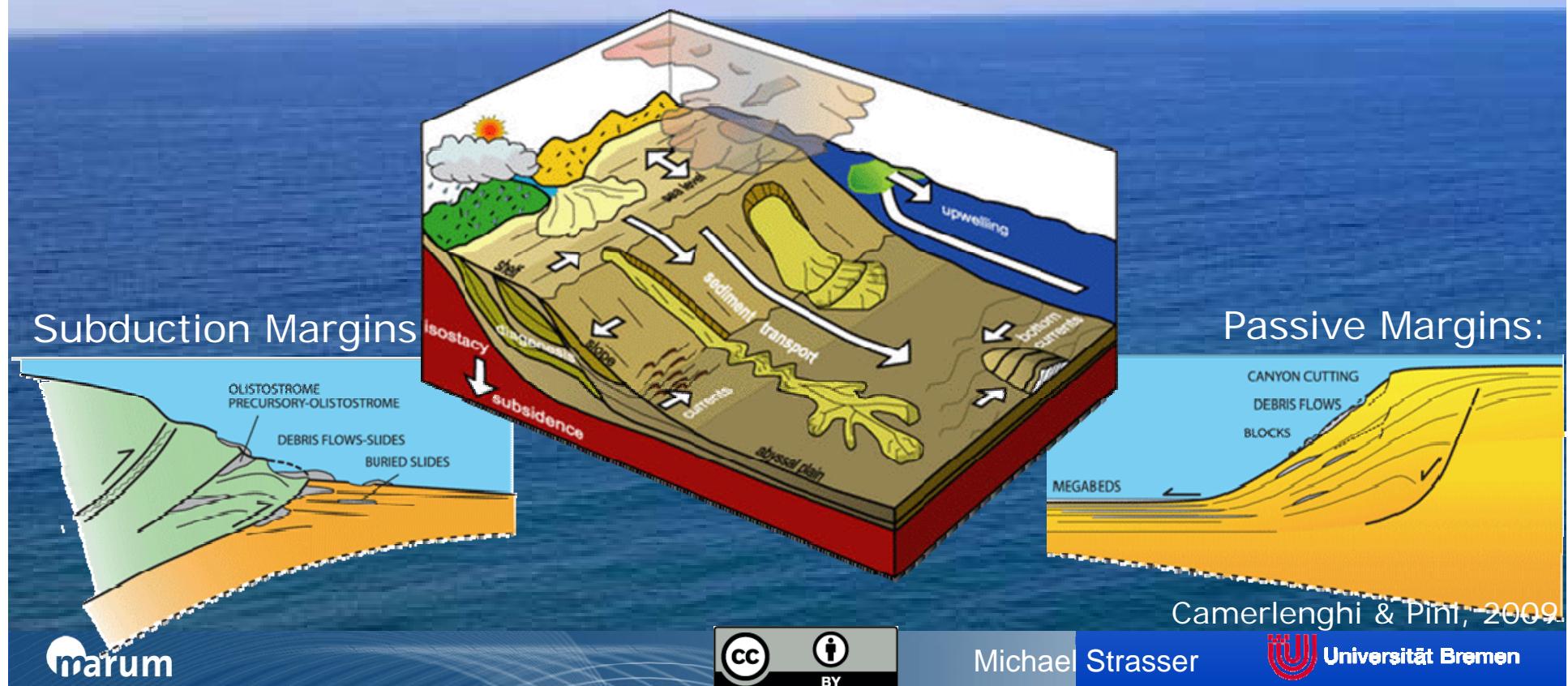
- geologic agents in shaping the world's continental margins



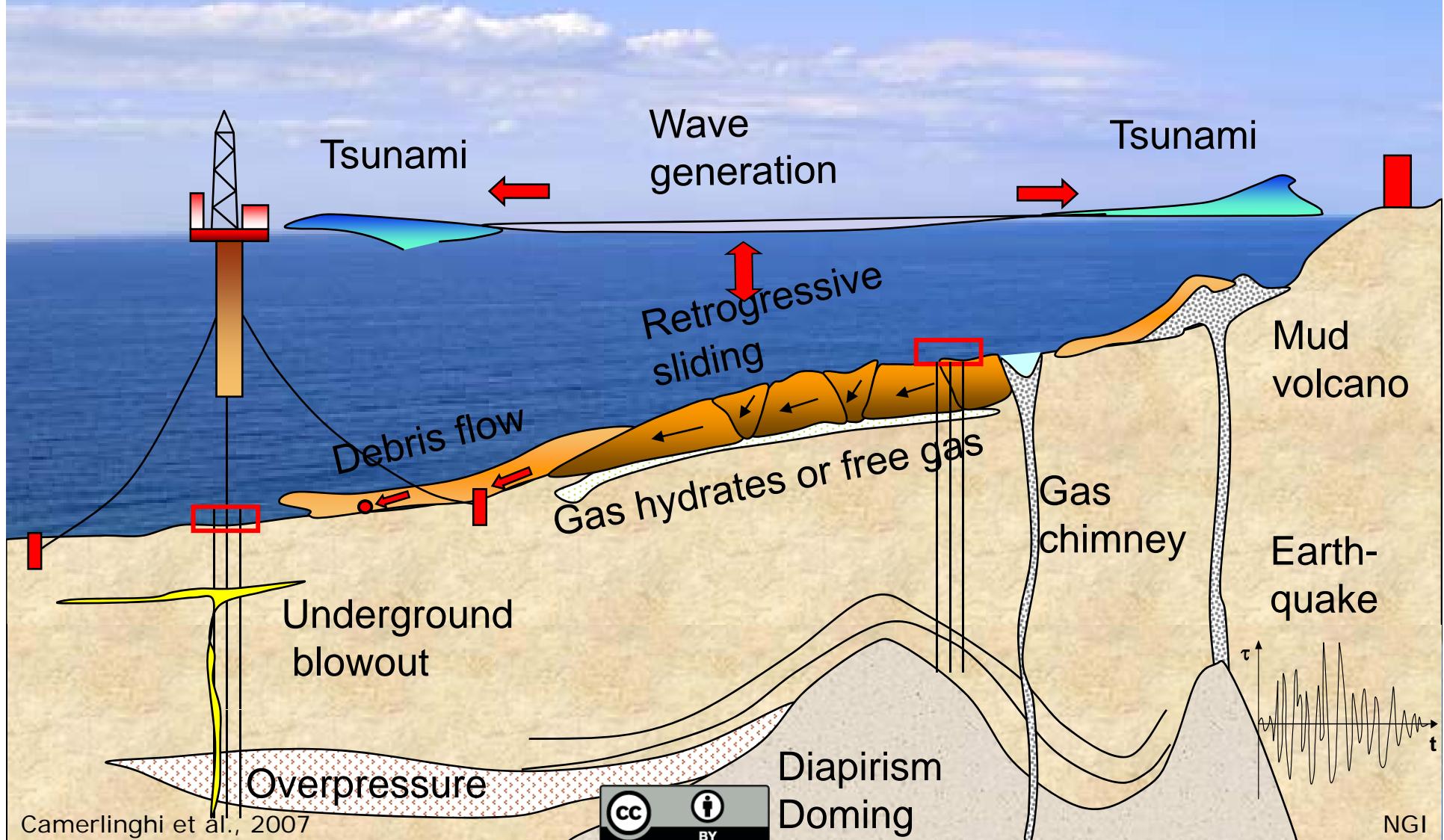
Submarine Landslides

are

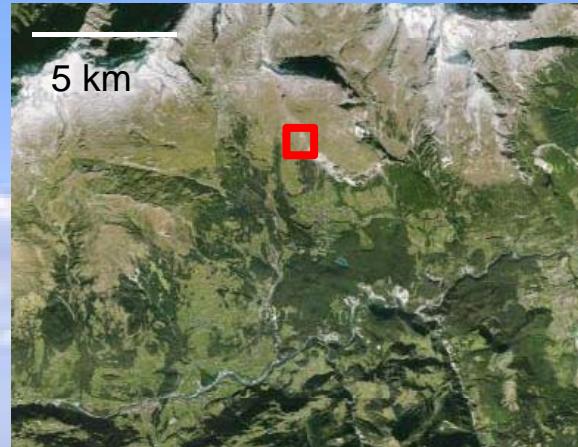
- geologic agents in shaping the world's continental margins
- considerable potential geohazard



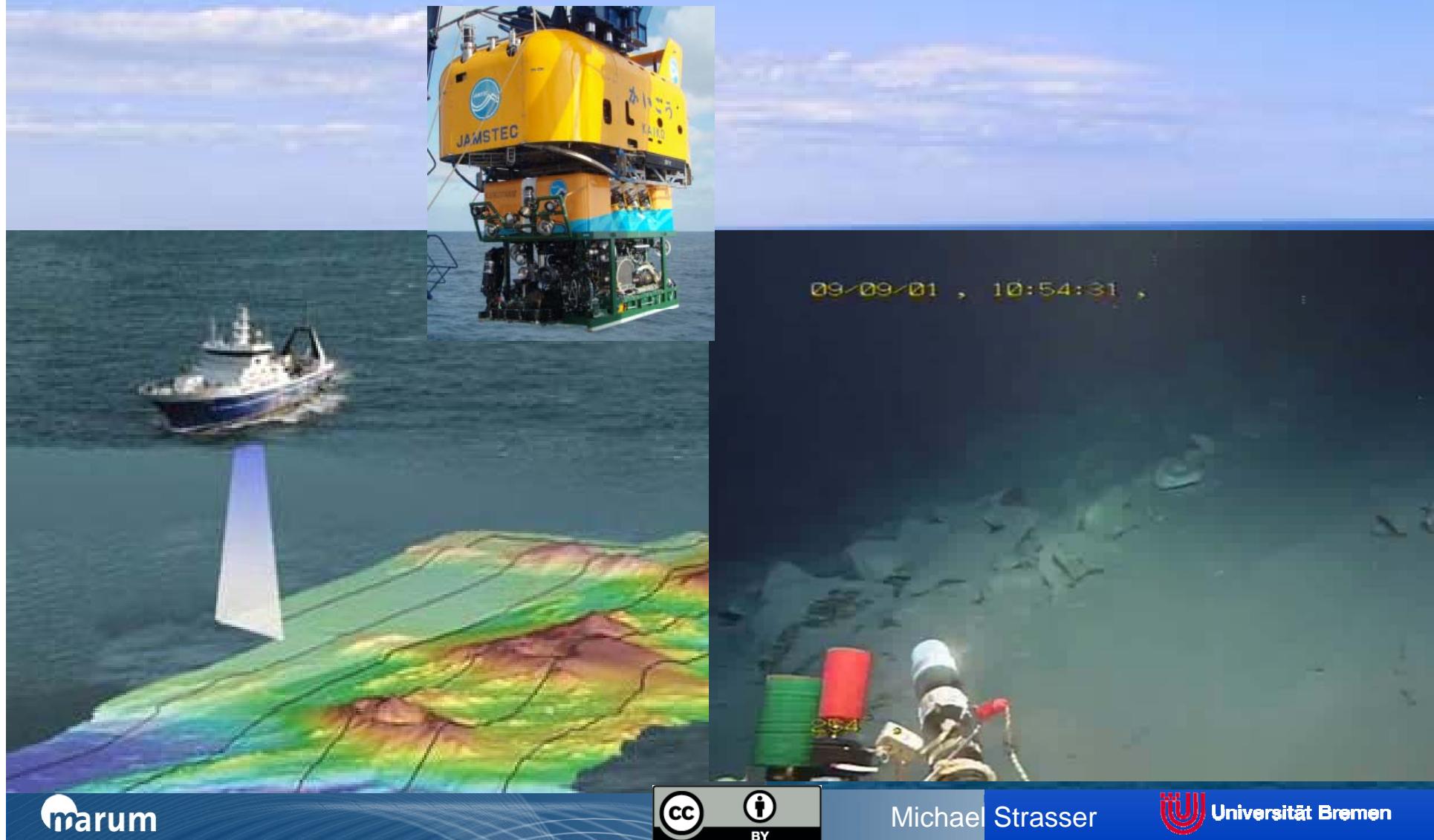
Causes and Consequences of Submarine Landslides



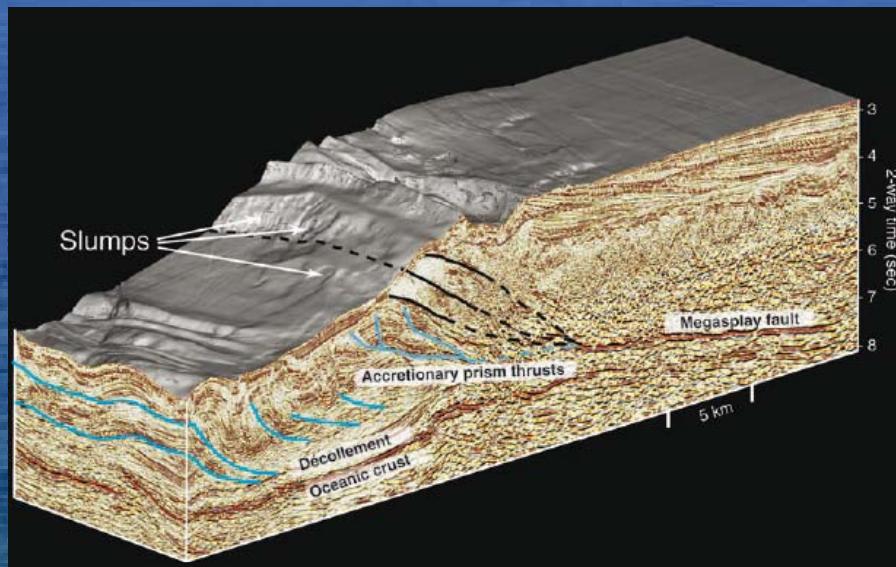
Investigation methods



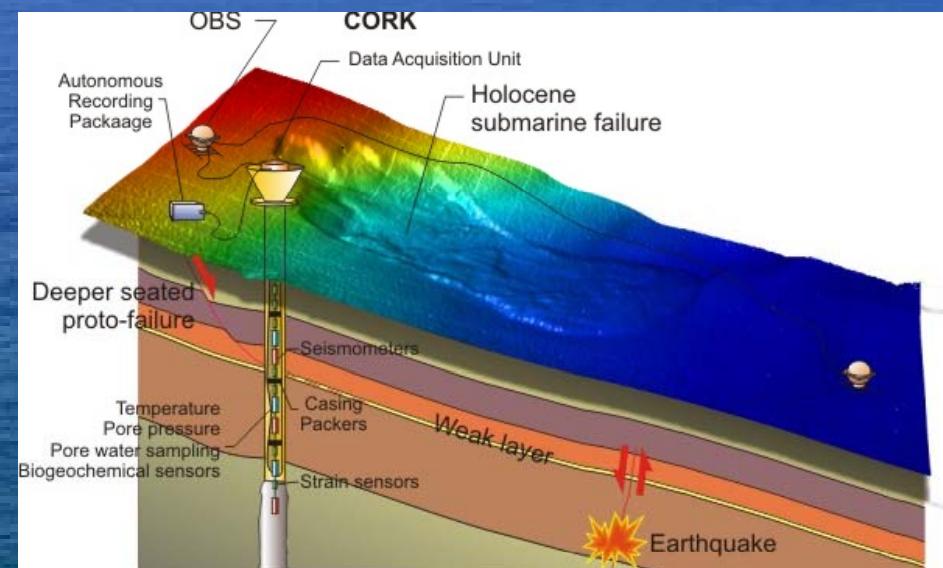
Investigation methods



Investigation methods



Moore et al., 2007



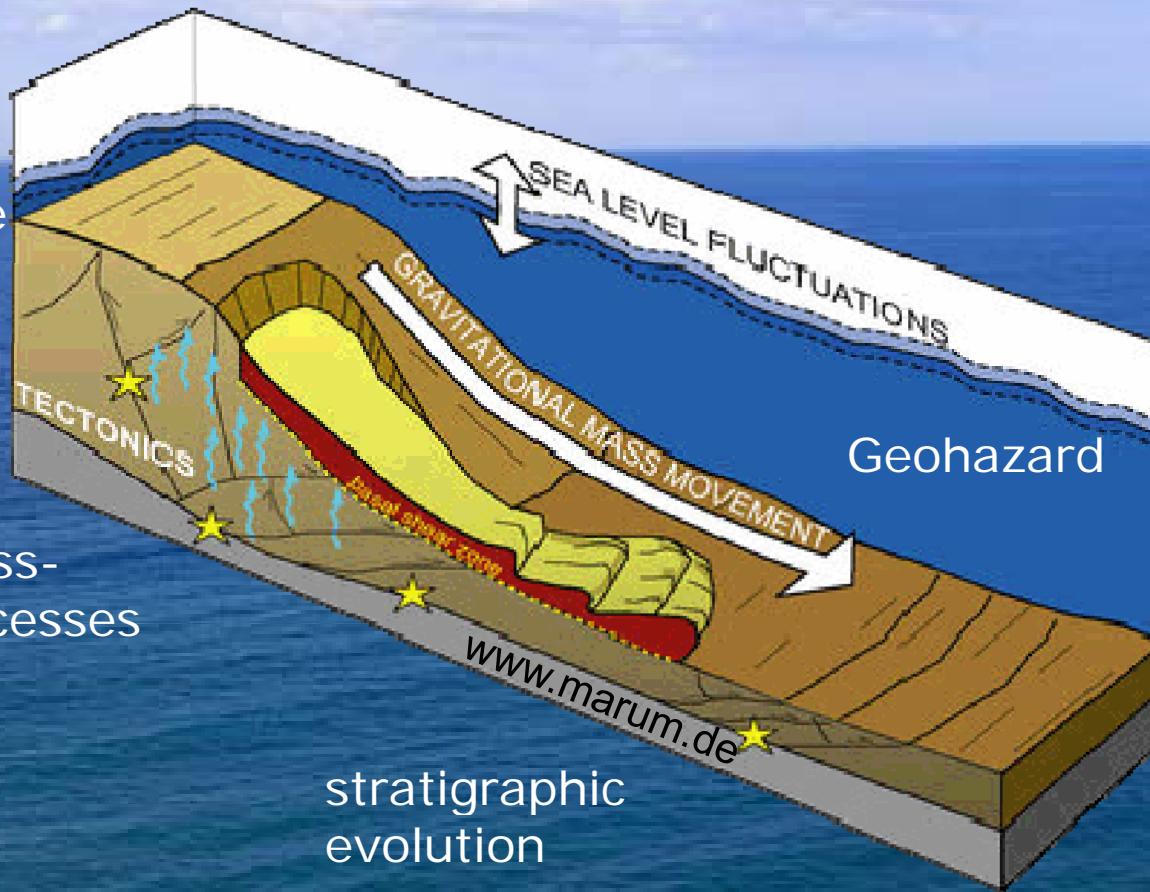
Urgeles, unpublished

Submarine Landslide Research

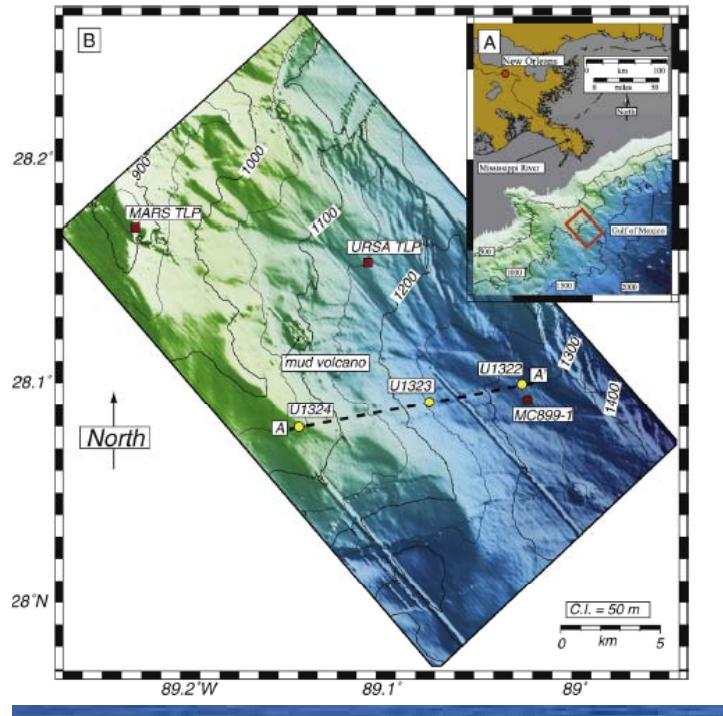
Multi-method approach to tackle fundamental and societal relevant challenges of modern earth sciences

Slope stability, failure initiation & trigger mechanisms

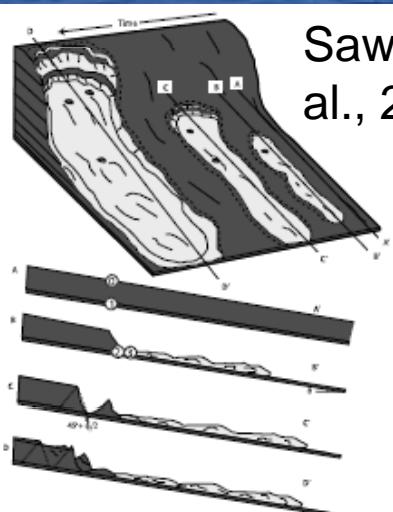
Sediment mass-transport processes



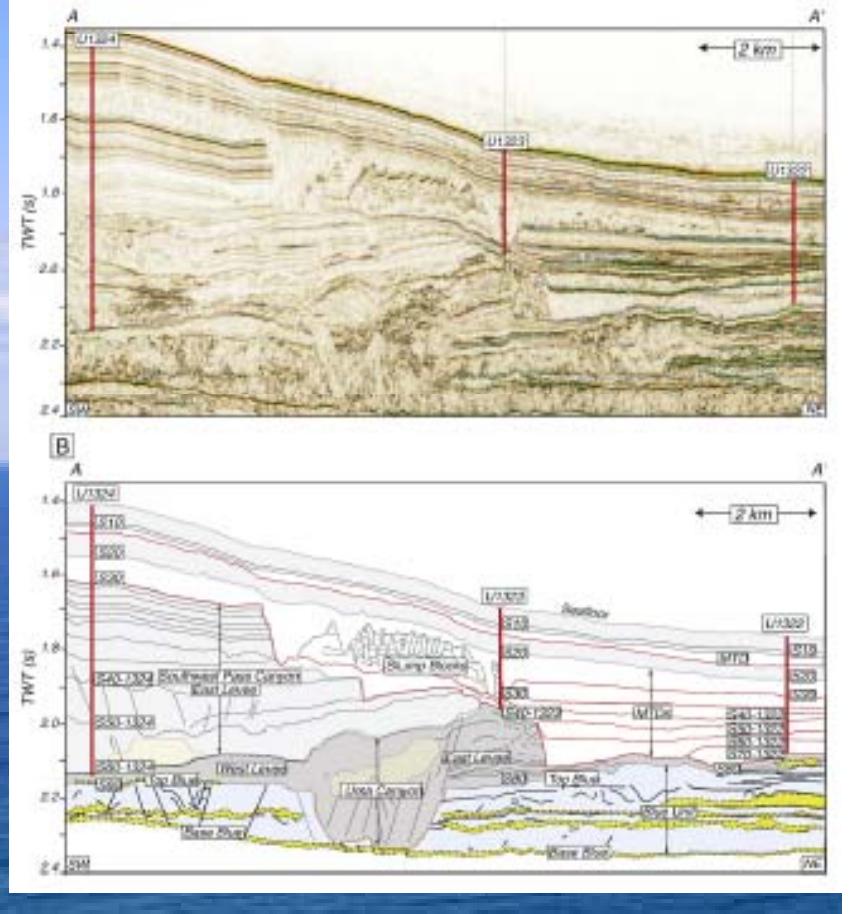
Submarine slides in the Gulf of Mexico



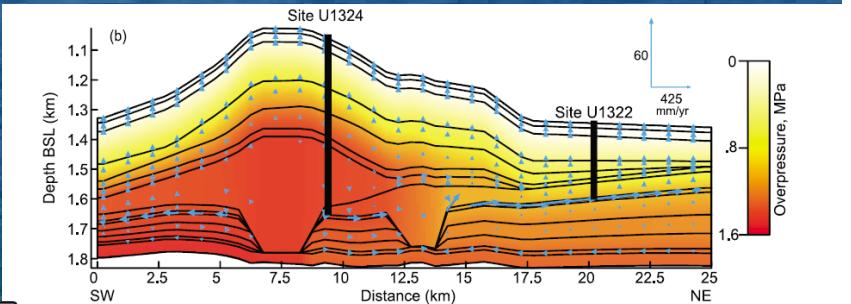
IODP Exp 308
Flemings et al.,
2008



Sawyer et
al., 2009



Stigall
and
Dugan,
2010



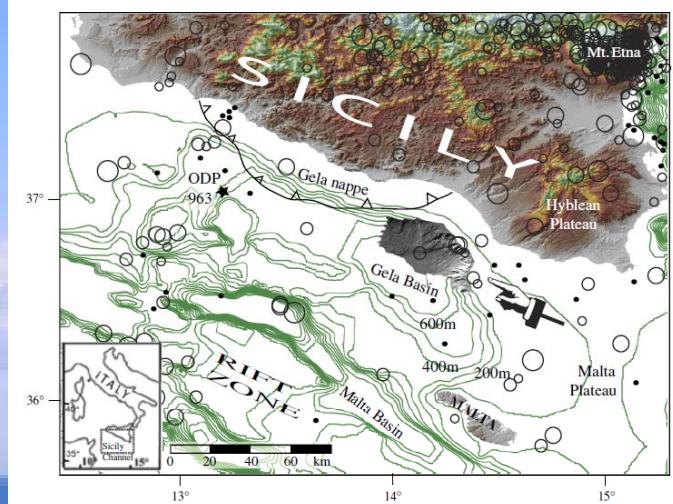
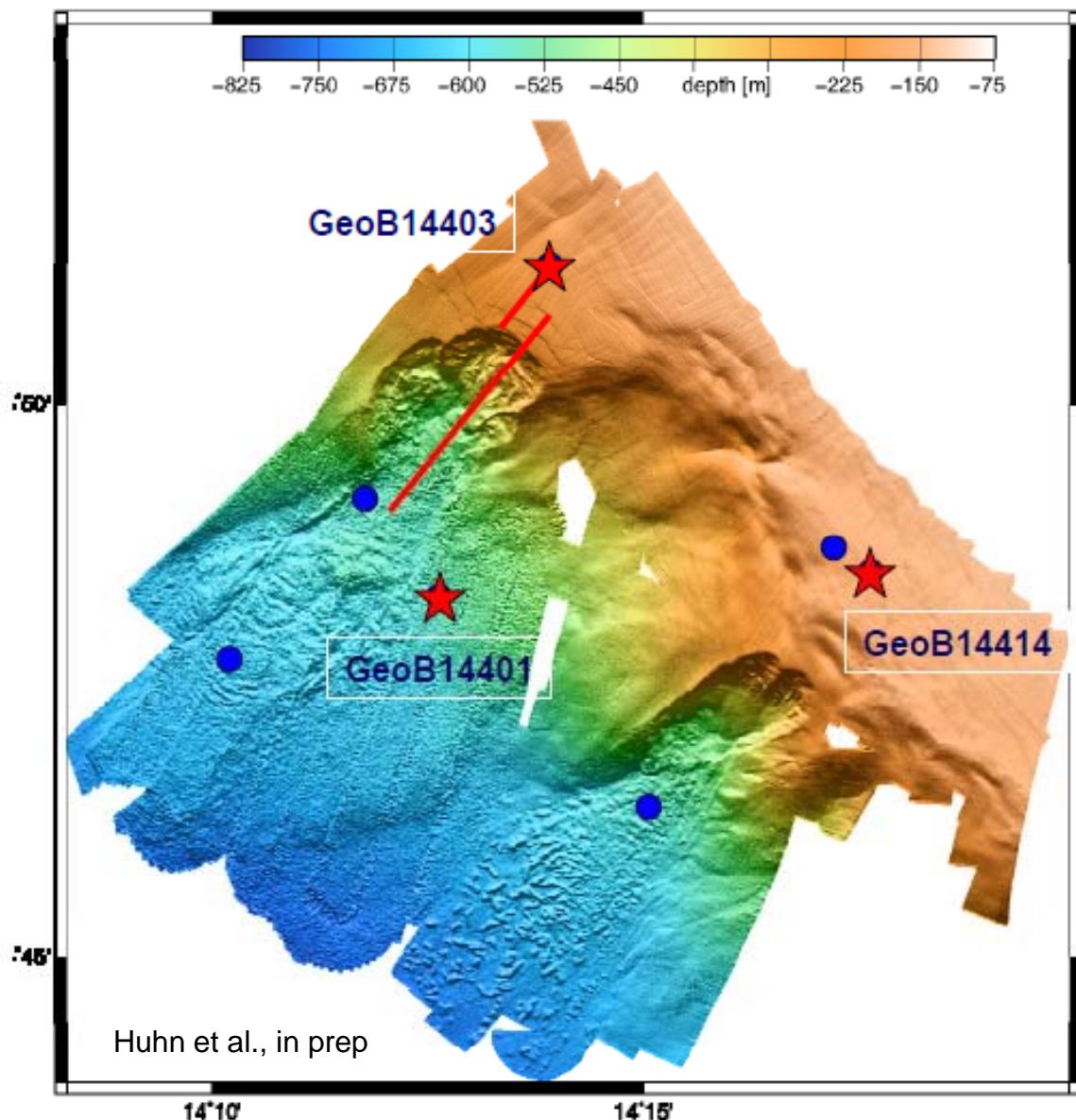
Michael Strasser

Universität Bremen

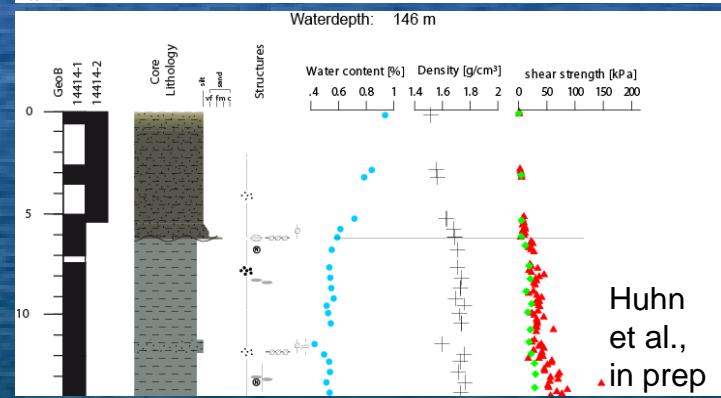
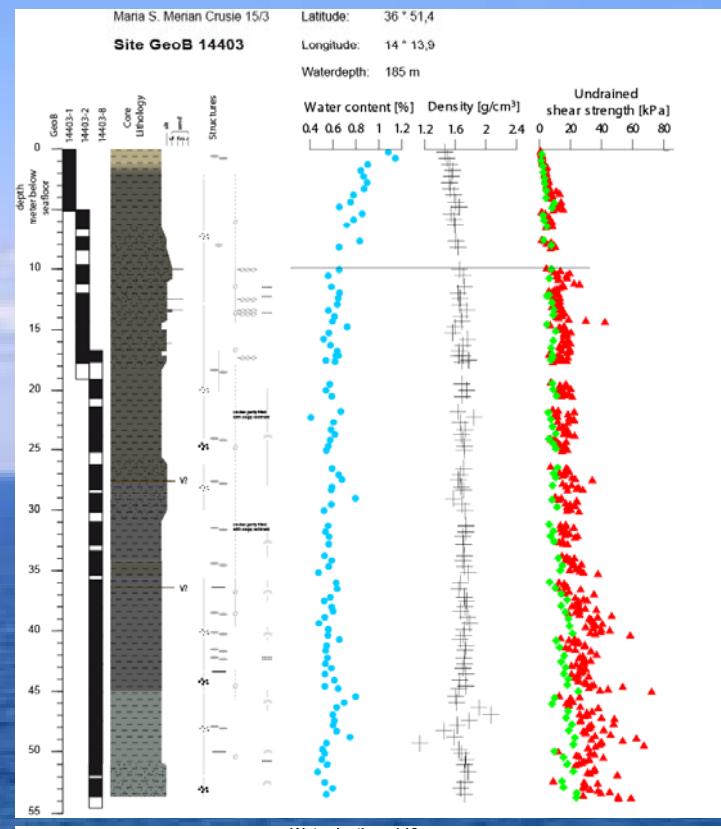
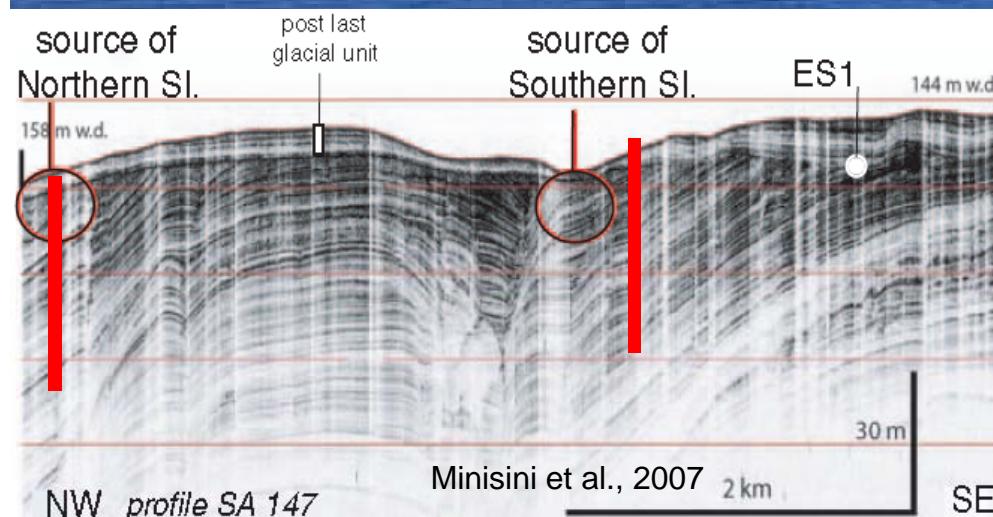
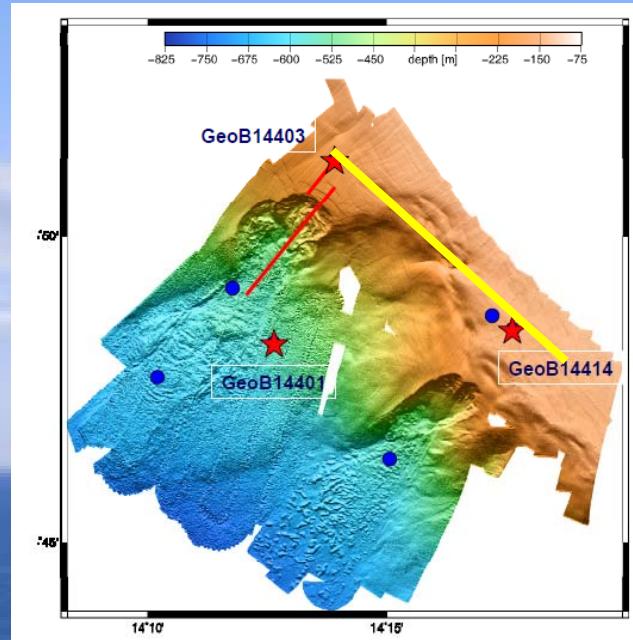
marum



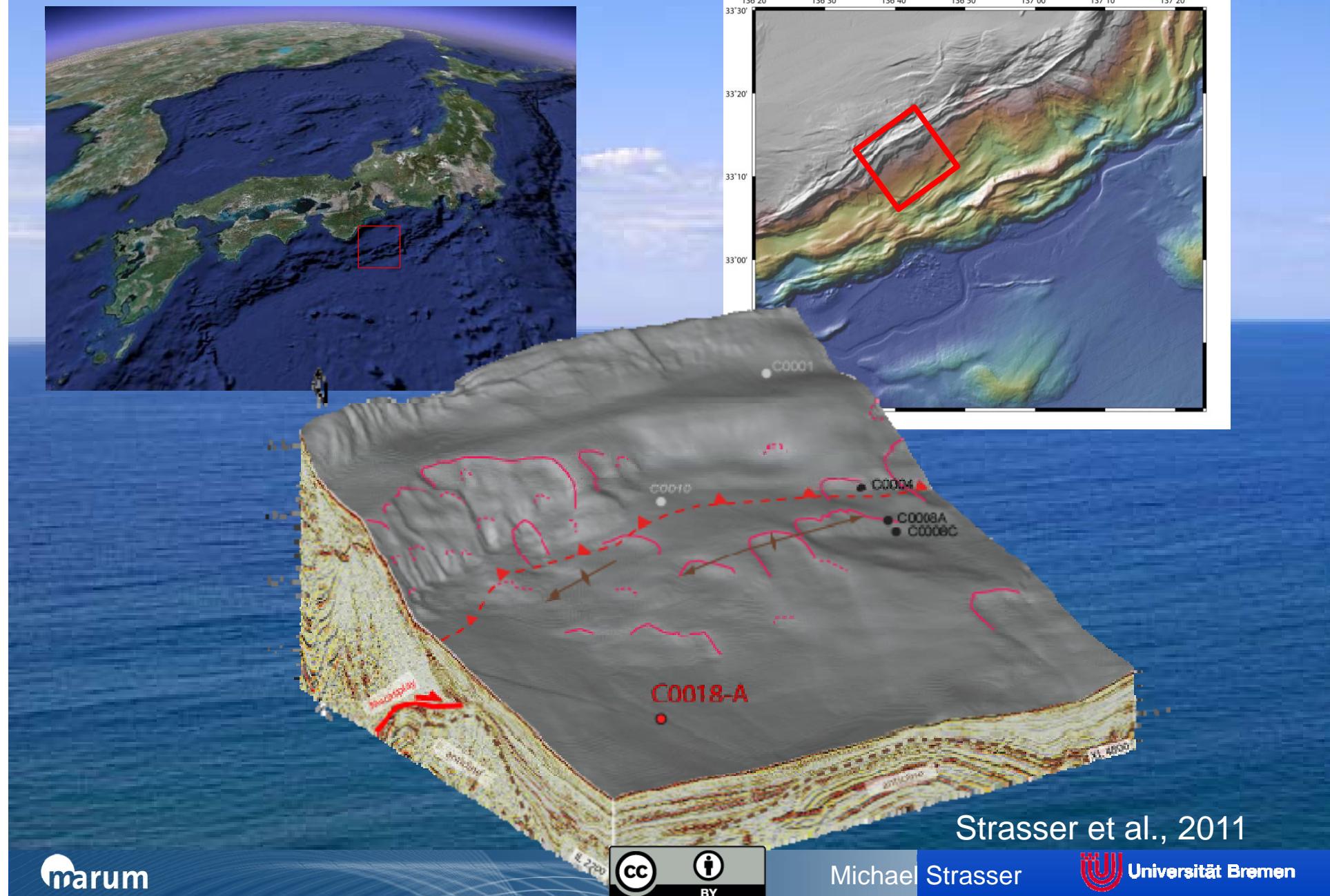
Twin Slides offshore Sicily



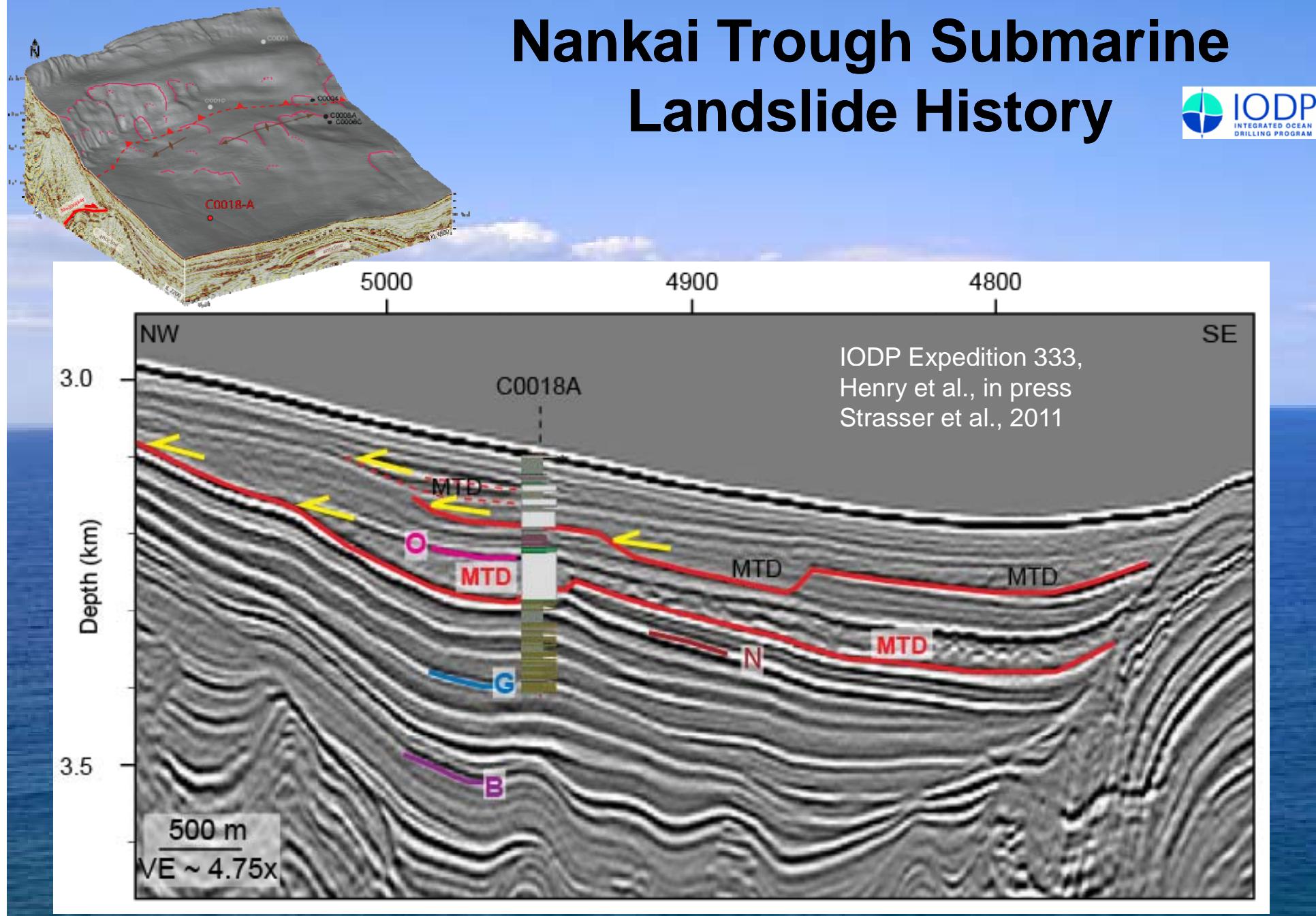
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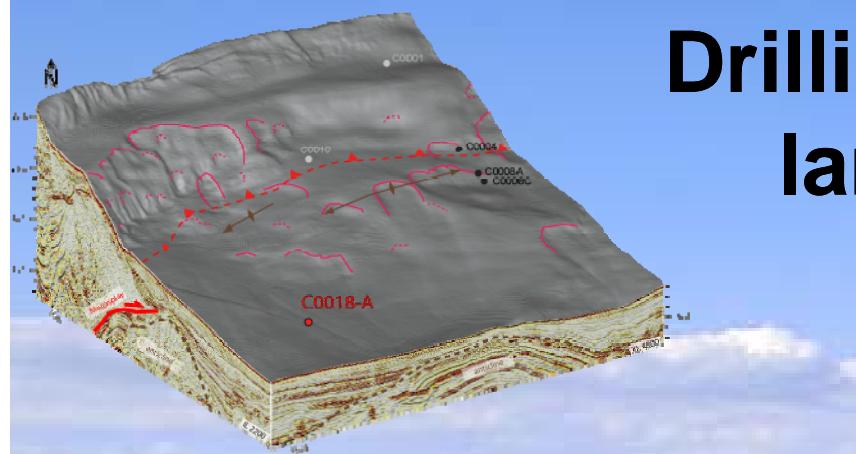


Nankai Trough Submarine Landslide History



Nankai Trough Submarine Landslide History





Drilling Quaternary submarine landslides on the Nankai accretionary wedge

Friday 13:30–13:45 , Room 1
Pierre Henry, et al.



European Geosciences Union
General Assembly 2011
Vienna | Austria | 03 – 08 April 2011

Friday, 8. April, 13:30 – 15:00 Room 1
NH3.11/SSP3.4: Submarine Landslides: Mechanisms, Processes and their Sedimentary Record



www.igcp585.org

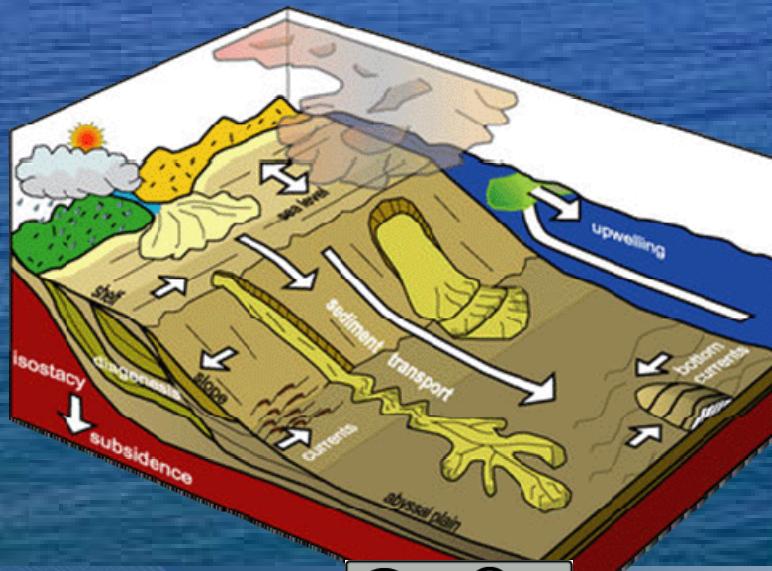
Thank you for your attention

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 - considerable potential geohazard



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