RUSALCA-2009:
RESULTS OF HYDROCARBON STUDIES

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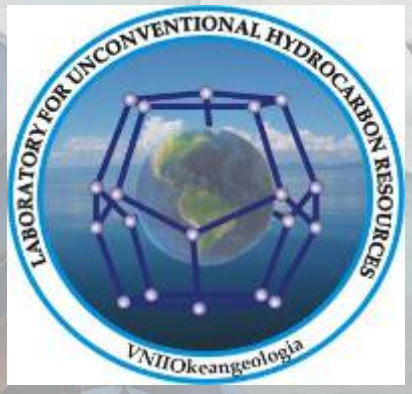


VNIIOkeangeologia

RUSALCA-2009 METHODS AND EQUIPMENT

RUSALCA-2009 cruise: what was done?

The aim of the study was revelation of hydrocarbons indications in sediment by using geophysical, geological, and geochemical methods

- gas-induced seismic anomalies

- specific bottom structures (seeps, vents, pockmarks)

- water or gas discharge within sediment

- high content of CH_4 and its homologies in sediment

- anomalous pore water composition

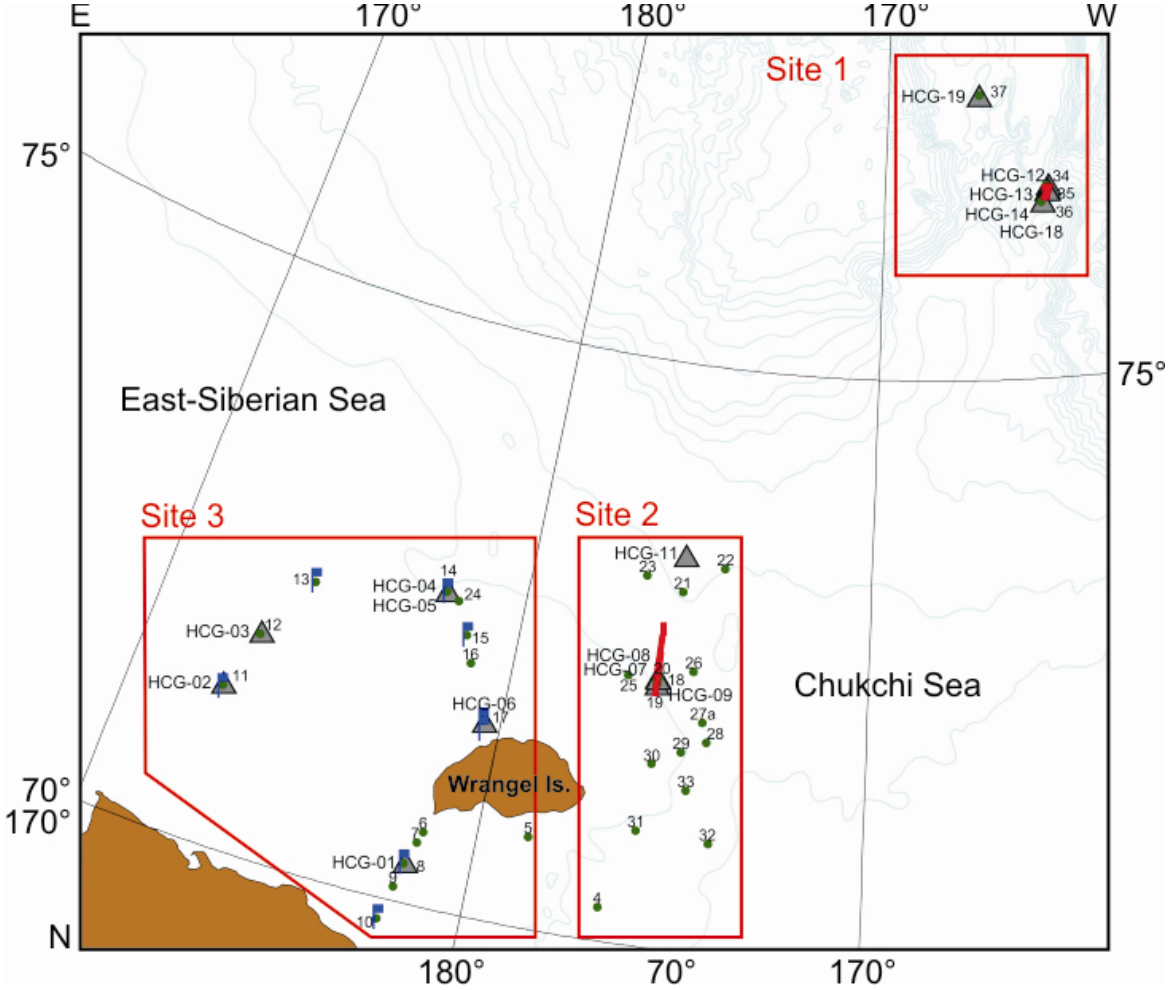
- anomalous water isotopic composition

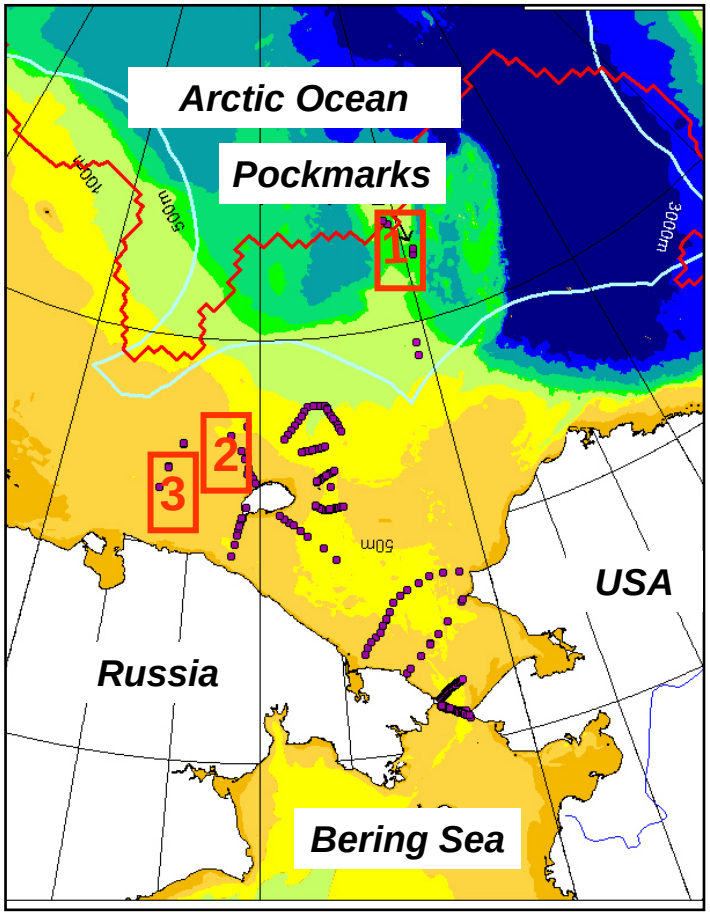
- DOM peculiarities

Data collected during RUSALCA-2009 by VNIIOkeangeologia team

- *Side-scan sonar survey at sites 1 and 2 (7 lines - 300 km)*
- *Subbottom profiler survey at sites 1 and 2 (7 lines - 300 km)*
- *Gravity coring (19 cores)*
- *Sedimentological description of the cores obtained*
- *Shallow water video observations (10 oceanological stations)*

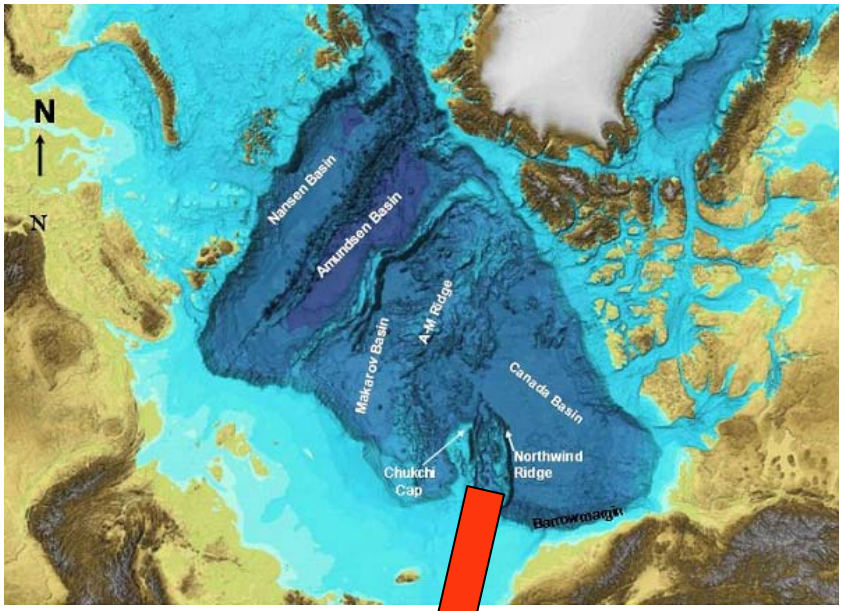
RUSALCA-2009 GEOLOGICAL SAMPLING STATIONS

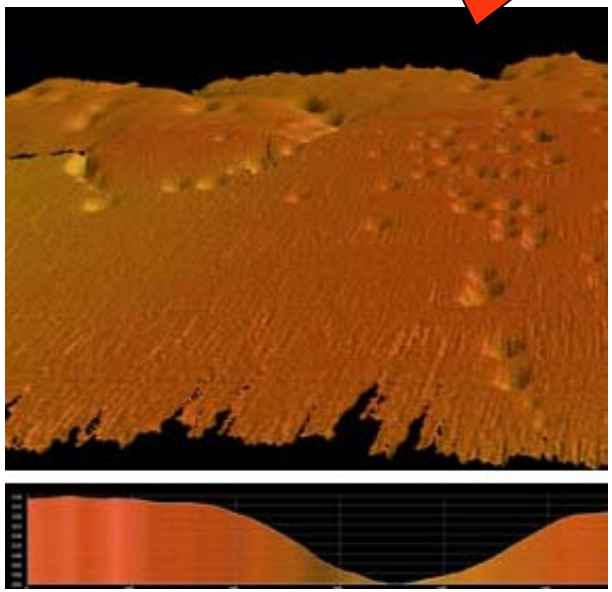




SITE 1 Pockmarks area

Water depth - 400-500 m

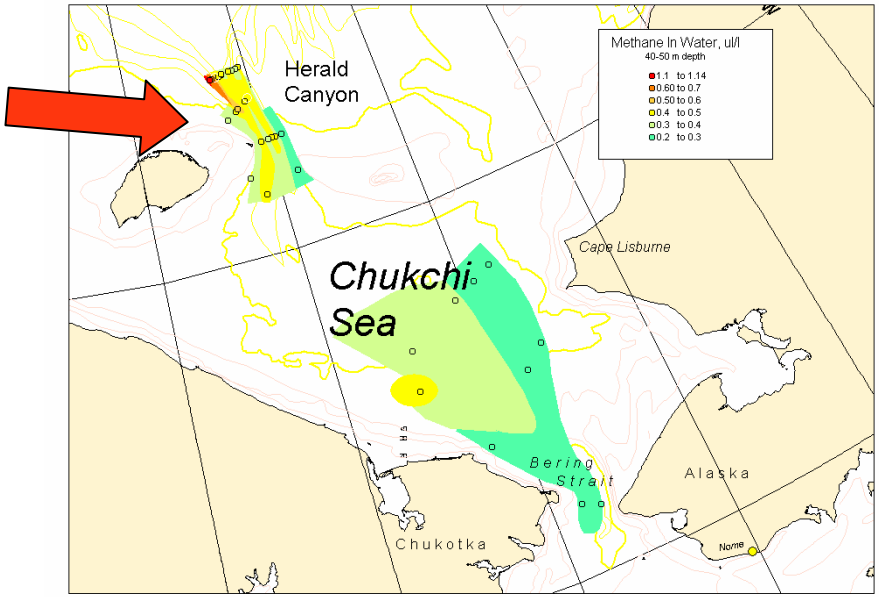




Mayer et al., 2009

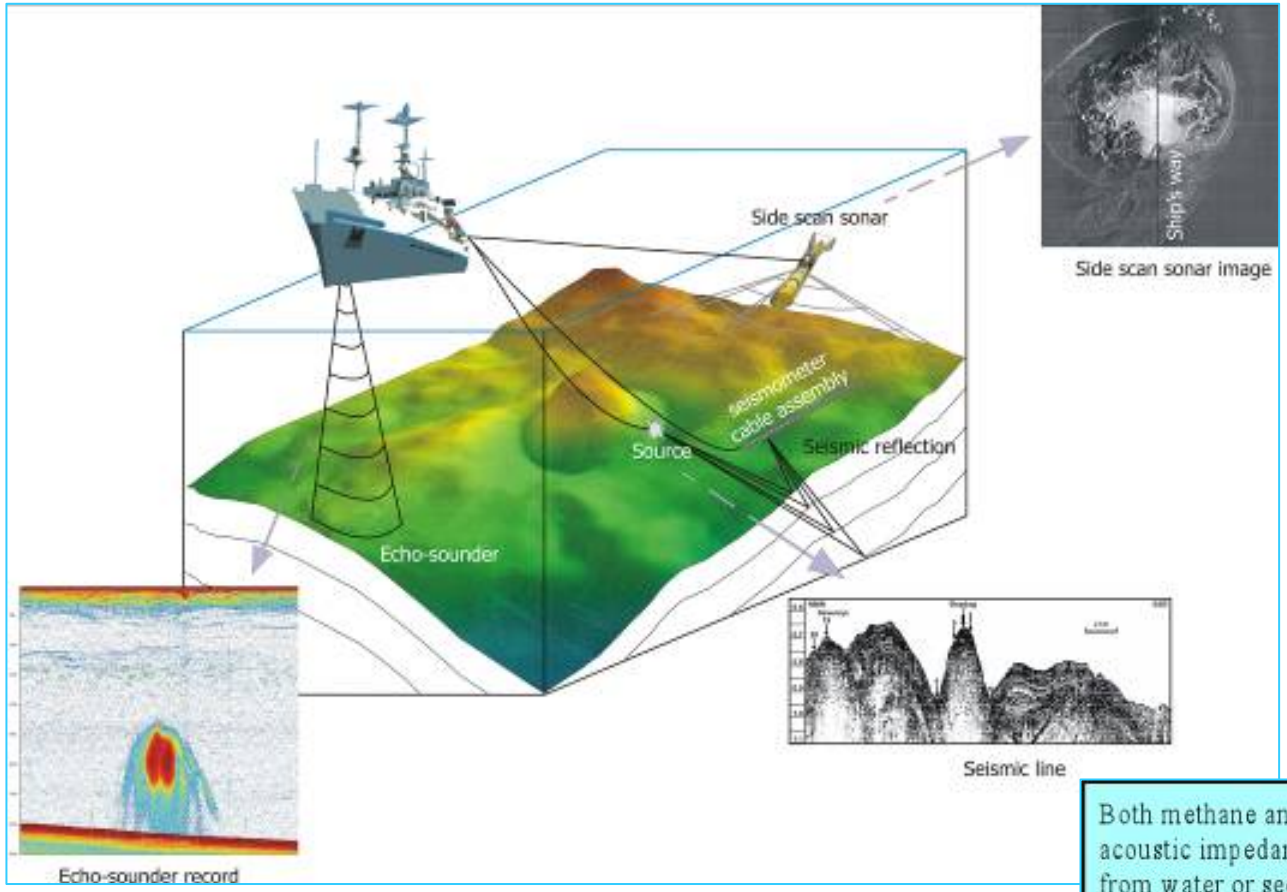
SITE 2 An extension of the Herald Canyon

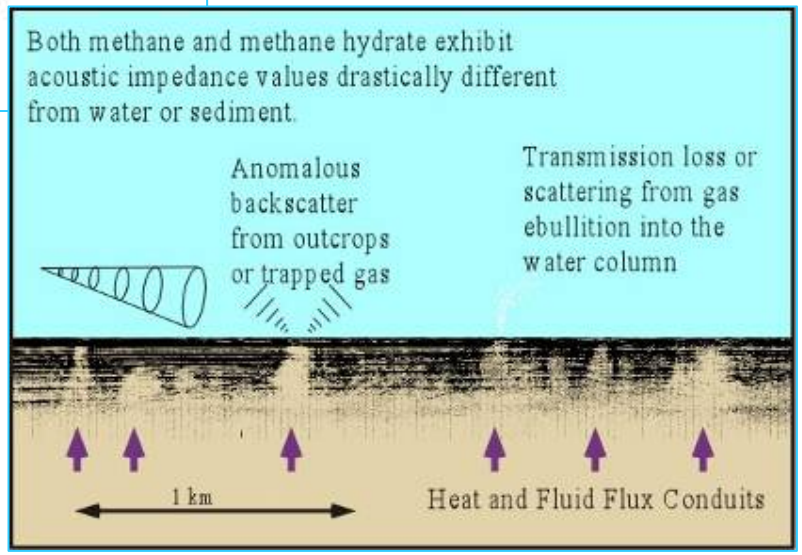
Water depth - 50-150 m



Savvichev et al., 2004

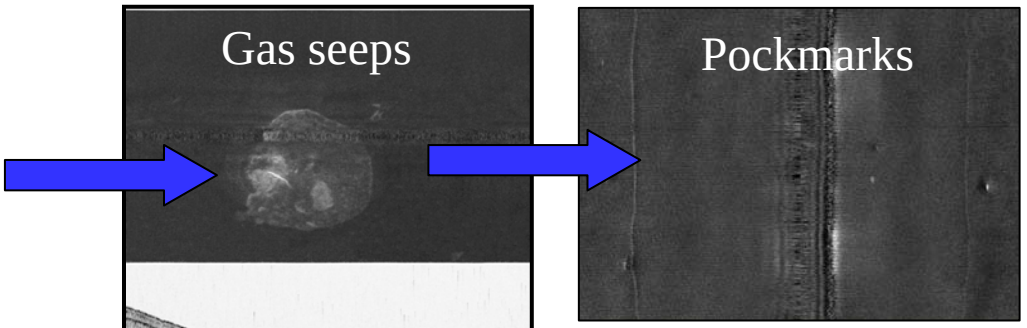
FLUID FLUX IDENTIFICATION BY SEISMIC METHODS



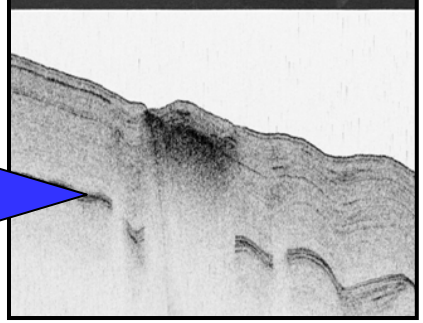


METHANE-RELATED AMPLITUDE AND FREQUENCY ANOMALIES ON THE GEOPHYSICAL RECORDS: SOME EXAMPLES

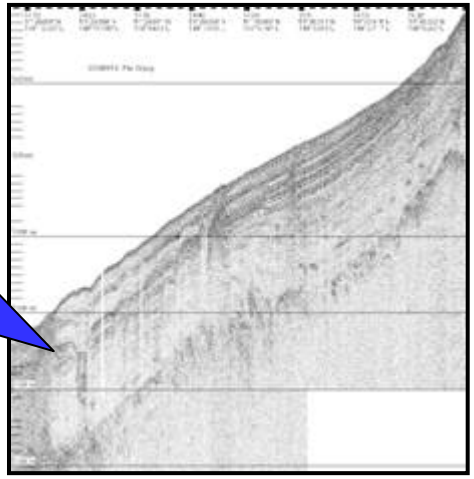
- **On the side scan sonar records (surface expressions)**



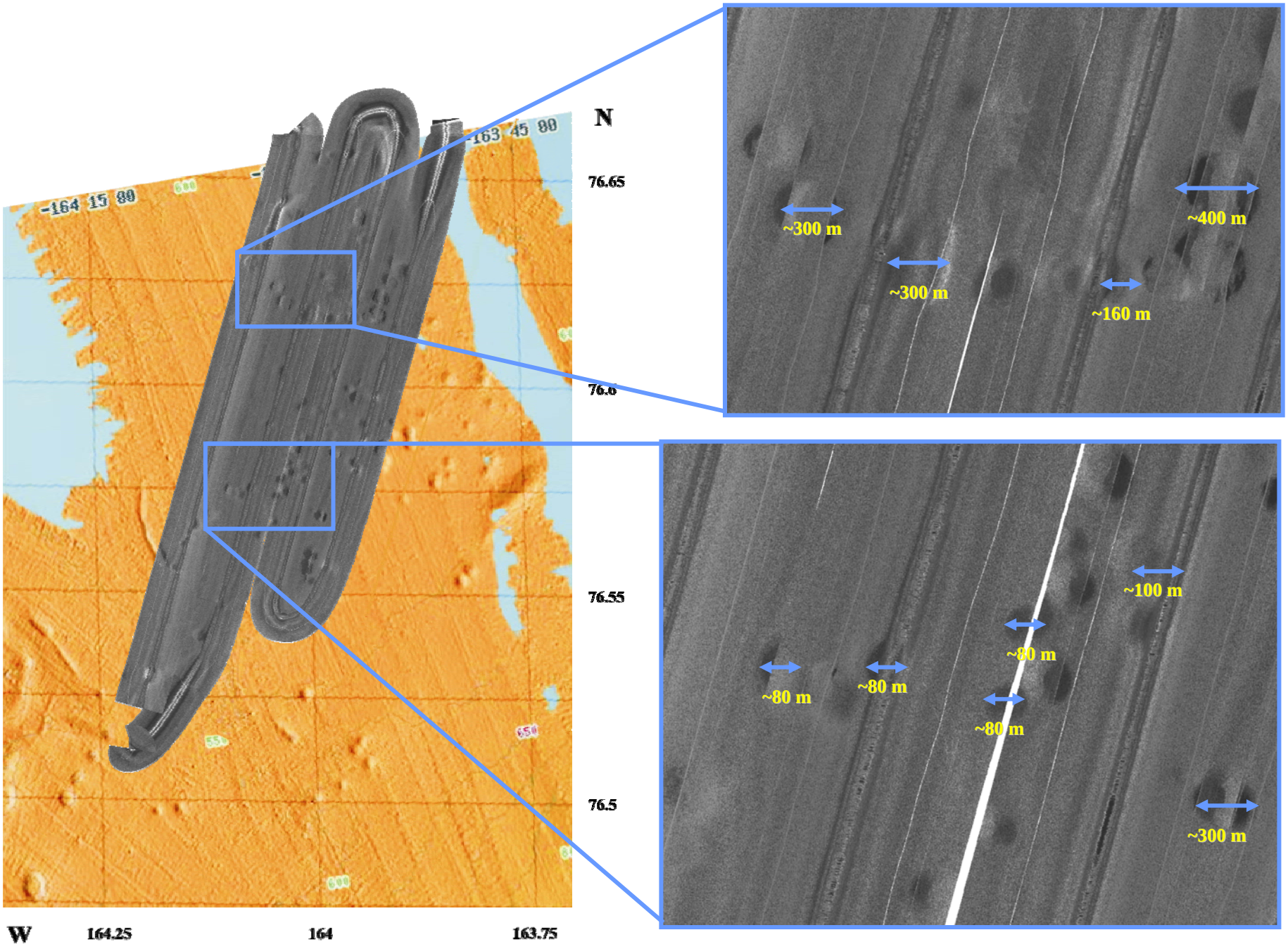
- **On the subbottom profiler records (subsurface expressions)**



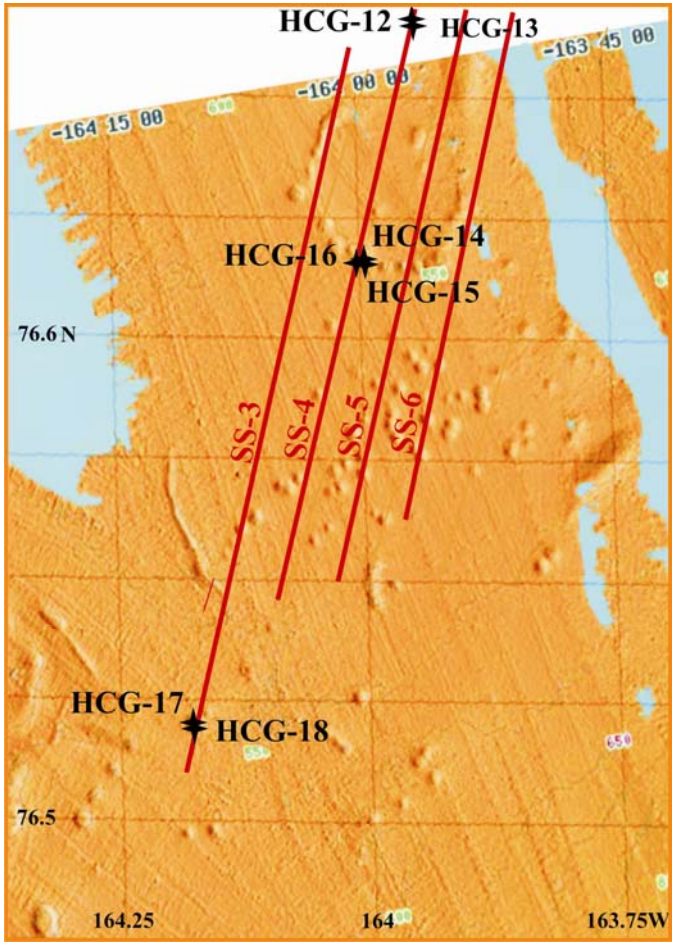
- **On the seismic records (subsurface expressions)**



SITE 1 Pockmarks area side-scan sonar data

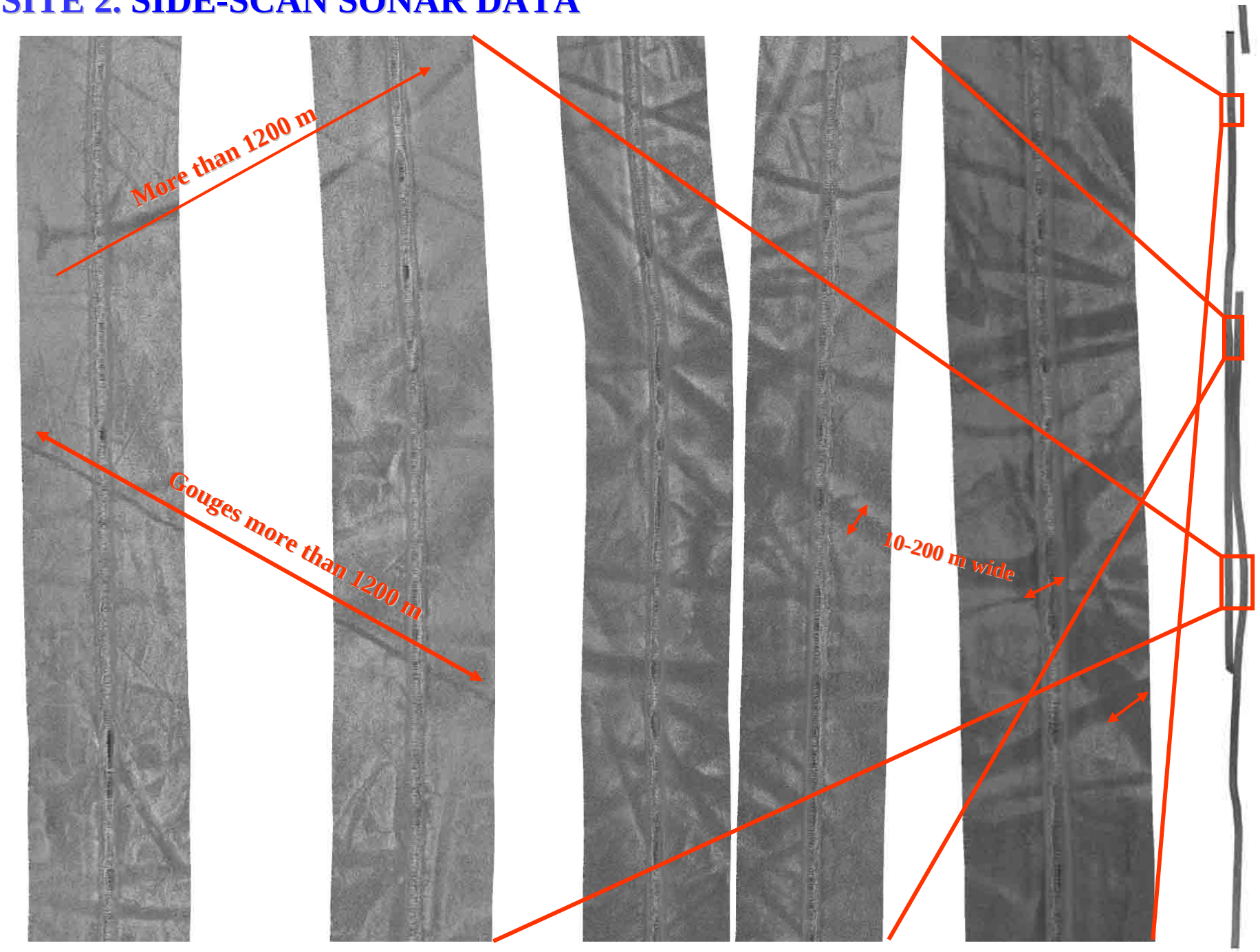


SITE 1 GRAVITY CORING

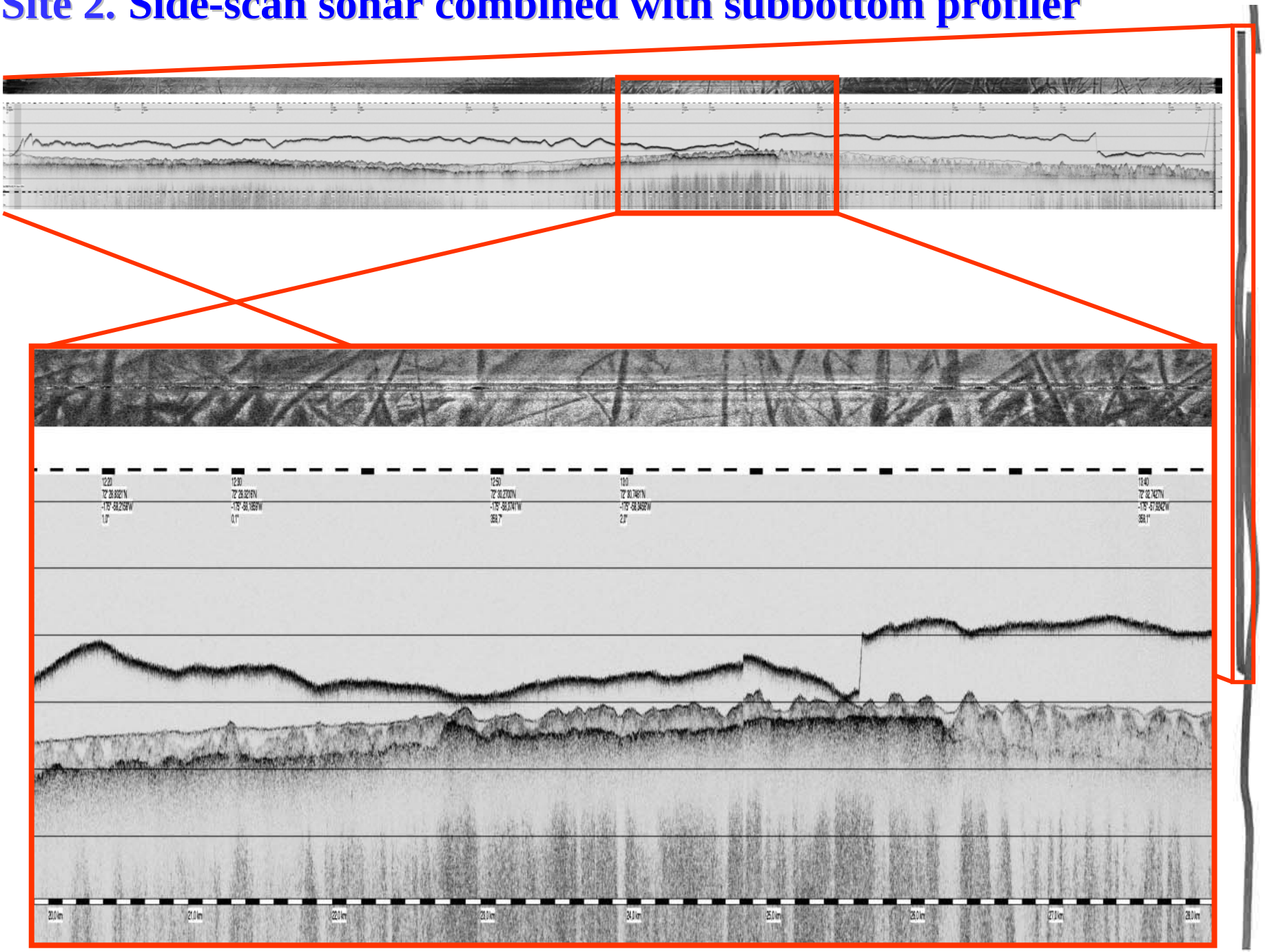


All cores characterized by brown oxidized clayey- silt with sand admixture in upper 0-15 cm horizon. Brecciated structures of sediment (different in color) were observed in some horizons.

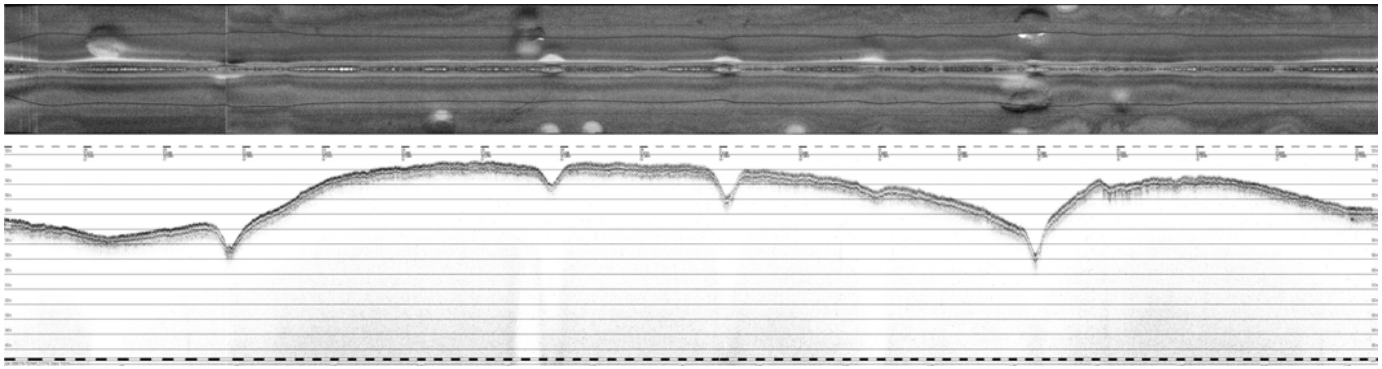
SITE 2. SIDE-SCAN SONAR DATA

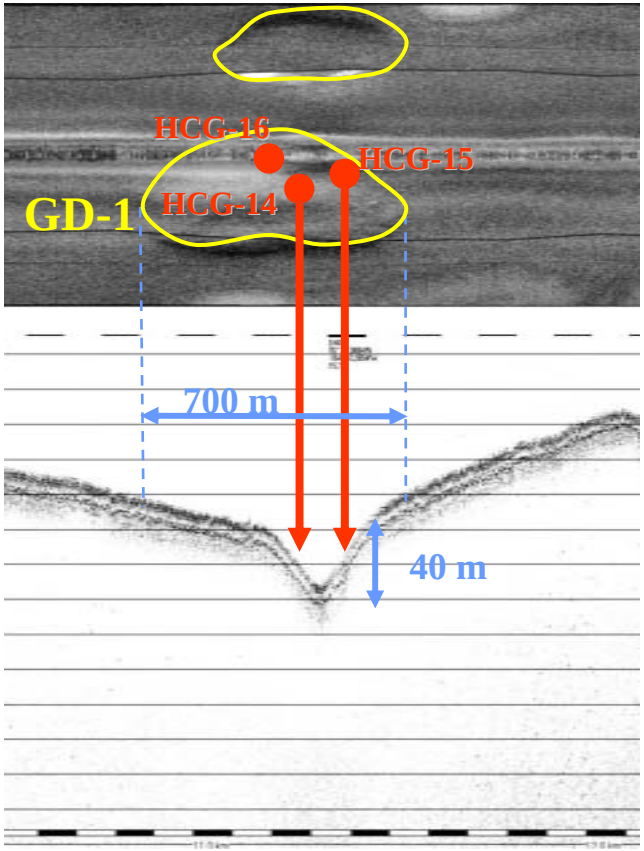


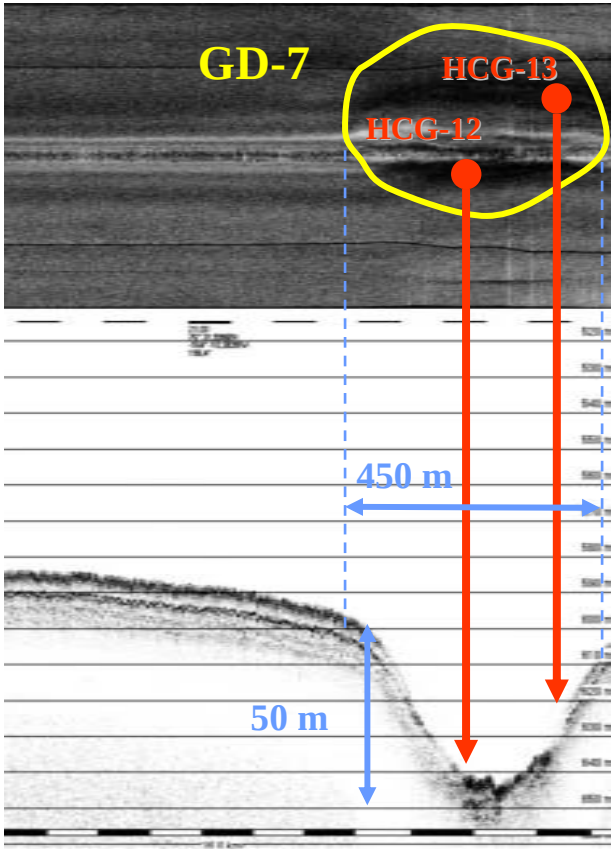
Site 2. Side-scan sonar combined with subbottom profiler

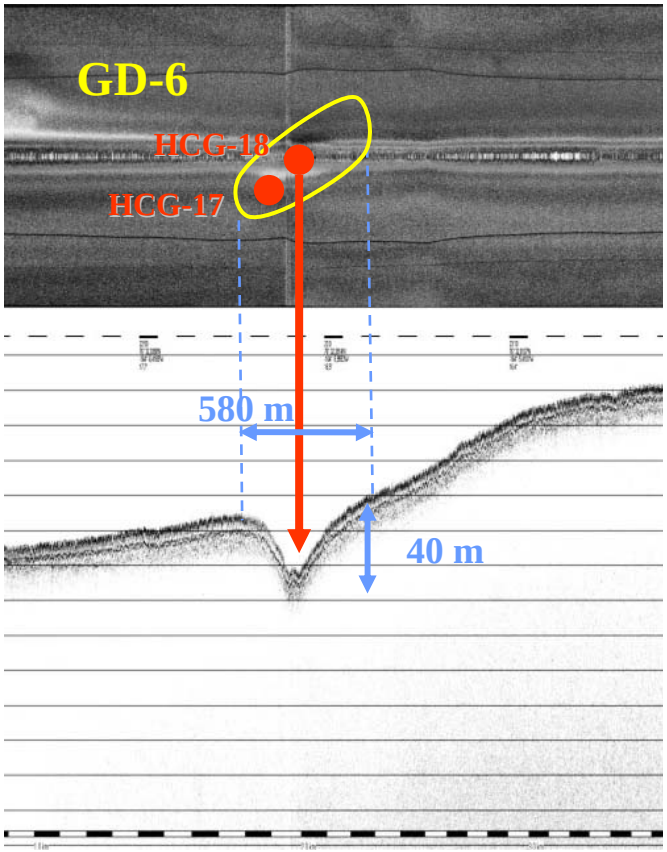


SITE 1 side-scan sonar combined with sub-bottom profiler

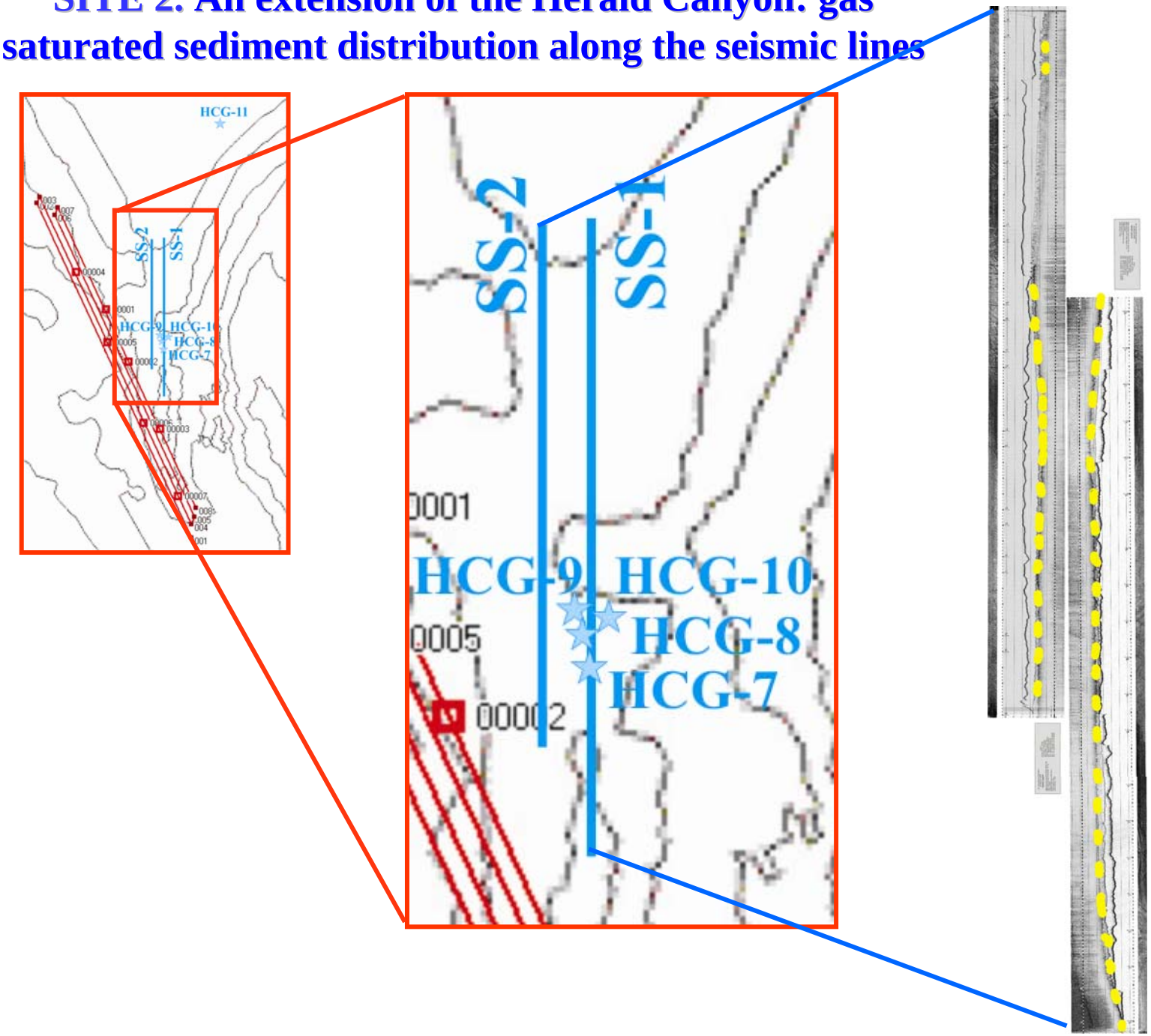




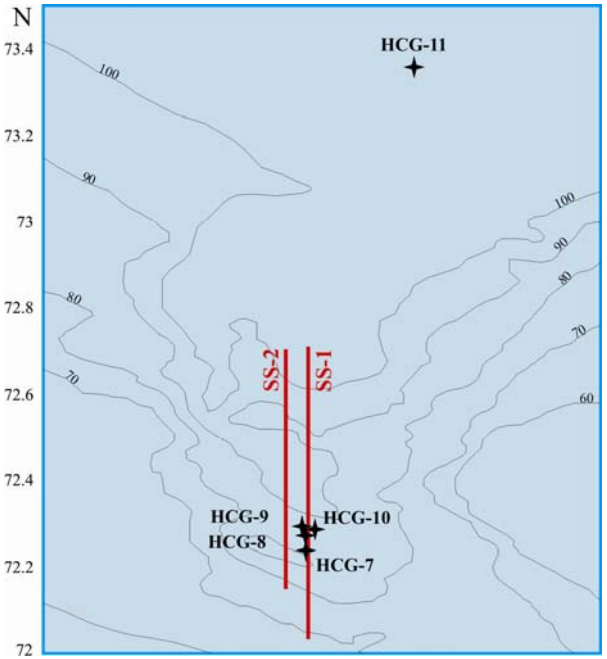


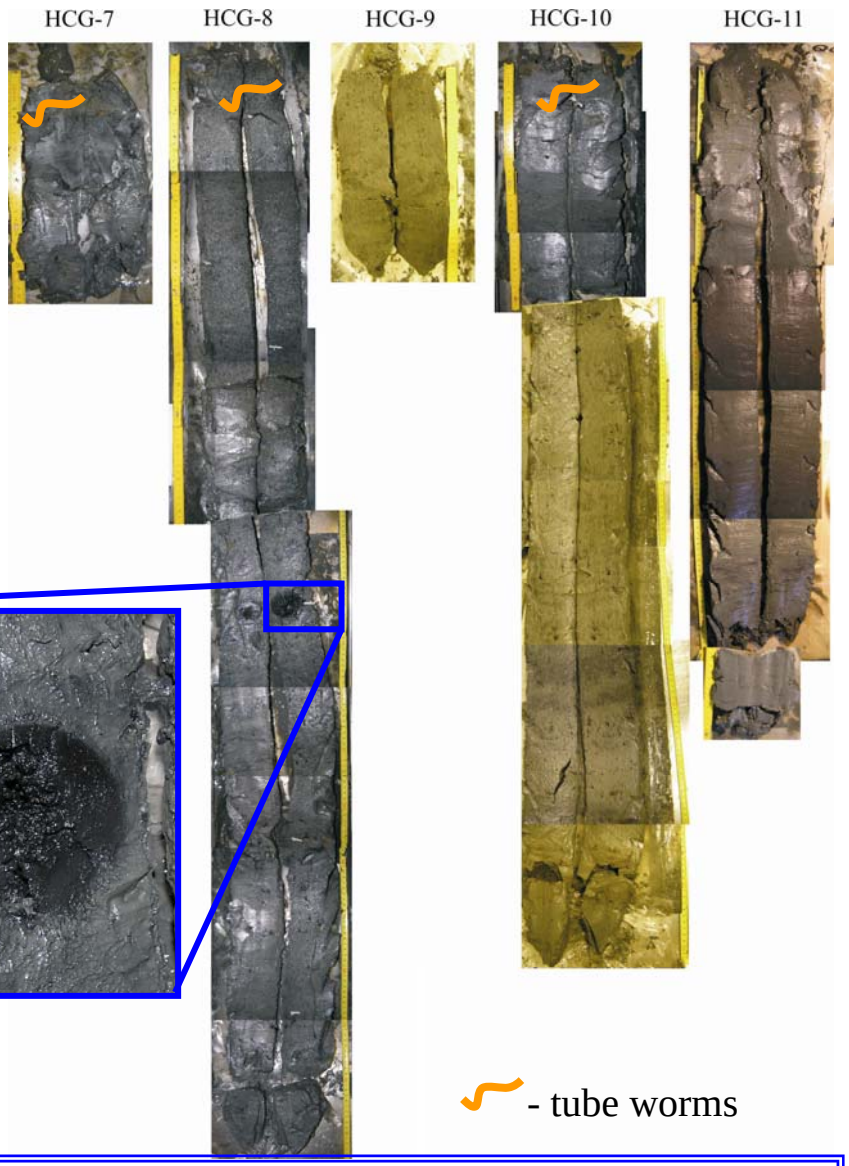


SITE 2. An extension of the Herald Canyon: gas saturated sediment distribution along the seismic lines



SITE 2 GRAVITY CORING

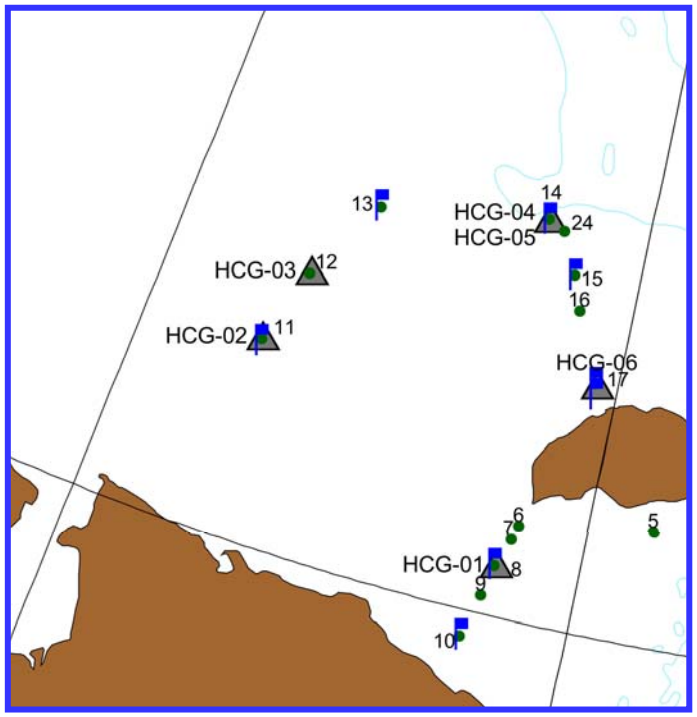


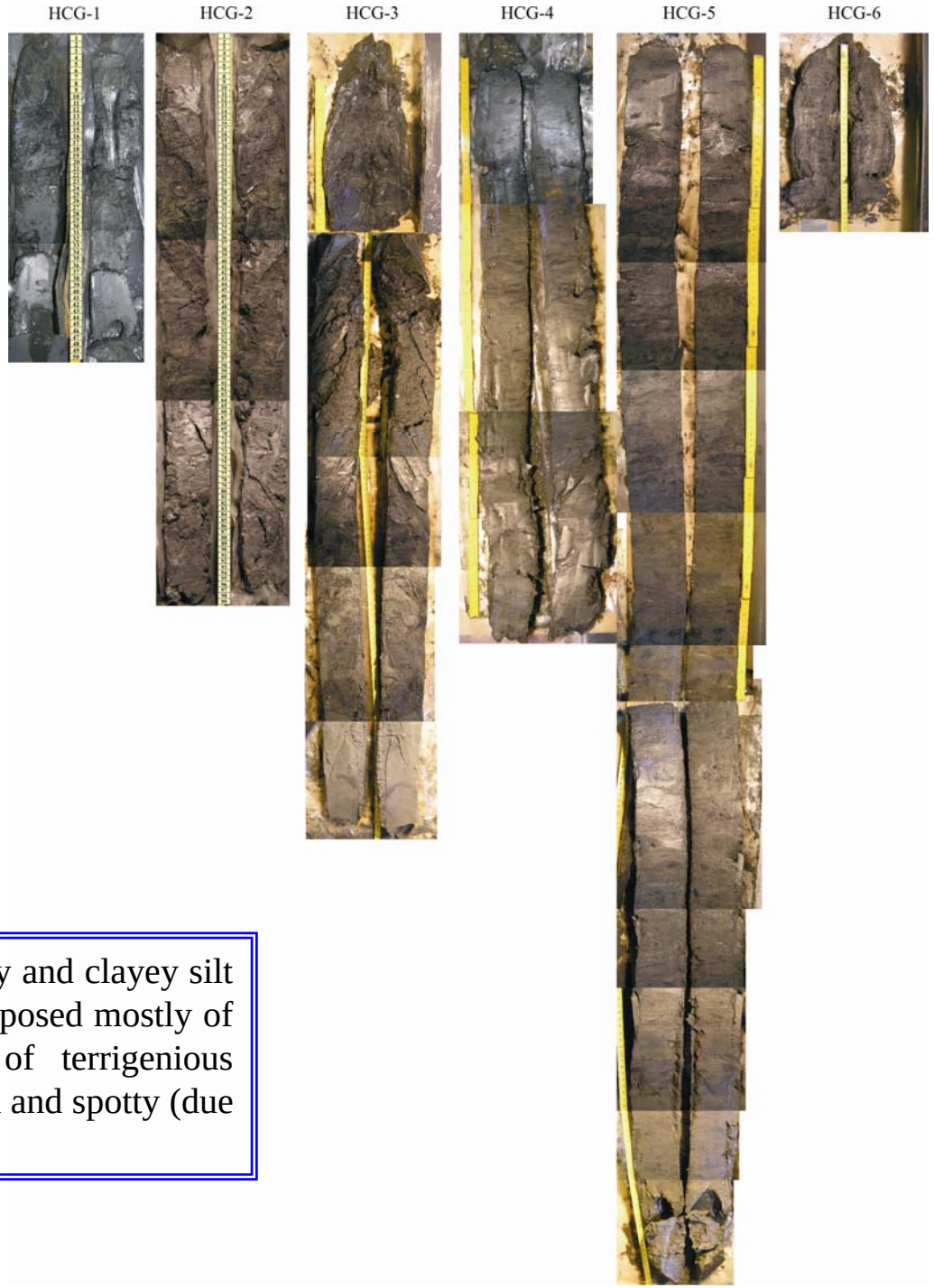


- tube worms

Sediments recovered within Site 2 were represented by dense dark-gray sandy-clays with different amount of sand admixture and interbedded with hydrotroilite laminas. The uppermost sediments (0-12 cm below seafloor) contain considerable silt and sand admixture that most probably resulted from bottom currents activity.

SITE 3. EAST-SIBERIAN SEA
GRAVITY CORING





The sediments in general represented by silty-clay and clayey silt with minor admixture of sandy fraction, and composed mostly of siliceous organic debris with an admixture of terrigenious material. The structure is homogeneous or banded and spotty (due to black hydrotroilite laminas).

Implications

HYDROCARBONS INDICATIONS WITHIN THE CHUKCHI AND EAST SIBERIAN SEAS

Site 1: pockmark-like structures at the Chukchi Cap

Further studies: heat flow, high resolution seismic, coring, lipid biomarkers

Site 2: An extension of the Herald Canyon

Further studies: mapping the methane-reach sediments by seismic methods, reinterpretation of RUSALCA-2004 seismic data, coring, AOM

Site 3: East Siberian Sea

No strong hydrocarbons signature observed