Insu

Architecture and lithofacies of silicoclastic turbidite systems: An integrated approach from a field outcrop- to a seismic-scale observation dedicated to geosciences students

UPMC
Marine Observatory of Villefranche/mer (French Riviera)

Why?

To address some topics in deep-sea sedimentary processes:

• understanding the construction of sedimentary bodies through time and space and their controlling factors

• prediction of oil reservoir geometries (major challenge for deeply buried reservoirs)

• construction of analogue models

How?

The training covers an exhaustive workflow, including:

• Acquiring seismic-reflection profiles (2 days at sea) and understanding underlying principles

• Data processing

• Interpretation of seismic profiles

• Comparison with field outcrops: 2-3 days field trip

+ lectures and practicals (32 h)

In brief...

A long-lived and recognized expertise – training sessions followed by:

● Students from UPMC (Master1-2, 3 sessions/year, equivalent to 3 ECTS)

● Students from Universities teaching Earth Sciences

- Université Paris Sud-Orsay

- Université de Nice Sophia Antipolis

- Université de Lille

- Université de Nantes

- Université de Grenoble

- Institut de Physique du Globe de Paris (IPGP)

- ENS-Paris

- ENS-Lyon

- Université de Genève

● Students from Engineer Schools teaching Earth Sciences

- Lasalle-Beauvais

- ENS-Nancy

● Junior and senior geologists working in the industry

- Exxon-Mobile

Specificity

● Practical experience of data acquisition at sea in a geologically-rich area

N/O Téthys II

Deployment of the multi-channel streamer
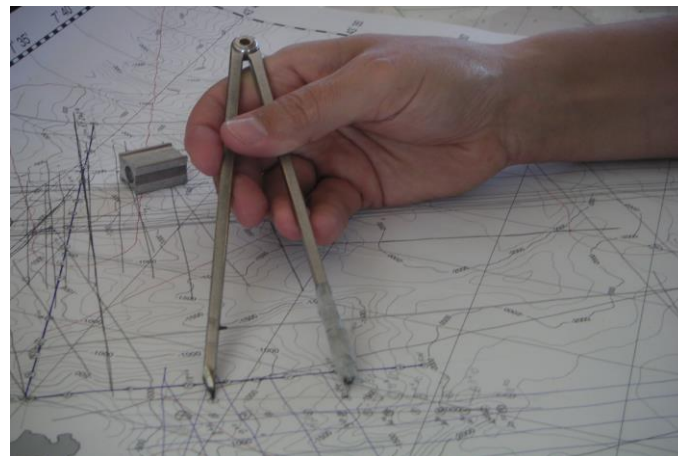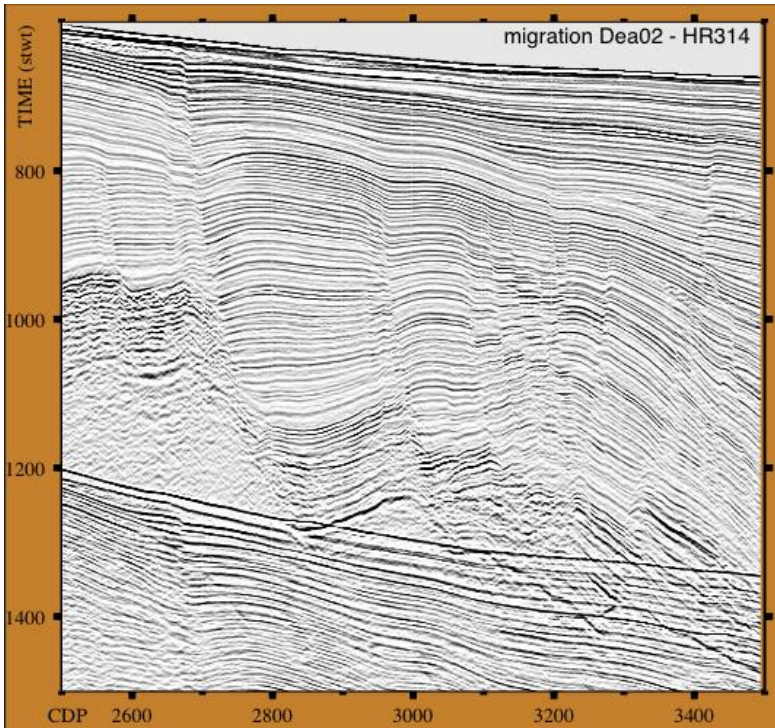
Deployment of the air gun source
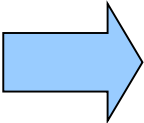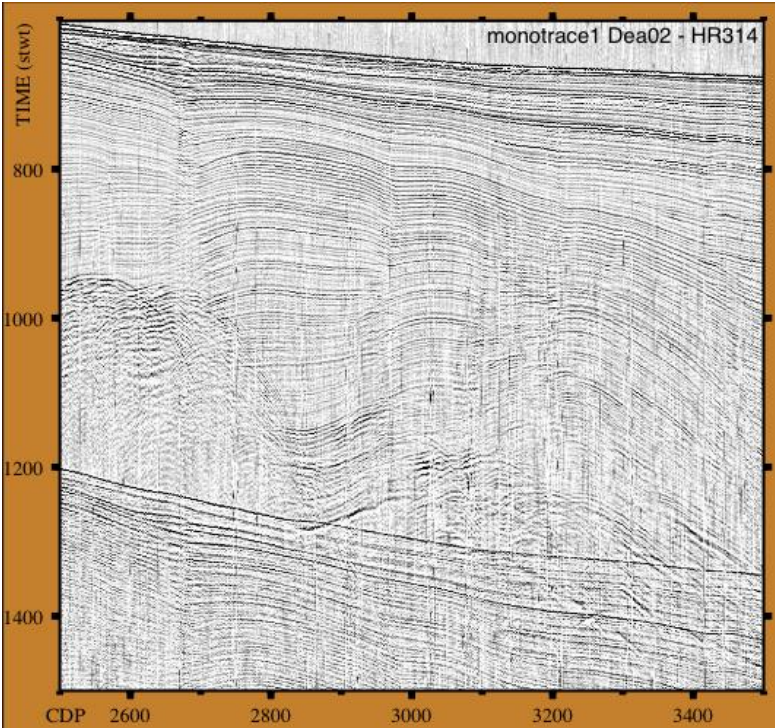
Data acquisition

Seismic acquisition is conducted as a real research cruise

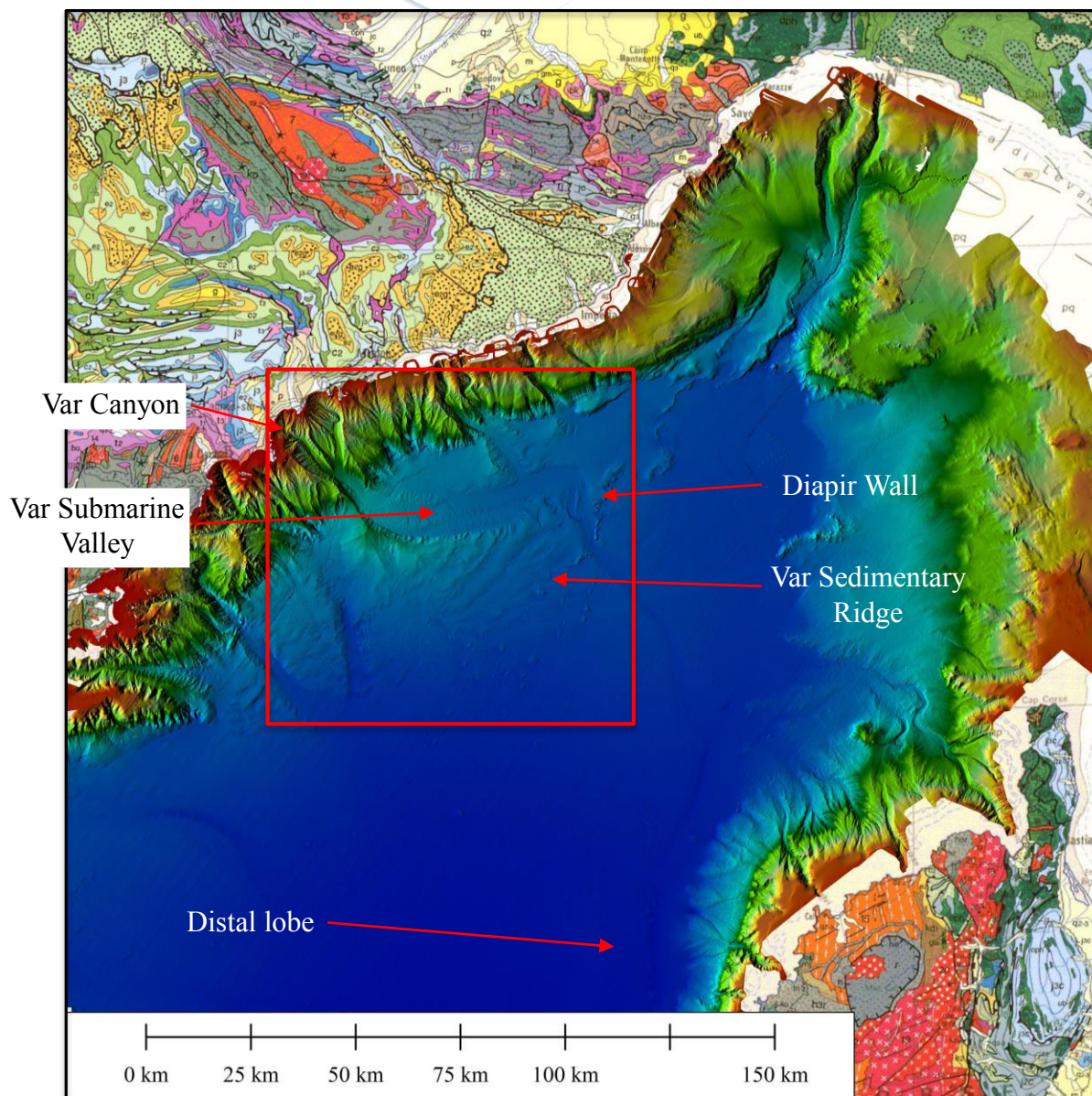Interaction with the bridge for vessel tracks, location of seismic profiles etc.

• Step-by-step data processing from raw to post-stack migrated images (CMP sorting, NMO, stacking etc.)
• Underlying principles, objectives and physics explained in details
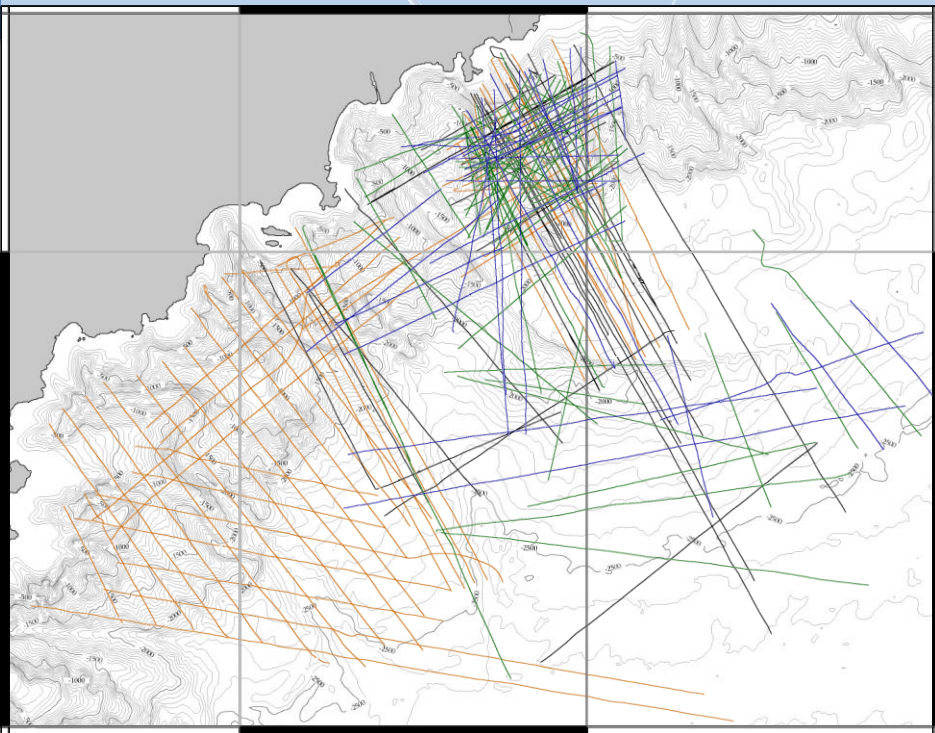• Focus on acquisition parameters and their consequences on data

Var Canyon

Var Submarine Valley

Diapir Wall

Var Sedimentary Ridge

Distal lobe

| 0 km | 25 km | 50 km | 75 km | 100 km | 150 km |

Seismic-profiles collected in the Var turbidite system, between Nice and Corsica island, and across the tectonically active North-Ligurian margin

- Seismic interpretations based on profiles collected during the training session, complemented by extensive database (more than 12000 km of seismic profiles).

- Specific exercises for identification and interpretation of seismic facies characterizing processes and architectures – continental slope, channel-levees accumulations, geological evolution of North-Ligurian margin...

Var Valley

Var Ridge

KS06   KNI22   KNI23   KNI27   KS03

0

2 m

? Holocene
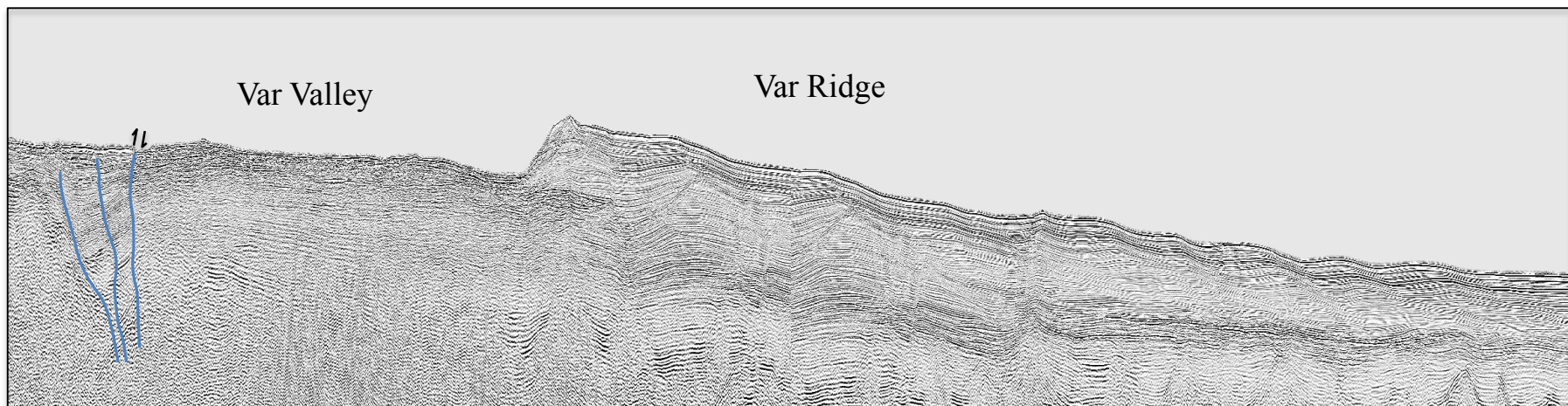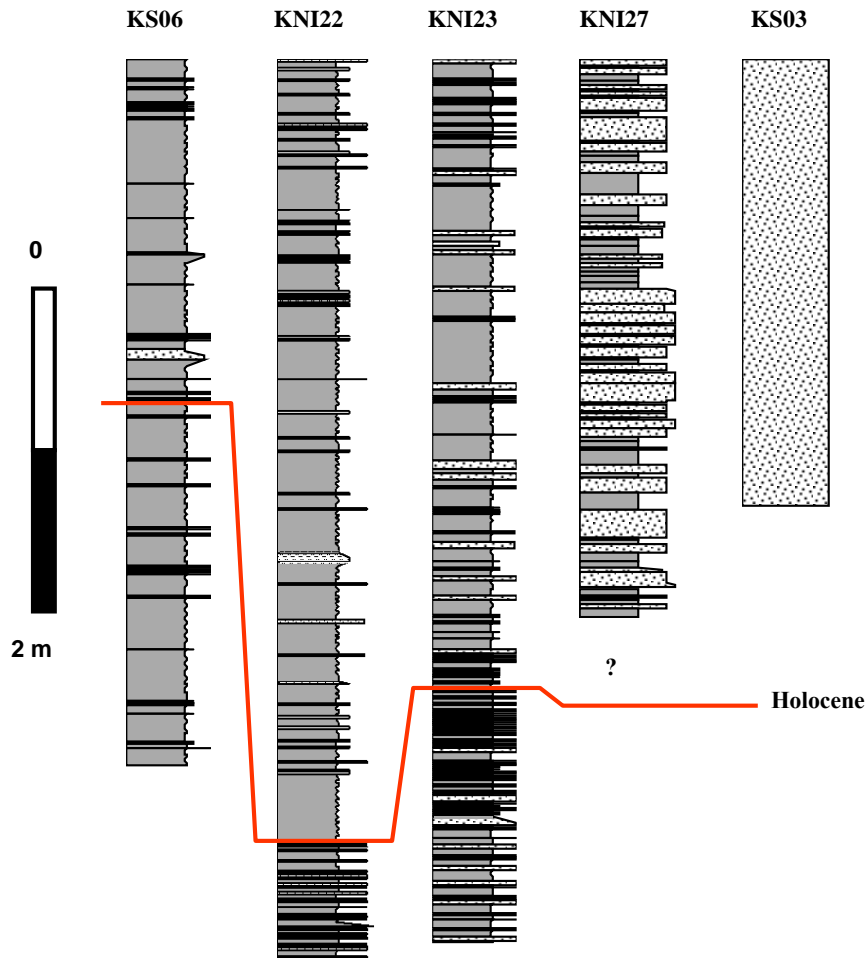
Seismic facies are correlated with sedimentological data (cores, dive observation…)

• 2-3 day fieldtrip in Oligocene Contes/Peïra Cava sandstones

• Comparison of equivalent architectures on the field and through geophysical images

• Fieldwork consists of panorama observation and interpretation, analysis of lithofacies and sedimentary structures.

• Integration between outcrops and seismic profiles allows students to build a geological model taking into account spatial distribution of lithofacies, continuity/connectivity of beds, controlling factors of sedimentary dispersion over a continental margin.

Well-layered facies
(continental-slope deposits)

Local slumping

Canyon axis

Two-Way Travel Time (s)

1.0

2.0

3.0

Messinian erosional surface

W

E

Blue marl