

WP1.2: Imaging the shallower portion of the Tiber basin to optimize drilling location

➤ Responsible: Luigi Improta, INGV – Roma 1

Objectives

High-resolution shallow imaging of the Tiber River basin and of the ATF splays bounding the basin westward

- Optimize location of a deep borehole (~200 m) that will house a seismometer (AIRPLANE Project)
- Yield new information on the recent basin evolution and ATF activity

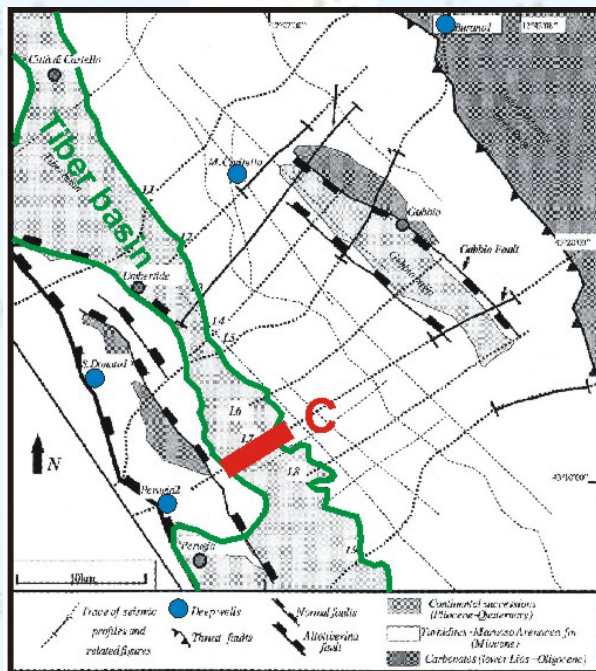
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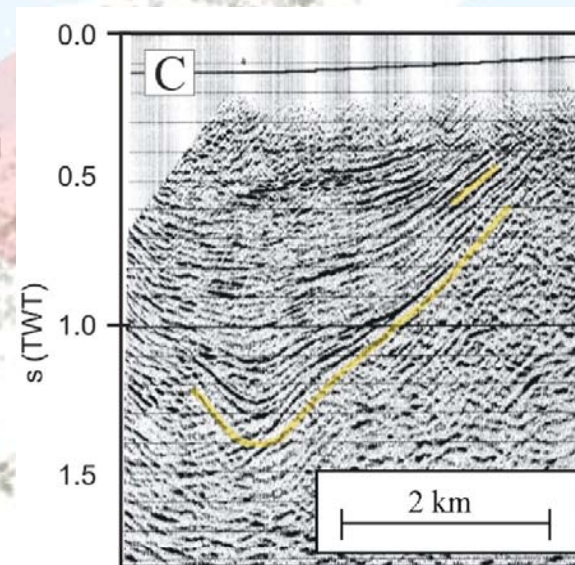
State of the Art

Six SW-trending commercial profiles cross the Tiber valley between Perugia and Umbertide constraining the large-scale/deep structure of the basin

But, commercial lines poorly define the shallow continental infill especially along the western border (TWT < 0.2-0.4 s, corresponding to ~200-400 m depth)



Commercial profiles crossing the Tiber basin (Mirabella et al., 2004)



Seismic image of the Tiber basin (Collettini & Barchi, 2002)

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Designing the experiment

- Two HR seismic profiles ~1500-2000 m long tied to the western margin of the basin
- Selection of the survey sites: (1) logistic and local geology, (2) location of the deep borehole, (3) commercial data
- Multifold wide-aperture acquisition geometry: array of receivers 900 m wide, geophone spacing 5 m, source spacing 10 m
- Vibroseis source (IVI MiniVib AMRA)

Collection of VHR data (e.g. Buffalo-Gun source) to investigate possible near-surface structures indicative of recent faulting activity

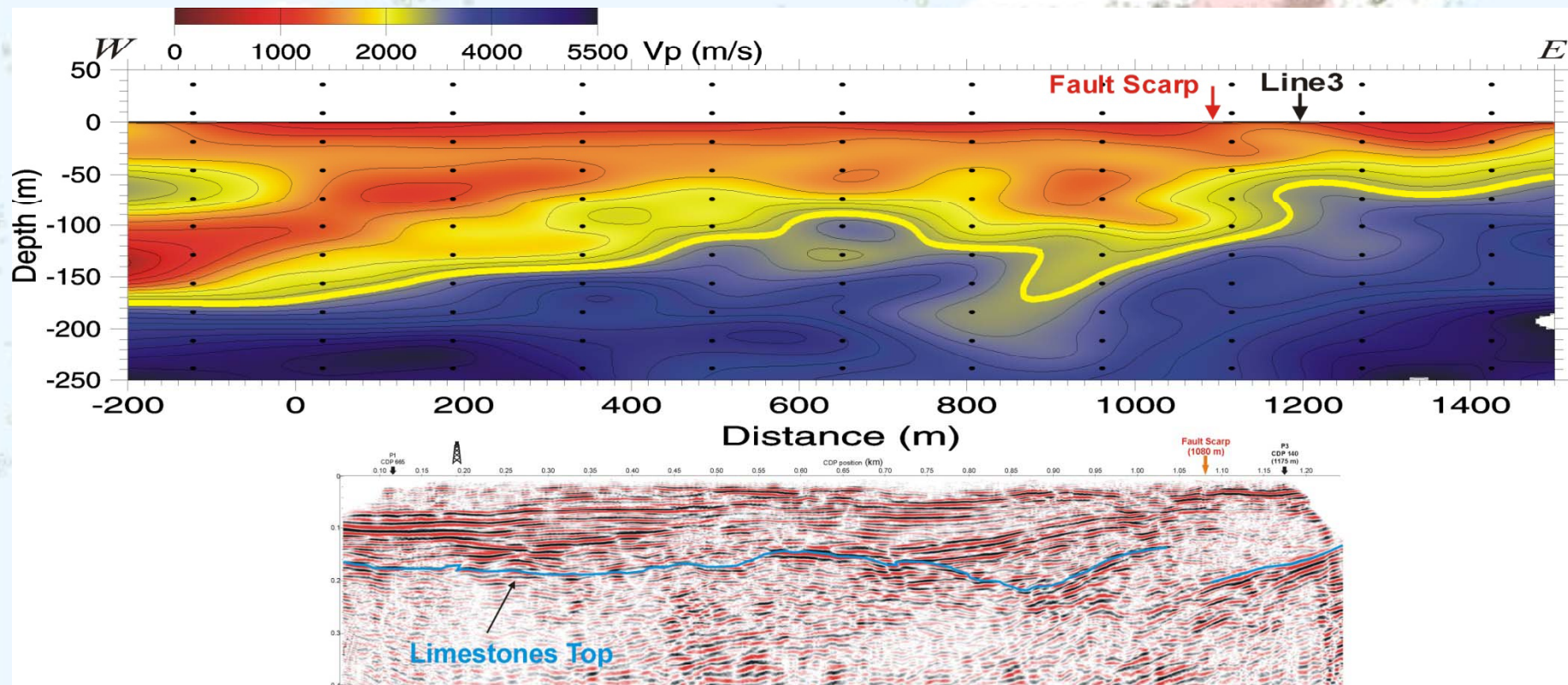
Seismic Imaging Flow

- First-arrival traveltimes tomography (multiscale V_p images)
- Common-depth-point processing of reflection data (migrated stack sections)

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Example of Vp and reflectivity images obtained in a intramontane basin of the Southern Apennines



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Activity will include five steps

- Analysis of commercial lines, of aerial photos and field surveys to select optimal survey sites
- Seismic experiments
- Data pre-processing, first-arrival picking and tomographic inversions
- CDP processing of reflection data
- Combined interpretation of Vp and reflectivity images

1-year workplanning

- Analysis of commercial profiles and of aerial photos (in collaboration with UNIPG-UR2)
- Field surveys to investigate local conditions and logistic
- Planning of the seismic experiments
- Request of permissions to local authorities