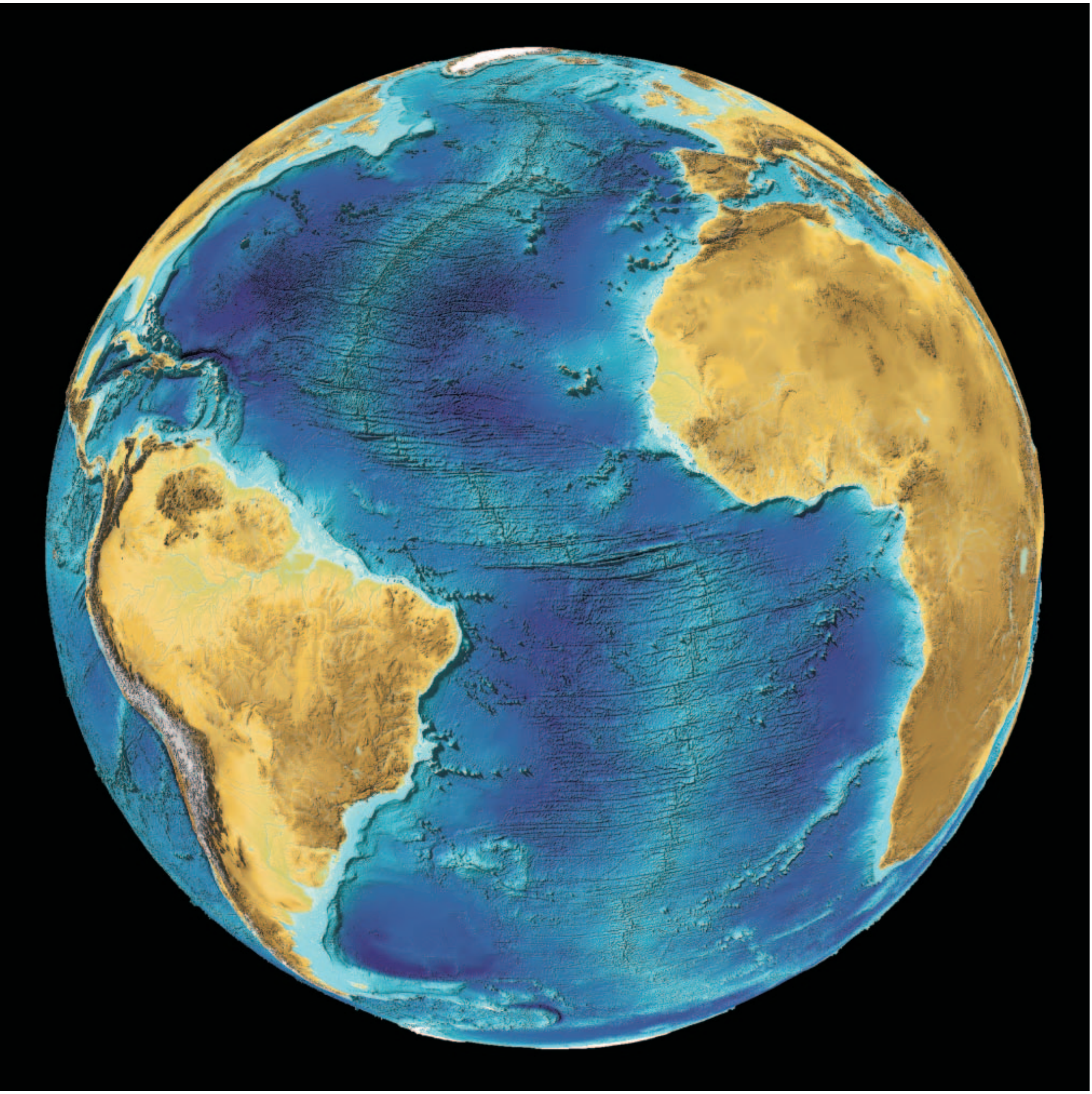
require a separate book to be explained. However, the spherical depictions are particularly suited to show the largest formations of the ocean floor up to global scales: the margins of the tectonic plates. They embody the fascinating and also terrifying processes which connect the hot interior of the Earth with the biosphere of our planet. The image captions will thus concentrate on these large scale formations since the high resolution sound images dealing with these tectonic processes (Sect. 5.2) represent close-ups which reveal the processes in detail.



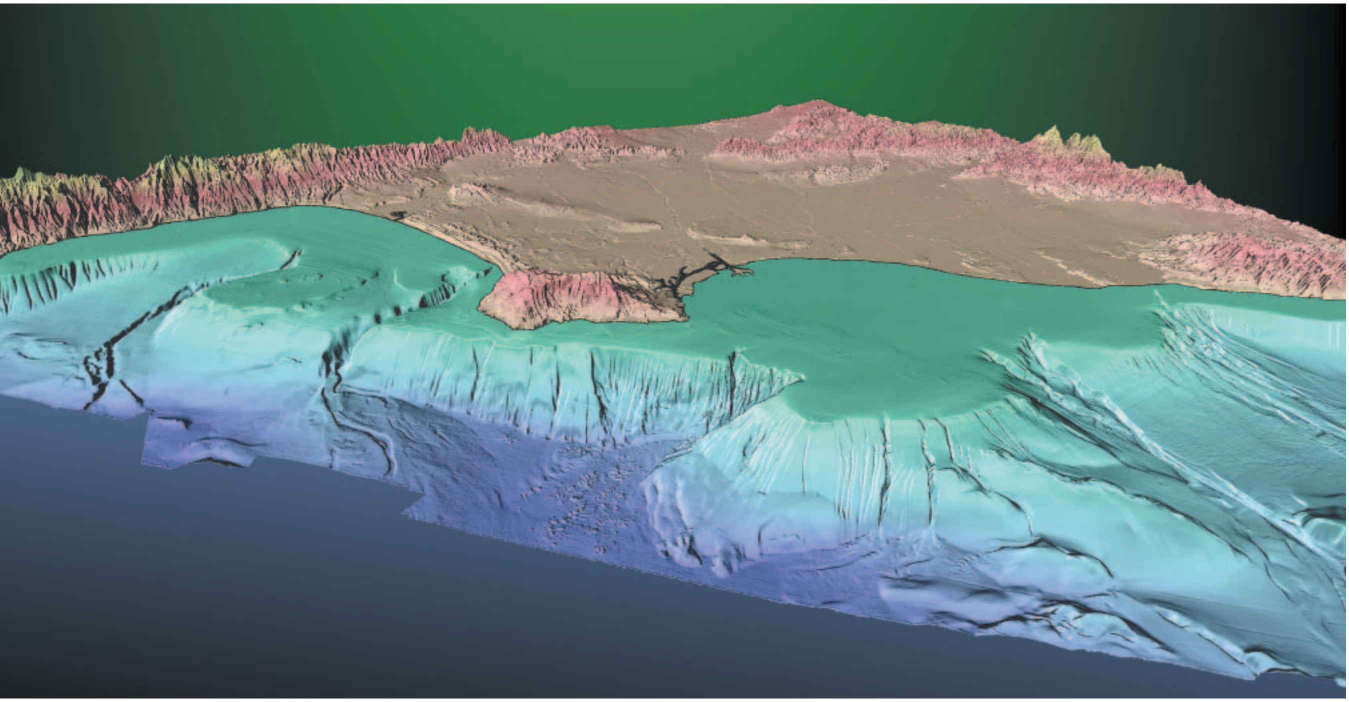


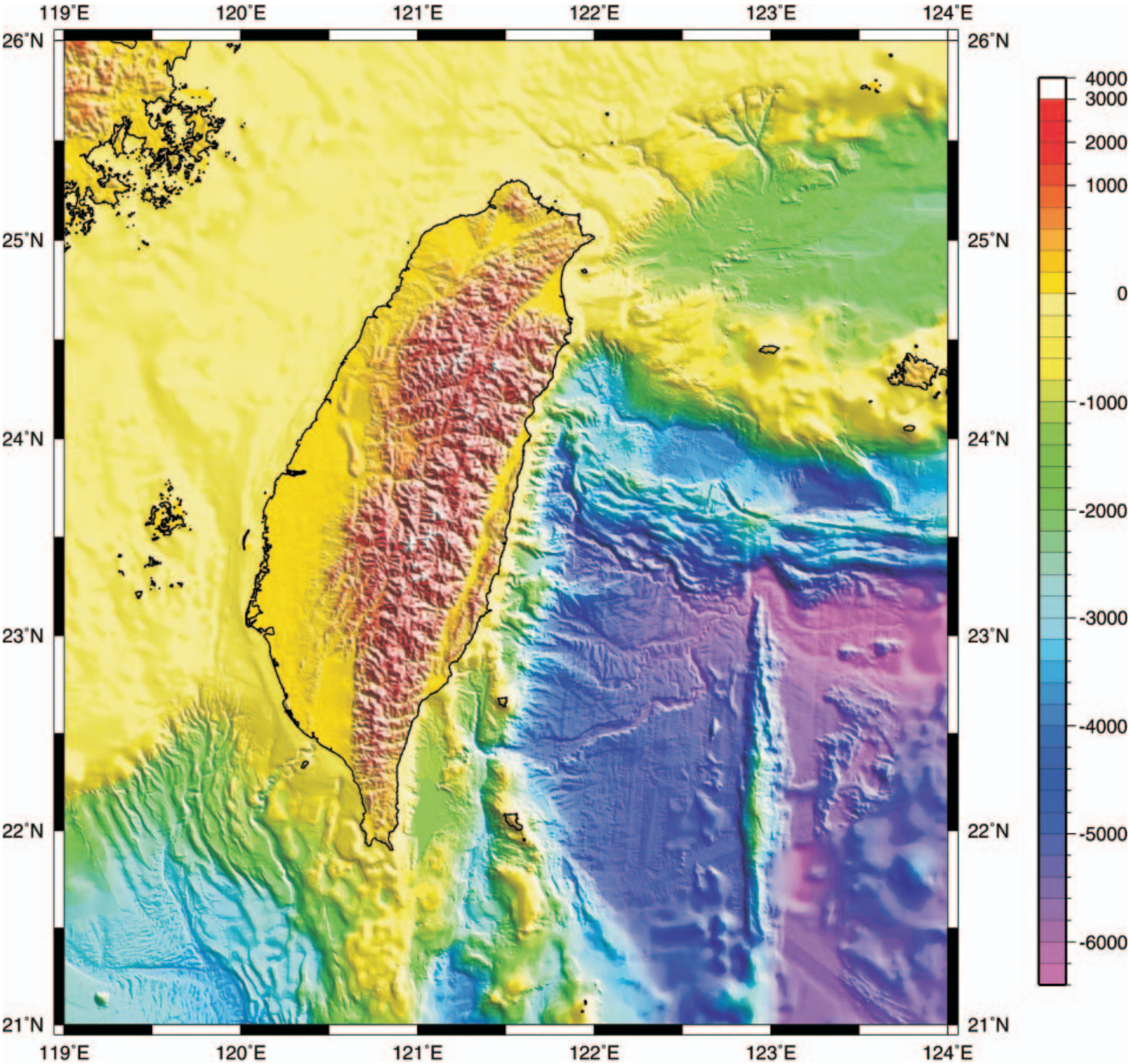
Image 5.2.5-1. Cut out of the strike slip fault margin, *Los Angeles Area* off *California*. 3D-multibeam sound image. The shaded-relief image of the Los Angeles margin shown is a 130-km section of the southern *California* margin. This section is crossed by a zone of active faults that roughly parallel the main plate boundary, the *San Andreas Fault* to the east. The main plate boundary evolves from the northern-most section of the *East Pacific Rise* (EPR, Sect. 5.2.4.2) that traverses the north-south length of the *Gulf of California*, and comes onshore at the head of the Gulf. This major transform fault slices through southern California with the densely settled Los Angeles basin and emerges back into the ocean south of *San Francisco*. These strike-slip transform faults differ in sense of motion from those transform faults that are pronounced relief features in spreading zones, such as the example at the Mid-Atlantic Ridge. (MAR, Sect. 5.2.3.1). Such transform faults occur along fracture zones between two spreading-ridge segments and are evident by ridge axis offsets.

A pronounced bend in the plate boundary in the vicinity of Los Angeles has produced a zone of major faulting throughout the Los Angeles area. One of these faults can be seen south of the *Palos Verdes Peninsula* in the middle of the image. The fault appears to have incised the edge of the continental shelf and upper slope as a multifold rupture of the sea floor.

It is the high resolution imaging that reveals the characteristic features of this rupture named Southern *Palos Verdes Fault (PVF)* in contrast to the two major canyons north of the peninsula which are obviously the result of erosion by sediment flow. However, the strike-slip transform fault type of plate margins is not normally a simple and singular rupture. It can be a complex aggregate of fissures or ruptures more or less aligned in parallel to each other and of finite length and different age, reflecting the history of local processes of tension release.

A newly discovered and investigated fault with the informal name *Avalon Knoll Fault (AKF)* is visible in the foreground of the relief image, about 10 km to the west of the PVF, extending for at least 14 km between the shelf edge and the base of the continental slope. Interpretations of seismic profiles through the sediment layers across the two faults (not shown here), suggest the AKF developed in the Holocene and must be younger than 10 000 years old. The geometry of such faults allows quantitative estimates of the minimum magnitude generated by seismic events along the faults. For the AKF the magnitude would be 6.5. This corresponds to the equivalent of 5 million tonnes TNT or a large nuclear explosion.

Project: Tectonic strike slip fault margin of the *Los Angeles* area; 1998
Research vessel: *RV Ocean Alert*, USA
Multibeam echosounder: Kongsberg Simrad EM300; 30 kHz, beamwidth 1° and 2°; 135 beams
Land topography: USGS DEM; resolution: 30 m; Color code of sea floor depths: light green: 50 m; light blue: 800 m
Image ©: James V. Gardner, Center for Coastal & Ocean Mapping, University of New Hampshire, Durham, NH, USA ■



Annotations in Image 5.2.9-1 (*left figure*): *CC*: Chi-Mei Canyon; *CCSF*: Chinese Continental Shelf; *CCSP*: Chinese Continental Slope; *CR*: Coastal Range; *FB*: Forearc basin; *HB*: Huatung Basin; *HC*: Hualien Canyon; *HR*: Hengchun Ridge; *KPC*: Kaoping Canyon; *LV*: Longitudinal Valley; *NLT*: North Luzon Trough; *NSC*: North San-Hsian Canyon; *PC*: Penghu Canyon; *RT*: Ryukyu Trench; *SOT*: Okinawa Trough; *SSC*: South San-Hsian Canyon; *TC*: Taitung Canyon; *YR*: Yaeyama Ridge

Project: ACT cruise, funded by CNRS of France, as part of the Taiwan-France Cooperation in the Earth Sciences Program; 1996

Survey Vessel: Atalante, France

Multibeam echosounder: SIMRAD, EM12-dual, hull-mounted; frequency: 13 kHz, beamwidth: 1.8°/3.5°, 162 beams; fan width: 150°

Image ©: Char-Shine Liu[1,2], Serge Lallemand[3] and Shao-Yung Liu[2]

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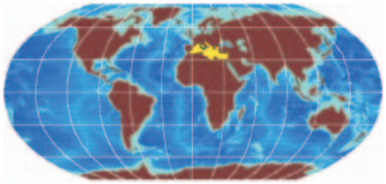
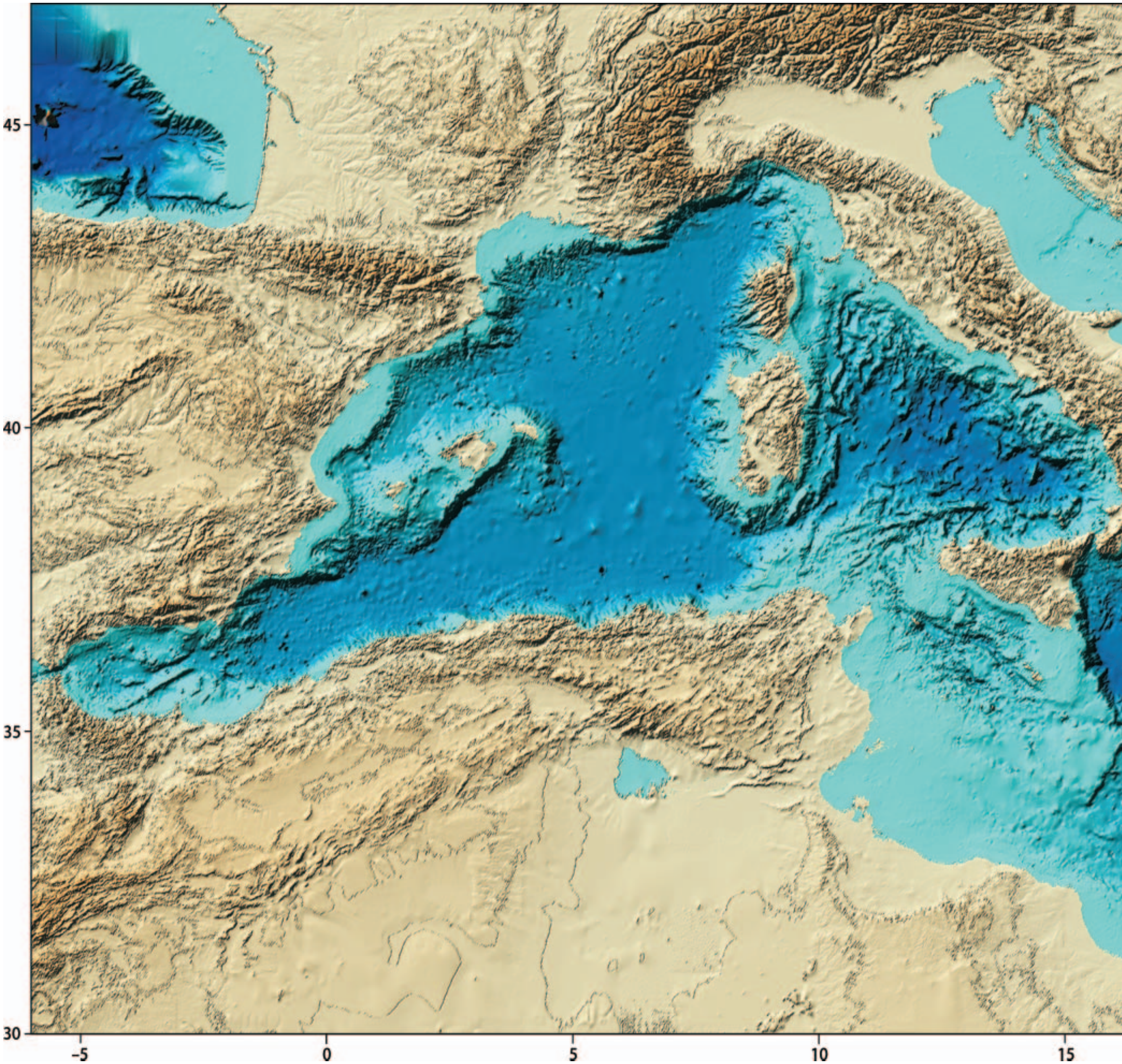
5.6



5.6
Mediterranean Sea Formations, the Overview

Revealing the sea floor topography of the Mediterranean by sound imaging may be emotionally considered differently from most other sites shown. It is like looking into the abyss, the subject of awe of those to whom we owe the



cradle of the occidental culture and the earliest encounter between Orient and Occident. These inhabitants of the Mediterranean area were privileged by the mild climate but they had also to live with weird, enigmatic hazards which they attributed to eruptions of divine rage: seemingly peaceful mountains were suddenly spouting fire and glowing flow and seemingly tranquil landscapes were suddenly shaken by unimaginable forces of destruction.

Image 5.6-1.
The Mediterranean sea floor. The relief image of the Mediterranean sea floor with its four large, deep basins indicates our present understanding of the origin of those phenomena, feared by our forefathers – as well as ▶