APPENDIX 3

Examples of geological effects of earthquakes

This appendix provides a collection of images of environmental effects of earthquakes. Most of the photographs show examples of surface faulting (Figs. A3.1-A3.20), the most spectacular effect of major earthquakes, which actually is the main geological evidence of their causative process.

Also, some examples are given of ground fractures, which are the most elusive among the geological effects of earthquakes. As a matter of fact, their origin is often argument of debate among scientists: surface faulting, hence a primary feature, or ground settlement (slide, lateral spread, liquefaction, soil compaction, etc..), due to ground shaking? A meticulous field investigation, although not always able to reconcile the different viewpoints, permits in general a satisfactory understanding of the underlying process.

Liquefaction events are frequent in loose recent coastal alluvial and lake sediments. Effects can be spectacular and source of high risk, where buildings, bridges, artificial basins are constructed above liquefaction-prone ground as in Njigata in 1964 (Fig. A3.28), Anchorage in the same year (Fig. A3.29), and in many other cases in the world (e.g., the failure of the Lower San Fernando dam in 1971).

Sinkholes are not frequently associated to earthquakes, but in peculiar conditions they might characterize the landscape and be a significant source of hazard (Figs. A3.34-35).

Landslides and rock falls are very common in the epicentral area, but may occur even far from it, where the equilibrium is already precarious (as it was likely the case at Cerda, Fig. A3.33); moreover, landslides may show up days after the event.

Hydrological changes and gas emissions are also elusive, being often temporary and difficult to document by images.