
Surface Processes and Landforms

Second Edition

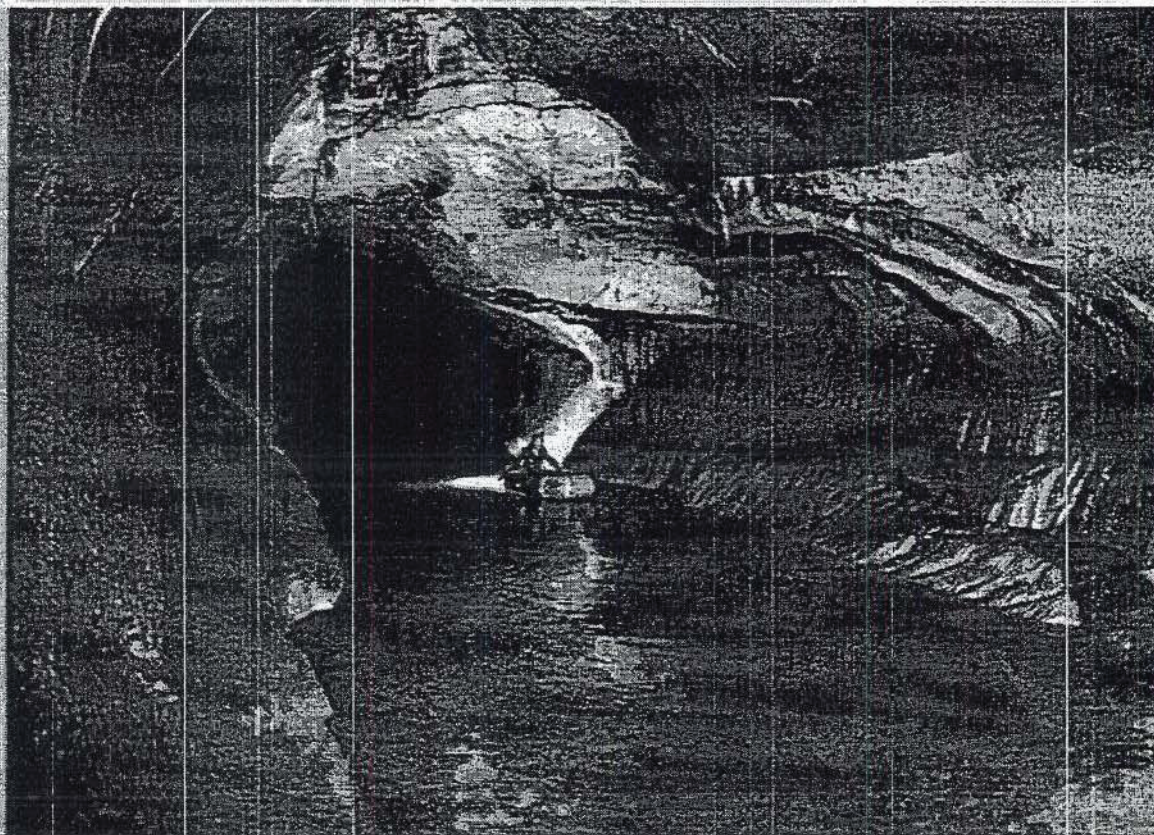
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Groundwater



Subterranean stream in a limestone cave, Krizna Jama, Slovenia. (Photo by A. N. Palmer)

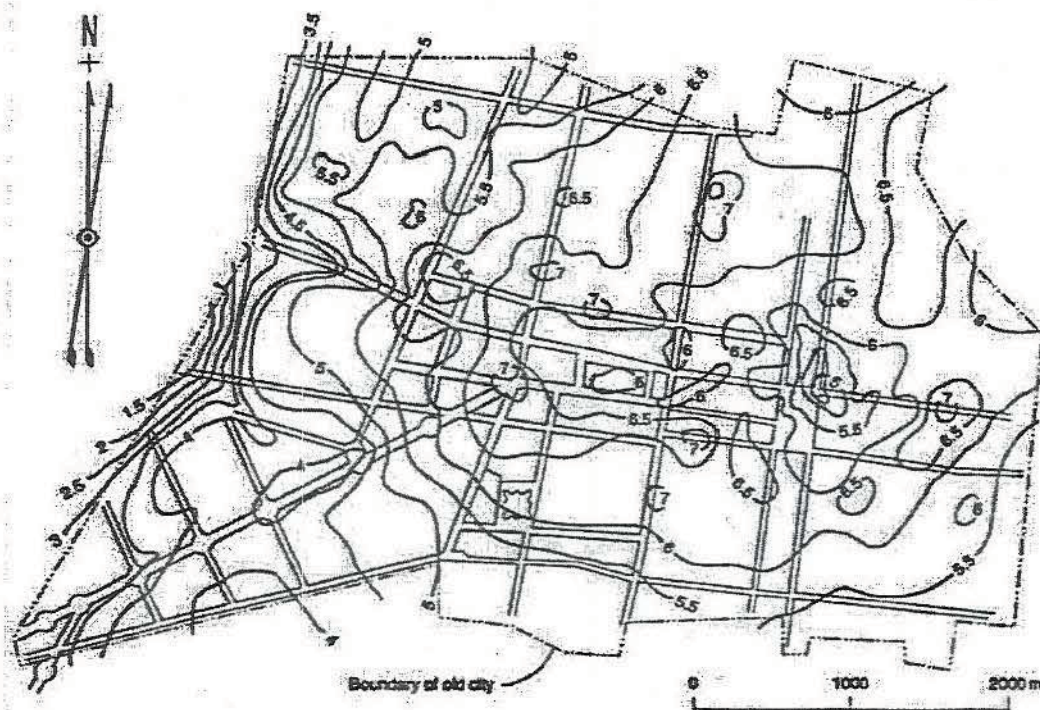


FIGURE 7-11
Subsidence of Mexico City,
1891–1959, shown by lines of
equal subsidence (meters).
(After Comisión Hidrológica de la
Cuenca del Valle de México,
1961)

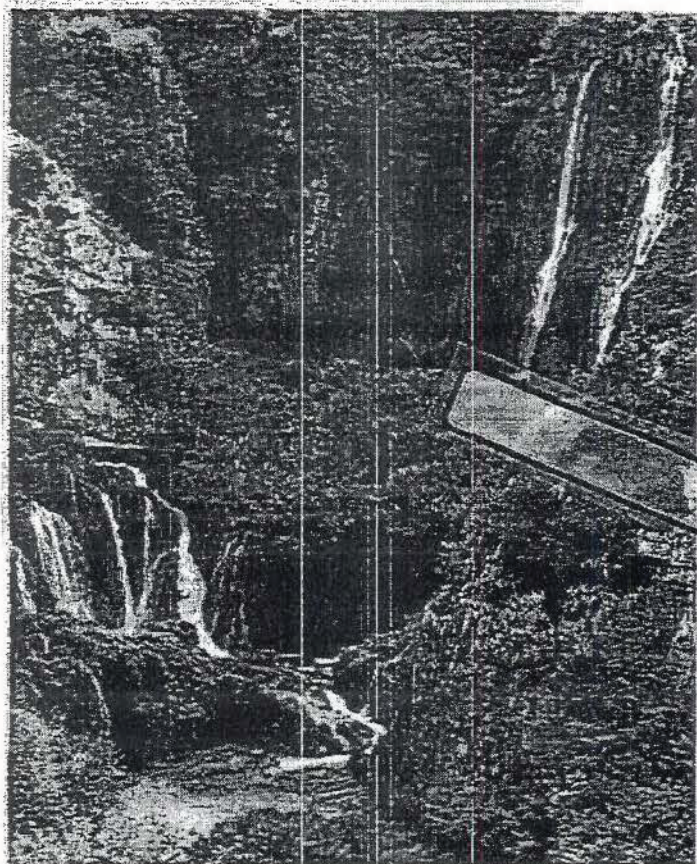


FIGURE 7-12
Solution valley, Plitvice, Yugoslavia.

ity, imparts high partial pressures of carbon dioxide in tropical groundwater, making it exceptionally effective as an agent of solution and producing strongly developed karst features (Jennings and Bilk, 1962; Monroe, 1976). Generation of bio-

genic CO_2 is perhaps the most important aspect of tropical regions that enhances solution (Smith and Atkinson, 1976; Trainer and Heath, 1976; Drake, 1980; Brook et al., 1983).

Karst Controls

Lithology and Structure

Although karst develops primarily on carbonate rocks (mostly limestones), not all carbonate rocks possess the proper combination of physical and chemical properties that are conducive to generation of karst topography. Geologic structure is an important factor in karst development (Palmer, 1977).

Most of the world's karst regions are developed on limestone, which by definition consists of at least 50 percent calcite and/or aragonite (CaCO_3). Isomorphous substitution of magnesium for calcium in the carbonate mineral structure forms the mineral dolomite (CaMgCO_3). If more than 50 percent of the rock is composed of dolomite, the rock is a dolomite (or dolostone). Because substitution of magnesium for calcium in the mineral structure may occur in virtually any amount, a considerable variation in composition of a carbonate is possible. In general, the purer the limestone is in CaCO_3 , the greater is its proclivity to form karst. Some evidence suggests that about 60 percent CaCO_3 is necessary to form karst, and about 90 percent may be necessary to fully develop karst (Corbel, 1957). However, even pure limestones may not produce karst because other important factors may be lacking. Some karst features may form on dolomite, but their permeability is typically lower than that of limestone (Herman and White, 1985), so the occurrence of karst in dolomites is usually relatively minor. Rock salt (halite, NaCl)