## Landslide at Vaiont, Italian Alps

Ranking among the greatest civil engineering disasters of modern times, Vaoint was unusual in that it involved, in 1963, a brand new reservoir, but did not include any failure of its dam. The landslide scar still dominates this view from the village of Casso, in the Venetian Alps of northern Italy. The huge mass of slide debris, hundreds of metres deep, is now largely covered with pine trees. The dam still stands (off to the right in this view); it was a brilliant design, as a thin concrete cupola dam, like a thin shell curved bot horizontally and vertically, and 266 metres tall. It stood in a narrow limestone gorge that was a perfect dam site. The same cannot be said of the reservoir site. Its one wall was a great slab of strong Jurassic limestone overlying a thin clay bed and dipping at around 30° towards the reservoir. Not recognised at the time, the entire hillside of limestone had slipped during the Pleistocene, when it had filled the valley below. Post-glacial erosion had then cut a new valley through the debris, thereby removing the toe of the old landslide, and leaving an unstable slipped slab to form the hillside. Filling the reservoir then raised pore water pressures enough to make failure inevitable. Creeping movement of the hillside was monitored, but the fatal mistake was to assume it would continue as slow creep until stability was achieved over a hypothetical curved slip surface. But brittle rupture of some key limestone beds triggered an instant failure. The whole hillside slid into the reservoir. This was so fast that it created a wave more than 100 metres high, which overtopped the dam, hurtled through the gorge below and killed more than 2000 people in the town of Longarone. Amazingly, the dam survived almost unscathed. As did the village of Casso, which was just above wave level, although two buildings at the lower edge of the village were destroyed in the air-pressure wave created in front of the water wave; such was the scale and speed of the Vaiont landslide.