Cotopaxi volcano has been monitored by the Instituto Geofìsico of the Escuela Politécnica Nacional (IGEPN) with one seismograph since 1977 and with four permanent telemetered one-component seismic stations since 1989. Deformation studies using a laser EDM on radial lines started in 1987 (WOVO, 1994). Between August 1996 and June 1997, we operated an array of 12 additional seismic stations (Figure 1). This work was accomplished in the framework of collaboration between ORSTOM and the IGEPN. The goal was to characterise and analyse the nature of the volcano's seismic activity and to perform a preliminary study of the internal structure of the volcano. Geodetic, gravity and microgravity studies were also carried out at Cotopaxi in the frame of this research program with the aim to study ground deformation and internal changes related to the volcanic activity. In this summary, we present a synthesis of the preliminary results of the seismological experiment made in 1996-97 and of the geodetic and gravity data gathered in October 1996.

Description of the SEISMOLOGICAL experiment and data ACQUISITION

The experiment was carried out in two phases. First we installed some stations on the volcanic cone varying at azimuths and distances from the crater and other stations in a wide area around the volcano, up to 20 km distance from the crater, to do the structural study (Figure 1). In a second phase, we moved part of the equipment closer to the crater in order to register in geater detail the volcanic activity concentrated below the summit area. One station was installed along the edge of the crater on a rock base at an elevation of 5820 m.

The array was composed of 3 RefTek stations employing Mark Products L4-3D seismometers, one Leas station equipped with a Mark Products L4C seismometer and 8 telemetered stations divided in two groups of four stations comprising sub-arrays which had separate reception and acquisition units. Three other Leas stations worked occasionally between March and June 1997. One of these stations was equipped with a Guralp 40T seismometer, and the others with Mark Products L4C vertical seismometers. The data were registered on 500 Mb hard disks with the RefTek stations and on 170 Mb PCMCIA disks with the Leas stations, both at 100 samples/sec. The acquisition, digitalization and storage of the telemetered data was performed at the same sample rate with the program ACQ (Fréchet and Glot, 1994).

Characteristics of the seismic activity

The local activity associated with Cotopaxi volcano represents roughly 2000 events per month. We categorize for the 10 month period three main classes of local seismicity :

1) About 100 well located volcano-tectonic events. The volcano-tectonic hypocenters are located 2-10 km under the summit and are distributed under the volcano's flanks and the crater.

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