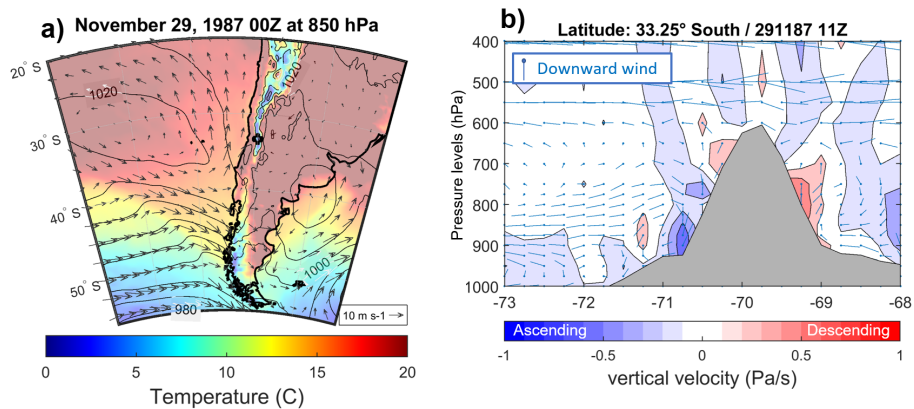
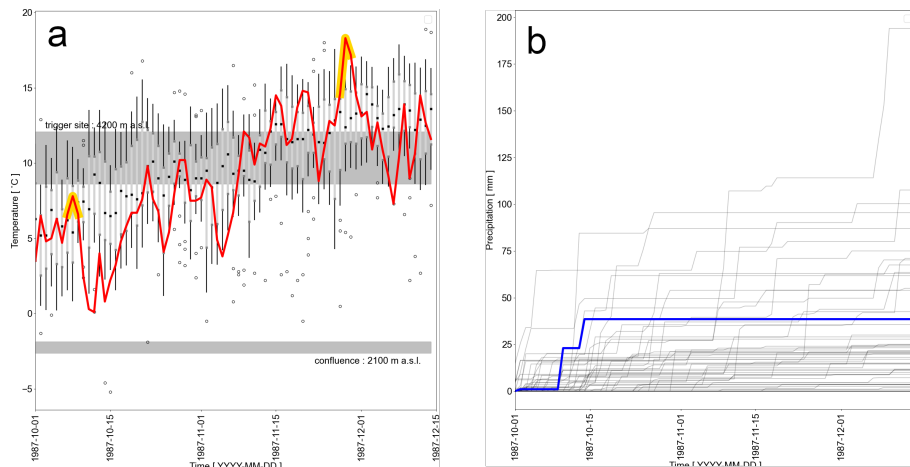
Supplementary Figure S1. Orthomosaic prior to the Parraguirre debris flow along the Río Colorado section (a). (b) close-up of the La-Paloma camp site and a corresponding in-situ photograph after the debris flow (c). In-site Photo (c): credit and courtesy of Humberto Peña. Aerial photos (a, b): credit & courtesy of SAF, Chilean Air Force, 1987.

Supplementary Figure S2. Synoptic view on November 29 of 1987 at 0:00 UTC (21:00-1 local) of the south of South America from ERA5. Plan-view air temperature (colours) and winds (arrows) computed at 850 hPa (a) about 1.5 km above the surface. Black contours represent sea-level air pressure in hPa and the black thick dot highlights the closest grid point form ERA5 to the rock-avalanche location. Panel (b) shows a latitudinal cross-section at 33° 15'S the avalanche day at 11:00 UTC (08:00 local), of vertical velocity in colours and winds in arrows (zonal and vertical component).

Supplementary Figure S3. Weather station information from El Yeso Embalse from October to mid December. For daily temperatures (a), vertical bars indicate the 1977-1993 median (black rectangles) and interquartile range (IQR, light grey bars). 1.5 times the IQR defines the outliers (whiskers and circles). The year 1987 is highlighted (red line). Warm periods (orange lines) are defined by 3 consecutive days exceeding the 75-percentile within a 21 day period. Grey shading indicates the zero-degree transition at the trigger site ($4\,200$ m a.s.l.) and the confluence with Río Colorado ($2\,100$ m a.s.l.) using a lapse-rate range of 5 to 7 10^{-3} °C m^{-1} altitude. Precipitation (b) is presented as cumulative values together with annual variations from 1962 to 2020 (black thin lines) as reference with highlights for 1982 and 1987 (blue line).