Nowadays gravimetry and GNSS leveling data are the most widely used input for terrestrial geoid determination. As regards the achievable accuracy this holds true for smooth or moderately structured topographies. In mountainous regions such as the Alps or other dominant mountain ranges, however, the determination of a local high-precision geoid is strongly improved by deflections of the vertical.

In the past, the measurement of deflections of the vertical was restricted to few institutions such as Universities or Federal Agencies equipped with dedicated instruments and skilled observing crews. This matter of fact was raising the costs of vertical deflection data per station and hence prevented a wide-spread implementation of deflection data in local geoid models. In order to overcome these drawbacks, the low-cost real-time observation system DAEDALUS has been developed at the Geodesy and Geodynamics Lab (GGL) of ETH Zurich. The system can be clipped onto a total station without mechanical changes. DAEDALUS consists of an adapted small CCD camera which is placed on the instrument's telescope instead of the standard eyepiece, a pluggable front lens, a low-cost GNSS receiver for timing purposes, and dedicated software for steering, imaging, and on-line processing.

It enables automated high-precision digital and precisely time-tagged pointing measurements towards stars, unaffected by human interference (personal equation). Since the software is based on an appropriate star catalogue, the observations can be processed in real-time hence offering new possibilities for the determination of deflections of the vertical in real-time.