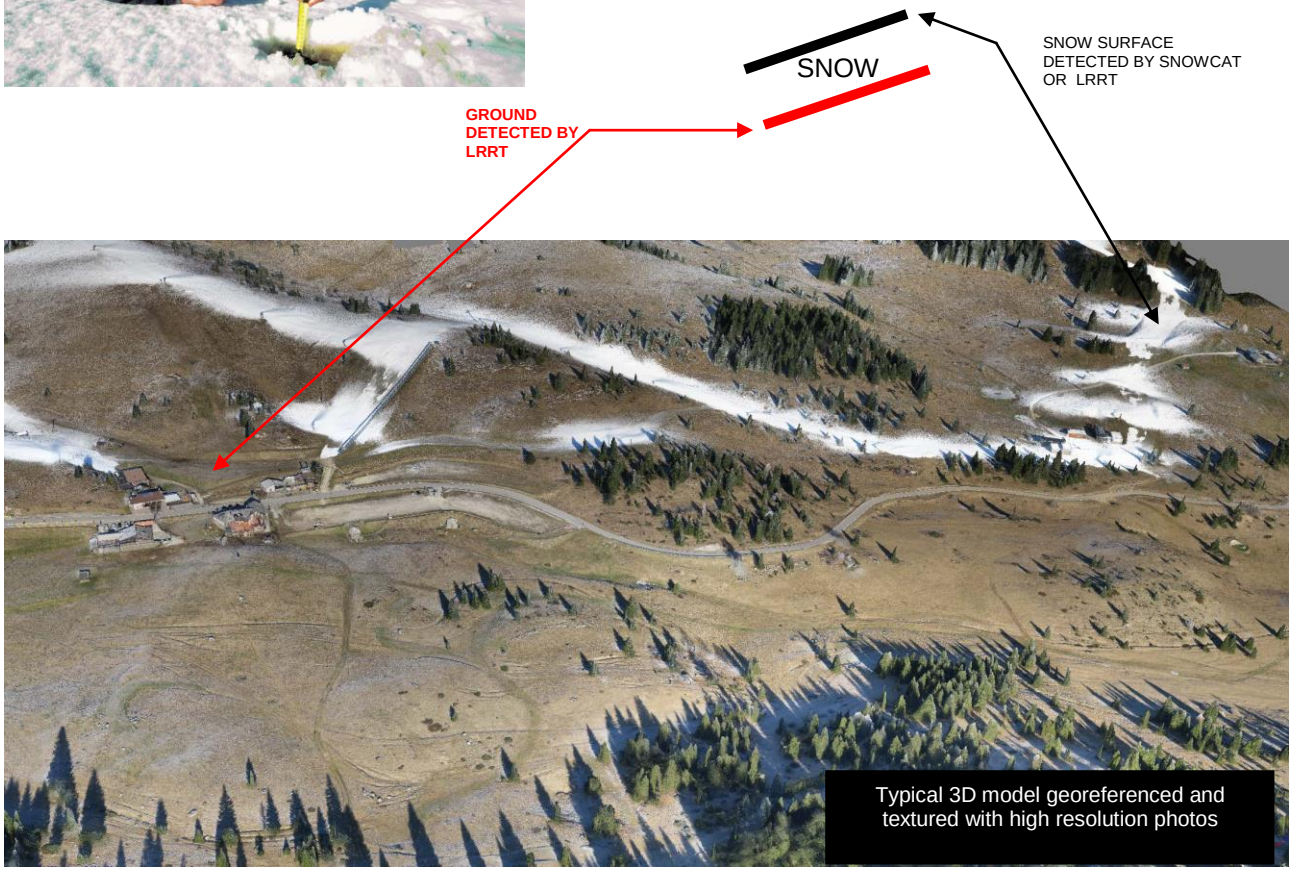
Services offered to ski areas: 1. Snow Depth Measurements

Laboratorio Rocce e Ricercca Tonon SRL (LRRT) provides detailed surveys (3D, georeferenced and textured with high resolution photos) of ski runs and their surrounding areas, just like the survey shown below. These surveys may be used as a baseline for snow depth measurement systems (e.g., SNOWSat, Nevimeter, etc.).



These 3D models may also be used for:

- Advertising purposes
  - Virtual fly-throughs or walk-throughs
  - A visitable 3D model on the Client's website
- Design and monitoring purposes:
  - Cross-sections
  - Contours
  - Virtual downhills

We use UASs (Unmanned Aerial Systems), also called "drones", to acquire aerial data. We are authorized by FAA for the commercial use of UASs. Unfortunately, the market is replete with many "pirates", who offer services without the necessary permissions, or (although legally authorized) work outside their authorization limits or even against the FAA rules. Additionally, many operators promise levels of accuracy that cannot be reached. For example, they use the UAS GNSS sensor to georeference the photographs on the horizontal plane; and/or they use the UAS pressure sensor (1 m accuracy at best) linked to the take-off/landing point elevation to determine the camera elevations (crucial to the measurement of snow depth) without any knowledge of geodetic systems and datums. Finally, to obtain accurate elevations, the camera must be

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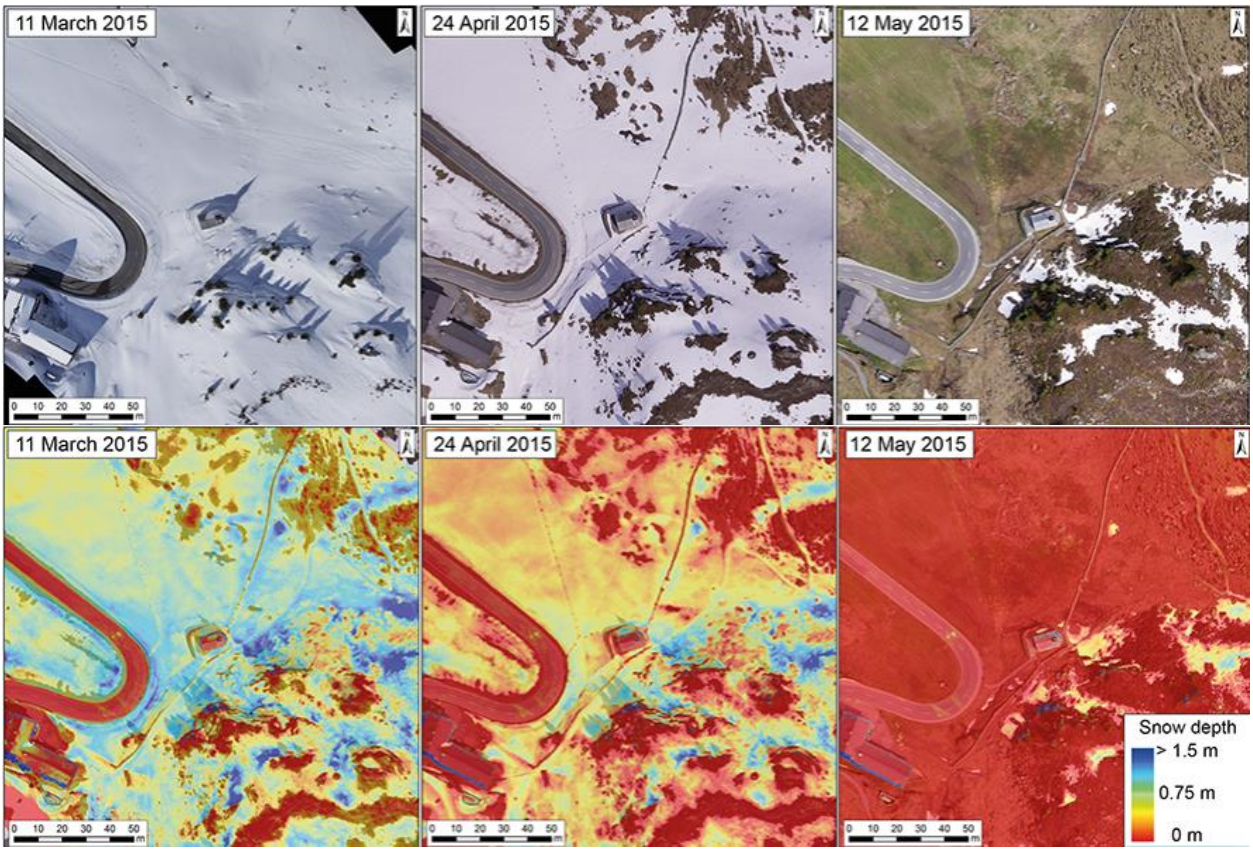
carefully calibrated along the focal length (photo scale); on the contrary, competitors use cameras that are very often calibrated on plane scenes or even not calibrated at all.
We spent many years and resources to develop sensors, integrations, and calibration methods necessary to ensure half-inch accuracy even without ground control. This is a key point for extended areas such as ski runs where placing ground control points may be overly time-consuming.

Besides the baseline (summertime) survey before snowfall, the same equipment may be used to survey the snow surface (wintertime) to determine the snow depth(see below) with the aim of:

- Checking the snow depth provided by satellite systems (e.g., SNOWSat, Nevimeter, etc.)
- Covering the areas that cannot be covered by the SNOWSat, like those near the ski runs that can be dangerous for the skiers (e.g., rocks hidden below a thin layer of snow, unstable snow masses near the ski runs).
- Replacing snowcats not equipped with snow depth measuring devices.



Survey format: as requested by the Client, e.g., shapefiles for SNOWSat, .las, .laz, .xyz, .ply, .tif (GeoTIFF); .kml for Google Earth, html for Google Maps; textured 3D mesh (.obj, .fbx, dxf, ply, pdf); animation videos for fly-throughs (.mp4, .mkv, .avi).

Cost: Indicatively: variable between 10 and 100 Euros per hectare, except isolated ski slopes, except isolated ski runs and except for animation videos for fly-throughs (to be quoted separately).

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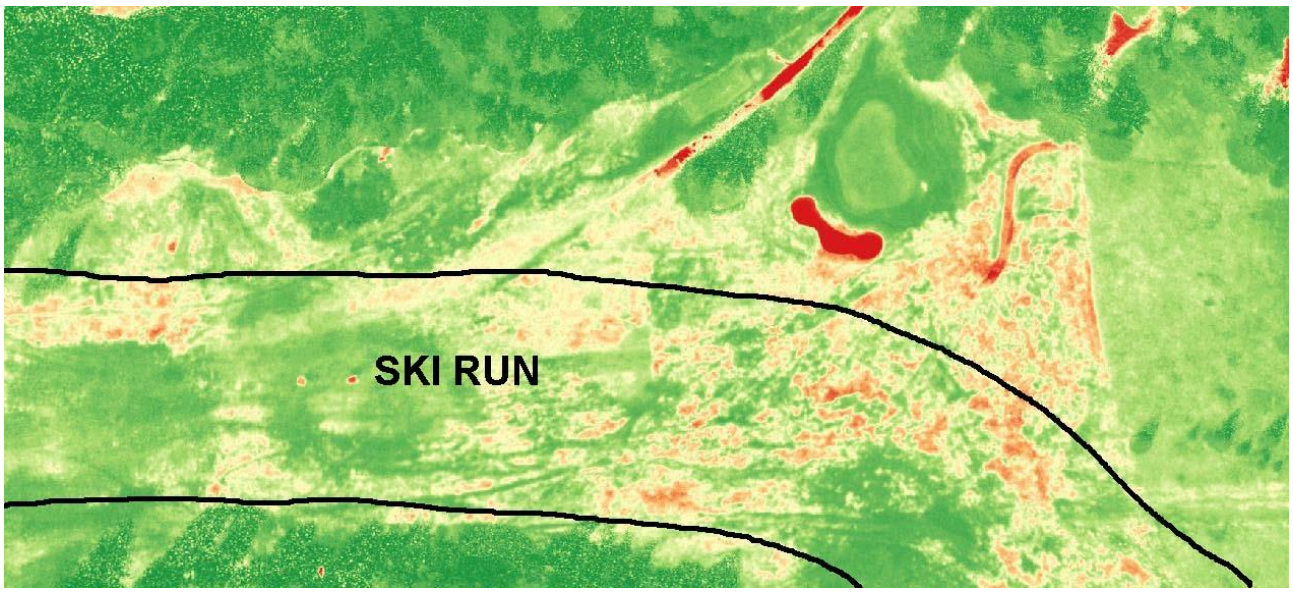
Services offered in support to ski areas: 2. Plant vegetation indexes

In the summertime, ski runs may be subject to erosion and uneven vegetation. We produce plant vegetation index maps (e.g., NDVI, Non-Dimensional Vegetation Index, and EVI, Enhanced Vegetation Index) that allow managers to find areas where the vegetation is stressed, and act in a targeted manner only where and how it is necessary. This avoid the application of unnecessary treatments with obvious benefits to the environment and to the budget. Spatial resolution is about 10-18 cm.

The following example shows a vigor map (NDVI) of a ski run during the summertime, when it is covered with grass: a green color indicates healthy grass (high chlorophyll level), while a red color indicates stressed grass. The spatial variability of the grass vigor may be clearly observed, and so the need to act in a targeted and precise way, rather than to act extensively on the whole ski run.



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Services offered in support to ski areas: 3. Inspections

We offer inspections of hardly accessible structures using high resolution photos, which are repeated over time with the aim to identify corrosion, the presence of boulders in rockfall barriers, ruptures in rockfall nets, damage in the nets or barrier components, and even check the pulleys and pylon mechanisms and conditions.

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Services offered in support to ski areas: 4. Rock Mass Characterization, Block Stability, Rock Wall Stabilization

We offer these services thanks to Dr. Fulvio Tonon's experience as:

- Associate Professor of Geotechnics at Università di Udine.
- University Professor in the USA for 10 years, with research contract amounting over $ 1 million.
- Twenty years of professional experience in Rock Mechanics and Engineering, with projects in three continents: Europe, North America, Central America, Africa.
- Founder and Director of Laboratorio Rocce e Ricerca Tonon (Aut. Min. 410-27/11/2015, rocce). Rock testing for customers all over the world.
- Creator and Director of the On-line Certificate in Tunneling, currently offered by University of Colorado Boulder, USA (www.colorado.edu/tunneling). This "second level master" is provided under the tutelage of ITA (International Tunneling Association https://about.ita-aites.org/wg-committees/ita-cet/master-courses) and is equal to the "Master in Mechanized Tunneling" provided by Politecnico di Torino.
- 8 years (the maximum allowed time) as president of the Rock Mechanics Committees of the American Society of Civil Engineers, USA: http://committees.geoinstitute.org/people/rock-mechanics/

Condino (TN). Volcanic Breccias, stabilization projects of unstable blocks for a height of 50 m.

Hanging Lake Slope, Colorado, USA. Monitoring of a rock wall affected by rock falls: 550 m high, 900 m wide with a precision of 12 mm, and a 10-mm pixel size on the rock slope.

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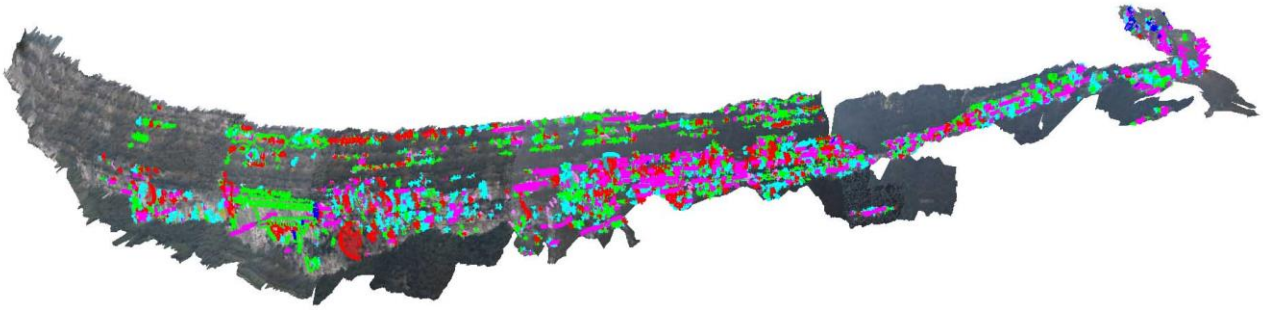

Monte Brione (TN): 3D model of a 3.2 km long slope, accuracy of 3 cm, pixel size on the ground = 13-19 mm; 7,000 identified fractures (mapped one by one and “by hand”). Joint sets, joint spacing, identification of 1.000 unstable blocks, for every unstable block: failure mode, dimensions and volume. Identification of climbing descent routes for geologists.

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