Grain componentry

Meaning
The componentry analyses are the analyses that allow to determine the relative proportions of the different components in a pyroclast sample. The main components are usually juvenile, crystals and lithic fragments. Juvenile fragments can be veisculated or dense, while the lithic fragments can be wall rocks (xenoliths, deep seated rocks forming the magma chamber, walls fragments from the conduit erosion, or altereted rocks from a geothermal reservoir at the fragmentation level depth) or accidental (eroded from the substratum). Therefore, the abundance and the relative proportions of these components in the different granulometric classes provide information about:

- the depth of the fragmentation level (
- map of the fragmentation surface
- the nature of the magma chamber walls (Fulignati et al.)
- the nature of the geothermal system (Gurioli et al 2012)
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- the nature of the fragmentation mechanisms (Zimanowski et al., 2003 and reference therein)
- fragmentation conditionfor example an abundance of
- lithics may indicate a partially blocked conduit, or collapse of vent walls
- the transport process (e.g. Gurioli et al 2002; 2007;
- the feeding system and conduit processes (D'Oriano et al. 2011; Taddeucci et al. 2002; 2004; Lautze et al.,)

Requirements the sample has to be representative of the variability of the deposit, so particularly attention has to be used in the field to make sure to quantify the whole variability of the deposit

Methodology
Different techniques are used to separate the three main components (juvenile, crystals and lithics). The larger size classes are handpicked. For the size classes 2 mm to 0.5 mm hand picking is carried out under a binocular microscope using fine forceps. For the finest classes, following the method of Barberi et al 1989, thin sections of the grains are made. The grains are embedded in the epossilic resin and the thin section is made out from these "inglobates". The grains are than counted, with the help of an automatic point counting under an optical microscope. At least 750 points per thin section are required. In doing that it necessary to determine a conversation factor to convert the counted percentage into equivalent weight percentage measuring the density of the different grains.

Errors

Based on the Van Der Plas and Tobi (1965) chart, we made an error up to 3.5 %..

Grain morphology

Meanings
The morphology and size of ash provides important information on the relative roles of different; they can also provide information on the. Particle morphology is relevant in terms of depositional mechanism, as the shape of ash grains influence their likelihood of either

being deposited or suspended in the atmosphere, posing implications for ash hazard analysis and mitigation (Taddeucci et al. 2011). These measurements will be also the starting point of the VSD and CSD in fine ash, as explain in the following section

Methodology

For the ash fraction, the methodology is more complex because the sample needs to be grain sieved, the ash fraction needs to be divided in the three main components (juvenile, lithic and cristals) and density measurements needs to be performed on the density juvenile fraction, as proposed by Barberi et al 1989; D'oriano et al 2010 and Eychienne and Le Pennec 2012. This time consuming procedure will be implemented with the use of the new instrument, the morphology G3. This instrument provides an advanced yet easy to use particle characterization tool for the measurement of particle size and particle shape from 0.5 microns to several millimeters by the technique of static image analysis. Its strength relays on the integrated dry powder disperser, which makes preparing dry powder samples easy and reproducible. The instrument captures images of individual particles by scanning the sample underneath the microscope optics, while keeping the particles in focus. This techniques allows measuring of a range of morphological properties for each particle as: i) particle properties (size, shape, transparency, count, location), ii) particle size parameters (circle equivalent, diameter, length, width, perimeter, area, max distance, sphere equivalent, volume), iii) particle shape parameters (aspect ratio, circularity, convexity, elongation, high sensitivity, circularity, solidity), iv) particle transparency parameters (intensity mean, intensity standard deviation).