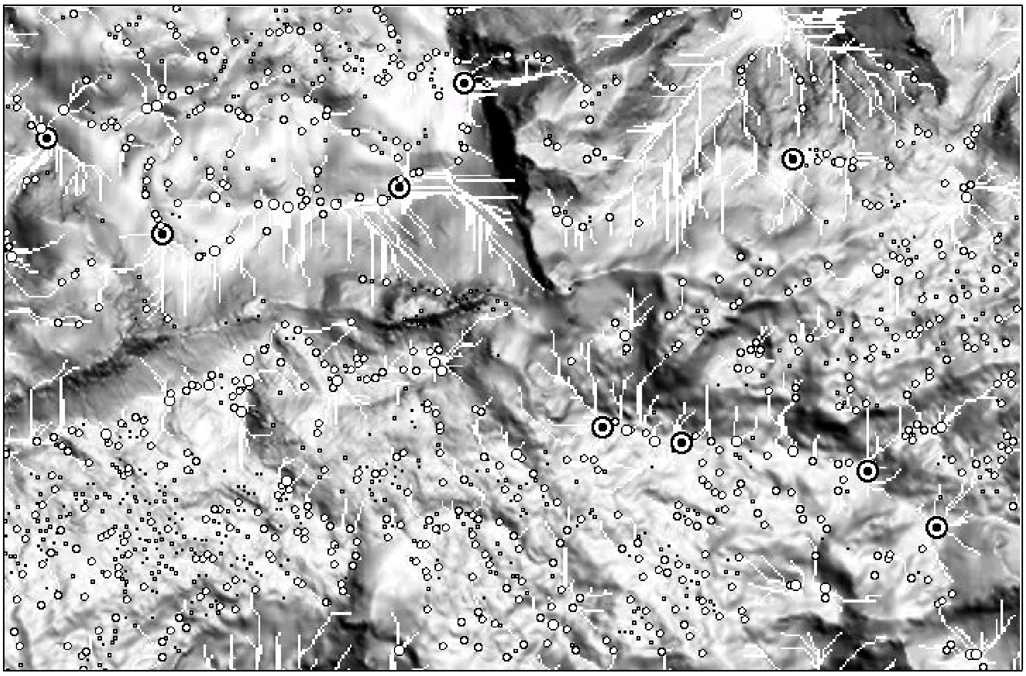

***Abb. 1.** Schattiertes DEM des Hochschwabplateaus nördlich der Sonnschienalm. Attributierte Sinks sind gemeinsam mit den potentiellen Oberflächengerinnen dargestellt. Aufgrund ihrer Verteilung werden Gebiete unterschiedlicher Verwundbarkeit differenziert. Kreise nach potentieller Einzugsgebietsgröße differenziert (Ringe mit Punkt: Einzugsgebiete mit mehr als 0,4 km²).*

Improving of the stacking routine of paleomagnetic (directional) data: The *Gamstack* software.

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One of the most important topics in paleomagnetism is the calculation of Characteristic Remanent Magnetization (ChRM) vectors. ChRM´s are stable directions that can be isolated during the demagnetization and have to be coherent with the geological background. Several different methods have been proposed to calculate ChRM's: Demagnetization Circles, Difference Vectors, Difference Vectors Paths, Principal Component Analysis, Linearity Spectrum Analysis, "Line Find" and Bootstrap approach. When maximum accuracy is pursued (i.e. characterization of rotations), ChRM directions should be fitted in the most objective way.

Stacking of data is commonly used in seismic data processing to reduce the noise. The application to paleomagnetic data was proposed by Scheepers & Zijderveld (1992) as an automatic, objective and preliminary method to obtain an averaged out orthogonal demagnetization diagram for a single and homogeneous data set (site). The method calculates (stacks) an individual mean out of all vectors for a given demagnetization level (step) in a given site (set of homogeneous specimens). The error associated to any stacked step is the fisherian α_{95}, which supposes a population of unit vectors; intensities from different samples (for a given step) are assumed equal.

We have developed a first software for the stacking routine, that offers some methodological improvements compared with the original procedure. In the program, the stacking error can be calculated via Fisher statistics (original choice) or as a standard error. This choice does not assume homogeneity of the magnetic intensity for the different samples of a site, which certainly is in better agreement with the natural magnetic response of the rocks to the external magnetic field. Some examples from paleomagnetic sites in the Northern Calcareous Alps are shown and they are compared with other classical methods (Demagnetization Circles, and Principal Component Analysis). In most of the studied cases, the degree of similarity is very good, with the advantage of being a very fast and reliable preliminary analysis for large data sets.

The input format in Cartesian coordinates is easily converted to spherical coordinates and, therefore, extends the application of the method to any kind of directional data in structural geology, sedimentology, etc. and can be applied together with a fourth variable (time, thickness, etc.).

Scheepers, P.J.J., Zijderveld, J.D.A., 1992: Stacking in Paleomagnetism: Application to marine sediments with weak NRM. Geophys. Res. Lett., 1914, 1519-1522.

Tectonic correction of linear data in plunging structures; a case study in the Cerbara magnetostratigraphic section (Italy)

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The restoration of linear data (paleomagnetic vectors, structural indicators, paleocurrent directions, etc.) observed in plunging structures to the (paleo-)horizontal has to be done in view of the geometry and kinematics. If the plunge is due to the acting of several deformation axes (most cases), simple bedding correction (BC; using the strike as the rotation axis for an angle equal to the dip) will generate an error. The error will be different for the different positions of the structure and this can be checked if a set of linear data distributed all around the geometry is available. A plot of the strike of the beds against the azimuth (declination) of their associated linear elements after BC (the so called "oroclinal bending diagram") will show a linear relationship for the whole data set: that is to say, an apparent and erroneous positive oroclinal bending (Fig. 1A). Once the source of error has been detected in such a way, and the structure orientation has been calculated from field data, the restoration should be performed considering the deformational history. Normally the plunge is removed under the assumption, that it was acquired by a tilting perpendicular to the azimuth of the structure axis. This operation certainly eliminates the strike-declination dependence (apparent oroclinity) but the supposition is not necessarily true and may also cause big errors.

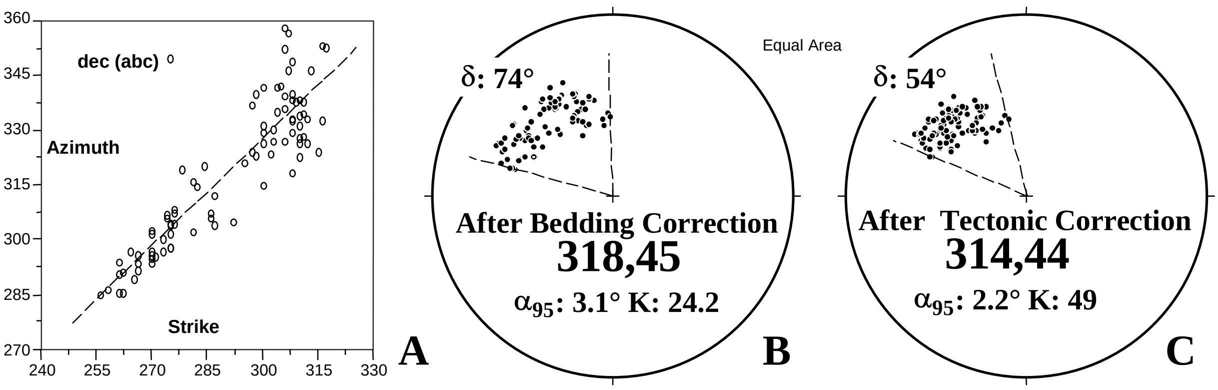

***Fig. 1**. Paleomagnetic data restoration in the Cerbara section. The BC and the tectonic correction differ substantially. The latter displays 22° less of dispersion and a much higher concentration parameter (K).*

The Cerbara section (Umbrian Apennines) represents a good example to check the restoration errors in such structures. This Cretaceous/Paleogene boundary was studied for magneto-stratigraphical dating and it is part of a 55° northwards plunging structure. The simple BC clearly shows (Fig. 1B) a conical-Binghamian scatter ("banana like" distribution). The conventional correction of the plunge gives a better Fisherian distribution (Fig. 1C). A further accurate correction based on a detailed field study should be done in the future. Field data will allow the characterization of the kinematics of this structure; that is to say, the relative orientation between folding and tilting axes, probably associated with syn-sedimentary movements.