*Géologie et minéralogie de la région du Naret (Pennique inférieur, NW du Tessin)

LODETTI Florence; M

Supervisor: Prof H. Masson, Institut de Géologie et Paléontologie

This study is about the lithostratigraphy, structural geology and metamorphism of the lower penninic units located in the Naret area, NW of Ticino. This sector of the lepontine Alps includes the northern and frontal part of the Maggia nappe, the eastern part of the Lebendun nappe, as well as metasediments belonging to the Bündnerschiefer of the Bedretto valley. The latter ones are referred to as the Madone zone in this work. On a 7 km2 area, field work and mapping (at a 1:5'000 scale) of these three tectonic units have been carried out with the aim to specify their inter-relation, currently little known. The multi-disciplinary approach adopted in this study has allowed us to find new constraints concerning the sedimentary evolution of the Maggia nappe cover and the tectono-metamorphic history of this unit in relation to the adjacent Lebendun nappe and Madone zone.
A stratigraphic and petrographic description of the three tectonic units has been carried out. The detailed study of the Maggia nappe metasediments has allowed the definition of the lithostratigraphic column of its cover, where the ages of each formation, estimated by facies correlation with the helvetic mesozoïc sediments, are spread from higher Triassic to Aalenian. Consequently, a model, recalling the mode and environment of sedimentation evolution, was proposed for the Maggia bassin. The discovery of detrital dolomite grains in the Lebendun paragneisses has allowed us to estimate that the age of this nappe in the Naret area is post-triassic.
The three defined tectonic units have a common tertiary structural history which is articulated in six ductile deformation phases. Displayed on the outcrops scale, the deformation phases were correlated to the structures taking shape on the geological mapping scale, with the aim to establish a regional kinematic model. The tectonic history has been compared to the metamorphism progression by the study of the mineralogical assemblages evolution in connection with the structures evolution. The suggested model comprises three isoclinal phases (D1-D3) related to forward thrust movements of the nappes towards the NW and accompanied by prograde metamorphism conditions, reaching temperatures of 550°C during D3. A first backwards thrust phase (D4) generates a transverse folding. During its final stage, the thermal peak characterized by a temperature of 600-620°C took place. Then during the retrograde path, a second backwards thrust phase (D5) gave rise to open concentric folds. Finally, kink folds having a horizontal axial surface (D6) indicate a late episode of vertical compression.
This model implies, with regard to the relative paleogeographic position of the studied bassins, that the Lebendun unit was initially bordered to the N by the Maggia unit and was also limited to the S by the Madone zone.
The P-T conditions, characterizing the thermal peak of the regional metamorphism, were pinpointed by the means of two complementary approaches. Concurrently to their estimation based on the chemistry of the mineral species and on the study of the critical parageneses of the various sequences, a thermo-barometric study calling upon multiple balances was carried out on samples coming from the three units. These investigations showed that no metamorphic discontinuity exists between the studied tectonic units, which are characterized by paroxysm temperatures of

approximately 600°C corresponding to pressures of about 10 kbar. The pressures estimated by this work are higher than those presented in former studies. This implies, at a kinematic level, that the units have been buried to more significant depths than those generally thought for this area of the Alps.