Soča during the daily sampling period was 10.6 mg/l while in the Mrzlek it was 3.9 mg/l. Mean calcium concentration in the same period of time was in the Soča 43.3 mg/l and in the Mrzlek 48.4 mg/l. In September during rainy period the magnesium concentration was very similar in both sampling points while the calcium concentration was much different.

The seasonal model showed the catchment area of the Hubelj is not changing much at different hydrological conditions. The catchment area of the Vipava seems to be more changeable at different hydrological conditions.

The hydrochemical analyses of weekly samples in the period of three years and the analyses of daily samples taken during six-month period gave very similar characteristics. The results of the weekly sampling during one year period would be satisfactory as well.

4.2.2. Water pulse of the Vipava spring - Pod Lipo 4/2

(J. KOGOVŠEK)

After a medium-sized water pulse in the second half of September the Vipava discharge was decreasing through the whole of October. On November 11, 1995 the discharge increased (the occurrence of the first water pulse) and reached its maximum of 9.6 cubic meters two days later. During the following two days it decreased to a half. On the next day, November 16, the discharge increased again and reached its maximal value of 51.9 cubic meters on November 17, 1995 at 3 p.m., thus forming the second water pulse (see Fig. 4.20). In this time we manually sampled Vipava at the spring Pod Lipo, No. 4/2 for physico-chemical analyses. We measured the temperature, specific electric conductivity and pH and we determined carbonate, calcium and total hardness, and chloride, sulfate, nitrate and phosphate levels.

During the first, smaller, water pulse a slight increase of carbonates, calcium and SEC was recorded, probably due to replacement of old water from a recharge area, for there was no considerable change in discharge in the last 45 days. The second water pulse was followed by a rapid increase reaching the maximal value of discharge in 27 hours. The first sample was taken 7 hours after the minimal discharge at the beginning of water pulse when the discharge reached twice the minimum. The carbonate and calcium levels were lower by 0.3 meq/l than at the first lower water pulse. Unfortunately we did not sample in the intermediate time between the two water pulses.

The discharge increase in the second wave was followed by a slight increase of carbonates and calcium, but when the maximal discharge rapidly decreased they decreased also. Later, when the discharge decrease was slower the hardnesses were in slight increase (Fig. 4.20). Minor deviation was recorded in calcium level, as at the initial decrease its concentration decreased slightly less and during continuing slower discharge decrease remained higher compared to

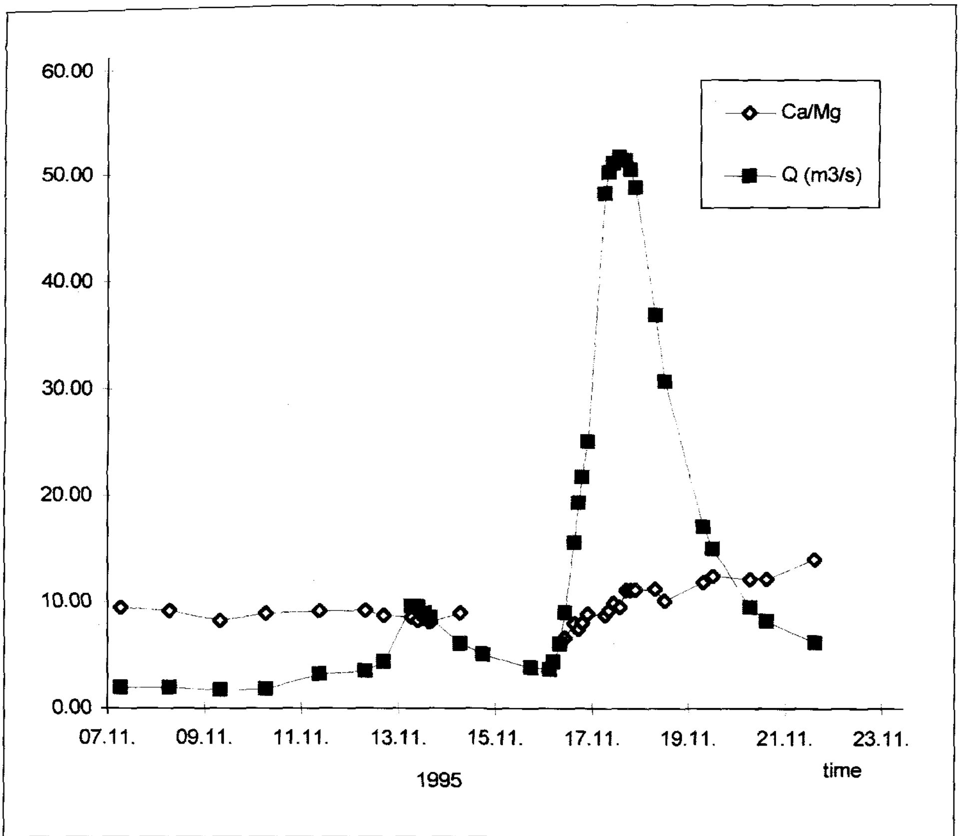

Fig. 4.20: The water pulse (Q) and the Ca/Mg ratio the Vipava spring in November 1995.

carbonates and total hardness during the beginning of the water pulse, although the increase of all three hardnesses was proportionate.

Specific electric conductivity (SEC) is proportionate to total hardness. Dependence of SEC on discharge is seen in Fig. 4.21. Well seen is the difference of SEC dependence on discharge during its increase and decrease. During the first smaller water pulse also SEC increased together with carbonates and calcium. During the second water pulse the SEC firstly slowly decreased when the discharge was in increase, and when it reached the value of 50 cubic meters SEC rapidly decreased until maximal discharge was attained and at that time the minimal value of SEC was recorded. During the discharge decrease SEC at first increased slowly, but when the discharge reached the value of about 10 cubic meters, SEC started to increase faster). The changes in SEC are relatively small, being the difference between the minimal and maximal value within a water pulse 20 to 25 μS/cm, similar to that recorded at carbonates and calcium. In any case all these measurements and statements must be checked and confirmed by observation of greater number of water pulses and by isotopic analyses and other approaches.

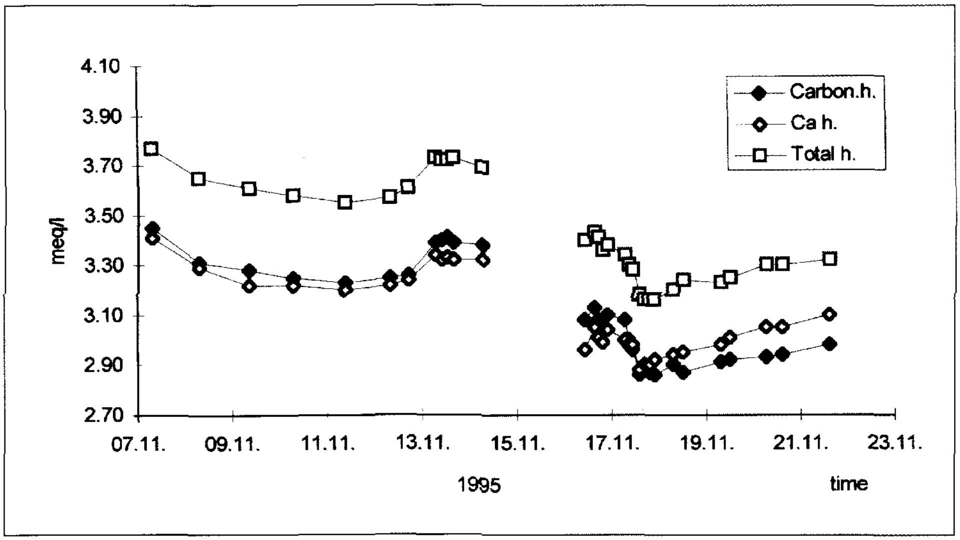

Fig. 4.21: Variations of the carbonate and the calcium levels as well as of the total hardness in the Vipava spring during the water pulse in November 1995.

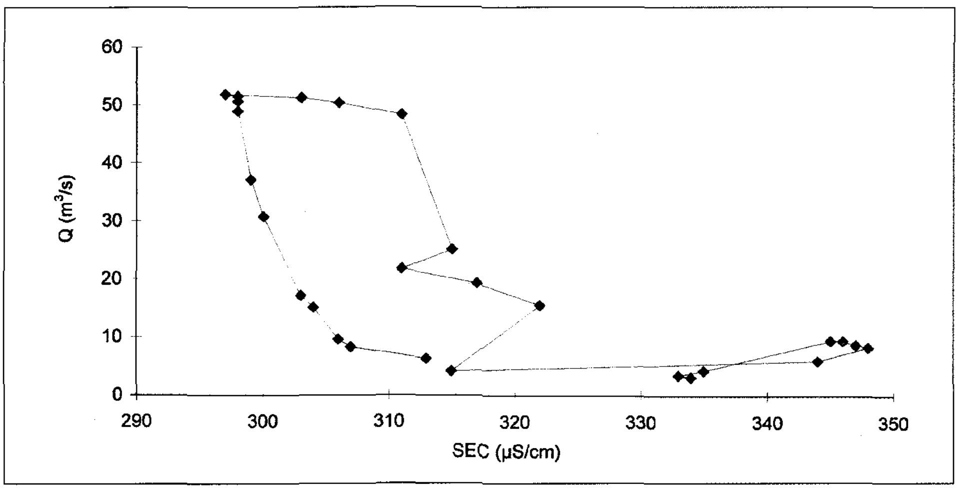

Fig. 4.22: Dependence of the conductivity (SEC) from the discharge during the Vipava water pulse in November 1995. Level contents during the Vipava water pulse in November 1995.

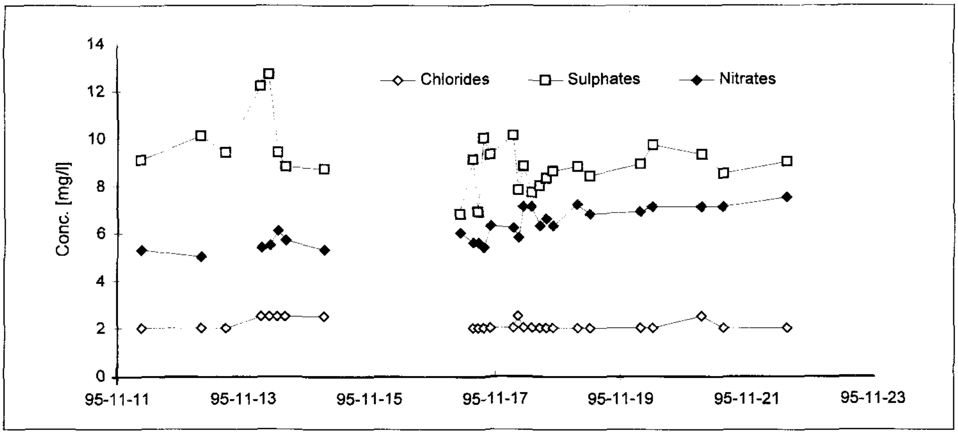

Fig. 4.23: Variations in the chloride, nitrate and sulfate contents during the Vipava water pulse in November 1995.

Determination of phosphate and chloride levels did not display any changes during the two water pulses, or, maybe they were so small that we did not register them. The phosphate concentration was at the limit of detection (0.01 mg PO_4^{3-}/l), and the chloride concentration 2 mg Cl^-/l (Fig. 4.22).

In the first water pulse we recorded a slight increase in nitrate levels of 1 mg NO_3^-/l. During the second water pulse the values only oscillated slightly. During both water pulses a small, but permanent increase in nitrate level was recorded.

The initial value of sulfate level, 9.5 mg SO_4^{2-}/l at the beginning of the first water pulse increased to 12.5 mg SO_4^{2-}/l during the maximal discharge and later it decreased. Similar increase was recorded at the beginning of the second water pulse (Fig. 4.23). When a discharge approached the starting value also the level of sulfate reached the starting value before both water pulses.

4.2.3. The Use of Silica to characterise the allogenic Flysch Component in Vipava Springs during the observation of Single Events

(V. ARMBRUSTER, C. LEIBUNDGUT)

4.2.3.1. Introduction

The Vipava springs show some characteristics of a karst spring, that is influenced by an allogenic flow component. Its catchment borders on Eocene flysch in the East, where sinking streams drain parts of the flysch area and probably have a connection towards Vipava springs.