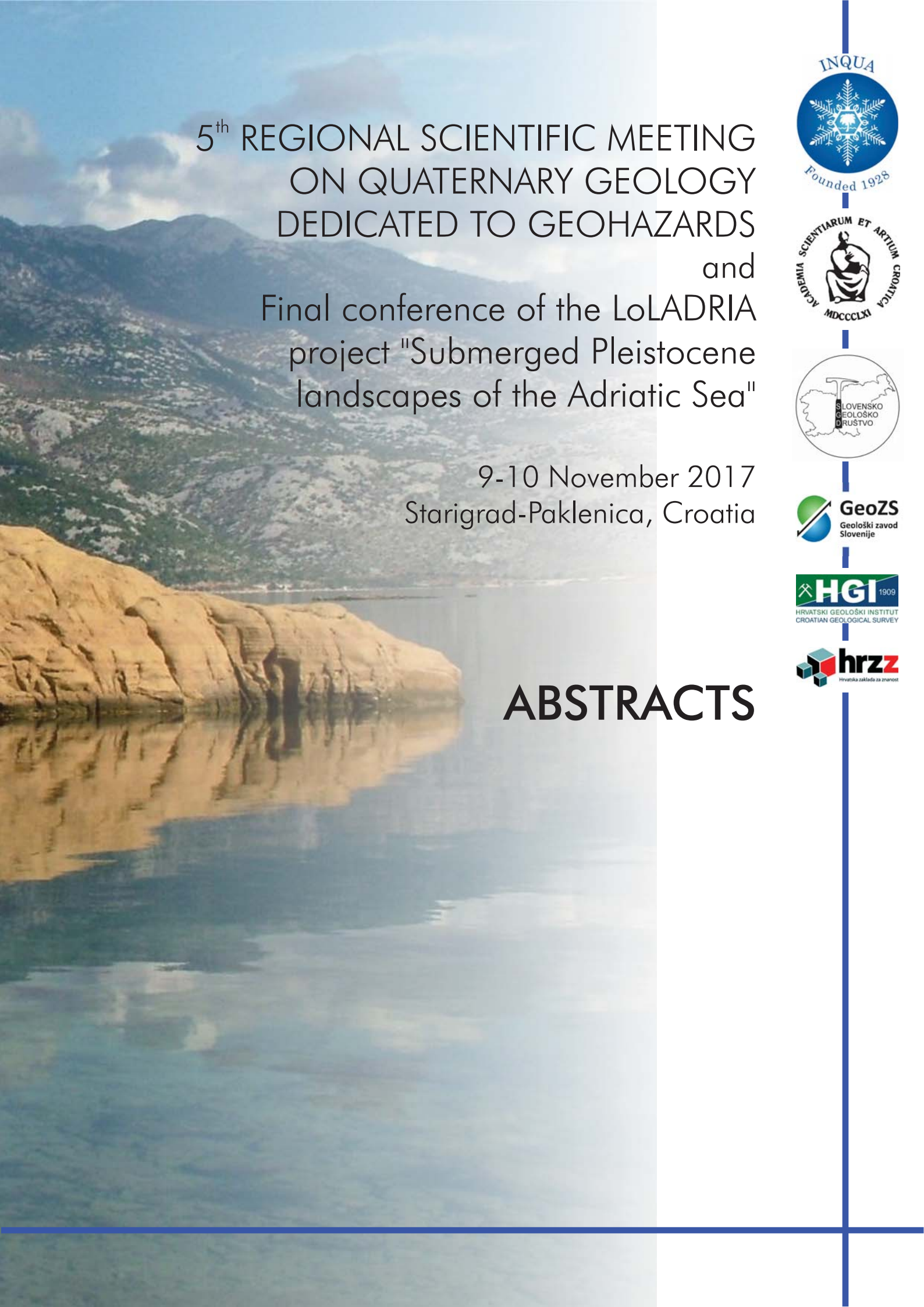

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ABSTRACTS

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C-isotope composition of freshwater submerged mosses as an indicator of carbon incorporation during photosynthesis

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Carbon isotopes compositions ($a^{14}C$ and $\delta^{13}C$) of freshwater submerged mosses and of dissolved inorganic carbon (DIC) were measured in the karst region of Croatia - at the Plitvice Lakes and along the water path of the Zrmanja and Krupa rivers. The moss samples were identified and they all belong to the C3 type plants regarding the photosynthesis pathway. The carbon isotope composition of mosses was compared to that of DIC and of atmospheric CO_2, i.e., carbon reservoirs from which mosses pull carbon for photosynthesis. The current measured values at the Plitvice Lakes region were compared to the values measured 30 years ago, when the $a^{14}C$ of the atmosphere was about 30 % higher than today (Srdoč et al. 1986; Marčenko et al. 1989).

The share of atmospheric carbon to carbon from DIC incorporated in mosses (ω_{atm}) was calculated. Most moss species had ω_{atm} values between 0 % and 66 %. A good correlation found for $\delta^{13}C_{moss}$ vs. ω_{atm} gives a potential of using fossil mosses found in inactive tufas in determination of age of tufa formation, which is important for reconstruction of rivers' palaeoflow, palaeoclimate and palaeoenvironment.

However, two species of mosses (*Cinclidotus aquaticus* and *Ptychostomum pseudotriquetrum*) had $a^{14}C$ values bellow the $a^{14}C_{DIC}$ which implied that they incorporated carbon only from DIC, i.e. that they turned to anabiosis during dry periods. Therefore, these moss species can be used as an indicator of an average $a^{14}C$ of DIC which is used to determine the initial activity of secondary carbonates (tufa and lake sediments) at the sampling sites. Values of $a^{14}C_{DIC}$ for grab samples can have fluctuations depending on the water levels and are therefore not as reliable as the $a^{14}C$ values of composite samples such as the anabiotic moss species.

From ω_{atm} and $\delta^{13}C_{moss}$ values, the ^{13}C fractionation between DIC and organic tissue of a moss was calculated ($\varepsilon_{DIC\text{-}moss}$) and it ranged from -50 ‰ to -29 ‰ which was probably the result of moss adjustment to synthesize primarily atmospheric CO_2. For comparison, the ^{13}C fractionation between atmospheric CO_2 and organic tissue of a C3 plant, $\varepsilon_{atm\text{-}plant}$ is ~-20 ‰. Correlation of $\varepsilon_{DIC\text{-}moss}$ vs. ω_{atm} showed the following pattern: 1) true aquatic moss species fractionated more if they contained more atmospheric C, and 2) moss species growing on wet rock fractionated more when they grew in higher water flows.

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