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Groundwater geochemical composition and fluorescence analysis: a tool for evaluating the desertification processes

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Desertification is the degradation of land in arid, semi-arid, and dry subhumid areas and it is primarily due to human activities and climatic variations. In the Italian scenario, the impact of desertification is restricted to the southern regions where the risk is linked to water erosion, strong human aggressiveness, intense precipitations and to water and soil salinization. Moreover, the slow but constant losses of organic matter content in the soils strongly affects the soil structure and its water retention capability, thus reflecting the influence of changing crop and soil management practices. Dissolved organic matter mainly consists of humic and fulvic acids, amino acid proteins, produced by plant and animal (bacteria) life dispersed in the terrains, algal poly-saccharine essudate and phenols. As a consequence, it is linked to biological activity. Humic releases in the soils are affected by salinity, temperature and, therefore climate changes can affect the humidification contribution on different scales, ranging from short (few years) to very long (hundred years) time scales. To this respect, the Italian project RIADE (Integrated Research for Applying new technologies and processes for combating DEsertification) has selected the alluvial plain of the Licata town (Sicily, Agrigento province) for an integrated application of the hydrogeochemical and spectroscopical methods in order to settle on qualitative characteristics of the water resources. Laser Induced Fluorescence (LIF) spectroscopy technique allows to perform qualitative and quantitative in situ determination of dissolved (humic and fulvic acids, pollutants) or particulate (phytoplankton) organic matter. In particular, in the Spring 2005, a joint campaign has been performed along the Salso River and in differ-

ent wells in the neighbourhood territory of the Licata plain followed to determinate in the water resources the a) dissolved matter, i.e. CDOM (Chromophoric Dissolved Organic Matter), tyrosine and tryptophan; b) particulate matter (algae); c) groundwater depth; d) electrical conductivity; e) pH; f) temperaure and g) geochemical composition of water. The integrated analysis of all data is presented and discussed in terms of emerging information on ongoing desertification processes.