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Landscape-scale learning : developping a multidisciplinary approach in earth science

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Earth Science ingenieers need to be trained in multidisciplinary approaches but also to learn how to combine fieldwork and numerical simulation. While a multidisciplinary approach is crucial to understand and solve environmental problems, but students often have perceptible difficulties to link all earth science disciplines in an environmental diagnosis. This is partly due to the difficulties on combining different disciplines in a same learning module. Another difficulty lies in the separation often observed between modules dedicated to fieldwork and others focusing on numerical analysis and modeling. This communication presents an original teaching module, initiated in 2007 at Montpellier SupAgro (France), combining different earth sciences e.g. Geology, Soil Science, Hydrology, Bioclimatology and GIS, and based on fieldwork and numerical modeling. To achieve this we decided to work at the landscape scale i) integrating the landforms, the land-use and the land-cover and ii) resulting from the interaction of natural (geology, climate..) and anthropic factors (hedgerows, roads...). Then, understanding the landscape in terms of soil, air and water quality leaded us to understand flows between all landscape constitutive compartments and disturbances caused by human activities. Furthermore simulating the landscape evolution leaded us to use numerical model as a tool to understand and test different scenarios. On a practical point of view, the learning period is threefold. First, a classical learning time with lectures provided by specialists in each tdiscipline which should: i) focus on a common spatial scale, the landscape, ii) explicitly develop knowledge on transfers (energy and matter) between all the components of the landscape, iii) explain the potential effect of human-induced disturbances on landscape evolution. In a second step, knowledge acquired during the first period are used in a one week field study, during which the

student describe all the physical components of a chosen landscape, collect different data and constitute a geographical information system. The last step is devoted to an initiation on complex numerical modeling using the previously collected data. During this modeling session they can test hypotheses previously formulated about the landscape functioning and compared different scenarios of land use and management in terms of soil, air and water quality. The communication will present the entire learning period and results of the related fact-finding study.