ESCAPADE to quantify nitrogen losses in territories and assess mitigation and adaptation strategies

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Abstract: Agriculture is facing the challenge of maintaining or even increasing production while limiting the use of nitrogen inputs. The introduction of mineral nitrogen in agroecosystems feeds a cascade of processes and losses to the environment at each stage of the cascade with many environmental and societal impacts (degradation of air, water and soil quality, impacts on greenhouse gas balance, biodiversity and human health...). Since classical approaches at plot or farm scale do not make possible to control all impacts, levers must also be sought at larger scales. The overall objective of the interdisciplinary project ESCAPADE (ANR-12-AGRO-0003, 2013-2017) is to build and assess innovative solutions to reduce nitrogen losses in the environment or adapt production systems. It aims at understanding and hierarchizing the processes involved in the nitrogen cascade and nitrogen losses to the environment, as well as integrating them by taking into account spatial and temporal interactions within landscape mosaics. The project mainly focuses on rural sites from a few km² to a few tens of km² and also on larger territories from hundreds to thousands of km². Modelling approaches are associated with inventories and observations to quantify flows of different forms of reactive nitrogen (NO₃⁻, NH₃, NOₓ, N₂O...). Agro-environmental scenarios of nitrogen and landscape management in sites and larger territories are co-constructed and assessed from models. Results produced from the models, the observations and inventories, as well as from the scenarios will be used to propose innovative strategies to mitigate nitrogen losses and adapt production systems to the new agricultural contexts.

Keywords: nitrogen; modelling; scenario; management; landscape; territory