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

Jean-Louis Drouet

UMR ECOSYS, INRA, AgroParisTech, Université Paris-Saclay, jean-louis.drouet@grignon.inra.fr

François Laurent

ARVALIS-Institut du Végétal

Patrick Durand

UMR SAS, INRA, Agrocampus Ouest

Gilles Billen

UMR METIS, CNRS, UPMC

Pierre Cellier

UMR ECOSYS, INRA, AgroParisTech, Université Paris-Saclay

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Presenter/Author Information

Jean-Louis Drouet, François Laurent, Patrick Durand, Gilles Billen, Pierre Cellier, Olivier Maury, Stéphanie Potok, Philippe Faverdin, Christophe Fléchar, Josette Garnier, Armelle Guy, Catherine Hénault, Catherine Mignolet, Hervé Monod, Anne Probst, Stéphane Sorin, Gaëlle Tallec, Matthias Beekmann, Eric Ceschia, Cécile Le Gall, Thierry Morel, Gauthier Quesnel, and Eric Ramat

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Jean-Louis Drouet¹, François Laurent², Patrick Durand³, Gilles Billen⁴, Pierre Cellier¹, Olivier Maury¹, Stéphanie Potok⁵, Philippe Faverdin⁶, Christophe Flécharde³, Josette Garnier⁴, Armelle Guy⁷, Catherine Hénault⁸, Catherine Mignolet⁹, Hervé Monod¹⁰, Anne Probst¹¹, Stéphane Sorin¹², Gaëlle Tallec¹³, Matthias Beekmann¹⁴, Eric Ceschia¹⁵, Cécile Le Gall¹⁶, Thierry Morel¹⁷, Gauthier Quesnel¹⁸, Eric Ramat¹⁹

¹ UMR ECOSYS, INRA, AgroParisTech, Université Paris-Saclay, F-78850, Thiverval-Grignon, France

² ARVALIS-Institut du Végétal, F-91720, Boigneville, France

³ UMR SAS, INRA, Agrocampus Ouest, F-35042, Rennes, France

⁴ UMR METIS, CNRS, UPMC, F-75252, Paris, France

⁵ INRA Transfert, F-75015, Paris, France

⁶ UMR PEGASE, INRA, Agrocampus Ouest, F-35590, Saint-Gilles, France

⁷ TRISKALIA, F-29206, Landerneau, France

⁸ UR USS, INRA, F-45075, Orléans, France

⁹ UR ASTER, INRA, F-88500, Mirecourt, France

¹⁰ UMR MAIAGE, INRA, Université Paris-Saclay, 78350 Jouy-en-Josas, France

¹¹ UMR ECOLAB, CNRS, INPT, UPS, F-31326, Castanet-Tolosan, France

¹² TERRENA, F-49002, Angers, France

¹³ IRSTEA, UR HBAN, F-92761 Antony, France

¹⁴ UMR LISA, CNRS, UPEC, UPD, F-94010, Créteil, France

¹⁵ UMR CESBIO, CNRS, UPS, CNES, IRD, F-31401 Toulouse, France

¹⁶ TERRES INOVIA, F-78850, Thiverval-Grignon, France

¹⁷ CERFACS, F-31057, Toulouse, France

¹⁸ UR MIAT, INRA, F-31326 Auzeville, France

¹⁹ LISIC, ULCO, F-62228, Calais, France

Jean-Louis.Drouet@grignon.inra.fr

Abstract: Agriculture is facing to 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, NO_x, 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