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- Paper scientifico su rivista internazionale

SALIS M, DEL GIUDICE L, ROBICHAUD PR, AGER AA, CANU A, DUCE P, PELLIZZARO G, VENTURA A, ALCASENA-URDIROZ F, SPANO D, ARCA B (2019) Coupling burn probability and erosion models to quantify post-fire erosion before and after fuel treatments: a case study from Northern Sardinia, Italy. International Journal of Wildland Fire 28, 687-703 (doi: 10.1071/WF19034)

- Abstract e poster presentati presso EGU General Assembly 2020, Online Conference, 4-8 Maggio 2020

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post-fire sediment delivery yields. This is particularly important with future climate change and the predicted increase in the occurrence of extreme weather events. Future work will focus on the evaluation of the economic trade-offs between fire severity reduction, erosion control and how these fuel treatment costs, in terms of erosion reduction, relate to the benefits of reduced future erosion.

#### Conflicts of interest

The authors declare no conflicts of interest.

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# MED-Star: Strategies and measures to reduce wildfire risk in the Mediterranean area

Michele Salis, Bachisio Arca, Grazia Pellizzaro, Andrea Ventura, Annalisa Canu, Marcello Casula, Liliana Del Giudice, Carla Scarpa, **Matilde Schirru**, and Pierpaolo Duce National Research Council of Italy, Institute of BioEconomy of Sassari, Sassari, Italy (michele.salis@ibe.cnr.it)

Wildfires represent a major threat to Mediterranean ecosystems and are responsible for relevant impacts to environmental, economic and social values. In the period 2010-2016, the cross-border Interreg Italy-France Maritime territory, which includes Sardinia, Corsica, Tuscany, Liguria and PACA Regions, had about 20,000 wildfire ignitions and a total burned area of about 122,000 ha. In the face of social and environmental conditions and risks of the Maritime Regions, strengthening and developing innovative common guidelines and systems of wildfire management, from the monitoring and forecast to suppression, can provide more effective solutions to the wildfire problem, and can help strengthen cross-border cooperation in case of days with high risk. This work is devoted to introduce the MED-Star project, and to describe his main activities and results, with a focus on the tasks and activities coordinated by the National Research Council of Italy, Institute of BioEconomy (CNR-IBE) of Sassari. MED-Star is a 3-years strategic project supported by the Interreg Italy-France Maritime Program 2014-2020, which is co-financed by the European Regional Development Fund (ERDF). MED-Star is closely linked to 4 joint simple projects (Intermed; Med-Coopfire; Med-Foreste; Med-PSS), which mainly focus on investments in small infrastructures for wildfire risk prevention and support to wildfire suppression operations. The MED-Star project aims to share and discuss fire management policies and the most advanced strategies that can reduce the risk associated with wildfires, also through the combination of joint action plans and pilot / demonstration actions. The partnerships of MED-Star and the related 4 simple projects include the main actors competent at the administrative, technical and scientific level on the wildfire topic in the Maritime area of cooperation, and are able to meet the abovementioned challenges, contributing to 1) the reduction of wildfire risk in the five Regions involved, 2) the definition of strategic and operational solutions, 3) the implementation of operational actions and investments for wildfire prevention, monitoring, forecast and suppression, and 4) the strengthening of joint early warning and risk monitoring systems.

#### MED-Star MED–Star: Strategies and measures to reduce wildfire risk 🐠 Interreg | in the Mediterranean area MARITTIMO-IT FR-MARITIME Fondo Europeo di Sviluppo Regionale Michele Salis, Bachisio Arca, Grazia Pellizzaro, Andrea Ventura, Annalisa Canu, Marcello Casula, MED-Foreste MED PSS MEDCOOPEIRE INTERMED Liliana Del Giudice, Carla Scarpa, Matilde Schirru, and Pierpaolo Duce EGU General Assembly 2020 National Research Council – Institute of BioEconomy (CNR – IBE), Sassari (Italy) Context **Training and Education Activities** MED-Star COMPONENTS & Main Communication Actions Wildfires represent a major threat to Mediterranean coordinated by the National Research Council (CNR) -回热家回 ecosystems and are responsible for relevant impacts to E-learning platform and face to face Institute of BioEconomy (IBE) - Sassari environmental, economic and social values. In the period courses to train and reinforce expert knowledge in the forecast, management, 2010-2016, the cross-border Interreg Italy-France Maritime prevention and suppression of wildfires territory, which includes Sardinia, Corsica, Tuscany, Liguria and PACA Regions, had about 20,000 wildfire ignitions and a total burned area of about 122,000 ha. **Knowledge Transfer** Wildfire MED-Star is a 3-years strategic project supported by Forecast & the Interreg Italy-France Maritime Program 2014-2020. Educational courses through the MED-Star E-learning platform MED-Star aims to share and discuss fire management Prevention targeted on young students (11-17 v policies and the most advanced strategies that can educe concerning wildfire prevention the risk associated with wildfires, also through the Communication, combination of joint action plans and pilot / demonstration Training actions. Project & Dissemination MED-Star is closely linked to 4 joint simple projects which Dissemination Wildfire Management mainly focus on investments in small infrastructures Management for wildfire risk prevention and support to wildfire Documentation concerning & Strategic suppression operations. The partnerships of MED-Star and wildfire prevention, forecast and the related 4 simple projects include the main actors suppression is available for public Planning interests competent at the administrative, technical and scientific level on the wildfire topic in the Maritime area of Wildfire Strategic cooperation, and are able to meet the abovementioned Monitoring Platforms & challenges. **Networking Activities** Tools **Challenges & Main Goals:** Exchanges among Investments partners and news, 1) Reducing wildfire risk in the five Regions involved, best practices, project 2) Defining strategic and operational solutions, updates 3) Implementing operational actions and investments for wildfire prevention, monitoring, forecast and suppression **Scientific Events & Results Sharing** 4) Strengthening of joint early warning and risk monitoring systems. International Conference on Fire 5) Developing innovative common guidelines and systems of **Behaviour and Risk** wildfire management, from the monitoring and forecast to the suppression phases **MED-Star** ICFBR2021.it 6) Reinforcing cross-border cooperation in wildfire Website management

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# Coupling wildfire spread and erosion models to quantify post-fire erosion in Northern Sardinia, Italy

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High severity wildfires can have many negative impacts on ecosystems. In this work, we coupled wildfire spread and erosion prediction modelling to evaluate the effects of fuel reduction treatments in preventing soil runoff in Mediterranean ecosystems. The study was carried out in a 68,000-ha forest area located in Northern Sardinia, Italy. We treated 15% of the study area, and compared no-treatment conditions vs alternative strategic fuel treatments. We estimated pre- and post-treatment fire behaviour by using the Minimum Travel Time (MTT) fire spread algorithm. For each fuel treatment scenario, we simulated 25,000 wildfires replicating the historic weather conditions associated with severe wildfires in the area. Sediment delivery was then estimated using the Erosion Risk Management Tool (ERMiT). Our results showed how post-fire sediment delivery varied among and within the fuel treatment scenarios tested. The treatments realized nearby roads were the most efficient. We also evaluated the effects of other factors such as exceedance probability, time since fire, slope, fire severity and vegetation type on post-fire sediment delivery. This work provides a quantitative assessment approach to inform and optimize proactive risk management activities aimed at reducing post-fire erosion in Mediterranean areas.

# "Coupling wildfire spread and erosion models to quantify post-fire erosion in Northern Sardinia, Italy"

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Consiglio Nazionale delle Ricerche Istituto per la BioEconomia



Vienna | Austria | 3-8 May 2020

#### **Please note:**

# This talk will present the methods and results of the following manuscript:

Salis, Del Giudice, et al. (2019) Coupling wildfire spread and erosion models to quantify post-fire erosion before and after fuel treatments. International Journal of Wildland Fire 28, 687-703. <u>https://doi.org/10.1071/WF19034</u>

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## Goals

To <u>link</u> the fire simulation modeling approach based on the application of the <u>MTT algorithm</u> (Finney 2002) with the <u>Ermit modeling</u> approach (Robichaud 2007) to characterize <u>post-fire erosion</u> in Northern Sardinia, Italy

To investigate the potential of different <u>fuel treatment</u> strategies in modifying <u>post-fire erosion</u>

## Methods: Study area - NE Sardinia, Italy (68,000 ha)



- About 20% of the area classified as EU Site of Community Importance
- Complex topography, Med climate, high susceptibility to post-fire erosion processes
- Natural vegetation mostly characterized by Q. ilex and Q. suber, and dense Mediterranean maquis (shrubs + forests = 70% of the area)



The area was affected in July 1983 by the Wildfire of Curraggia (18,000 ha, 9 people killed)

## Methods: Fuel Treatment alternatives

Treatments hypothesized the following fuel management operations in forest, shrublands and herbaceous pastures:

- pruning of the lowest branches
- removal of dead fuels and part of the understory for shrublands, forest understory, and herbaceous pastures

We tested 3 fuel treatment alternatives :

nearby Wildland Urban Interfaces (WUI)
nearby Roads (ROAD)
randomly located (RAND)

We treated 15% of the landscape

## Methods: Wildfire modeling approach



Coupling wildfire spread and erosion models to quantify post-fire erosion in Northern Sardinia, Italy



## **Main results**

- Spatial location of fuel treatments influence spatial variation of burn severity, and therefore also post-fire sediment delivery is spatially affected
- Post-fire sediment delivery varied among and within the fuel treatment scenarios tested.
- > The treatments realized nearby roads were the most efficient.
- Post-fire sediment delivery was also affected by of other factors such as exceedance probability, time since fire, slope, fire severity and vegetation type.

#### **Main results**

The proposed approach permits to obtain spatial information on the areas characterized by high severity and burn probability, which can suffer the most relevant impacts in terms of soil erosion after a wildfire event

## For more details please refer to:

Salis, Del Giudice, et al. (2019) Coupling wildfire spread and erosion models to quantify post-fire erosion before and after fuel treatments. International Journal of Wildland Fire 28, 687-703. https://doi.org/10.1071/WF19034

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