



WORKCLIMATE

Technological and operational solutions to counteract the effects of environmental heat in the workplace

[Project](#)
[Forecasts](#)
[Publications](#)
[Social Wall](#)


National Call for Collaborative Research - (BRiC - 2019)
- Research Activity Plan 2019-2021. Topic ID n. 06/2019

*"Occupational exposure to extreme outdoor temperatures.
Development of methodological tools and epidemiological studies
for the characterization of the injury risk."*

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Department of Biology, Agriculture and Food Science

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INAIL
ISTITUTO NAZIONALE PER L'ASSICURAZIONE
CONTRO GLI INFORTUNI SUL LAVORO

Alessandro Marinaccio
a.marinaccio@inail.it

Start

June 15th 2020



End

December 15th 2022

The project will **go on for 2 years** (it started on June 15th 2020)

Institutional Proposer:

Institute of BioEconomy (IBE) – National Research Council

Principal Investigator: Morabito Marco

Institution: National Research Council – Institute of BioEconomy (IBE)

Internal Operating Unit of the INAIL Research Department

Department of Occupational and Environmental Medicine, Epidemiology and Hygiene- National Institute for Insurance against Accidents at Work (INAIL), Rome, Italy

Alessandro Marinaccio e Michela Bonafede

Project partners and coordinators of the Units involved:

1. Institute of BioEconomy (IBE) – National Research Council – Principal Investigator Marco Morabito
2. Epidemiology Unit, Department of Prevention, Central Tuscany Local Health Authority, Florence, Italy – Person in charge Miram Levi
3. Physical Agents Sector, Regional Public Health Laboratory, Siena, Italy – Person in charge Iole Pinto
4. Department of Epidemiology Lazio Regional Health Service, ASL ROMA 1, Rome, Italy – Person in charge Paola Michelozzi e Francesca de'Donato
5. Tuscany Region, LaMMA Consortium, Weather Forecaster and Researcher at Laboratory of Monitoring and Environmental Modelling for Sustainable Development, Sesto Fiorentino, Florence, Italy – Persons in charge Bernardo Gozzini e Daniele Grifoni

WORK GROUP

Filippo Ariani, Alessandra Binazzi, Andrea Bogi, Michela Bonafede, Raimondo Buccelli, Alfonso Crisci, Francesca de'Donato, Fabio De Francesco, Simona Del Ferraro, Pina Galzerano, Claudio Gariazzo, Rino Ghelfi, Claudia Giliberti, Emanuela Giuli, Bernardo Gozzini, Valentina Grasso, Daniele Grifoni, Giulia Guerri, Giulia Ionita, Miriam Levi, Alessandro Marinaccio, Agnese Martini, Alessandro Messeri, Paola Michelozzi, Vincenzo Molinaro, Stefano Monti, Marco Morabito, Antonio Moschetto, Francesco Pasi, Francesco Picciolo, Pietrafesa, Meri Raggi, Nicola Stacchini, Edvige Sorrentino, Donatella Talini

General aim of the project



The aim of the project was to deepen the knowledge on the effect of environmental thermal stress conditions on workers (in particular heat) especially through the INAIL injury database.

All this will was achieved through:

- **WP 1:** *Epidemiological analysis* for the *social costs' estimation* of injuries at work related to extreme temperatures.
- **WP 2:** Organization of ad *hoc case studies* in selected companies in different geographical areas and *surveys on the workers' perception* of risk linked to exposure to extreme temperatures.
- **WP 3:** Proposals for *technological/organizational solutions and operational procedures* useful in various occupational fields (or tasks).
- **WP 4:** Development of an *integrated weather-climatic and epidemiological heat alert system*, specific for the occupational sector, represented by a *web forecasting platform* and a *web app* with customized forecasts based on individual workers' characteristics and those of the environment work.
- **WP 5:** *Scientific dissemination and presentation of the results, the information obtained and the tools developed to Stakeholders* in order to provide concrete and operational support that guides not only the workers but also the corporate safety actors and prevention and protection operators.



Multidisciplinary

It provided different perspectives by involving people with different skills to study a complex and multifaceted topic

Environmental epidemiologists

Biometeorologists

Statistics

Occupational doctors

Psychologists

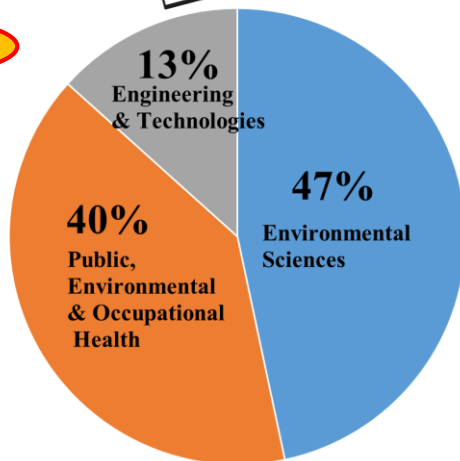
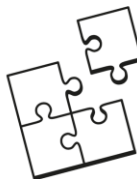
Meteorologists

Physicists with experience in environmental modeling



Interdisciplinary

Integration of the different knowledge with the aim of transversally investigating the phenomenon studied



Transdisciplinary

Connection of scientific innovation and institutions, the daily work of research and the interests and needs of various stakeholders.

Training for those involved in health and safety at work



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Creation of a network of companies interested in the topic

Main project results/products

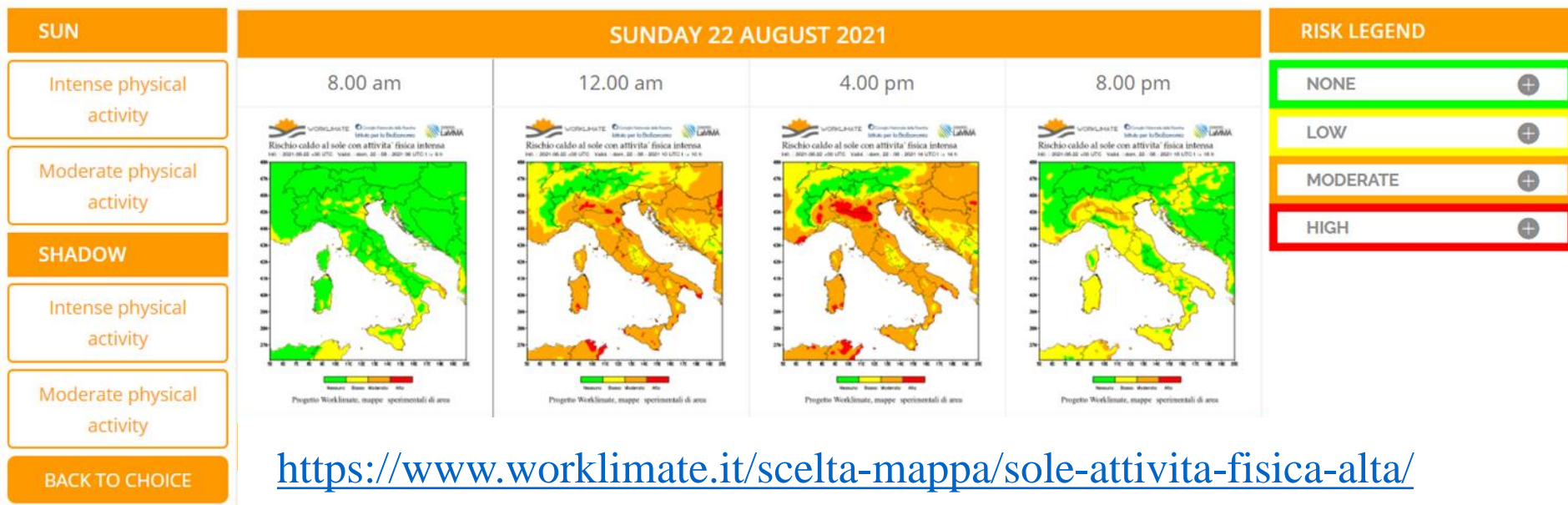


➤ Scientific results:

- ❖ 10 publications in international peer review Journals
- ❖ 20 other publications and project reports
- ❖ Results presented at over 20 national/international conferences

➤ Operational tools:

- ❖ Development of the heat stress forecasting system for the initial screening of risks among outdoor workers



<https://www.worklimate.it/scelta-mappa/sole-attivita-fisica-alta/>

Main project results/products



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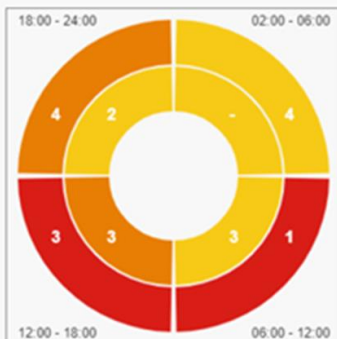
- ❖ Development of the heat stress forecasting system for the initial screening of risks among outdoor workers
- ❖ Development of the WORKLIMATE webapp with customized forecasts of heat risk and potential productivity loss

🏠 Riepilogo 📄 Profili 🗣️ Feedback 👤 Account Stakeholder

🚪 Logout

Previsione del rischio di stress da caldo

mar, 19 lug 2022



LIVELLI DI RISCHIO DA CALDO E SUGGERIMENTI

Fascia 02:00 -> 06:00 (Nr ore massimo rischio: 4)

Min: rischio basso » Max: rischio basso

Fascia 06:00 -> 12:00 (Nr ore massimo rischio: 1)

Min: rischio basso » Max: rischio alto

Fascia 12:00 -> 18:00 (Nr ore massimo rischio: 3)

Min: rischio moderato » Max: rischio alto

Fascia 18:00 -> 24:00 (Nr ore massimo rischio: 4)

Min: rischio basso » Max: rischio moderato

Nessun rischio

Rischio basso

Rischio moderato

Rischio alto

By

Main project results/products



➤ Scientific results:

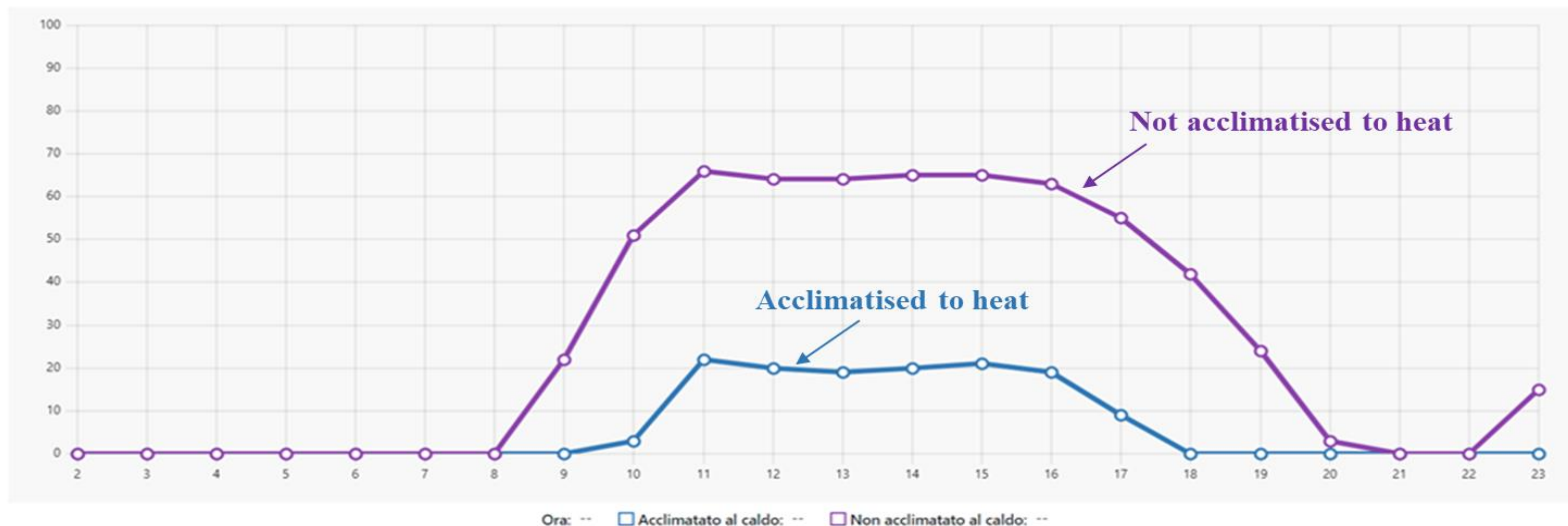
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Forecast of potential heat-related hourly labor productivity loss

Hourly productivity level change expressed as a percentage: Tue, Jul 19, 2022



Main project results/products



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➤ Operational tools:

- ❖ *Development of the heat stress forecasting system for the initial screening of risks among outdoor workers*
- ❖ *Development of the WORKLIMATE webapp with customized forecasts of heat risk and potential productivity loss*
- ❖ *Development of a prototype observatory model of events attributable to heat in the workplace by the press*

REPORT CALDO E LAVORO
ESTATE 2021
PDF

REPORT CALDO E LAVORO
ESTATE 2022
PDF

REPORT CALDO E LAVORO
ESTATE 2023
DAL 24 MAGGIO AL 11
SETTEMBRE
PDF

Main project results/products



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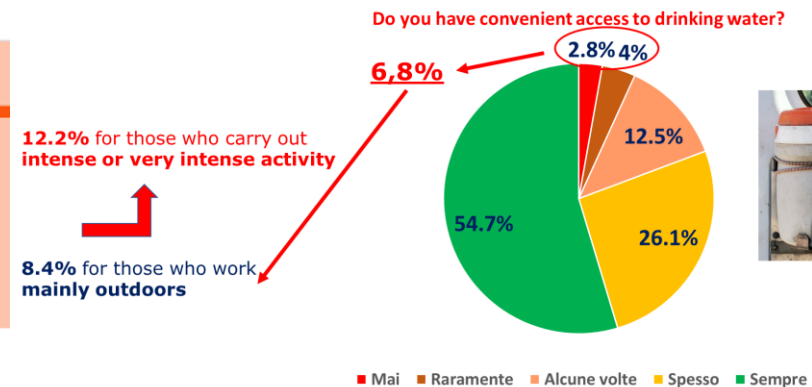
➤ Operational tools:

- ❖ Development of the heat stress forecasting system for the initial screening of risks among outdoor workers
- ❖ Development of the WORKCLIMATE webapp with customized forecasts of heat risk and potential productivity loss
- ❖ Development of a prototype observatory model of events attributable to heat in the workplace by the press
- ❖ National survey for the assessment of heat risk in the workplace

Sezione 1 di 8

NATIONAL SURVEY ON THE PERCEPTION AND KNOWLEDGE OF HEAT-RELATED RISK - WORKCLIMATE PROJECT (BRIC-INAIL 2019)

INVITO ALLA PARTECIPAZIONE ALL'INDAGINE NAZIONALE CALDO E LAVORO



Main project results/products



REGIONE PUGLIA

ORDINANZA DEL PRESIDENTE DELLA GIUNTA

N. 182 del Registro

OGGETTO: Attività lavorativa nel settore agricolo in condizioni di esposizione prolungata al Sole - ordinanza contingibile ed urgente per motivi di igiene e sanità pubblica

N. 61 - BOLLETTINO UFFICIALE DELLA REGIONE BASILICATA - 01/07/2021



REGIONE BASILICATA

ORDINANZA N. 33 DEL 1° LUGLIO 2021

OGGETTO: Divieto di lavoro in condizioni di esposizione prolungata al sole sull'intero territorio regionale nelle aree o zone interessate dallo svolgimento di lavoro nel settore agricolo, con riferimento alla mappa del rischio "Workclimate" dell'INAIL

➤ **Practical implications:** *Impacts on public health practice*

During the summers of 2021 and 2022, the public health authorities in several regions (Apulia, Molise, Calabria, Basilicata) adopted ***restricted measures with force of law***.



REGIONE MOLISE

Presidenza della Giunta regionale

DECRETO

DEL PRESIDENTE DELLA GIUNTA REGIONALE

N. 38 DEL 29-06-2021



REGIONE CALABRIA

GIUNTA REGIONALE

ORDINANZA DEL PRESIDENTE DELLA REGIONE

n. 44 del 30 giugno 2021

OGGETTO: Ordinanza contingibile ed urgente in materia di igiene e sanità pubblica - Misure di prevenzione per l'attività lavorativa nel settore agricolo in condizioni di esposizione prolungata al sole.

OGGETTO: ATTIVITÀ AGRICOLA- LAVORO IN CONDIZIONI DI ESPOSIZIONE PROLUNGATA AL SOLE : RACCOMANDAZIONI

*All working activities in agriculture have been forbidden from 12:30 p.m. to 4 p.m when the “**HIGH**” heat risk level in the WORKCLIMATE project forecast map (referred to 12 p.m.) is forecasted for a “not acclimatized healthy workers, exposed to the sun and engaged in intense physical activity”.*

Main project results/products



➤ Practical implications: Impacts on public health practice

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Direzione centrale tutela, sicurezza e vigilanza del lavoro

*In July 2021, the **National Labor Inspectorate (INL)** sent a note to INAIL, INPS and Regions.*

The note was addressed to construction and road construction sites, agriculture and floriculture.

Agli Ispettorati Interregionali e Territoriali del lavoro
All' INAIL - Direzione Centrale Rapporto Assicurativo
All' INPS- Direzione Centrale Entrate
Al Coordinamento Gruppo Tecnico Interregionale Salute e Sicurezza sul Lavoro - c.a. Dr.ssa Nicoletta Cornaggia

Oggetto: tutela dei lavoratori – stress termico ambientale.

*The results of the **WORKCLIMATE** project are indicated as a reference tool and as an aid to risk prevention policies.*



Versione aggiornata su <http://www.8108amatodifiore.it>

Main project results/products



➤ **Practical implications:** *Impacts on public health practice*

INFORMATION MATERIAL

INFORMATION BROCHURES ON DISEASES FROM HEAT, ON THE FACTORS THAT CONTRIBUTE TO THEIR OCCURENCE AND ON THE RECOMMENDATIONS TO BE FOLLOWED FOR AN EFFECTIVE PLANNING OF COMPANY INTERVENTIONS IN THE FIELD OF MICROCLIMATE RISK PREVENTION, TO BE ADOPTED WITHIN THE SPECIFIC ORGANIZATION OF THE COMPANY PREVENTION SYSTEM (BASED ON ART. 2 PARAGRAPH 2 OF LEGISLATIVE DECREE 81/08).

Information on heat-related illnesses and the factors that contribute to their onset

READ

Chronic conditions that increase susceptibility to heat

READ

Decalogue for the prevention of heat-related pathologies in the workplace

READ

The importance of maintaining a good state of hydration

READ



The importance of scheduled breaks for workers exposed to heat

READ

EXPOSURE TO EXTREME TEMPERATURES AND IMPACTS ON OCCUPATIONAL HEALTH AND SAFETY. THE WORKCLIMATE PROJECT AND THE FORECASTING WARNING PLATFORM

<https://www.inail.it/cs/internet/comunicazione/pubblicazioni/catalogo-generale/pubbl-guida-infor-gest-rischio-caldo-work.html>

INAIL



2022



Main project results/products



➤ **Organizational:** *Agreements with organizations*



CASE STUDIES 2021 - Microclimatic and physiological monitoring and risk perception study.

VENTILATED JACKET TESTING

ADMINISTRATION OF "HEAT AND WORK" SURVEY



ADMINISTRATION OF "HEAT AND WORK" SURVEY



ADMINISTRATION OF "HEAT AND WORK" SURVEY

TESTING OF THE WORKCLIMATE ALERT SYSTEM

USE OF INFORMATION MATERIAL FOR CUSTOMIZED BROCHURES

WEBUILD SPA + SUBCONTRACTING COMPANIES

WORKSITE BOVINO ORSARA



CASE STUDIES 2023 - Microclimatic and physiological monitoring and risk perception study.

TESTING OF THE WORKCLIMATE ALERT SYSTEM

USE OF INFORMATION MATERIAL FOR CUSTOMIZED BROCHURES

Main project results/products



➤ **Organizational:** *Agreements with companies*



ADMINISTRATION OF “HEAT AND WORK” SURVEY - 2021

PRESENTATION OF RESULTS AND HEAT RISK TRAINING - MARCH 2022

TESTING OF THE WORKCLIMATE ALERT SYSTEM - 2022 – 2023

CASE STUDIES 2022 - Microclimatic and physiological monitoring and risk perception study.

CASE STUDIES 2023

USE OF INFORMATION MATERIAL FOR CUSTOMIZED BROCHURES



ADMINISTRATION OF “HEAT AND WORK” SURVEY - 2022

TESTING OF THE WORKCLIMATE ALERT SYSTEM - 2022 – 2023

USE OF INFORMATION MATERIAL FOR CUSTOMIZED BROCHURES



ADMINISTRATION OF “HEAT AND WORK” SURVEY – 2022 - Ethiopia

Science-based policy making in occupational safety and health

Scientific workshop - October 12, 2023

The Workclimate Project



Main project results/products



➤ **Organizational:** *Contacts and activities with companies*

| OCCUPATIONAL SECTOR | N. COMPANIES | ACTIVITIES |
|---|--------------|---|
| AGRICULTURE - Wine sector | 9 | CASE STUDIES |
| AGRICULTURE - Livestock sector | 3 | CASE STUDIES |
| BUILDINGS | 5 | CASE STUDIES VENTILATED JACKET TESTING "HEAT AND WORK" SURVEY WORKCLIMATE ALERT SYSTEM BROCHURE |
| SERVICES - Multiutility and environmental sector | 3 | CASE STUDIES "HEAT AND WORK" SURVEY TRAINING WORKCLIMATE ALERT SYSTEM BROCHURE |
| TRANSPORT | 2 | CASE STUDIES "HEAT AND WORK" SURVEY WORKCLIMATE ALERT SYSTEM BROCHURE |
| INDUSTRY | 2 | CONTINUOUS ENVIRONMENTAL MONITORING "HEAT AND WORK" SURVEY |
| LOGISTICS | 1 | CASE STUDIES |

Main project results/products



www.worklimate.it

<https://www.facebook.com/Worklimate>

<https://twitter.com/worklimate>

<https://www.youtube.com/@ProgettoWorklimate>