Farming and Mitigation: selected strategies in the Italian research agenda

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PLANETARY ENERGY BALANCE

- **Incoming solar radiation**: 100% (340 W/m²)
- **Reflected solar radiation**: 29%
- **Reflected by clouds & atmosphere**: 23%
- **Absorbed in atmosphere**: 23%
- **Convection**: 5%
- **Evaporation**: 25%
- **Absorbed by surface**: 18%
- **Reflected by surface**: 7%

**GREENHOUSE GASES**
- **Emitted by atmosphere**: 50%
- **Emitted by clouds**: 9%
- **Atmospheric window**: 12%
- **Surface radiation**: 117%
- **Back radiation**: 100%

**Outgoing heat radiation**: 71%
1. BIOCHAR
Pyrolysis process

Biomass → Pyrolysis → Syngas → Energy

TAR

CHAR

BIOCHAR

Soil Carbon Stock

Modification of the Carbon Cycle!!!
Biochar has high content of stable carbon, typically 50–85%, which resists decaying and remains in soils for long time

(Hammond et al., 2011)
The bright side
Mean = 10%
The dark side
Potential drawbacks

- Traceability of biomass
- Land use

Surface Albedo
Black Carbon
Biochar certification

Guidelines and legislation
2. CONSERVATION AGRICULTURE
3. ALTERNATIVE CHEESE SUPPLY CHAINS
Environmental profile of Sardinian sheep milk cheese supply chain: A comparison between two contrasting dairy systems

Enrica Vagnoni, A B, Antonello Frasca, Claudio Porqueddu, Pierpaolo Duce

<table>
<thead>
<tr>
<th>Feed</th>
<th>Actual and simulated scenarios</th>
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<th>FS2</th>
<th>FS3</th>
<th>FS4</th>
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<td>Improved pasture</td>
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4. HIGHLY REFLECTIVE CROPS
Current GHG-RF since pre-industrial=3.1 W m$^{-2}$

Seasonal= $-2.74 \pm 0.048$ W m$^{-2}$

Annual = $-0.87 \pm 0.1$ W m$^{-2}$
\[
\Delta \alpha(d) = \left( \frac{d}{GSL} \right) \left( \frac{1 + \left( \frac{d}{GSL} \right)^{k_3} \left( 1 - \left( \frac{d}{GSL} \right)^{k_4} \right)}{(k_0 + k_1 \left( \frac{d}{GSL} \right) + k_2 \left( \frac{d}{GSL} \right)^2)} \right)
\]

\[
RF_{p,SW} = 100 \left[ 365^{-1} \sum_{d=1}^{365} K_{p,d,\Delta \alpha} \Delta \alpha_{p,d} \right] \frac{A_{p,SoY}}{A_p}
\]

\[
RF_{p,SW}^{Global} = 100 \left[ 365^{-1} \sum_{d=1}^{365} K_{p,d,\Delta \alpha} \Delta \alpha_{p,d} \right] \frac{A_{p,SoY}}{A_{Earth}}
\]

-0.04 W m\(^{-2}\)

Equal to 12% of the current annual increase in the global GHG-driven RF

corresponding to -4.4 Gt CO\(_2\)-eq y\(^{-1}\)
Thanks for your attention