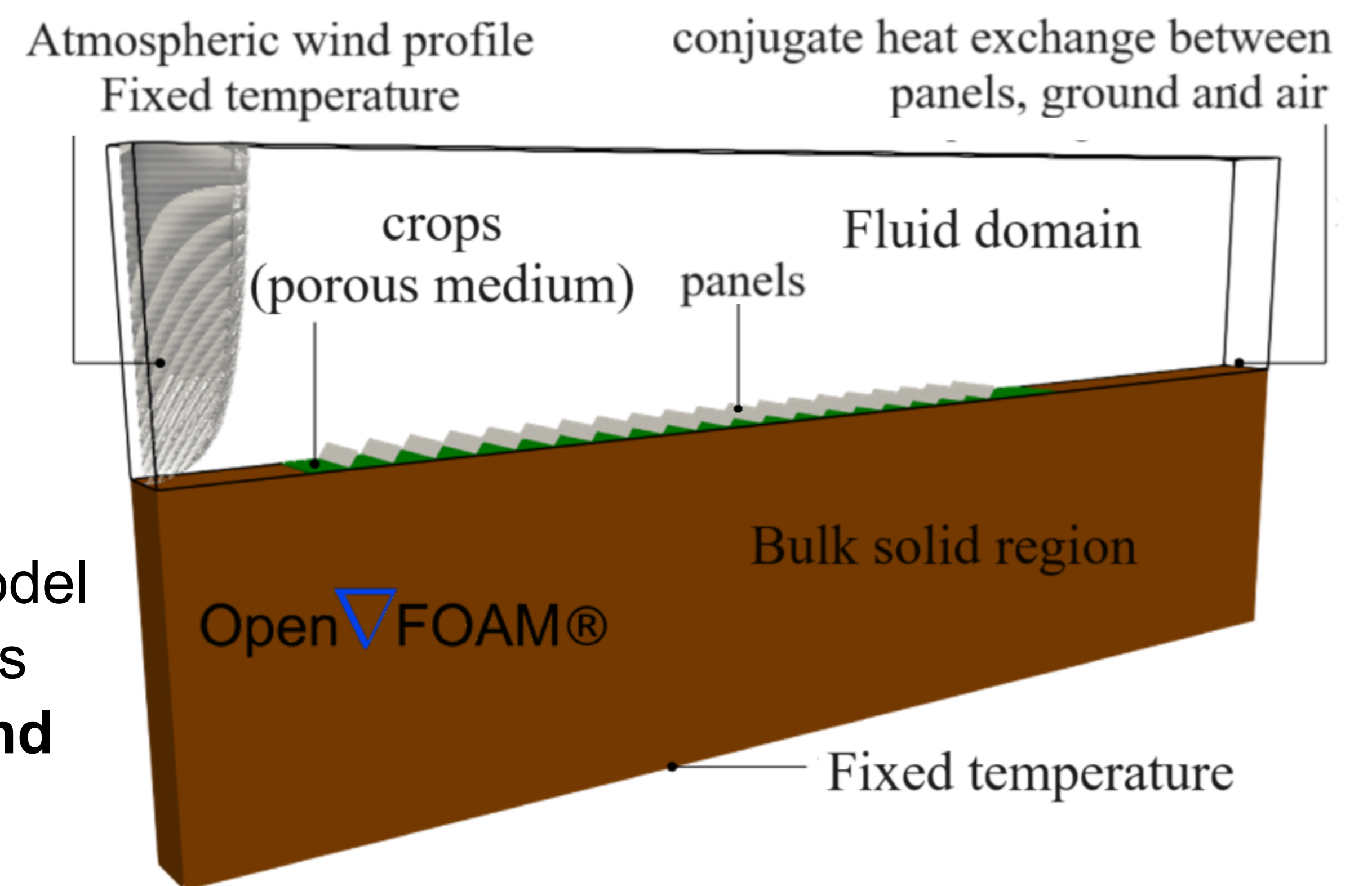


Impact of renewable energy integration: a numerical study of atmospheric flow around models of agrivoltaic farms

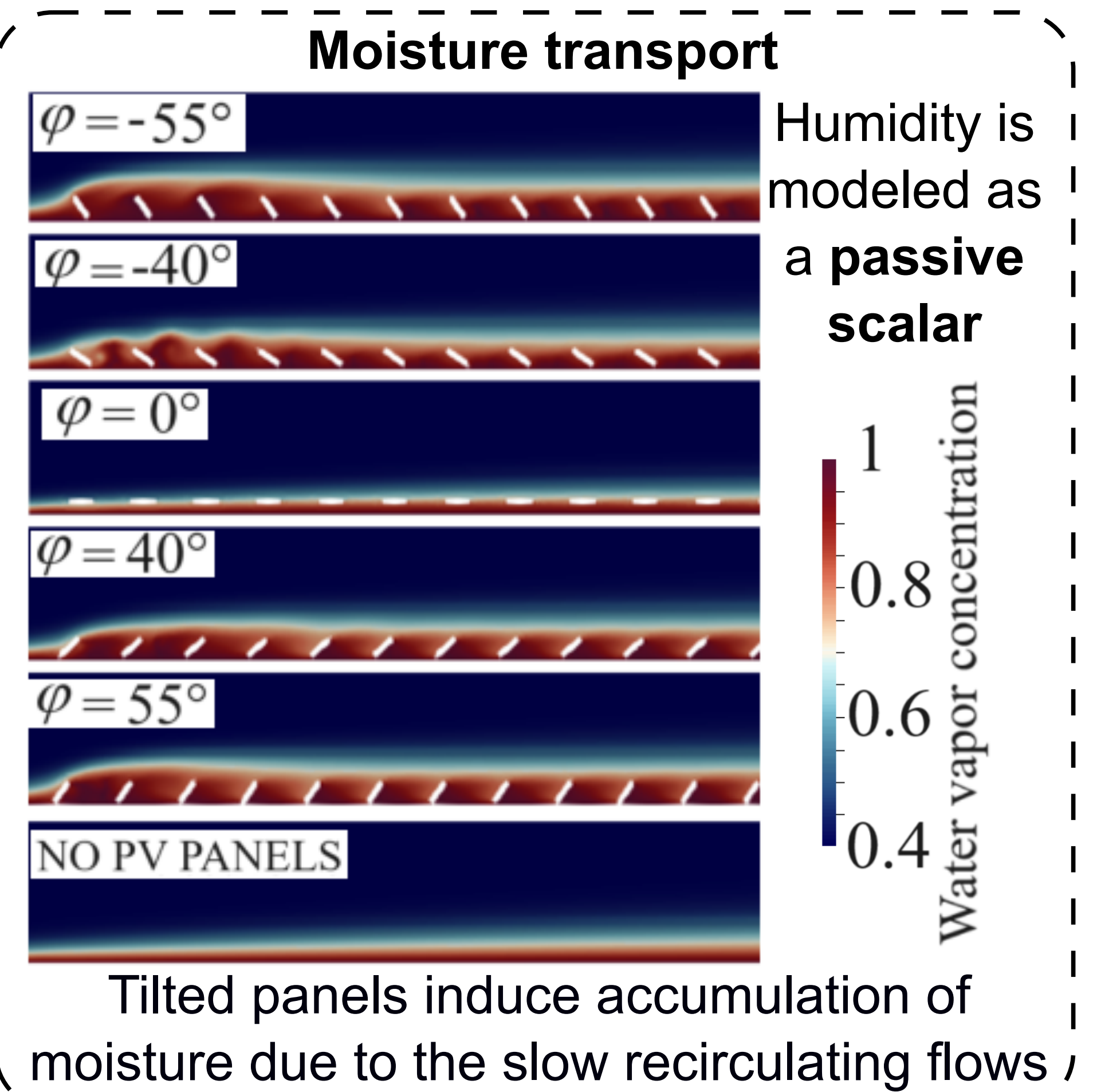
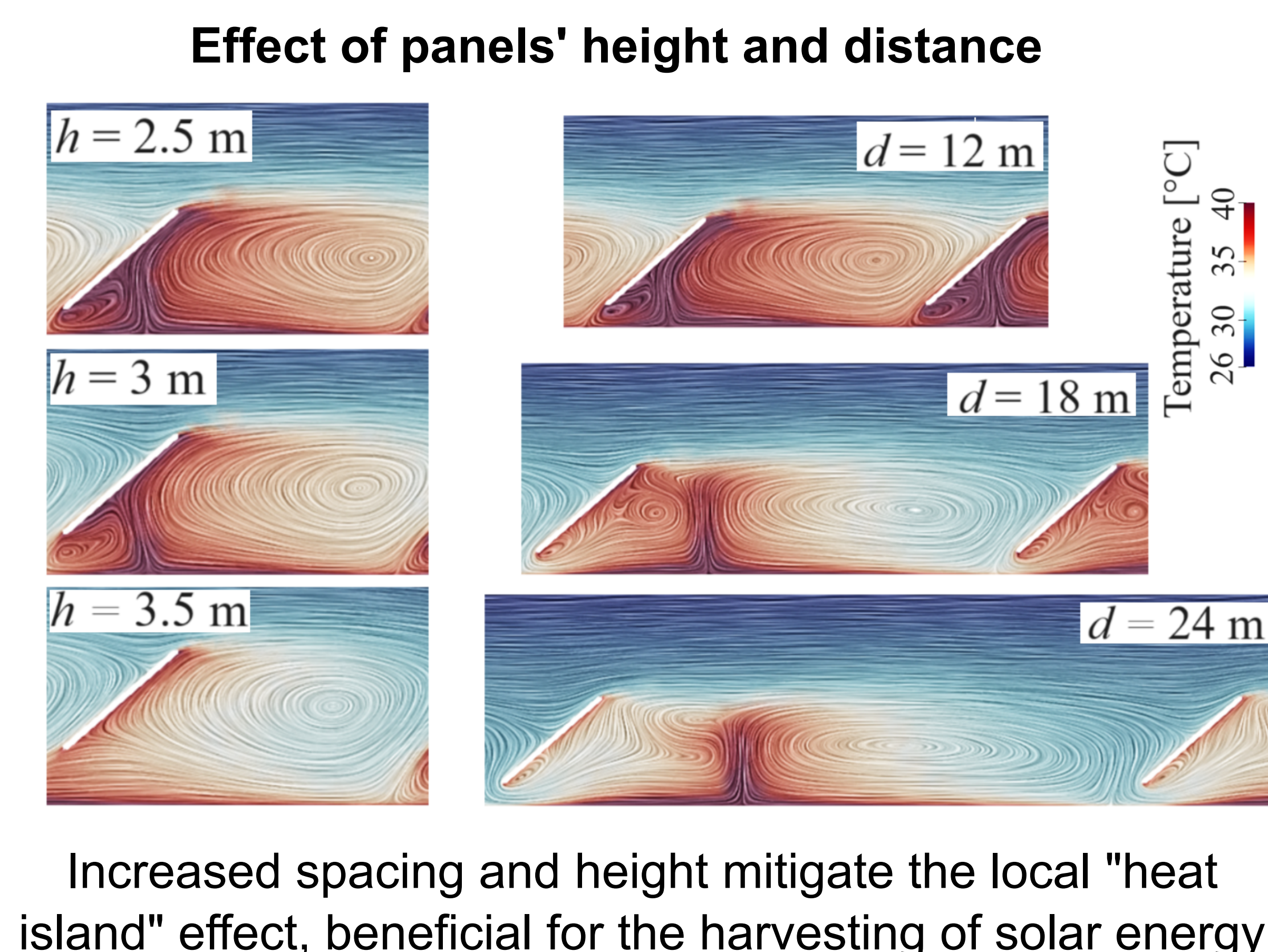
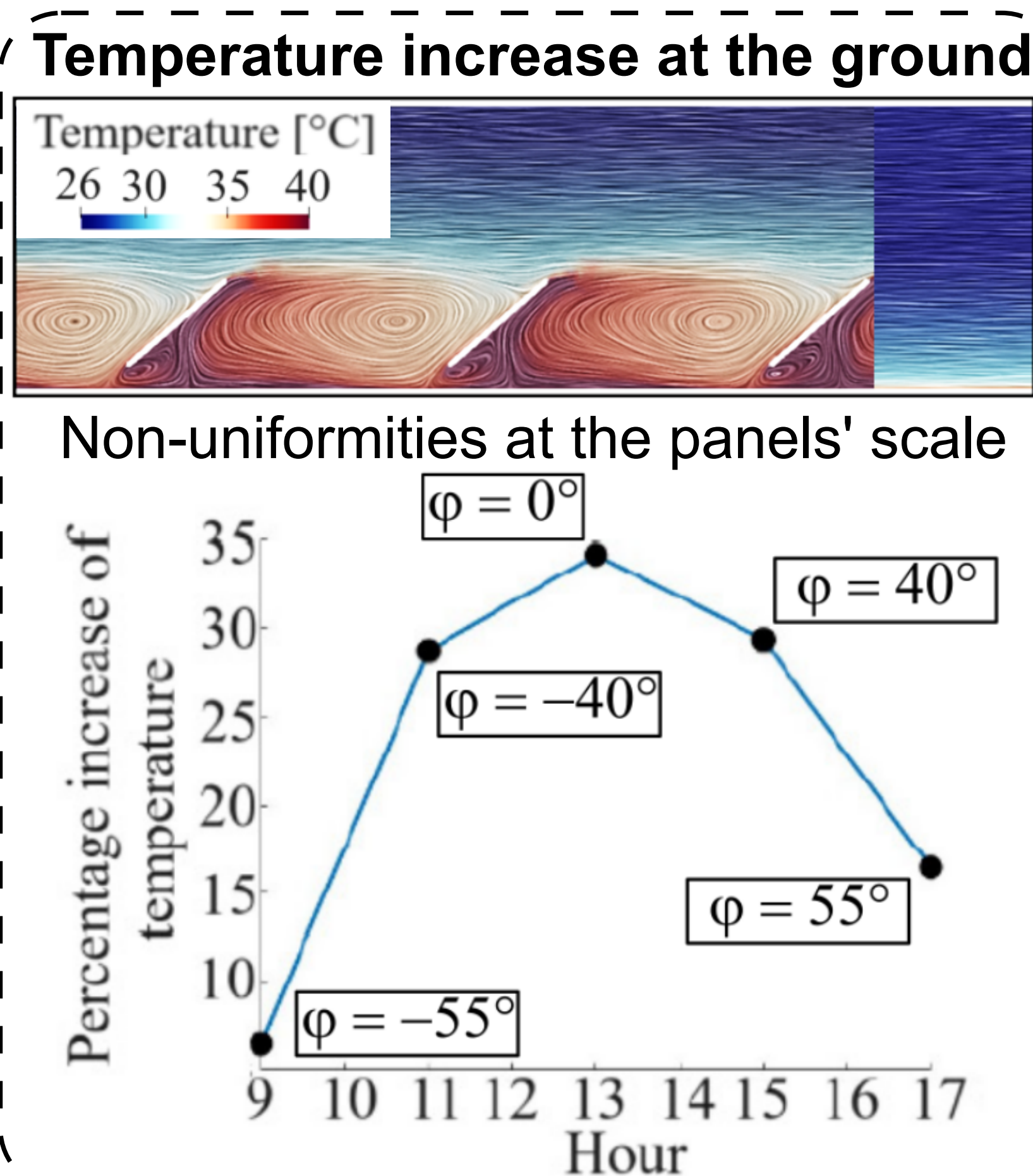
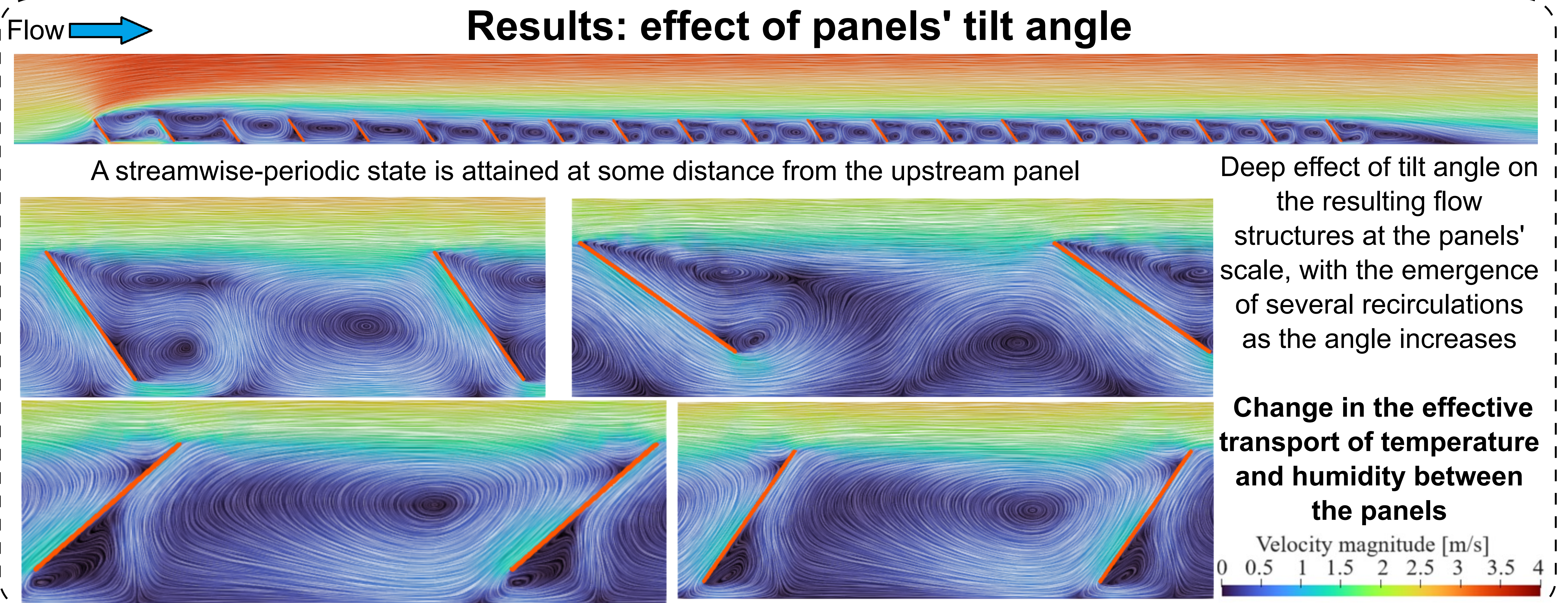
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Current circumstances often push toward the transition from traditional land use to systems that heavily rely on **renewable energy production**. Agrivoltaic farms blend energy harvesting with crop cultivation. The **installation** of photovoltaic farms can **alter the local heat and moisture exchanges**, potentially affecting **agricultural productivity**.



We numerically investigate the **flow dynamics** around a two-dimensional model of an **agrivoltaic farm** through a **RANS multiphysics model** which includes **temperature-induced buoyancy effects**, **heat transfer with the ground and panels**, and **solar radiation in a hypothetical Spring day**.

Panels' tilt angle varies during the day so that they are perpendicular to the solar radiation



The flow structures between the panels are affected by the time of the day (angle) and by distance and height

- Slow recirculating flows impact heat exchange: inclined panels reduce shadows but increase temperatures due to reduced convective heat transfer
- Larger distances increase the velocity between the panels and decrease temperatures, but also exposes more ground surface to direct sunlight
- These considerations can be extended to investigate the impact on crops and understand the micrometeorological effect of the farm at larger scales