NextSENSE:
solar energy nowcasting & short-term forecasting system

Panagiotis Kosmopoulos

Associate Researcher – National Observatory of Athens

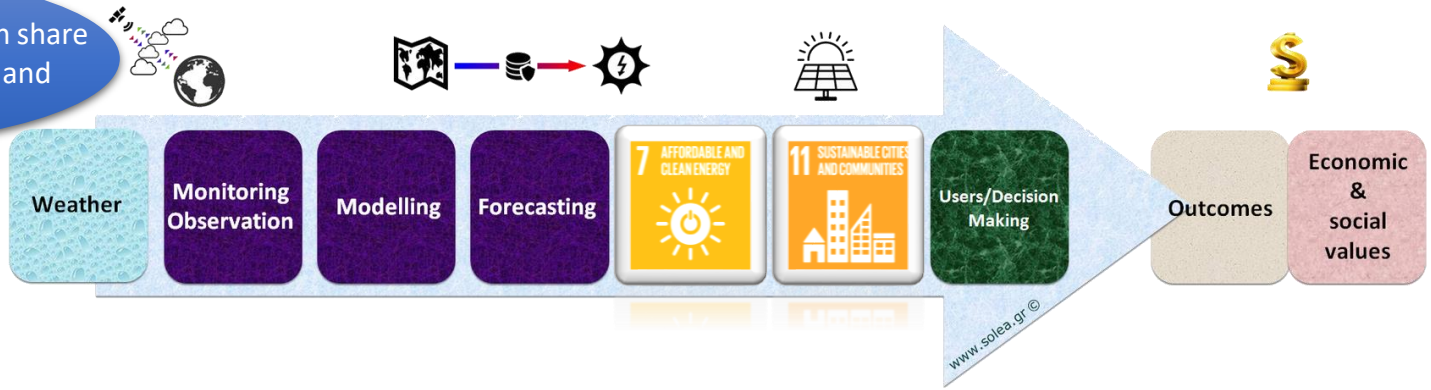
Motivation

Influence of climatic conditions from the irrational use of the produced energy

Increase of the RES's participation share in the total energy production and consumption mix

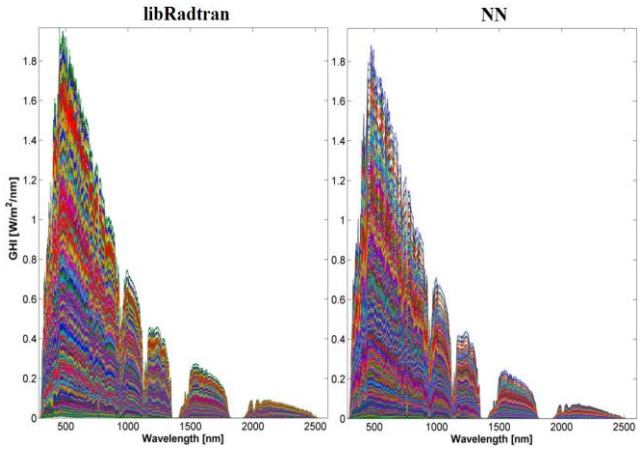
Need for optimal energy planning

Energy Management:
An integral part of the overall state administration

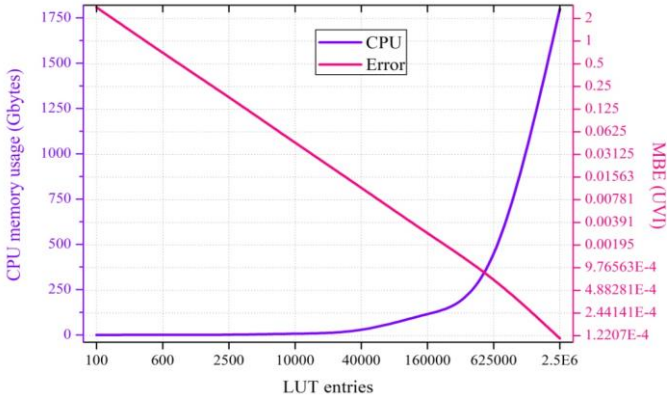


Scientific and technical background

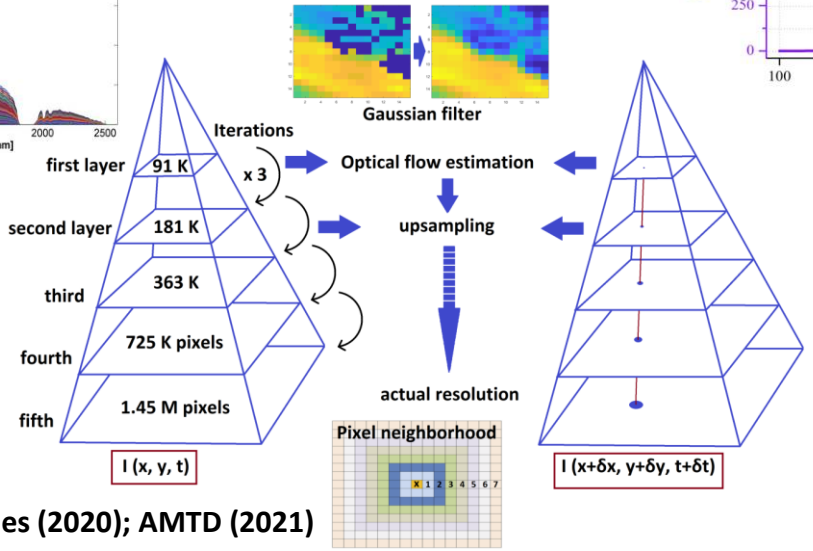
Look-Up-Tables, Machine Learning



High Performance Computing



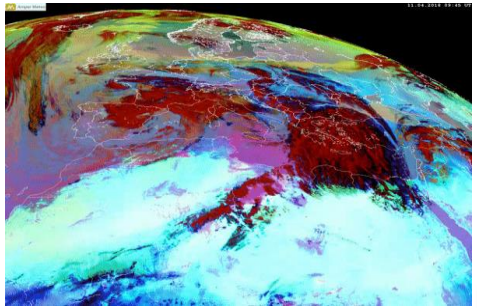
Computer Vision Techniques



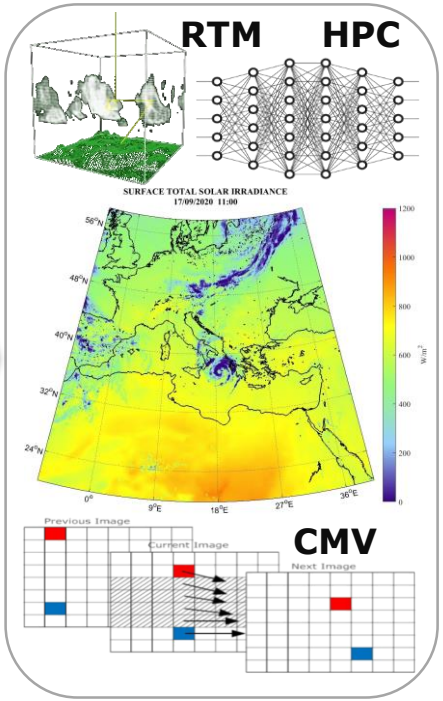
Kosmopoulos et al. @ AMT (2018); Energies (2020); AMTD (2021)

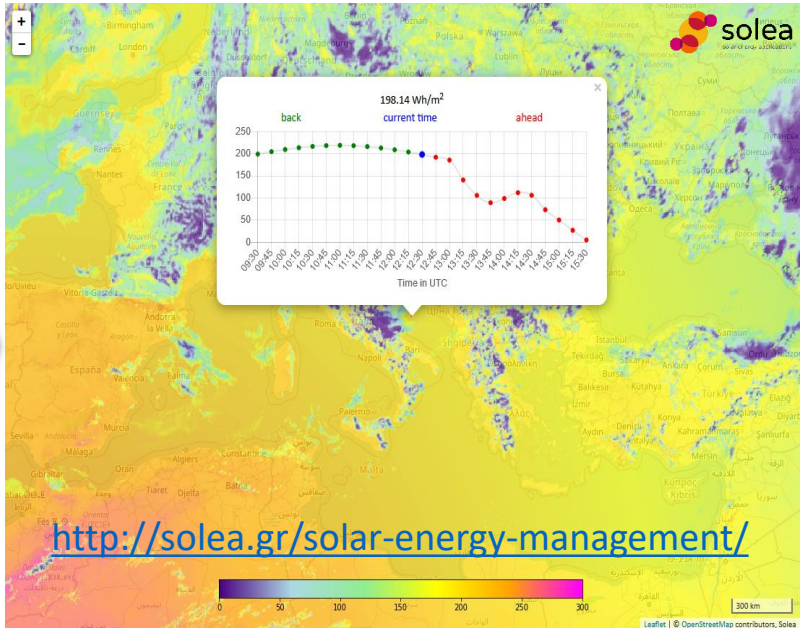
Solar energy short-term forecasting systems

EUMETSAT SAFNWC



Numerical models (CAMS)





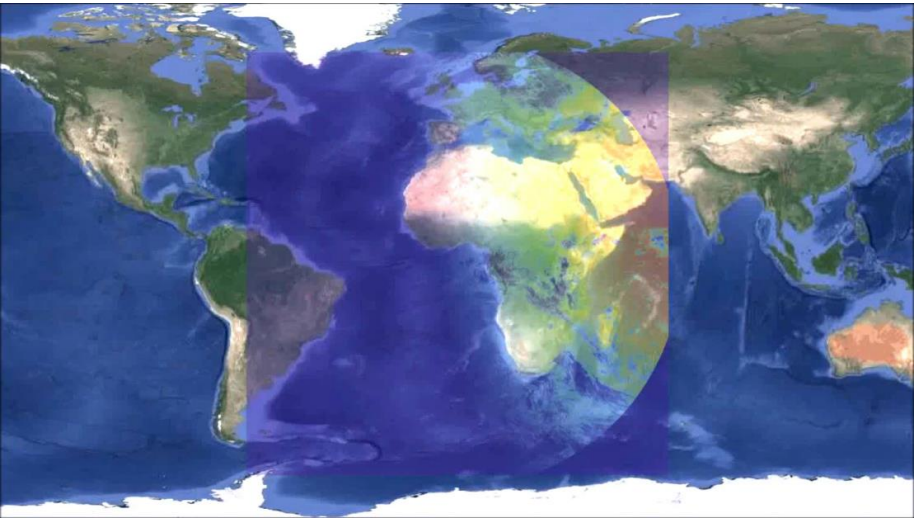
Inputs ----------> **nextSENSE** ----------> **Outputs**

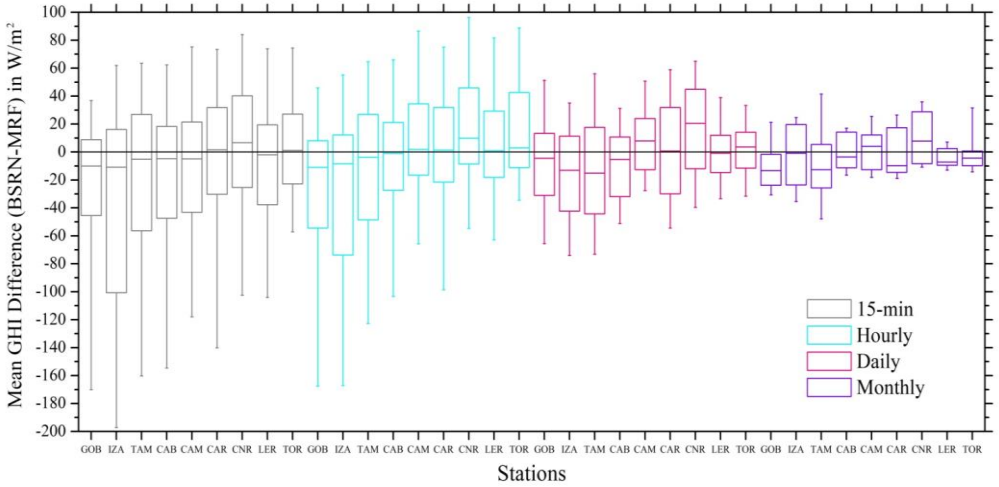
e-shape

Kosmopoulos et al. @ Copernicus Atmospheric Measurement Techniques 2018 & MDPI Energies 2020

https://e-shape.eu/

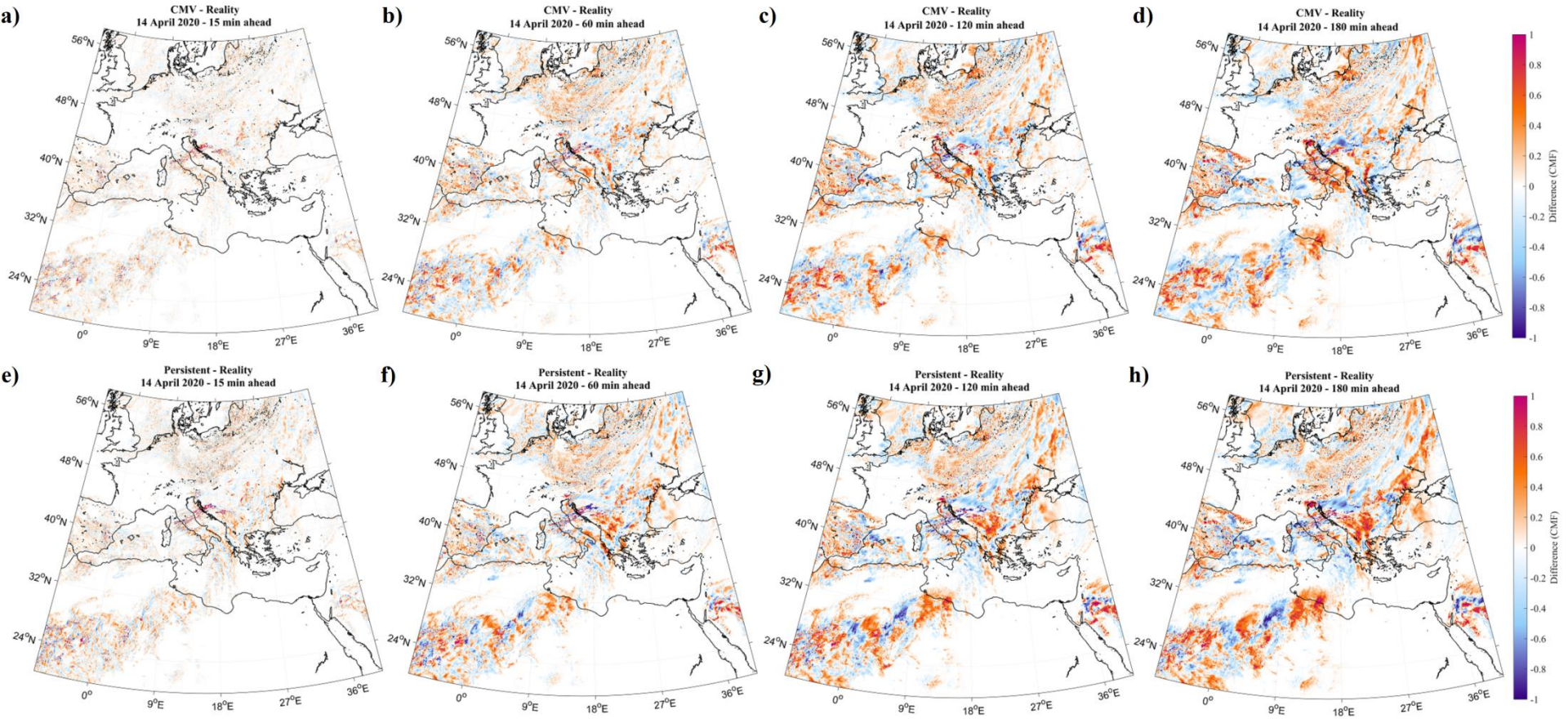
Real-time evaluation





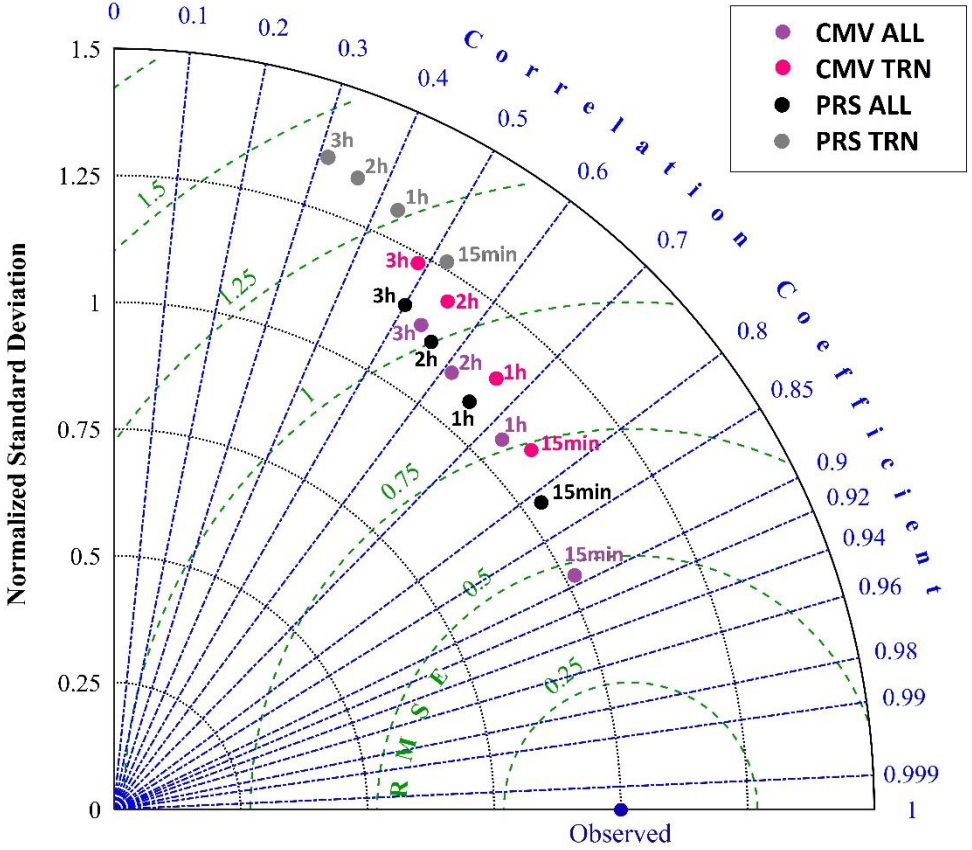
Kosmopoulos et al. 2018 @ AMT

Short-term forecasting evaluation



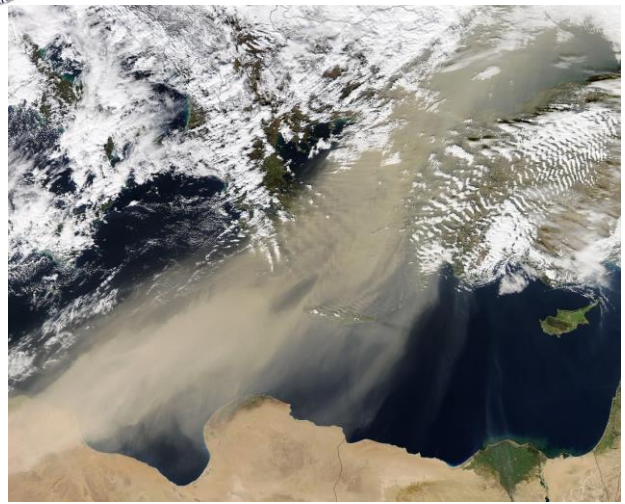
Kosmopoulos et al. 2020 @ MDPI Energies

Short-term forecasting evaluation

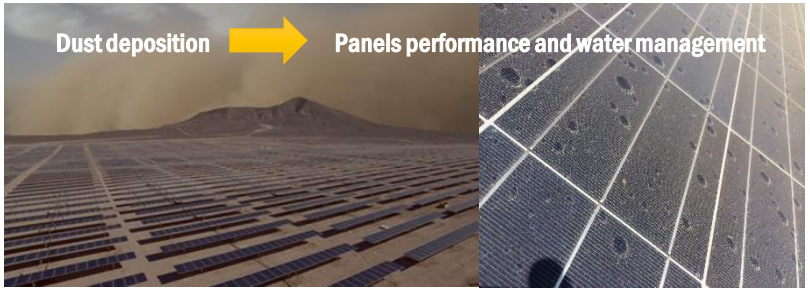


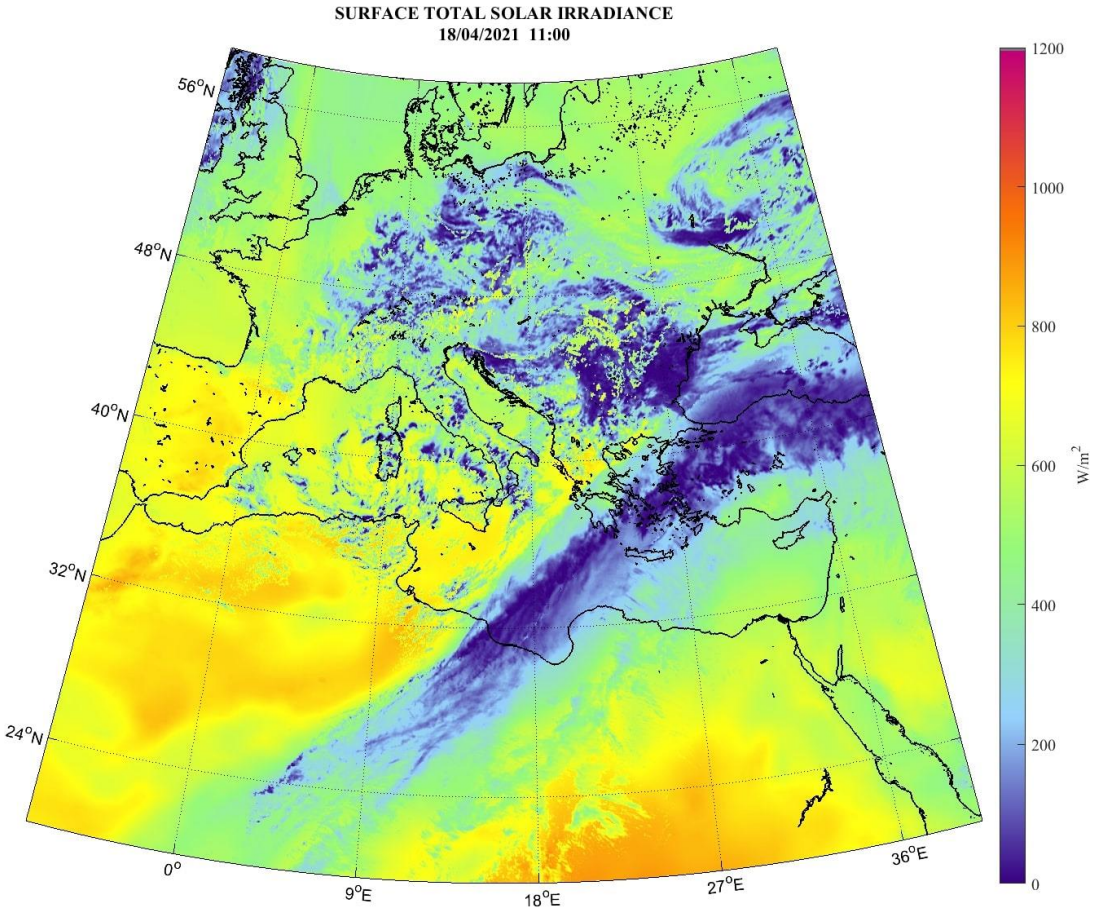
Kosmopoulos et al. 2020 @ MDPI Energies

Dust impact



Energy production reduction
32% for PV and 55% for CSP plants

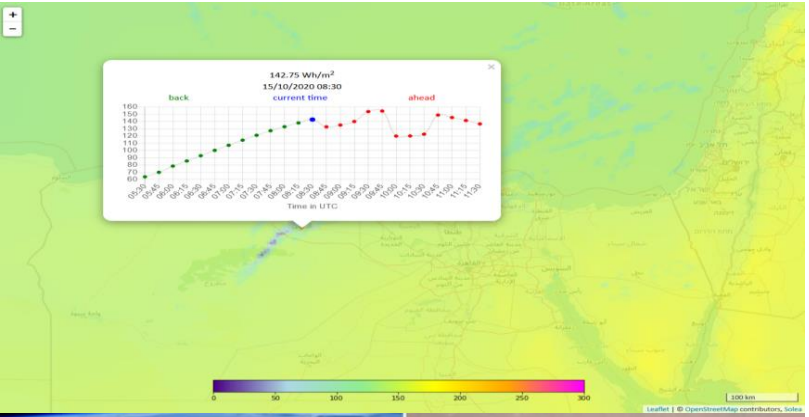


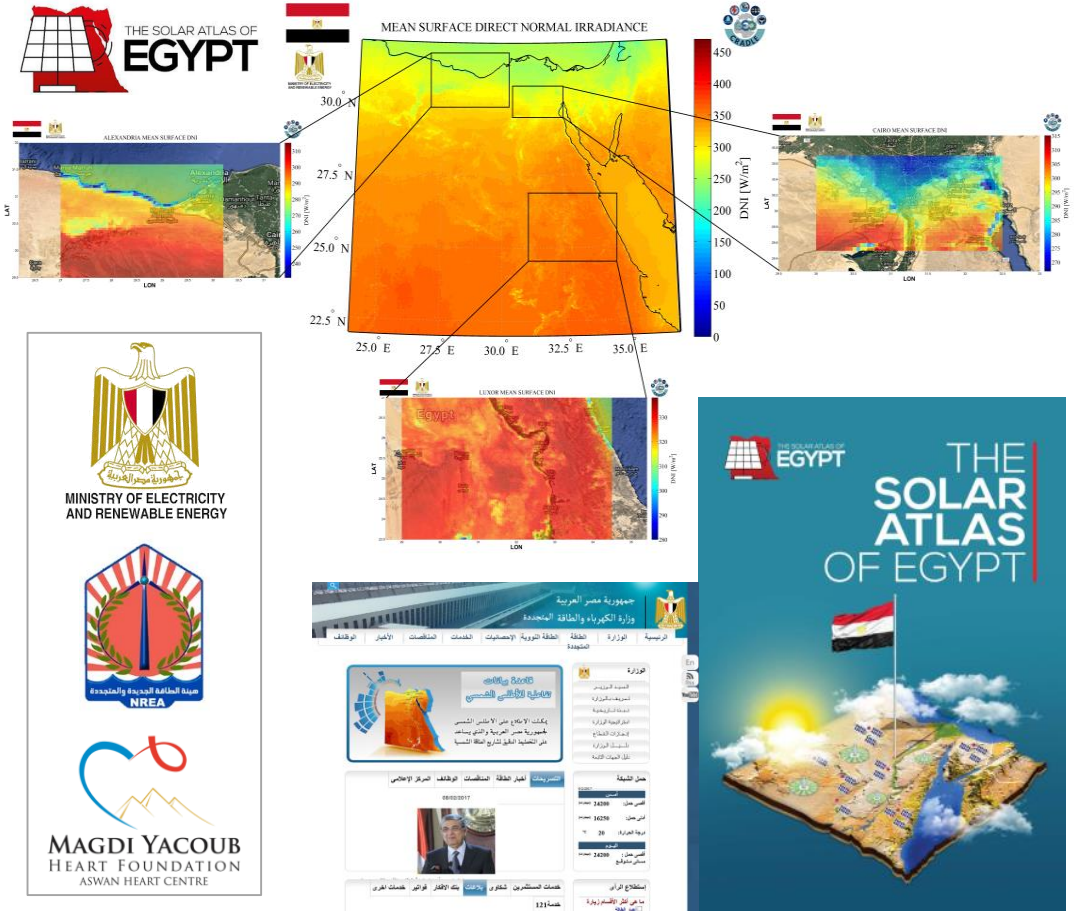


Kosmopoulos et al. 2017 @ AMT

Kosmopoulos et al. 2021 @ MDPI Remote Sensing - Under Preparation

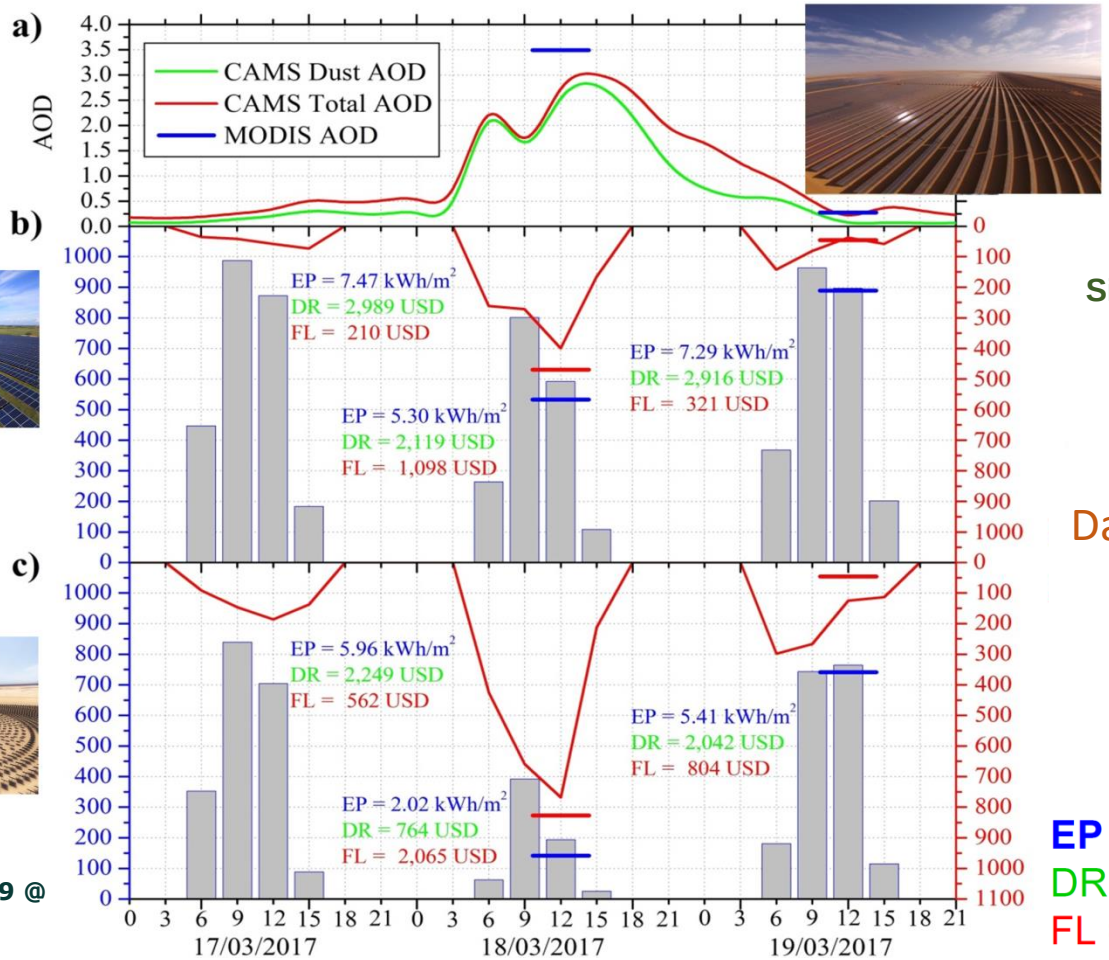
Solar energy applications in Egypt

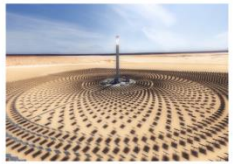




Kosmopoulos et al. 2019 @ Remote Sensing ©

Solar energy applications in Egypt





Solar power (W/m^2)

Daily financial losses (USD)

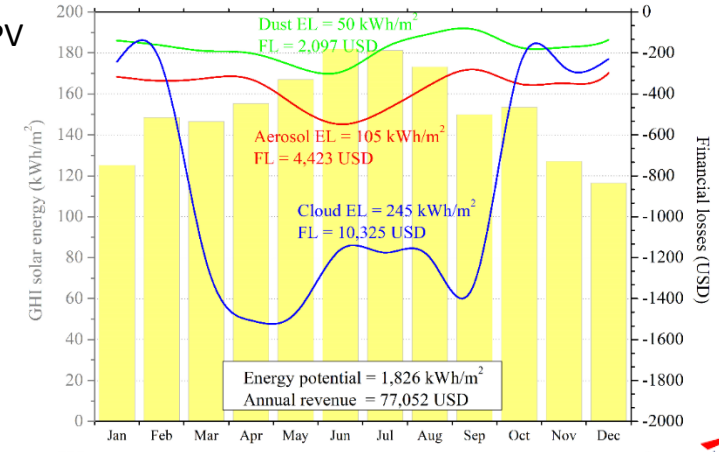
Simulated scenario 10 MW
Annual production ≈
25.687 kWh or 976.000 $

EP = Energy production
DR = Daily revenue
FL = Financial losses

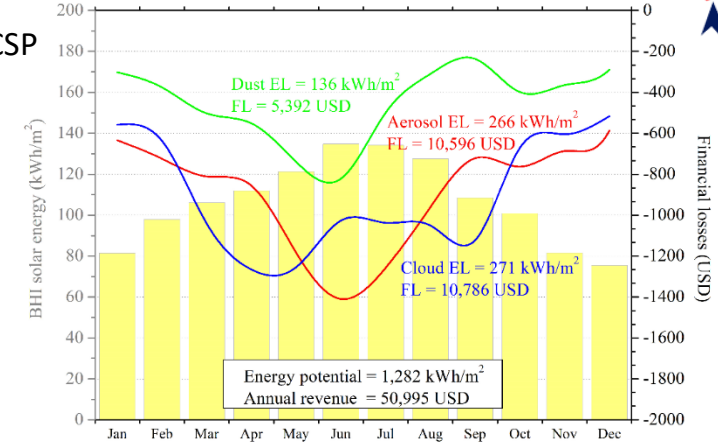
Kosmopoulos et al. 2019 @
Remote Sensing

Solar energy applications in India

PV



CSP



Dumka et al. 2021 @ MDPI Remote Sensing – Under Preparation

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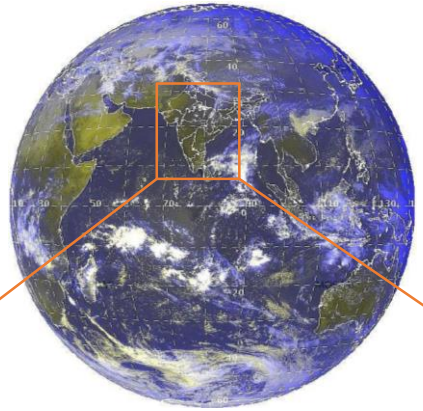
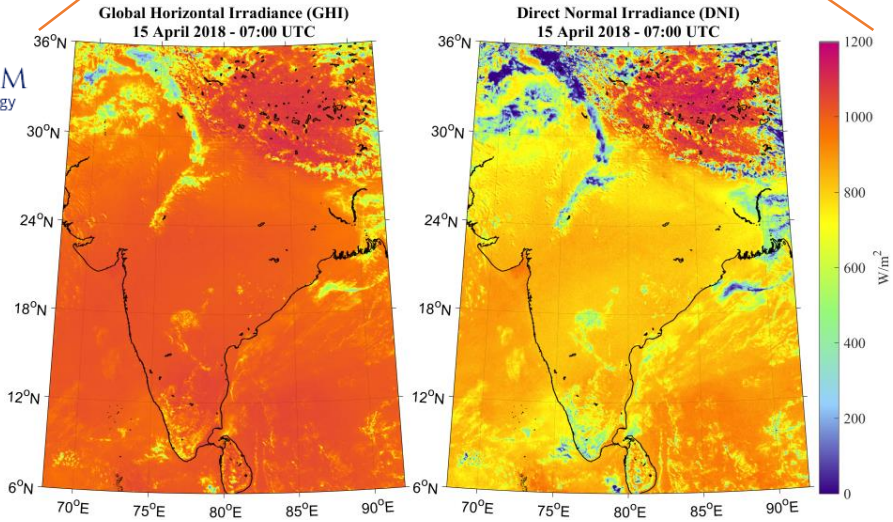
Aryabhatta Research Institute of Observational Sciences

CONTINUUM
Continuum Green Energy



INSAT3D

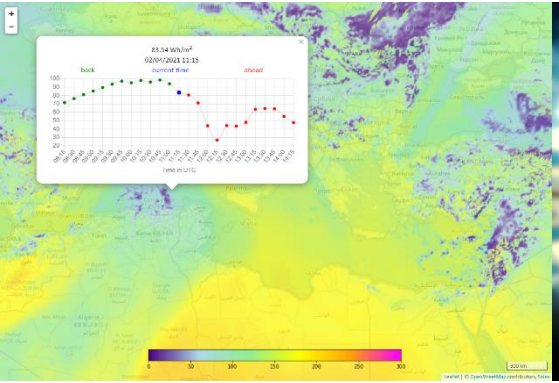


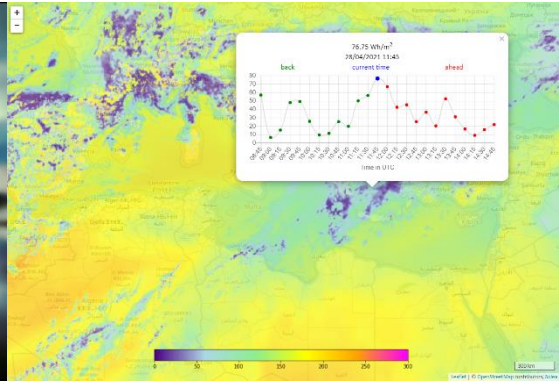
Akriti et al. 2020 @ MDPI Remote Sensing

The way forward to address solar energy needs

The nextSENSE is able to provide:

- Access to solar nowcasting and forecasting for smart energy management and grid stability.
- Adaptability to different regions, climatological & operating conditions and EO data sources.
- Real-time solutions for decision makers & producers promoting the exploitation of solar energy.





Email: pkosmo@noa.gr Twitter: https://twitter.com/SolarSolea