

# EUROGEOSS WORKSHOP 2019



#EGW2019

3-5 JULY 2019, LISBON



# Panagiotis Kosmopoulos

InDust Cost Action – Impacts on Solar Energy



**inDust**



# The inDust Cost action

International Network to Encourage the Use of Monitoring and Forecasting Dust Products

Organic Carbon + Elemental carbon

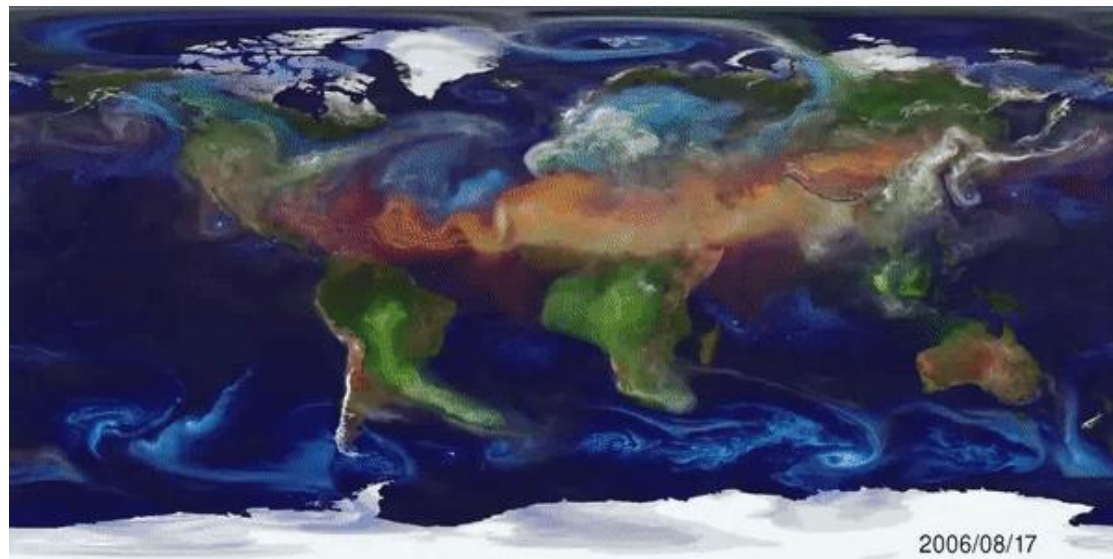
Dust

Sulfate

Sea salt

Our goal

dust user-oriented  
services



# The inDust Cost action

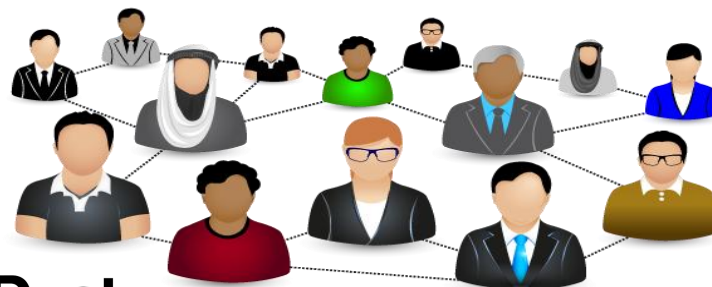
## Who

### Researchers on:

- Satellite products
- Ground observations
- Dust forecasting models
- Climate
- Socio-economic impacts

### Users:

- Solar energy
- Aviation
- Air Quality
- Health
- International bodies (WMO, UNCCD, ...)



# The problem: Dust effect on solar radiation

- Attenuation of solar radiation reaching the PVs or CSP mirrors
- Horizontal attenuation (mirrors to central point)

PV

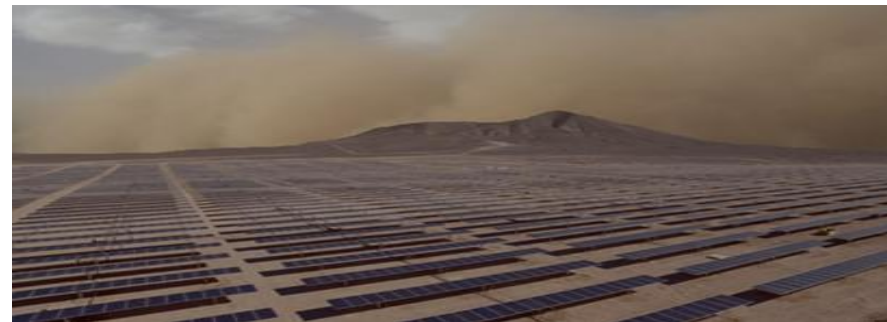


CSP



# The problem: Dust effect on solar radiation

- Soiling → panels efficiency and water management



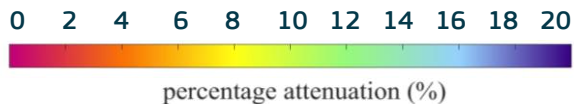
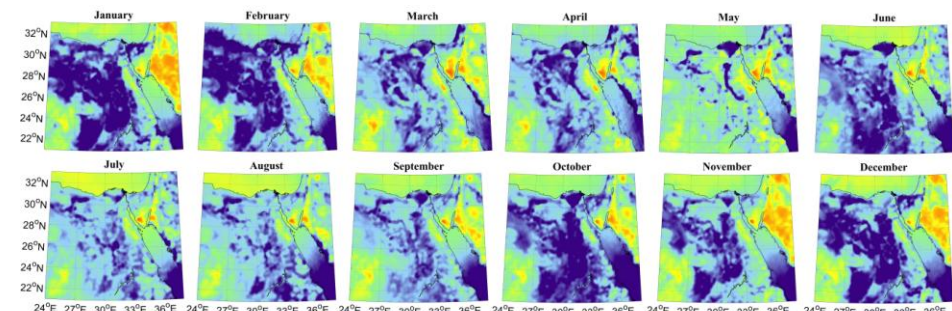
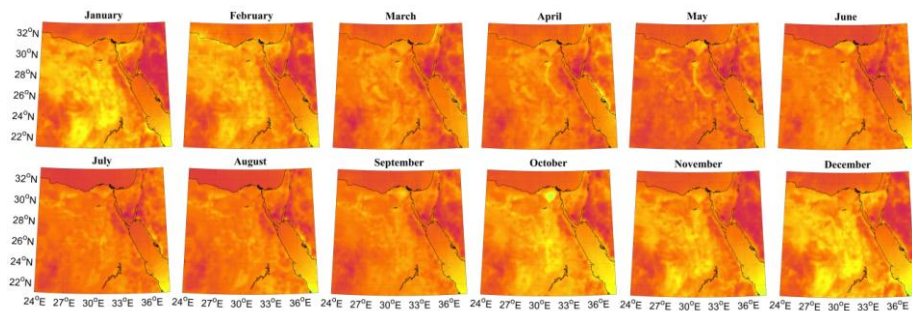
# Dust effect on PV and CSP input



$AOD = 0.034 - 0.966$

GHI attenuation = 0.7 – 12.9 %

DNI attenuation = 2.9 – 41.0 %

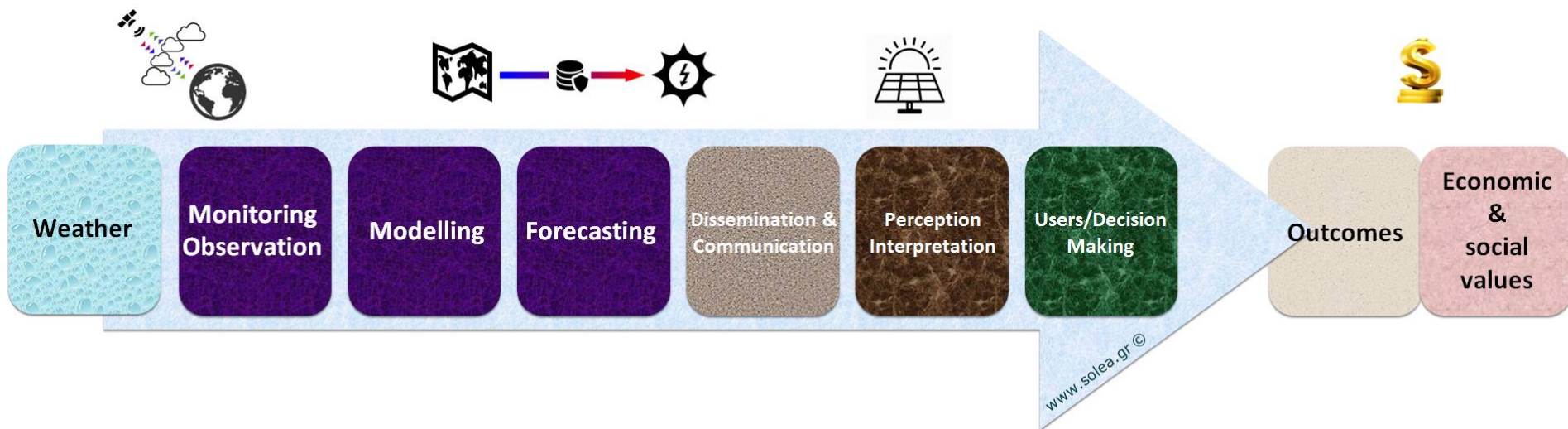


Monthly averages of solar energy percentage attenuation relative to the aerosol-free simulations under MODIS-based AODs.

Kosmopoulos et al. 2018 @ Remote Sensing ©



# Addressing the problem





# Addressing the problem

Use dust forecasting services

Log in

**NORTHERN AFRICA-MIDDLE EAST-EUROPE (NA-ME-E) REGIONAL CENTER**  
WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)

World Meteorological Organization  
BSC Barcelona Supercomputing Center  
Aemet Agencia Estatal de Meteorología

WMO SDS WAS || Asia Regional Center || America Regional Center

**HOME ABOUT US FORECAST & PRODUCTS PROJECTS & RESEARCH MATERIALS NEWS EVENTS CONTACT US**

You are here: Home

## Northern Africa-Middle East-Europe (NA-ME-E) Regional Center

by Francesco Benincasa — last modified May 29, 2012 03:33 PM

### Outstanding

- The InDust COST Action website has been launched
- RGB dust product from Himawari-8 and GOES-16
- Training Workshop on Sand and Dust Storms in the Arab Region
- The 9th International Workshop on Sand / Dust storm and Associated Dustfall. Call for Abstracts
- InDust

### Subscribe to the Public Newsletter!

To be informed about our activities, news and events related to dust. Frequency is almost monthly.

Full Name

Your email

**Subscribe**

### Portal manual

Please find a brief manual [here](#).

### Dust forecasts

WMO SDS-WAS N.Africa-Middle East-Europe RC  
MEDIAN Dust Surface Concentration (µg/m<sup>3</sup>)

Dakar (Senegal) - April 2018



<http://sds-was.aemet.es/>

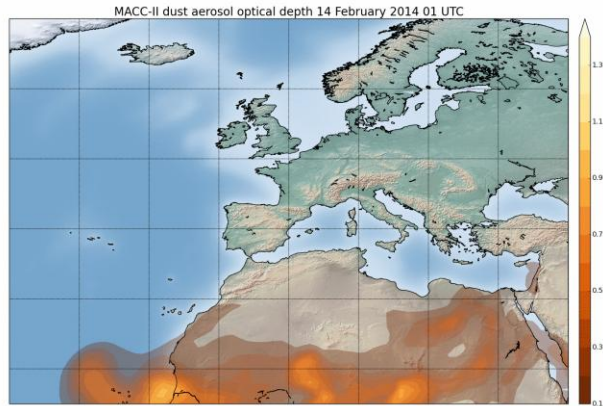
**InDust**

**#EGW2019**

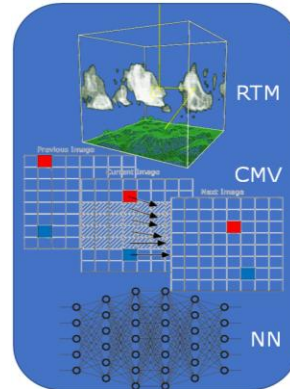
# Addressing the problem

Calculate attenuation / optimum and existing infrastructures ... Inclination

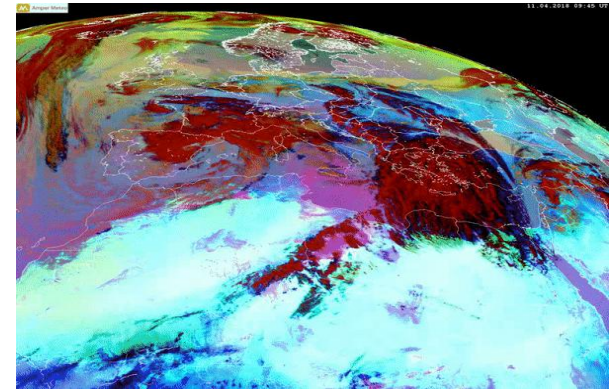
CAMS



Geo-Cradle SENSE



MSG



Translate solar radiation parameters to solar energy and economic effects



# End user involvement: the Aswan heart hospital

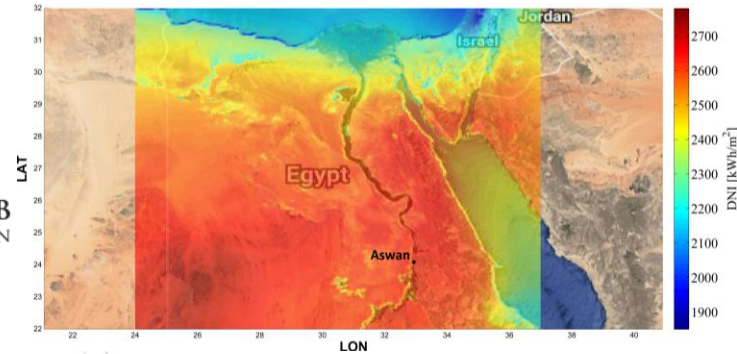


Area = 1260000 m2 (300 Feddan)

CORNERS	NORTH	EAST
1	9.34° 08' 35.50"	32° 49' 22.84"
2	9.34° 08' 32.21"	32° 49' 08.50"
3	9.34° 07' 58.00"	32° 48' 36.50"
4	9.34° 07' 58.00"	32° 48' 36.50"



EUMETSAT CM-SAF

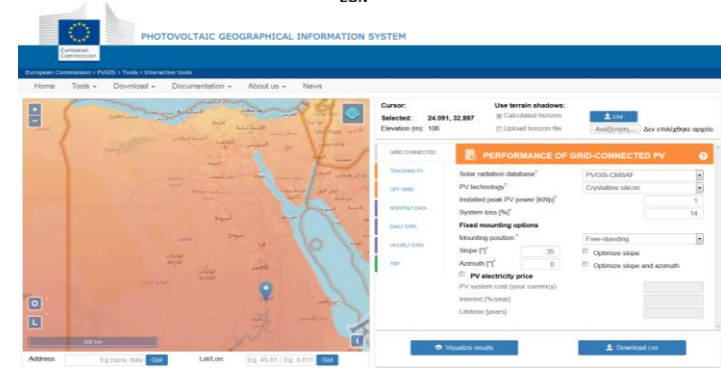


Development of business plan for establishment, operation and exploitation of a solar farm in Aswan.

<http://solea.gr/wp-content/uploads/2018/03/Aswan-Solar-Plant-Business-Plan.pdf>



GEOS funded project

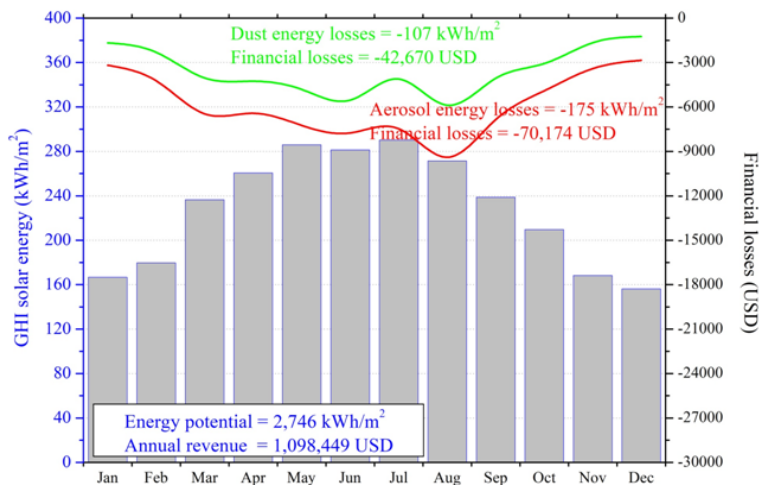


PVGIS

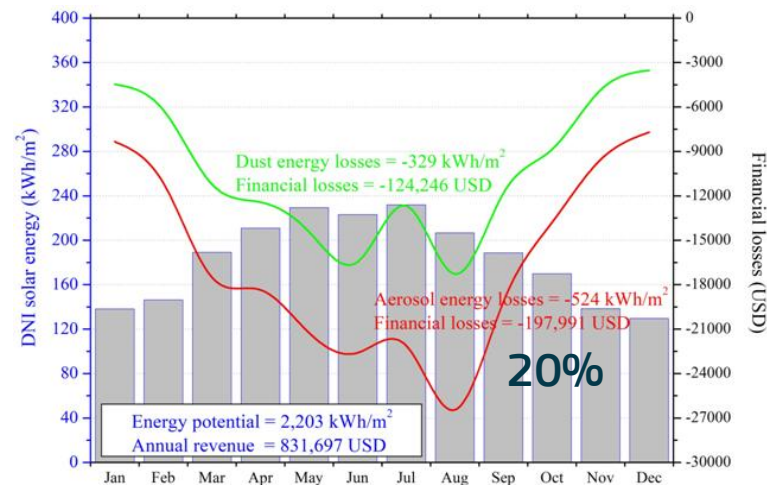


# Economic management plans

## Photovoltaic (PV) installations



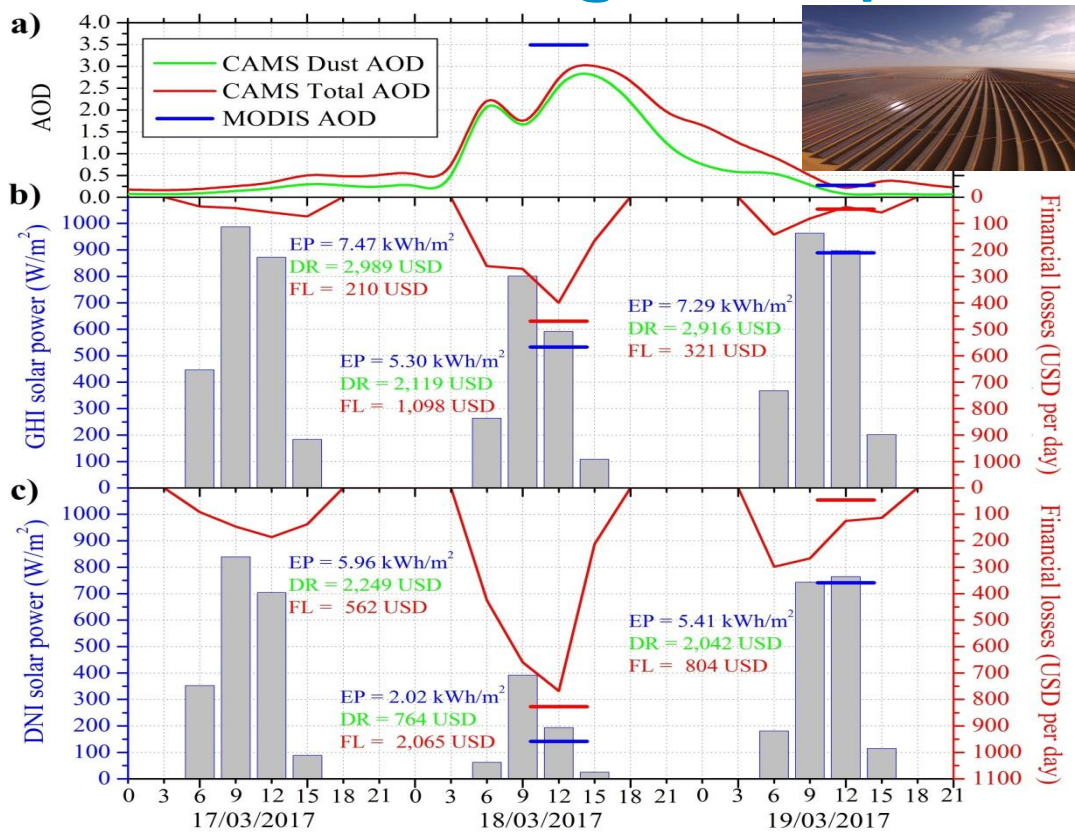
## Concentrated Solar Power (CSP) plants



Simulated scenario: 10 MW (produces annually almost 25,687 kWh or 976,000 USD)



# Economic management plans



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

The blue insets show the solar power (and FL in red), using as input the MODIS observations.

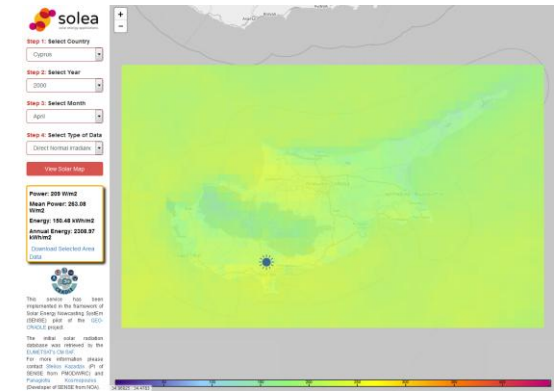
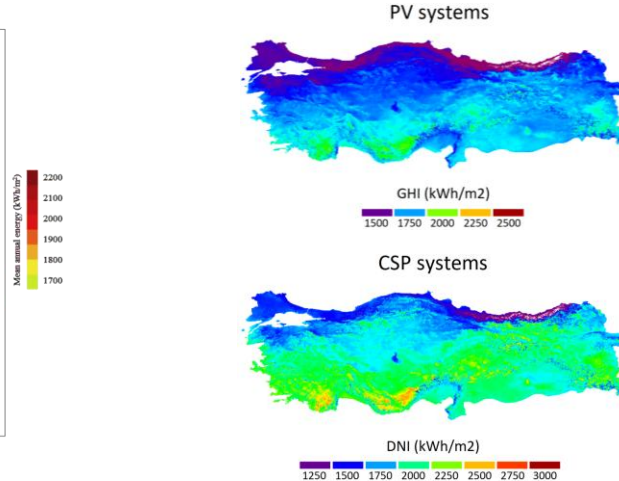
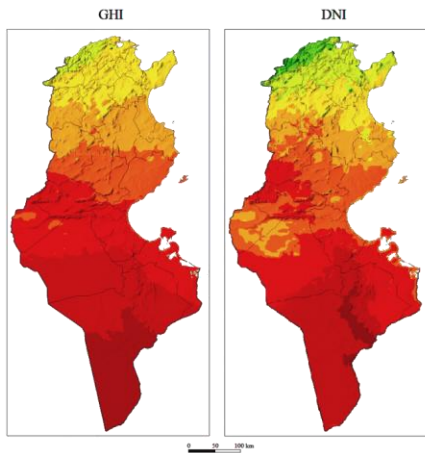
Kosmopoulos et al. 2018 @ Remote Sensing ©



#EGW2019

# Upscaling opportunities

Such energy data and techniques can be used at any area covered by EO. For that purpose 8 national bodies (institutes, TSOs, DSOs, ministries) from Egypt (MERE, CEDARE), Turkey (TUBITAK UZAY), Greece (PPCR, IPTO), Cyprus (CUT), Morocco (CRTS) and Tunisia (CERT) have declared their interest in the participation of the further development and use of the described dust and solar energy solutions.



Towards this direction, the inDust will contribute to the scientific and energy market knowledge by providing an holistic approach on desert dust and solar energy management and planning.



# Contribution to EuroGEOSS vision

- Response to solar energy demand in high solar potential areas where dust plays the most important role as attenuator
- Use of CAMS, EO
- Direct user uptake and use
- Possibilities for using this platform for other areas in N. Africa
- InDust searches to build a community of researches and users that can start designing the strategy to develop dust services



Thanks for your attention!

**inDust**

*COST Action CA16202*

[www.cost-indust.eu](http://www.cost-indust.eu)



*Panagiotis Kosmopoulos*  
Contact info: [pkosmo@meteo.noa.gr](mailto:pkosmo@meteo.noa.gr)

**#EGW2019**