Solar Radiation users feedback and further requirements for all MACC

MACC-III/Copernicus Atmosphere Services User Workshop
Rome, Italy

Claire Thomas, Transvalor
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TRANSfer and VALORization

- 50 people
- SME created in 1984
- 5 M€ Turn-over
- 2 departments:
TRANSfer and VALORization

1. “FORGE”
   45 people
   350 installed sites
   CEMEF
TRANSfer and VALORization

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   45 people
   350 installed sites
   CEMEF

2. “INNOVATIONS”
Transvalor Innovations

Aeromines: Aerodynamic, Aerothermal, Aerelasticity
Supercomputing on Demand for challenging Simulations

- CEMEF

fluid structure high performance cloud computing software
Transvalor Innovations

- Library MORPH-M of the Center for Mathematical Morphology for 2 and 3D segmentations
Transvalor Innovations

- Valorization of the MINES ParisTech lab OIE in the domain of solar energy since Apr. 2009
The “Human faces” of SoDa at Transvalor

The SoDa team
Working with O.I.E.
Sophia Antipolis, France

Etienne WEY
General Manager

Laurent SABORET
SoDa IT Support

Claire THOMAS
SoDa Support
The “Human faces” of SoDa at MINES ParisTech

Observations Impacts Energies (O.I.E.)
Sophia Antipolis
Director: Thierry Ranchin

“Evaluation of resources”
Resp. of activity: Philippe Blanc

Philippe BLANC

Thierry RANCHIN

Lucien WALD
Lionel MENARD
William WANDJI NYAMSI
Youva AOUN
Yehia EISSA

... and many others
What is **SoDa**

- A project *(2003)*
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- A project (**2003**)
- A website:
  - Old-MINES ParisTech: [www.soda-is.com](http://www.soda-is.com)
  - Old-Transvalor (backup server): [pro.soda-is.com](http://pro.soda-is.com)
  - New-MINES ParisTech: [www.soda-pro.com](http://www.soda-pro.com)
Duplicated chains of acquisition for a better reliability of the SoDa Service
What is 

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• More than 80 companies have trusted at least once
• More than 70 testimonies
The SoDa Service is a broker to a list of services and web services related to Solar Radiation provided by several providers in Europe and abroad.

The sign means that the page is currently under development:

**FIRST VISIT**
Dear visitor, welcome to this website related to solar radiation. Thanks also for your patience!
SoDa, this is more than:
Current annual subscriptions

42 annual subscriptions (Apr. 2015)

United Kingdom
OST
POVRY
SCIEMUS

Scotland
SGURRENERGY

Belgium
GDF SUEZ
INNOGREEN
MIND4ENERGY
NIZET

France
CEA-INES
EDFEN
EDFRD
EFFICIENCIA
FOLERES
ENITE
HELEXIA
IGEO
IRISOLARIS
KILOWATTSOL
LUXEL
PROSOLMED
QOSENERGY
RTONE
S4E
SOLAISS
SOLIGEST
URBASOLAR

Portugal
MARTIFER Solar

South Africa
Stellenbosch University

Brazil
FOTOVOLTEC

Norway
STATKRAFT

Germany
ENCOME
ENERCAST
ENERGY & METEO
ENERPARC
EON
IWES-Fraunhofer
LEONIDAS
SOLARENGINEERING
SOLPIG

Switzerland
METEOTEST

Italy
CANTIERI
FLYBY
Profiles of the SoDa Users

- Larges companies (EDF EN, RES-MED, ENERCAST, OST…)
- SMEs (FLYBY, VOLTALIA, FOTOVOLTEC…)
- Research centers and universities

- Countries of users: worldwide, mainly Europe, but also Morocco, Brazil, South Africa…
- Domains: solar energy, and to a less extent daylighting, hot water, material aging…

- SoDa indirectly reaches even more users thanks to large companies => value added services based on SoDa data
Interconnections: or how to reach end-users
How to reach end-users

European Union /
How to reach end-users

European Union /
How to reach end-users

European Union /

- TRANSVALOR
- MINES ParisTech
- DLR
- EUMETSAT
- ECMWF
- SoDa
- enercast
- R-TONE
How to reach end-users

European Union / Copernicus

MINES ParisTech
DLR
EUMETSAT
ECMWF

TRANSVALOR
SODA
enercast
R-TONE

Many other Users
What are these two services in solar energy

- **McClear service** => radiation components under clear sky conditions
  *Worldwide, from 1 min to 1 month, from Jan. 2004 to d-2*

- **MACC-RAD service** => radiation components for the actual weather conditions.
  *Meteosat coverage, from 1 min to 1 month, from Feb. 2004 to d-2*
McClear

$P_{\text{clear}}$: clear atmosphere variables from MACC analyses (ECMWF)
- Every 4 h, 80 km for ozone and water vapor contents
- Every 3 h, 120 km for aerosols

Ground elevation

$G_{\text{clear}}$
Heliosat-4 (MACC-RAD)

$P_{\text{clear}}$ : clear atmosphere variables from MACC analyses (ECMWF)
- Every 4 h, 80 km for **ozone** and **water vapor** contents
- Every 3 h, 120 km for **aerosols**

$P_{\text{cloud}}$ : **cloud properties**
- From APOLLO method (DLR)
- Every 15 min, 5 km

**APOLLO cloud properties**

**Ground elevation**

**Ground reflectance (MODIS-derived)**
Access to McClear (= MACC-RAD)

- Click on the image
- Type an address
- Or enter the values manually to set the geographical coordinates

http://www.soda-pro.com/web-services/radiation/mcclear
http://www.soda-pro.com/web-services/radiation/macc-rad
Inputs and output format

- First and last dates
- Time step
- The time reference
- The output format
- Click right on the output file
HelioClim-3 version 5: a value-added service based on McClear

- Both services (even if still pre-op) are very promising and delivers high quality results.

- As McClear is pretty stable for more than two years now, Transvalor decided to propose a value added service which combines the cloud index together with the McClear service => HelioClim-3v5, which gives better statistical results than the previous version.

=> “controlled risk”
Advantages, for MACC

• Transvalor invested money, time and energy in this resource => quicker access to McClear time series.
• Moreover, the operational use of McClear enabled the correction of bugs, leading to improvements of the base
• Reliable services (backup server)

• Another advantage is that we are now able to give a feedback to MACC from all our Users
Advantages for the SoDa Users

• Same standardized output => immediate adoption by users

• They can now benefit from this outcome of research within their same commercial conditions => No additional fee

• Many different value-added services are thus also immediately available for this v5 version.

So this is a win-win situation!
McClear access statistics

Number of requests to McClear first trimester 2015

- From companies: 431
- Researchers / Academics: 157
- Policy agencies: 90
- Unknown type: 431
MACC-RAD access statistics

Number of requests to MACC-RAD first trimester 2015

- From companies: 237
- Researchers / Academics: 168
- Unknown type: 71
- Policy agencies: 4
HelioClim-3 version 5 access statistics

Number of requests to HC3v5 first trimester 2015

- From companies: 11608
- Researchers / Academics: 322
- Policy agencies: Unknown type
Strategy for collecting feedbacks with McClear and MACC-RAD

• The data policy is that the services are available for free, with mandatory registration.

• Last June, a survey has been launched to gather the testimonies from the ~100 registered users for the MACC services => 3 emails have been sent to each user to finally receive ~50 feedbacks!

• => time consuming and… very boring task
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• Our proposal: manual registration against a pre-testimony, with the commitment to send an update later on => 100% answers
I have a surprise for you

- To fulfill the requirements of many users, we have developed the following precursor:
AOD at d-2.
Soon, O3 and WV

http://www.soda-pro.com/web-services/atmosphere/macc-aod
Mr. Christophe Vernay, technical director at SOLAIS, France

“As PV engineering office, we’ve been mandated by a customer to assess the effect of anthropogenic activity on the solar resource, for a site located in Asia, close to an industrial area. For that purpose, we have started working on clear-sky irradiance, using McClear service (also provided by SoDa) and have drawn first conclusions regarding the last 10 years during which clear-sky GHI decreased. Today, we need to go deeper in the analysis and better understand the root causes for such a decrease. This newly service, providing AOD details (black carbon, dust, sea salt, etc.) for any location in the Earth fully answers this need.

Thank you again for bringing such a scientific information to the PV actors.

30 Apr. 2015”
Other users of the SoDa MACC-AOD interface

- Mr. Pierre Ineichen, famous for his comparative survey of different solar radiation resources, is also testing the service.

- Mr. Marco Morelli, FLYBY, has been asking for this service for more than 2 years now, to refine his service on UV.
Conclusion

• So far, we proved that the two MACC services (McClea
  and MACC-RAD) for solar energy have a large audience
  by being available on SoDa
• This is also potentially the case for other data generated
  in MACC, and then in CAMS!

• Even if these services are still pre-op, the Users are very
  satisfied with these high quality data, and are also asking
  for more, and in particular:
Other users’ requirements

- Standardized access to high quality radiation forecasts (short and long term)
- To temperature: archive and forecasts
- To typical meteorological years of all meteorological parameters, with also an automatic access to the data
- To UV data

- They also prefer to discuss by personal email or by phone to give their feedbacks and ask their questions, instead of cold and impersonal computer interfaces and forms.
Thank you!
END
A normal question would now be:

*Why no operational / commercial solution is proposed based on MACC-RAD?*

⇒ McClear handles relatively low temporal (every 3 h) and coarse input resources, which can be stored on quick disk, but APOLLO (cloud info) gives one value every 15 min and every 5 km which is thus too large to be on quick disk => **time out reached for a 10 year MACC-RAD request.**
Another reason is that MACC-RAD is

⇒ … still a pre-op service as well, but it will probably have changes in the near future, with no prior warning!

- March 2013: first tests only on 2013
- Nov. 2014: extension of the service until 2004

⇒ Not enough experience on the service to provide a commercial service based on MACC-RAD.
However, in Jan. 2016 we plan

- To develop a service based on MACC-RAD
- As it won’t be based anymore on the cloud index, this will correspond to a new branch for developments => **HelioClim-4**

- Characteristics of this service:
  - Standardized outputs (other radiation components available)
  - Automatic access via wget
  - Quicker (optimization of the process and investments in large servers)
  - Data in real time instead of d-2
Analyse de délivérable avril 2015

• donner les raisons pour lesquelles des compagnies utilisent des services pré-op): for free, worldwide, easy to access… comparer avec HC-3
• Cause H2O (WV) on peut pas faire de temps réel.
Transvalor Innovations

- Software for complex materials modelling from the Material center
Transvalor Innovations

- Chemical reactions and reactive transport software
  CHESS (CHemical Equilibrium of Species and Surfaces)
Transvalor Innovations

- Investments in technological companies