

MESOR TRAINING SEMINAR

PART 7:

Outlook and Discussion

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What we've discussed today ...

- Review of user needs
- Overview on data sets
- We have now a common benchmarking procedure
- We see differences among the datasets, but in a repeatable and comparable manner
- We have a new portal with access to an increasing number of services

What can be expected in the next 1-3 years?

- How can we explain differences in datasets?
- What are current research topics?
- Which services are prioritized?

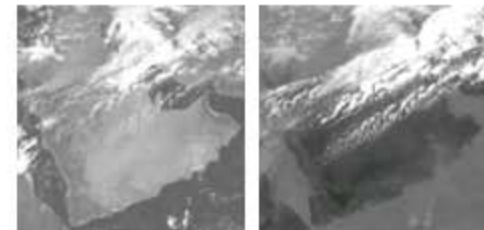
WP 3 Roadmap for future research and development of solar resource knowledge

- D 1.3.1 Roadmap report on “Future research objectives and priorities in the field of solar resources”
- D 1.3.2 Roadmap for new solar radiation services to faster deploy the market for solar energy applications and optimize grid integration
- D 1.3.3 Roadmap report on “Recommendations of an Improved Earth Observation System to better support solar energy”

Research Area 1 - Long-term Satellite Databases

- Height-dependence, 3d effects from terrain, parallax view
- Radiative transfer methods (e.g. HELIOSAT-4) provide direct/diffuse separation and spectral information
- Fluctuations within hourly data, 10 min, 1 min data
- Cloud detection over deserts using IR satellite channels

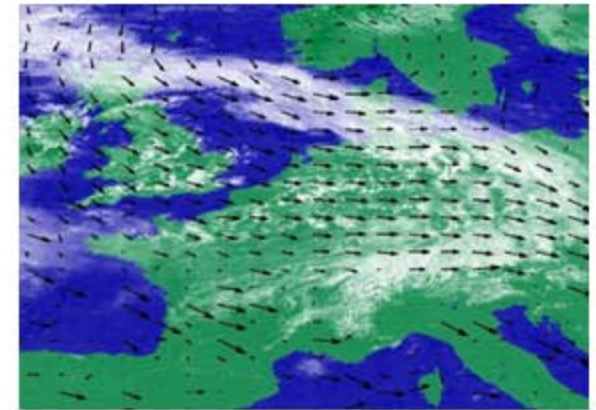
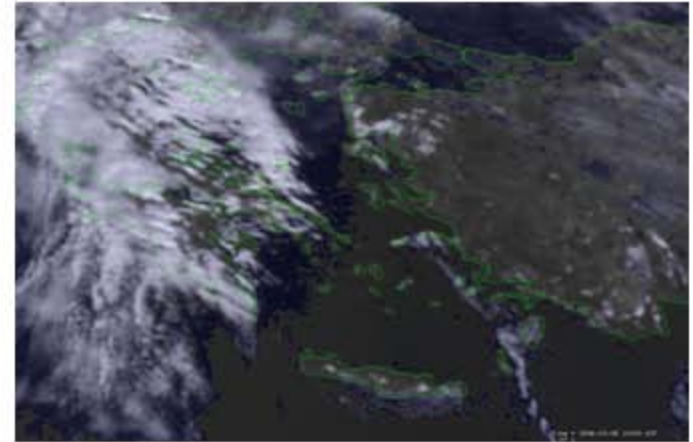
VIS-
channel
(0.5 –
0.9 μm)



IR-
channel
(10.5 –
12.5 μm)

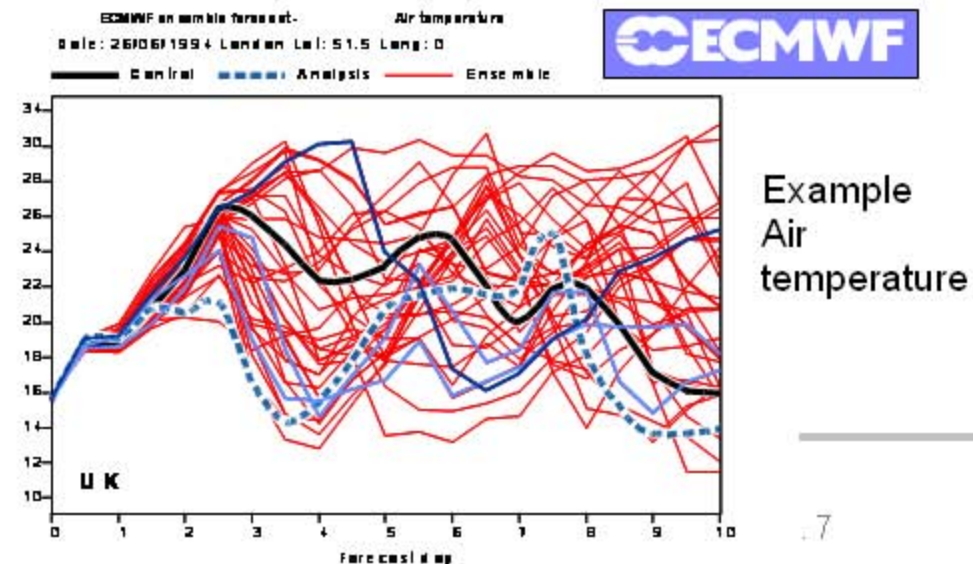
Research Area 2 - Near-Real-Time Information

- Snow and cloud discrimination using satellite retrievals (IR)
- Now-casting based on VIS/IR cloud detection
- Now-casting based on atmospheric motion vectors
- Aerosol nowcasting based on satellite/model
- Improved temporal resolution, rapid scanning mode, data fusion



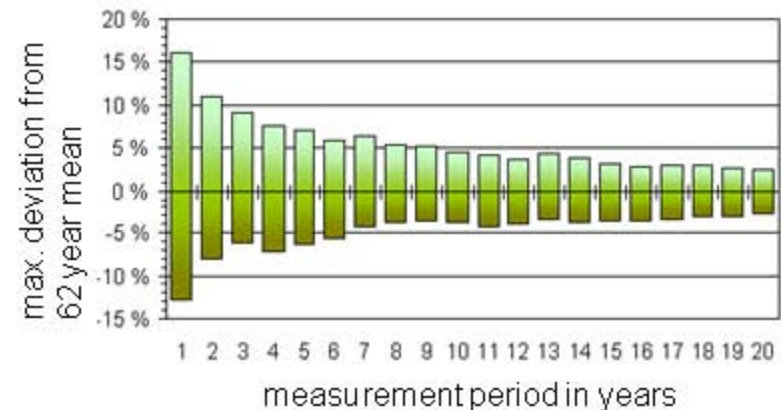
Research Area 3 - Forecasting Services

- Day-ahead and intra-day global irradiation forecast
- Day-ahead and intra-day direct irradiation forecast
- Combination of numerical weather prediction, ensemble prediction, chemical weather prediction
- Statistical post-processing like model output statistics
- 1 km and <1hour
- Intra-day timelines



Research Area 4 - Seasonal to Inter-annual Variability of Solar Radiation

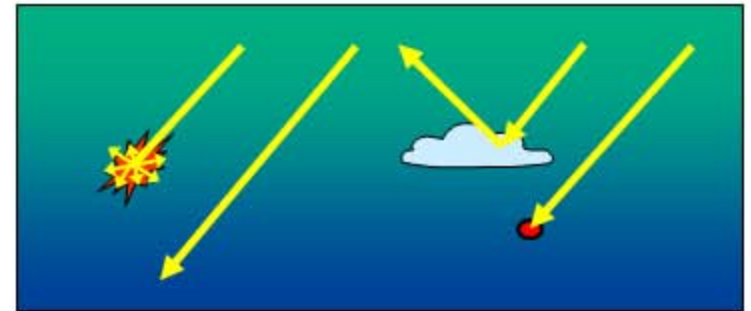
- Assessment of inter-annual long-term variability based on NASA SSE and SOLEMI
- Collaboration with the climate community has to be established furthermore
- Climate model is a scenario, but no prediction



meteorological station at Potsdam,
1937- 1999 (source: Quaschnig, 2001)

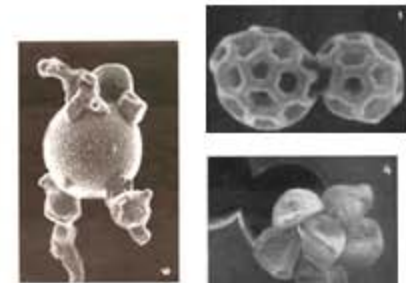
Research Area 5 - Atmospheric Parameters for Radiation Retrieval

- Better knowledge on aerosols (regional, temporal, chemical, spectral information,...)
- Chemical transport modelling instead of monthly climatologies
- Aerosol input dataset in hourly resolution
- Assessment of dust emission databases
- Validation through irradiance measurements



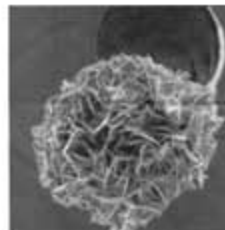
source: Univ. Oldenburg

biogenic particles



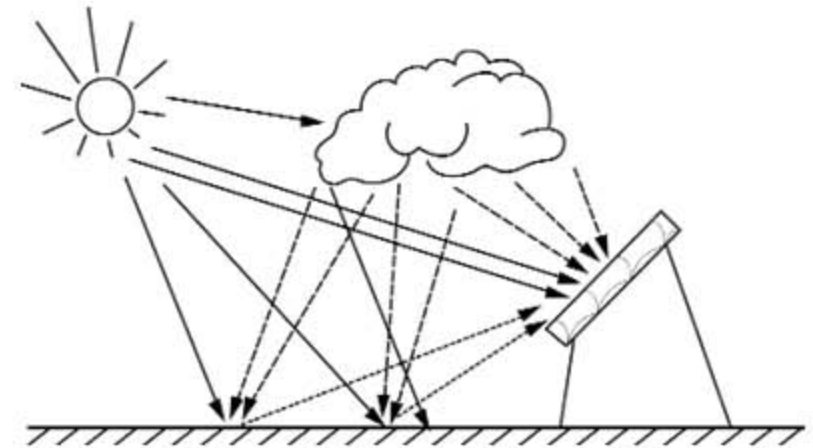
soot

desert dust

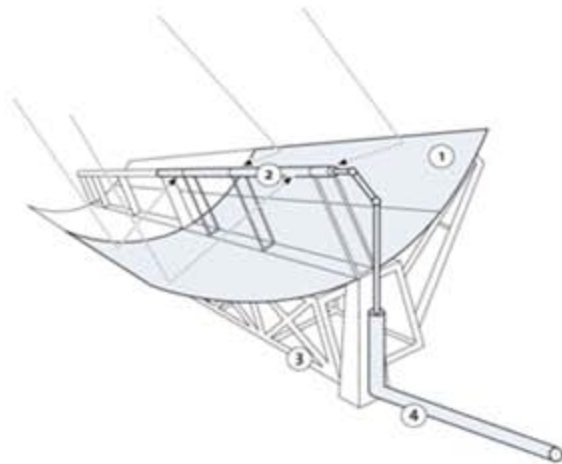


Research Area 6 - Auxiliary Information

- Ground albedo
- Snow cover
- Wind gusts



source: P. Ineichen



source: Solar Millennium AG



source: G. Wirth

Research Area 7 - Interaction with other Renewables

- Fluctuations in space and time
- Several renewables (wind, solar,...)

Service Area 1 - Astronomy – Unit conversion – Typical clear-sky values

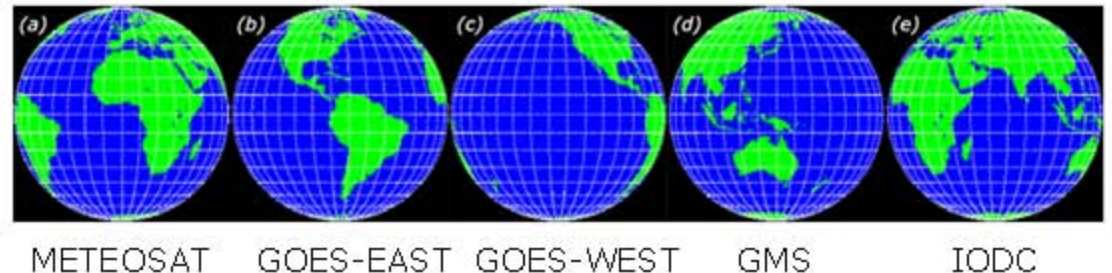
- SoDa services will be transferred to the new SoDa portal based on MESOR technology
- Position of sun in the sky, time lengths dependent on local topography, distance between sun and earth, extra-terrestrial radiation
- Unit conversion
- Typical clear sky values (aerosols...)

Service Area 2 - Ground-Based Measurements

- Standardised quality control procedures available online as a service
- Near real time quality control service
- Satellite-derived irradiances used as additional information in quality control

Service Area 3 - Long-Term Irradiance Databases

- Extend temporal and spatial coverage, non-European data



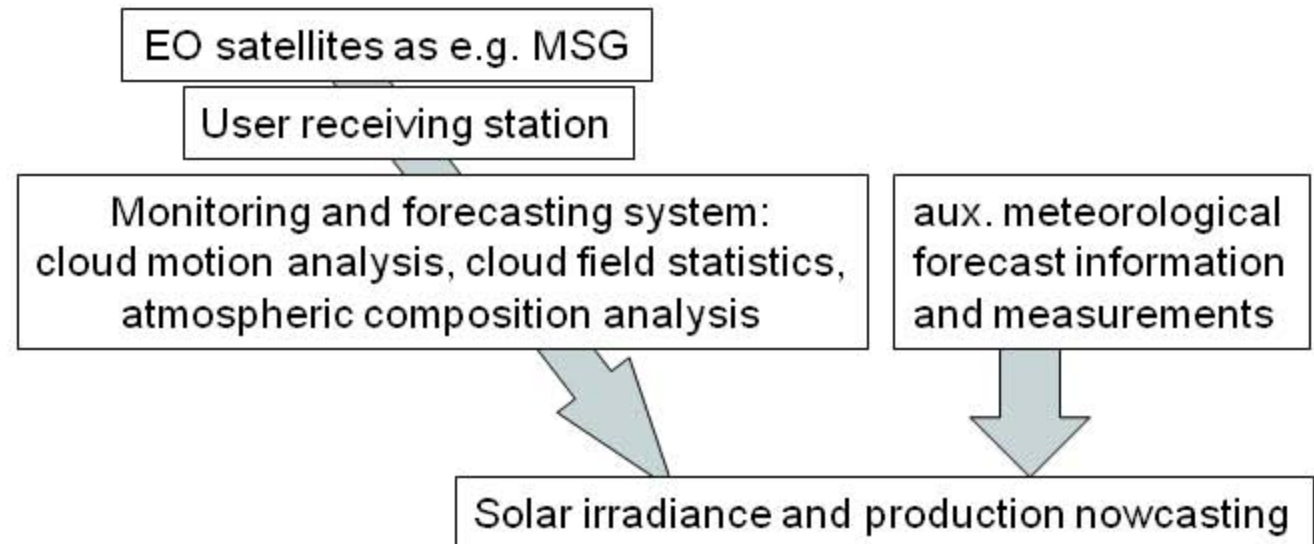
- Provide clear sky parameters used for comparison of different irradiance datasets
- Provide time series in high temporal resolution (<1 hour, use rapid scanning capabilities)
- Standardized benchmarking visualization

Service Area 3 - Long-Term Irradiance Databases

- Standardized best-of algorithm development
- Effort on software description/user guides
- Temperature, wind speed, gust speed, snow cover
- Direct and spectral irradiances
- Statistical combination of short-term measurements with long-term time series, bias correction schemes

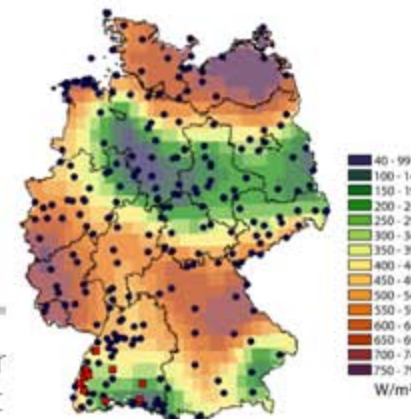
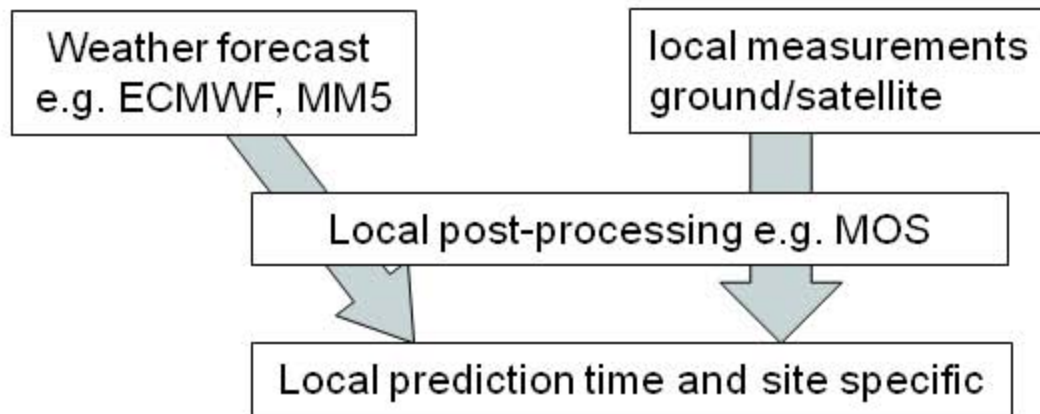
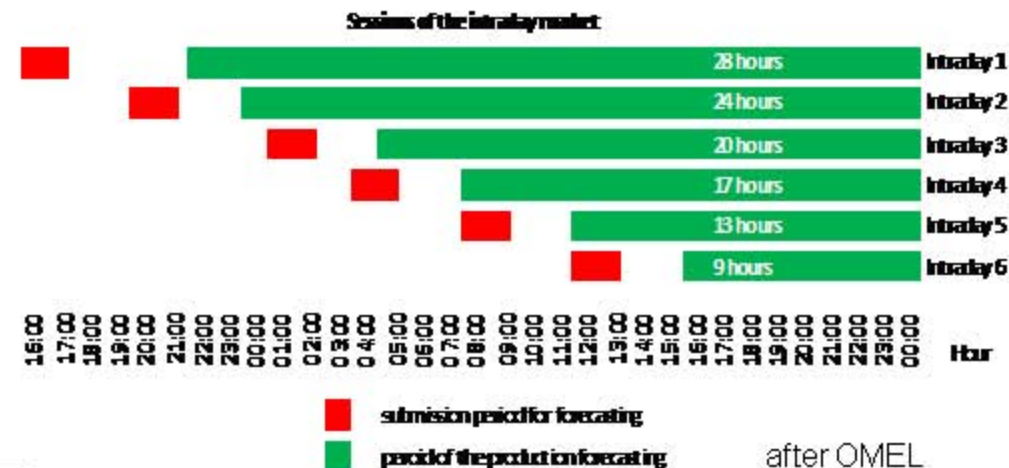
Service Area 4 - Near-Real-Time Irradiance Information

- Combined on-site and satellite measurements
- local aerosol sources (industries, construction works...)
- Cloud motion vector technique is operational
- Nowcasting of surface irradiances for building control



Service Area 5 - Forecasting Irradiances

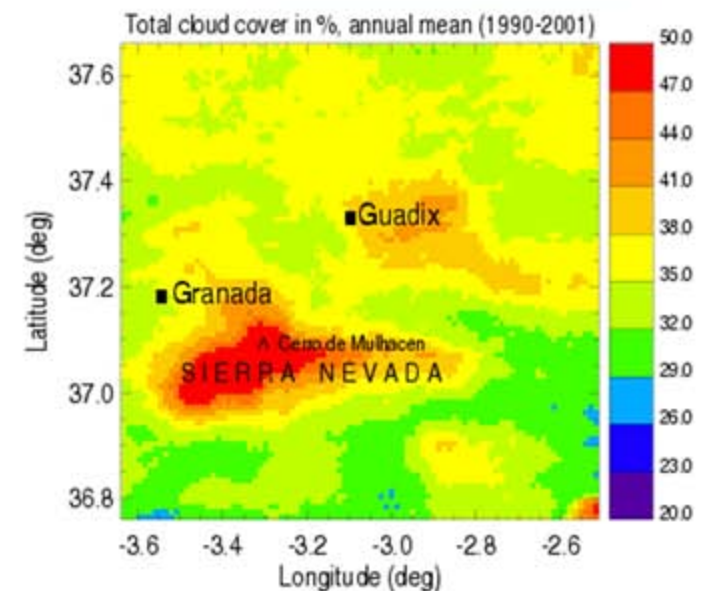
- Day-ahead forecasts based on numerical weather prediction and MOS
- Intra-day forecasts according to market timelines
- Irradiance, temperature, wind speed, wind gusts



ECMWF +
 Meteocontrol MOS,
 DWD and
 meteomedia ground
 measurements
 9.7.07, 11:00

Service Area 6 - Atmospheric Input Parameters for Radiation Retrieval

- Include existing aerosol modelling capabilities into irradiance modelling
- Couple with sandstorm monitoring schemes
- Couple with wild fire monitoring in certain regions
- Evaluate long-term cloud retrieval databases



Service Area 7 - Auxiliary Information

- Elevation models to be made available
- Horizon line mapping
- Temperature, wind speed, wind gust
- Long-wave incoming radiation for building control
- Snow cover monitoring is existing, make it available