EO-based solar energy applications into a wider GEOSS driven system through the GEO-CRADLE project in the international scale

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In the framework of the GEO-CRADLE project (http://geocradle.eu/en/), we introduced a novel Solar Energy Now-casting System (SENSE; http://solea.gr/), in order to coordinate, improve and support the regional Earth Observation (EO) infrastructures and capabilities, in Europe, North Africa and Middle East, related to "access to energy". The niche for this feasibility study is the operational, satellite-driven and real-time system for solar energy applications. SENSE is based on the synergy of Radiative Transfer Model (RTM) simulations, speed-up technologies (neural networks and multi-regression functions) and real-time atmospheric inputs from the Spinning Enhanced Visible and InfRared Imager onboard the Meteosat Second Generation satellite (MSG/SEVIRI) and the Copernicus Atmosphere Monitoring Service (CAMS). As a result, solar energy products and services were operationally produced in high spectral, spatial and temporal resolutions (1 nm, 0.05 x 0.05 degrees, 15 min). The reliability of SENSE's outputs was tested against ground-based measurements from the Baseline Surface Radiation Network (BSRN), the Global Atmospheric Watch (GAW) and the AERONET, and revealed that its precision depends on its speed, on the time horizon that is applied, and on the quality and resolution of the atmospheric input parameters. The application fields of SENSE include the production planning support on large scale solar farm projects (photovoltaics and concentrated solar power plants) and the efficient control of the electricity balancing and distribution (in support to the TSOs and DSOs), by incorporating the produced energy of the solar farms into the electricity grid. At the same time, the surface solar radiation (SSR) in different spectral regions highlight spectrally-weighted outputs like the UV-index, the Vitamin D efficiency and a number of agriculture and oceanographical related processes. To this direction, through the GEO-CRADLE's networking platform, SENSE succeeded in stimulating the interest of relevant energy stakeholders, decision makers and solar energy investors from the public and private sector like the Egyptian Ministry of Electricity and Renewable Energy, the Greek Power Transmission and Distribution System Operator, the Attica Group and various scientific communities (research institutes, universities, health sector). As a result, SENSE intended to be a starting point for energy related investments towards and beyond the implementation of GEO, GEOSS and Copernicus Energy activities and visioning innovative high-end applications and technologies.