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EDITORIAL

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In September 2015, the United Nations adopted the 2030 Agenda for Sustainable Development and agreed on a set of 17 Goals. Each Goal has several defined Targets to be reached by 2030; in total, 169 targets underpin the 17 Goals. Within each target, a set of indicators to assess baseline status and time progresses have also been determined, for a total of 200 indicators (United Nations, 2015).

Earth observation (EO) technology is of particularly important relevance for the generation of spatial information, which can be used to both determine indicator baselines, and tracking progress towards meeting the targets, thereby contributing to inform sustainable development planning and decision-making (Mulligan et al., 2020).

Some of the most relevant areas of contribution of EO technologies are highlighted below, with references to some of the recent papers that we have published in the *European Journal of Remote Sensing*.

Goal 6 is related to ensuring the availability and sustainable management of water and sanitation for all. Since this goal includes targets related to the improvement of water quality (6.3) and the restoration of water-related ecosystems (6.6), EO can be directly used to assess several different indicators, such as 6.3.2 for monitoring water quality (Bresciani et al., 2019) or 6.6.1 for quantifying the extent of water-related ecosystems over time (Kaplan & Avdan, 2017).

Goal 7 aims to ensure access to affordable, reliable, sustainable and modern energy for all. Monitoring the availability of renewable energy sources is essential (target 7.2) and EO can be a valid source of data for quantifying biomass sources, for example (Valbuena et al., 2019).

Goal 8 promotes sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. EO contributes substantially to the space economy, which is globally approaching a value of approximately 1 trillion dollars, thereby contributing to sustainable economic growth, as directly measurable by changes in GDP.

GOAL 9 is related to building resilient infrastructures, promoting inclusive and sustainable industrialization and fostering innovation. Once again, EO tools can be used to assess in a precise and affordable way transport infrastructures (Zhang et al., 2019) and to quantify indicators such as the proportion of the rural population who live within 2 km of an all-season road (indicator 9.1.1).

Goal 11 is aimed at making cities and human settlements inclusive, safe, resilient and sustainable. The assessment of air quality can be specifically assessed with new constellation of satellite systems (see, for example, the recent ESA Sentinel5 mission) as required for quantifying indicator 11.6.2 or for monitoring waste management for indicator 11.6.1. In such a framework, EO can also be used for monitoring green spaces in urban areas as specifically requested in target 11.7 (Wicht & Kuffer, 2019).

Goal 13 is aimed at taking action to combat climate change and its impacts. Here, remotely sensed data have already provided a long list of successful stories for monitoring greenhouse gas emissions and their effects on multiple environments. These results can be used to both support climate change mitigation strategies and adaptation measures to foster a more sustainable climate resilience and low greenhouse gas emissions development (Domingo et al., 2017).

Goal 15 is related to protect, restore and promote sustainable use of terrestrial ecosystems, the sustainable management of forests, combat desertification and halt and reverse land degradation and halt biodiversity loss. This is the area in which EO technologies have already demonstrated their potential in an operational way. More or less, all of the indicators set up for this goal can be quantified through the use of spatial data, for example, forest mapping and inventorying (Wallner et al., 2018), sustainable forest management assessment (Corona et al., 2012), desertification (Wang, 2020), protected sites (Gil et al., 2013), wildlife (Kuželka & Surový, 2018) and biodiversity monitoring (Bochenek et al., 2018).

Even if SDG indicators have to be reported in an aggregated form at the national level, EO can be used to monitor in a more detailed and spatially consistent way raw data that have to be transformed in information for decision-makers (Bhaduri et al., 2016). Since in situ data used by the countries to calculate SDG indicators could be acquired on the basis of different definitions and methods, they could hardly be aggregated for global analysis. Under this point of view EO data are acquired with the same standards at global level and, thus, can be used to support the harmonization of local data and to augment the comparability of national statistics (Anderson et al., 2017).

In order to identify optimal solutions based on remote sensing technologies to support the SDGs and the assessment of the different indicators, a large effort of the scientific community is needed. Researchers have to test different EO tools on different scales, in different environments, and they need to communicate the results of their research in a rapid and efficient way.

The *European Journal of Remote Sensing* welcomes all contributions related to the application of EO and spatial technologies and ensures a rapid and open access publishing mechanism within a rigorous peer-review system. For this reason, we look forward to receiving contributions related to the most advanced use of EO tools to support the implementation of the SDG goals, thus contributing to the general aim of making the SDGs a reality.

Disclosure statement

No potential conflict of interest was reported by the author.

References

Anderson, K., Ryan, B., Sonntag, W., Kavvada, A., & Friedl, L. (2017). Earth observation in service of the 2030 agenda for sustainable development. *Geo-spatial Information Science*, 20(2), 77–96. https://doi.org/10.1080/10095020.2017.1333230

Bhaduri, J., Bogardi, A., Siddiqi, H., Voigt, C., Vörösmarty, C., Pahl-Wostl, S. E., Bunn, P., Shrivastava, R., Lawford, S., & Foster, H. (2016). Achieving sustainable development goals from a water perspective. *Frontiers in Environmental Science*, 4, 64. https://doi.org/10.3389/fenvs.2016.00064

Bochenek, Z., Ziolkowski, D., Bartold, M., Orlowska, K., & Ochtyra, A. (2018). Monitoring forest biodiversity and the impact of climate on forest environment using high-resolution satellite images. *European Journal of Remote Sensing*, 51(1), 166–181. https://doi.org/10.1080/22797254.2017.1414573

Bresciani, M., Giardino, C., Stroppiana, D., Dessena, M. A., Buscarinu, P., Cabras, L., Schenk, K., Heege, T., Bernet, H., Bazdanis, G., & Tzimas, A. (2019). Monitoring water quality in two dammed reservoirs from multispectral satellite data. *European Journal of Remote Sensing*, 52(sup4), 113–122. https://doi.org/10.1080/22797254.2019.1686956

Corona, P., Cartisano, R., Salvati, R., Chirici, G., Floris, A., Di Martino, P., Marchetti, M., Scrinzi, G., Clementel, F., Travaglini, D., & Torresan, C. (2012). Airborne laser scanning to support forest resource management under alpine, temperate and mediterranean environments in Italy. *European Journal of Remote Sensing*, 45(1), 27–37. https://doi.org/10.5721/EuJRS20124503

Domingo, D., Lamelas-Gracia, M. T., Montealegre-Gracia, A. L., & de la Riva-fernández, J. (2017). Comparison of regression models to estimate biomass losses and CO2 emissions using low-density airborne laser scanning data in a burnt Aleppo pine forest. *European Journal of Remote Sensing*, 50(1), 384–396. https://doi.org/10.1080/22797254.2017.1336067

Gil, A., Lobo, A., Abadi, M., Silva, L., & Calado, H. (2013). Mapping invasive woody plants in Azores Protected Areas by using very high-resolution multispectral imagery. *European Journal of Remote Sensing*, 46(1), 289–304. https://doi.org/10.5721/EuJRS20134616

Kaplan, G., & Avdan, U. (2017). Object-based water body extraction model using Sentinel-2 satellite imagery. *European Journal of Remote Sensing*, 50(1), 137–143. https://doi.org/10.1080/22797254.2017.1297540

Kuželka, K., & Surový, P. (2018). Automatic detection and quantification of wild game crop damage using an unmanned aerial vehicle (UAV) equipped with an optical sensor payload: A case study in wheat. *European Journal of Remote Sensing*, 51(1), 241–250. https://doi.org/10.1080/22797254.2017.1419442

Mulligan, M., van Soesbergen, A., Hole, D. G., Brooks, T. M., Burke, S., & Hutton, J. (2020). Mapping nature's contribution to SDG 6 and implications for other SDGs at policy relevant scales. *Remote Sensing of Environment*, 239, 111671. https://doi.org/10.1016/j.rse.2020.111671

United Nations, 2015. *Transforming our world: The 2030 agenda for sustainable development A/RES/70/1*. Retrivied January 21st 2016, from. https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf.

Valbuena, R., Hernando, A., Manzanera, J. A., Görgens, E. B., Almeida, D. R. A., Silva, C. A., & García-Abril, A. (2019). Evaluating observed versus predicted forest biomass: R-squared, index of agreement or maximal information coefficient? *European Journal of Remote Sensing*, 52(1), 345–358. https://doi.org/10.1080/22797254.2019.1605624

Wallner, A., Elatawneh, A., Schneider, T., Kindu, M., Ossig, B., & Knoke, T. (2018). Remotely sensed data controlled forest inventory concept. *European Journal of Remote Sensing*, 51(1), 75–87. https://doi.org/10.1080/22797254.2017.1403295

Wang, Z. (2020). Research on desert water management and desert control. *European Journal of Remote Sensing*, 1–13. https://doi.org/10.1080/22797254.20201736953

Wicht, M., & Kuffer, M. (2019). The continuous built-up area extracted from ISS night-time lights to compare the amount of urban green areas across European cities. *European Journal of Remote Sensing*, 52(sup2), 58–73. https://doi.org/10.1080/22797254.2019.1617642

Zhang, Q., Kong, Q., Zhang, C., You, S., Wei, H., Sun, R., & Li, L. (2019). A new road extraction method using Sentinel-1 SAR images based on the deep fully convolutional neural network. *European Journal of Remote Sensing*, 52(1), 572–582. https://doi.org/10.1080/22797254.2019.1694447

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