File name: Supplementary Information

Description: Supplementary Figures, Supplementary Table and Supplementary References

Original article: Characterizing the Spatial and Temporal Availability of Very High Resolution Satellite Imagery for Monitoring Applications

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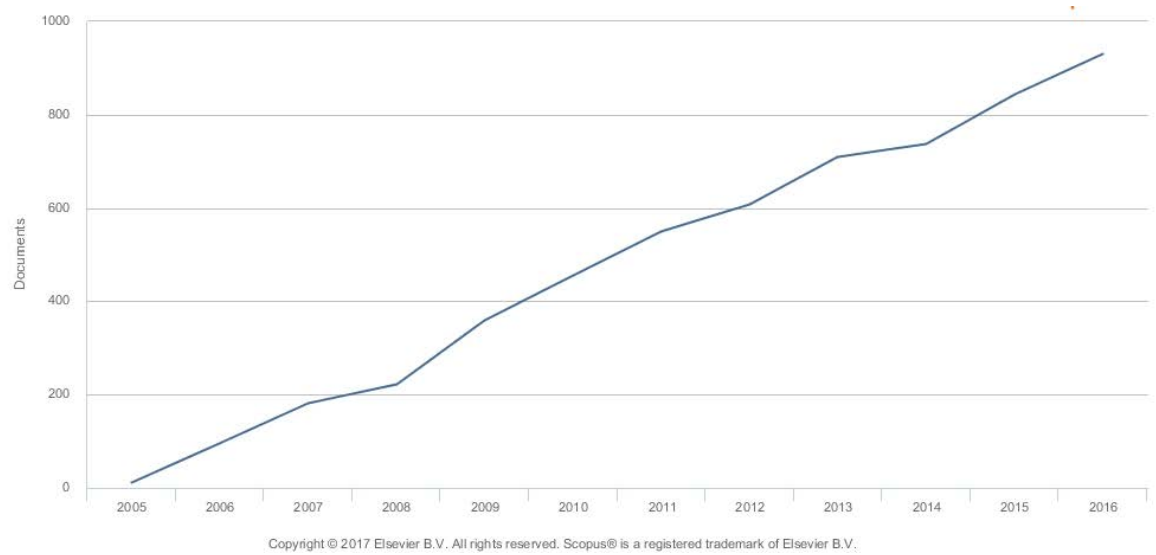
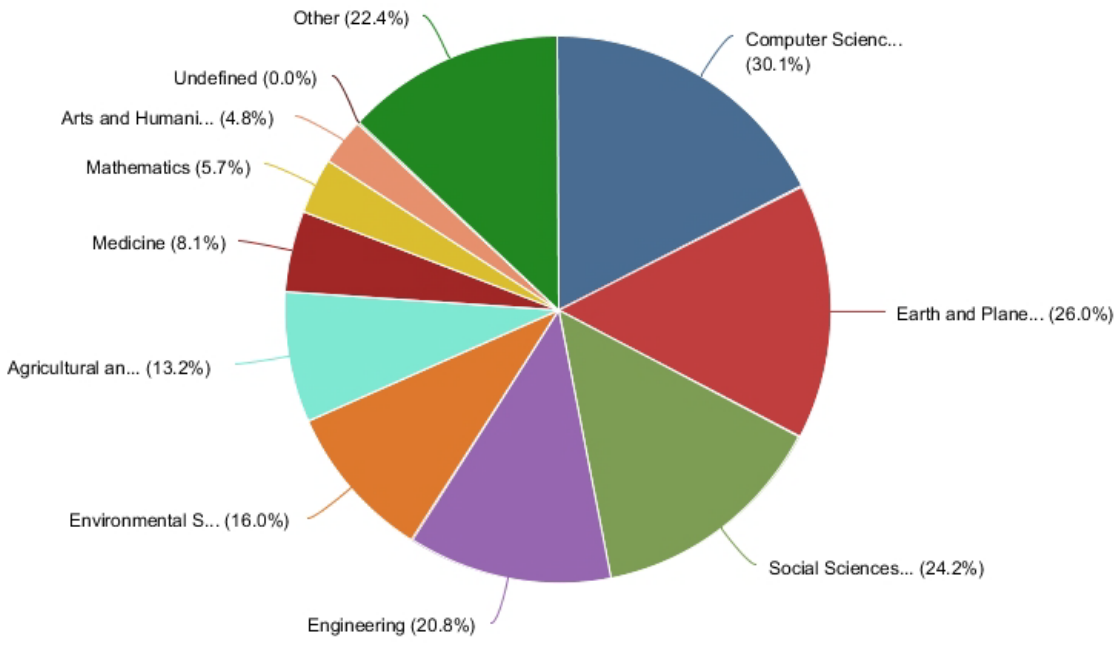
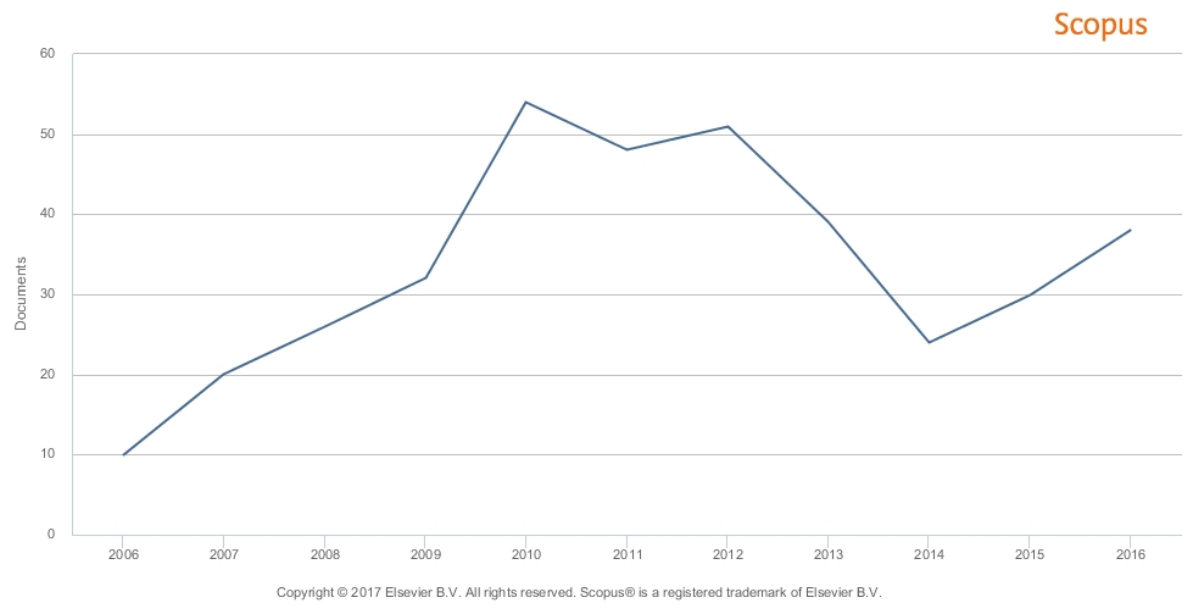


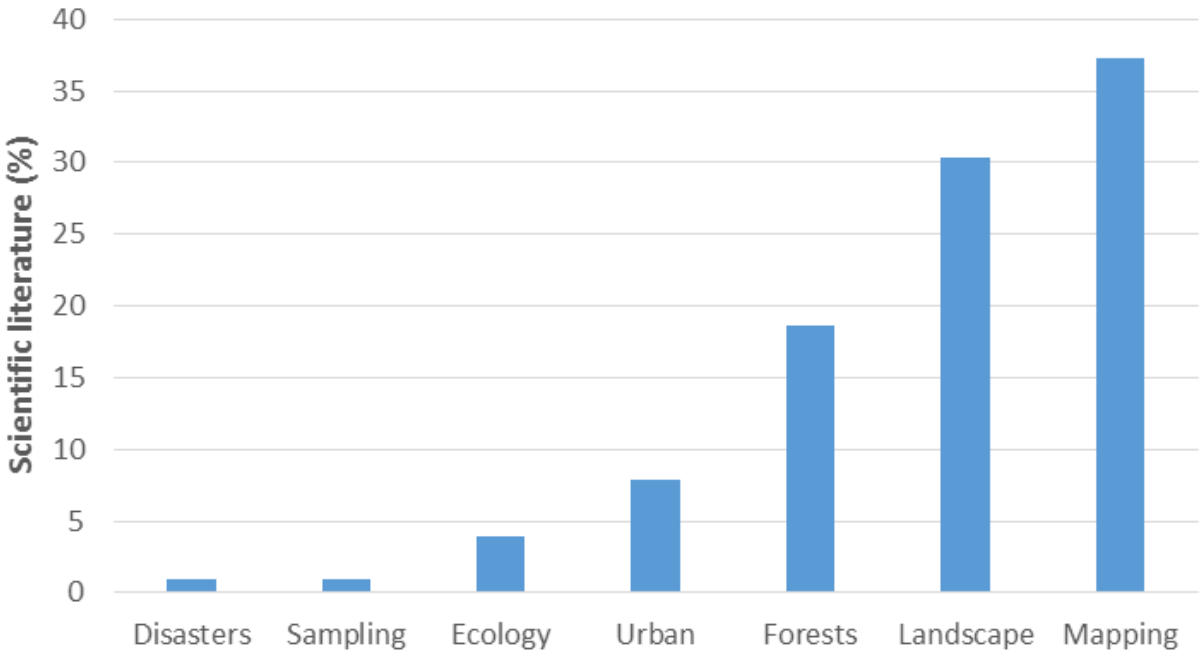
Supplementary Figure S1. The number of scientific documents that mention the search terms "Google Earth" or "Bing imagery" in Scopus® (n=5756) from 2005 to 2016.



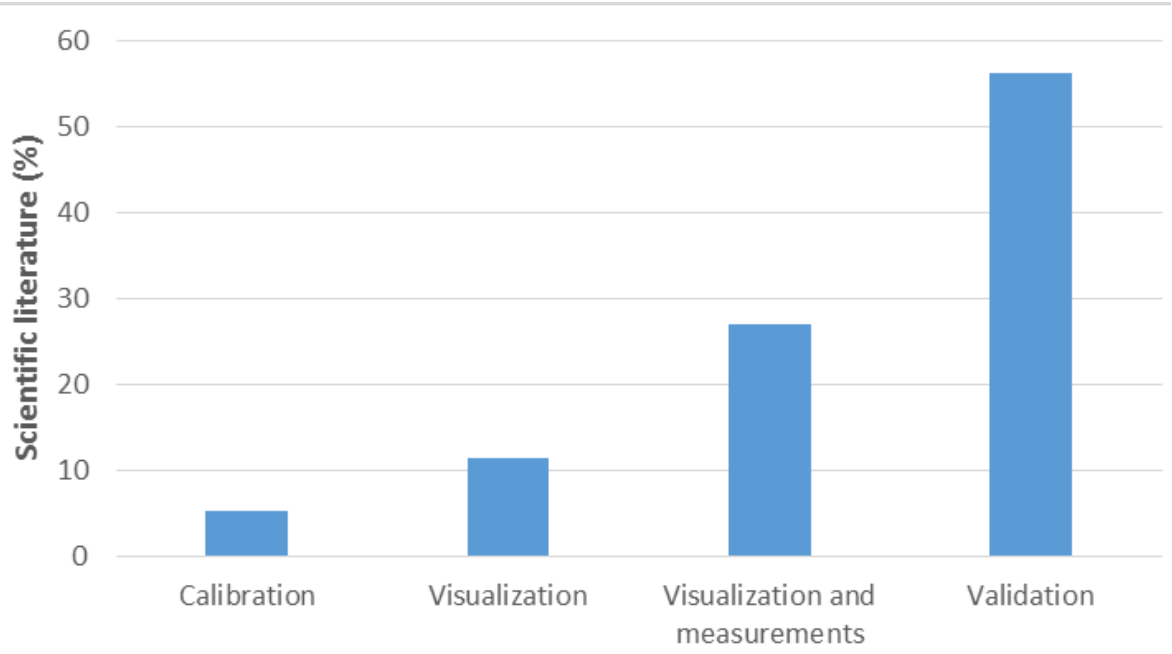
Supplementary Figure S2. The distribution of documents by subject area that appear in Scopus® from the period 2005 to 2016 containing the search terms "Google Earth" or "Bing imagery".



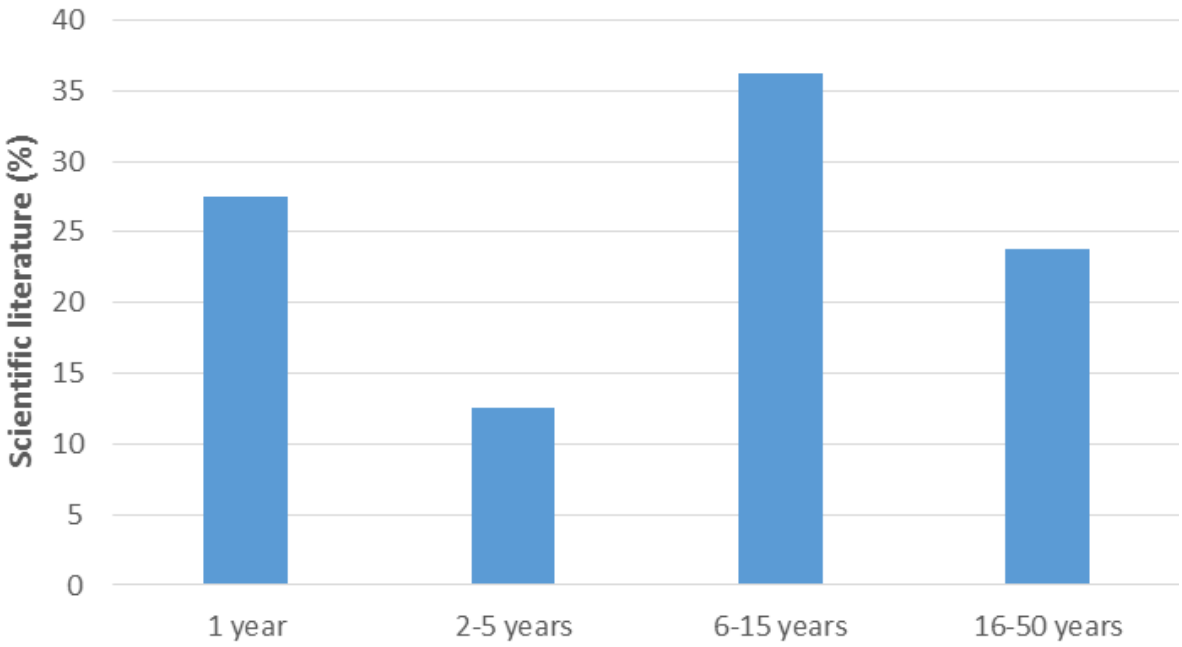
Supplementary Figure S3. The number of scientific documents found in Scopus® that mention the search terms “Google Earth” or “Bing imagery” and additionally contain the search terms “Validation”, ”Visualization” or “Calibration” in the abstract (n=372) from 2006 to 2016to focus in on paper in the field of remote sensing.



Supplementary Figure S4. Documents using Google Earth imagery for remote sensing purposes broken down by purpose or thematic area (n=102).

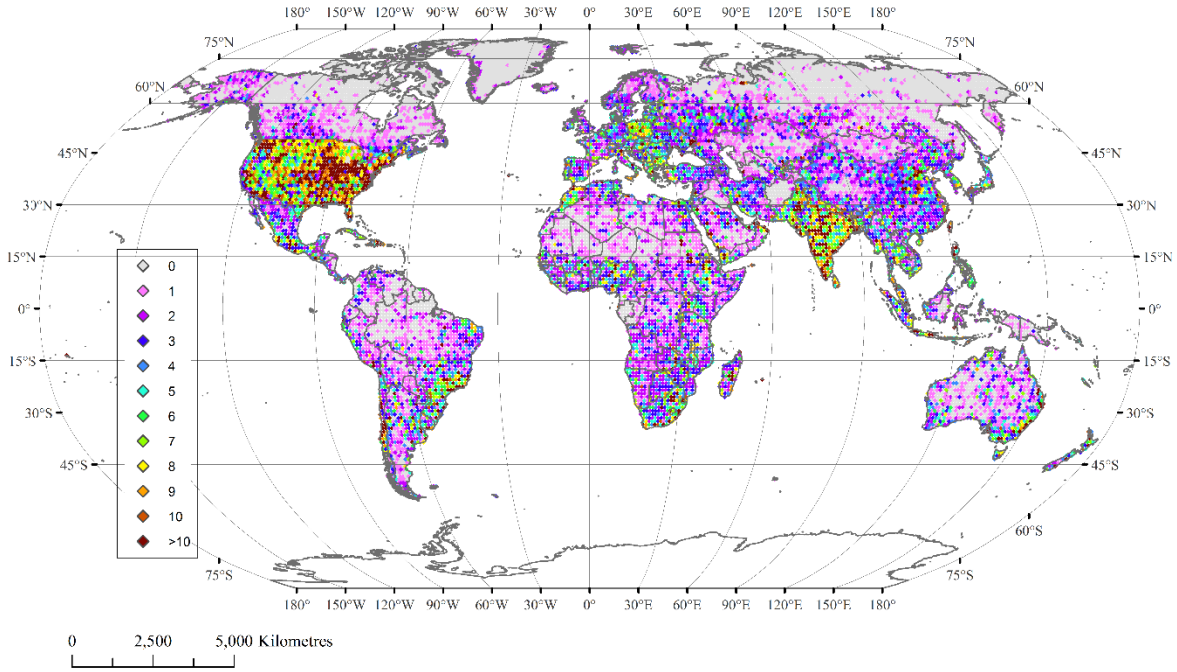


Supplementary Figure S5. Documents using Google Earth imagery for remote sensing purposes broken down by different remote sensing activities (n=96).



Supplementary Figure S6. Range of images reported as employed in studies using Google Earth imagery for remote sensing (n=80).

Supplementary Figure S7. World regions from FAO. The Global Administrative Unit Layers (GAUL) data set was obtain from the United Nations Food and Agriculture Organization (FAO)[1]. The world regions shown in Supplementary Figure 12, were used to calculate the zonal summary statistics that are presented in Tables 1 and 2. The country boundaries were used to calculate the zonal summary statistics that are presented in Tables 3 and 4. In Table 3, the Amazon region has been delineated using sub-national boundaries for administrative level 1 from GAUL while the Congo basin is the merger of 10 countries: Angola, Burundi, Cameroon, Central African Republic, Democratic Republic of the Congo, Republic of the Congo, Rwanda, South Sudan, Tanzania and Zambia. Countries boundaries have been used in Figures 1 to 8, as a background layer (Software: Esri®ArcMap™ 10.1)



Supplementary Figure S8. The number of VHR historical satellite images (< 5 m resolution) available in Google Earth (Software: Esri®ArcMap™ 10.1)

Supplementary Table S1: Correlation (Pearson correlation coefficient) between the number of images at a location and the population density, reported by FAO world region ranked in ascending order by positive correlation.

Region	Total number of grid points	Correlation of number of images with population	P-values
Northern Africa	536	0.46	<0.001
South America	372	0.40	<0.001
Western Asia	740	0.38	<0.001
Eastern Europe	219	0.29	<0.001
Eastern Asia	3129	0.23	<0.001
Australia and New Zealand	468	0.21	<0.001
Northern America	3421	0.19	<0.001
Southern Africa	727	0.15	0.016
Northern Europe	1534	0.11	0.041
Central Asia	318	0.11	0.014
Middle Africa	1212	0.10	0.016
Western Africa	415	0.10	0.019
Southern Europe	136	0.09	0.287
Western Europe	142	0.06	0.483
South-\astern Asia	509	0.05	0.25
Southern Asia	243	0.05	0.203
Eastern Africa	583	0.05	0.273
Central America (incl. Caribbean	530	0.02	0.776

Supplementary Table S2: Availability of very high resolution imagery inside and outside of cropland areas for selected countries. The shaded countries indicate those locations where more imagery is available in areas of cropland compared to those falling outside.

Countries		Total number of points	Coverage with very high resolution imagery in Google Earth	Summary of locations that fall within cropland area					Summary of locations that fall outside cropland area				
				Number of points where high resolution images are available	Most frequent max Year (Google)	Number of images	Number of unique years	Most frequent year (Bing)	Number of points where high resolution images are available	Most frequent max Year (Google)	Number of images	Number of unique years	Most frequent year (Bing)
Top countries with highest priority to map croplands	Angola	102	95%	13	2013	2	2	2012	84	2013	3	2	2013
	Chad	105	52%	11	2013	2	2	2013	44	2013	2	2	2012
	Ethiopia	91	91%	31	2016	6	3	2012	52	2013	3	2	2012
	Mongolia	183	64%						117	2007	2	1	2012
	Mozambique	68	99%	4	2013	2	2	2012	63	2013	3	3	2012
	Namibia	75	100%	3	2016	5	3	2012	72	2013	3	3	2013
Top countries with cropland expansion, 2000-2014	Nigeria	74	99%	53	2016	6	4	2012	20	2015	4	3	2011
	Indonesia	153	81%	22	2016	7	4	2012	102	2015	4	3	2010
	Brazil	705	71%	48	2014	4	3	2011	450	2014	4	3	2010
	Argentina	284	82%	56	2016	4	3	2013	176	2013	4	3	2013
	Tanzania	77	94%	26	2015	4	3	2012	46	2014	3	2	2012
Top countries with cropland area loss, 2000-	Australia	699	69%	44	2015	4	3	2014	437	2013	3	2	2014
	India	274	100%	170	2016	9	5	2015	104	2016	8	5	2015
	Sudan	209	77%	27	2015	3	2	2012	133	2013	3	2	2012
USA		1108	90%	171	2015	10	9	2011	826	2014	7	6	2011

Supplementary References

1. FAO. Global Administrative Unit Layers (GAUL). Available at: http://www.fao.org/geonetwork/srv/en/metadata.show?id=12691. (2014).
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