Supplement of Earth Syst. Sci. Data, 10, 219–234, 2018
https://doi.org/10.5194/essd-10-219-2018-supplement

Open Access Earth System Science Data

Supplement of

Gross and net land cover changes in the main plant functional types derived from the annual ESA CCI land cover maps (1992–2015)

Wei Li et al.

Correspondence to: Wei Li (wei.li@lsce.ipsl.fr)

Figure S1. Spatial distributions of net and cumulative gross changes of shrub, bare soil, water and urban PFTs between 1992 and 2015. Color scale indicates the changed fraction in each half degree grid cell.

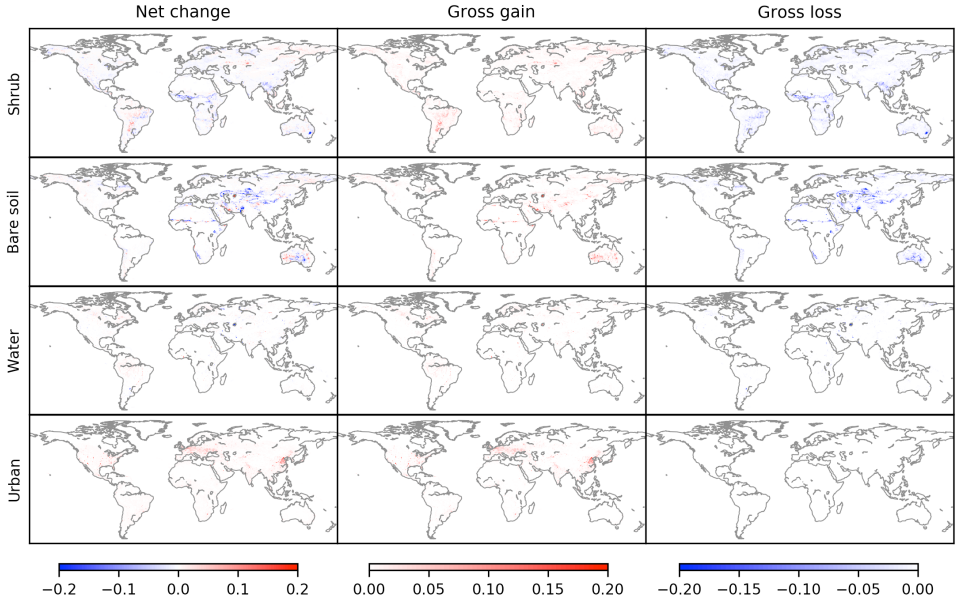


Figure S2. Difference of forest distribution between ESA CCI – derived PFTs and Hansen et al. (2013) in year 2000 (top) and the global map of aridity index (bottom). Positive values of forest difference indicate larger forest area in ESA CCI PFTs than in Hansen et al. (2013). The aridity index data are from Zomer et al. (2007, 2008), and higher values of aridity index indicate humid land.

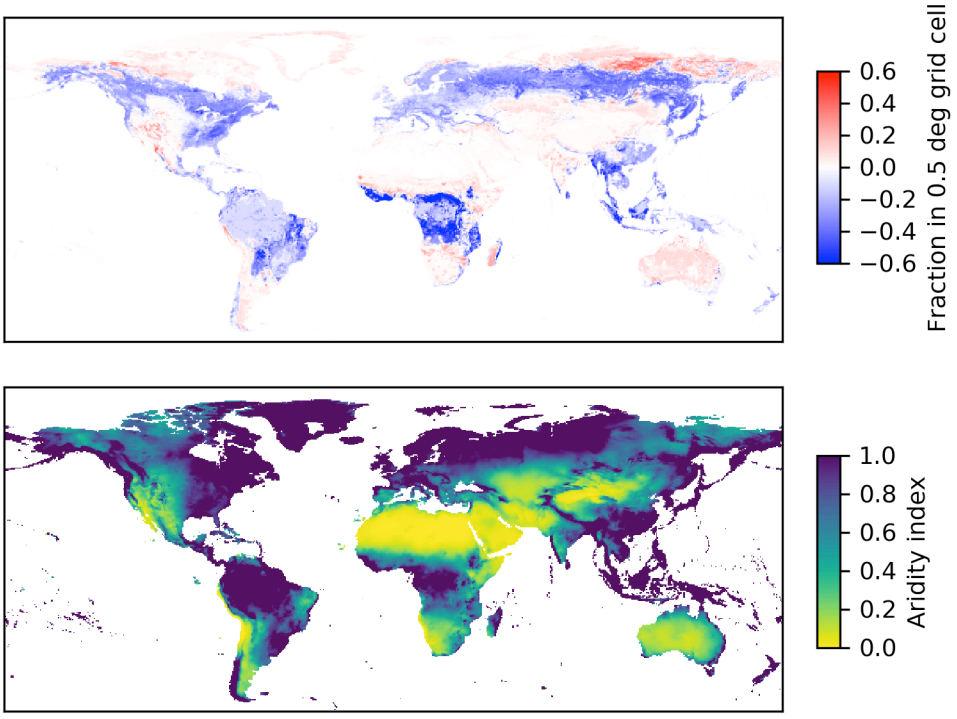


Figure S3. Global and regional gross changes in forest from different datasets.

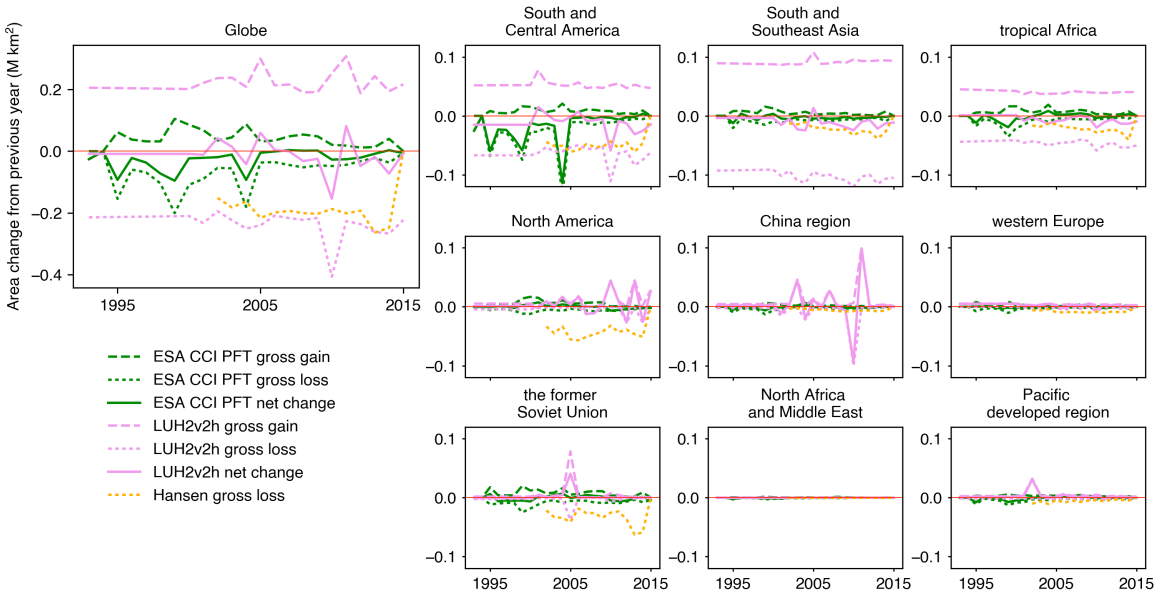
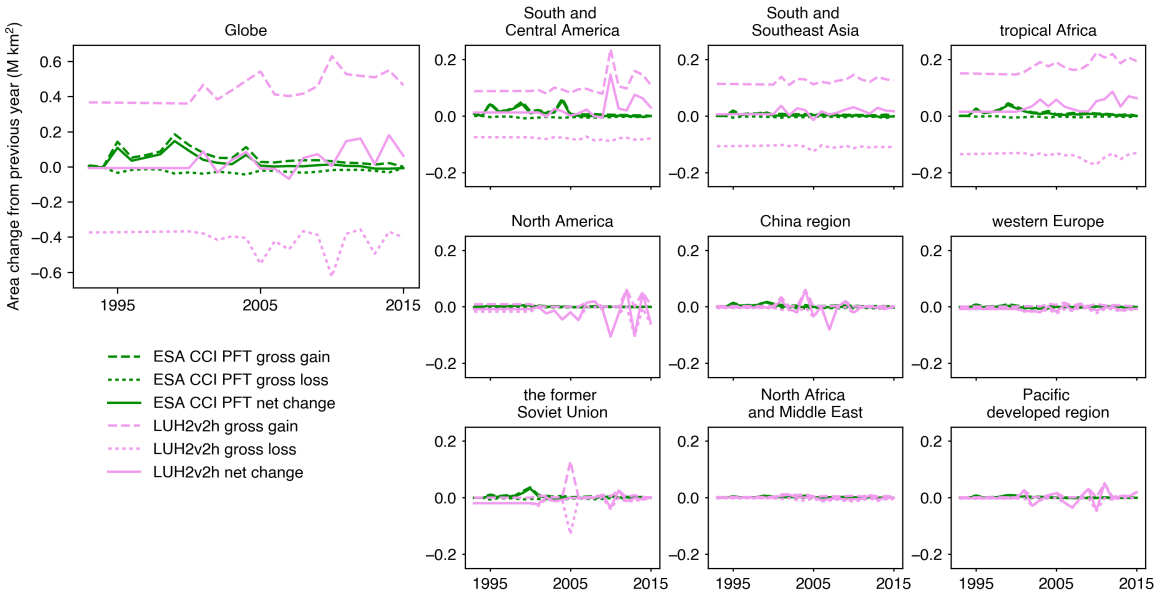


Figure S4. Global and regional gross changes in cropland from different datasets.



35

Figure S5. Gross changes of forest / natural land from 1992 to 2015 in tropical Africa in different datasets. The red line indicates the zero line. Note that there is no separation between forest and other natural vegetation (e.g. natural grassland) in LUH1, thus the lines for LUH1 refer to the changes in the total of primary and secondary land.

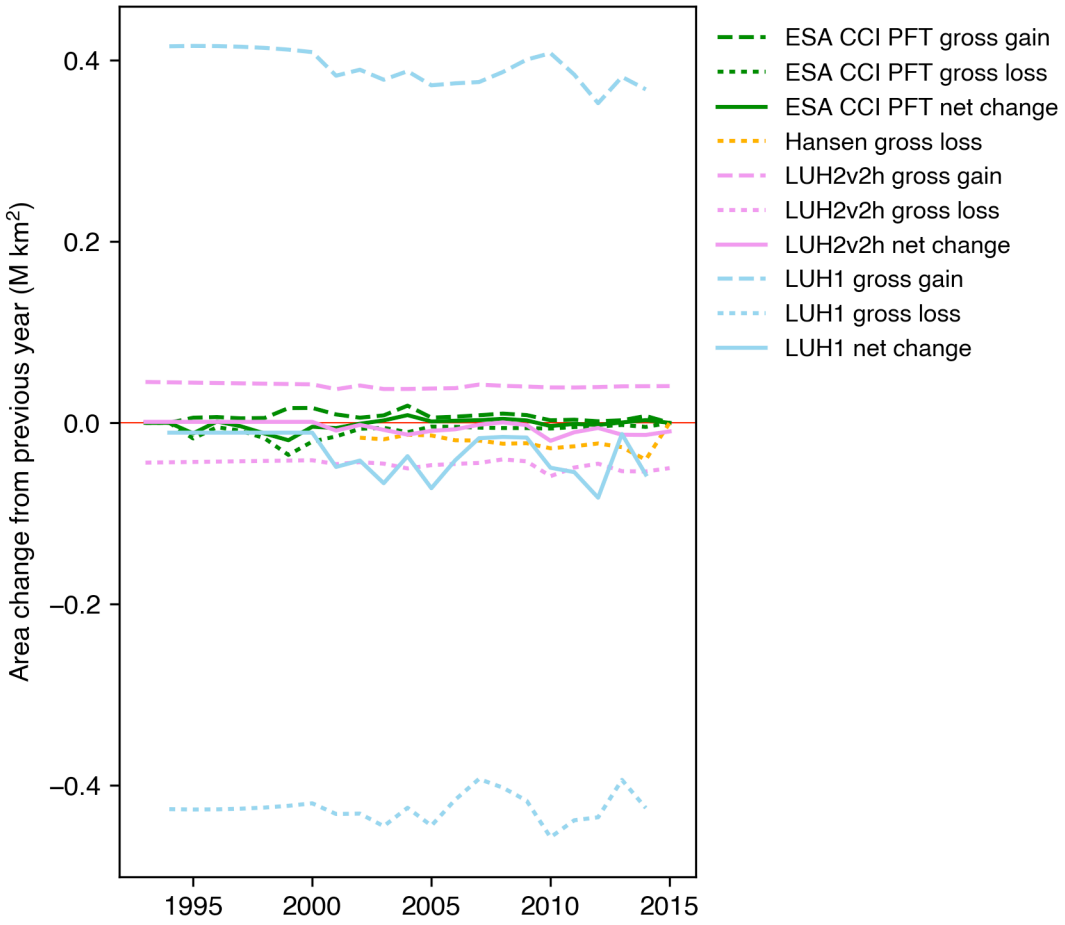


Table S1. The conversion factors from original ESA CCI land cover classes to PFTs (ESA, 2017; Poulter et al., 2015). Stars (*) indicate the classes that experienced changes.

		Tree						Shrub						Grass		Non-vegetated				
ID	**ESA CCI land cover description**	Broadleaf Evergreen	Broadleaf Deciduous	Needleleaf Evergreen	Needleleaf Deciduous	Broadleaf Evergreen	Broadleaf Deciduous	Needleleaf Evergreen	Needleleaf Deciduous	Natural Grass	Crop	Bare Soil	Water	Snow/Ice	Urban	No data
0	No data															100
10	Cropland, rainfed *									10	90					
11	Herbaceous cover *									10	90					
12	Tree or shrub cover						70				30					
20	Cropland, irrigated or post-flooding										100					
30	Mosaic cropland (>50%) / natural vegetation (tree, shrub, herbaceous cover) (<50%) *	5	5			5	5	5		15	60					
40	Mosaic natural vegetation (tree, shrub, herbaceous cover) (>50%) / cropland (<50%) *	7.5	7.5			10	15	10		30	20					
50	Tree cover, broadleaved, evergreen, closed to open (>15%) *	90				5	5									
60	Tree cover, broadleaved, deciduous, closed to open (>15%) *		50				20			30						
61	Tree cover, broadleaved, deciduous, closed (>40%)		70				15			15						
62	Tree cover, broadleaved, deciduous, open (15-40%) *		30				25			45						
70	Tree cover, needleleaved, evergreen, closed to open (>15%) *			70		5	5	5		15						
71	Tree cover, needleleaved, evergreen, closed (>40%)			70		5	5	5		15						
72	Tree cover, needleleaved, evergreen, open (15-40%)			30				25		45						
80	Tree cover, needleleaved, deciduous, closed to open (>15%) *				50	2.5	2.5	2.5	12.5	30						
81	Tree cover, needleleaved, deciduous, closed (>40%)				70	5	5	5		15						
82	Tree cover, needleleaved, deciduous, open (15-40%)				30				25	45						
90	Tree cover, mixed leaf type (broadleaved and needleleaved) *		30	20	10	5	5	5		25						
100	Mosaic tree and shrub (>50%) / herbaceous cover (<50%) *	10	20	5	5	5	10	5		40						
110	Mosaic herbaceous cover (>50%) / tree and shrub (<50%) *	5	10	5		5	10	5		60						
120	Shrubland *					15	30	15		40						
121	Shrubland evergreen*					30		30		40						
122	Shrubland deciduous *						60			40						
130	Grassland *									100						
140	Lichens and mosses									100						
150	Sparse vegetation (tree, shrub, herbaceous cover) (<15%) *		5	5			5	5		30		50				
152	Sparse shrub (<15%) *						10	10		30		50				
153	Sparse herbaceous cover (<15%)									50		50				
160	Tree cover, flooded, fresh or brakish water	37.5	37.5							25						
170	Tree cover, flooded, saline water	75				25										
180	Shrub or herbaceous cover, flooded, fresh/saline/brakish water *						25	15		60						
190	Urban areas *														100	
200	Bare areas *											100				
201	Consolidated bare areas											100				
202	Unconsolidated bare areas											100				
210	Water bodies *												100			
220	Permanent snow and ice													100		

45

Table S2. The mean annual gross and net change rates (% of area in the reference year) in different PFTs from different datasets. Positive values of net changes indicate area increase. The gross change rates is calculated from the sum of absolute loss and gain, and thus always positive. The mean annual rates are calculated for the period of 1992-2015 using year 1992 as a reference year for all datasets except for Hansen et al. (2012) with a period of 2000-2012 and a reference year of 2000.

Dataset	China region	North America	South and Central America	western Europe	tropical Africa	the former Soviet Union	South and Southeast Asia	Pacific developed region	North Africa and Middle East	Total
ESA CCI PFT, Forest, Net	-0.1	0.0004	-0.2	-0.04	-0.04	-0.01	-0.1	-0.1	-0.2	-0.1
ESA CCI PFT, Forest, Gross	0.4	0.2	0.4	0.4	0.3	0.3	0.5	0.5	0.7	0.3
ESA CCI PFT, Cropland, Net	0.1	0.01	0.1	-0.1	0.2	0.1	0.1	0.1	0.9	0.1
ESA CCI PFT, Cropland, Gross	0.6	0.1	0.2	0.4	0.4	0.2	0.4	0.2	1.8	0.3
ESA CCI PFT, Grassland, Net	0.01	-0.04	0.1	-0.02	-0.01	0.01	0.1	0.1	-0.4	0.01
ESA CCI PFT, Grassland, Gross	0.8	0.2	0.2	0.3	0.4	0.3	0.3	0.8	1.2	0.3
LUH2V2H, Forest, Net	0.9	0.2	1.4	0.4	2.5	0.1	5.6	0.6	0.8	1.2
LUH2V2H, Forest, Gross	0.9	0.2	1.4	0.4	2.5	0.1	5.6	0.6	0.8	1.2
LUH2V2H, Cropland, Net	0.8	0.4	2.2	1.1	9.0	0.3	6.7	1.7	50.2	2.3
LUH2V2H, Cropland, Gross	0.8	0.4	2.2	1.1	9.0	0.3	6.7	1.7	50.2	2.3
LUH2V2H, Grassland, Net	1.3	0.1	0.7	0.9	0.8	0.2	0.1	3.0	78.4	0.5
LUH2V2H, Grassland, Gross	1.3	0.1	0.7	0.9	0.8	0.2	0.1	3.0	78.4	0.5
Hansen, Forest, Net	1.0	2.6	0.7	3.0	0.3	1.7	2.4	1.5	1.3	1.5
Hansen, Forest, Gross	1.6	3.8	1.7	4.0	0.9	2.5	3.7	2.5	1.8	2.4
Houghton&Nassikas, Forest, Net	1.1	0.04	-0.4	0.3	-0.5	0.04	-0.3	-0.1	0.7	-0.1

Table S3. Correlations of global temporal gross and net changes between ESA CCI, Hansen et al. (2013) and LUH2v2h (Hurtt et al., 2011).

	r value	p value
Forest gross loss, ESA CCI PFT vs Hansen	0.04	0.89
Forest gross loss, ESA CCI PFT vs LUH2v2h	-0.11	0.62
Forest gross gain, ESA CCI PFT vs LUH2v2h	-0.25	0.26
Forest net change, ESA CCI PFT vs LUH2v2h	0.06	0.80
Cropland gross loss, ESA CCI PFT vs LUH2v2h	-0.07	0.76
Cropland gross gain, ESA CCI PFT vs LUH2v2h	-0.40	0.06
Cropland net change, ESA CCI PFT vs LUH2v2h	-0.27	0.21
Grassland gross loss, ESA CCI PFT vs LUH2v2h	-0.06	0.77
Grassland gross gain, ESA CCI PFT vs LUH2v2h	0.11	0.63
Grassland net change, ESA CCI PFT vs LUH2v2h	-0.04	0.85

References

ESA: Land Cover CCI Product User Guide Version 2.0. [online] Available from: http://maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2_2.0.pdf, 2017.

Hansen, M. C., Potapov, P. V, Moore, R., Hancher, M., Turubanova, S. a, Tyukavina, a, Thau, D., Stehman, S. V, Goetz, S. J., Loveland, T. R., Kommareddy, a, Egorov, a, Chini, L., Justice, C. O. and Townshend, J. R. G.: High-resolution global maps of 21st-century forest cover change., Science, 342(6160), 850–3, doi:10.1126/science.1244693, 2013.

Hurtt, G. C., Chini, L. P., Frolking, S., Betts, R. A., Feddema, J., Fischer, G., Fisk, J. P., Hibbard, K., Houghton, R. A., Janetos, A., Jones, C. D., Kindermann, G., Kinoshita, T., Klein Goldewijk, K., Riahi, K., Shevliakova, E., Smith, S., Stehfest, E., Thomson, A., Thornton, P., van Vuuren, D. P. and Wang, Y. P.: Harmonization of land-use scenarios for the period 1500–2100: 600 years of global gridded annual land-use transitions, wood harvest, and resulting secondary lands, Clim. Change, 109(1–2), 117–161, doi:10.1007/s10584-011-0153-2, 2011.

Poulter, B., MacBean, N., Hartley, a, Khlystova, I., Arino, O., Betts, R., Bontemps, S., Boettcher, M., Brockmann, C., Defourny, P., Hagemann, S., Herold, M., Kirches, G., Lamarche, C., Lederer, D., Ottlé, C., Peters, M. and Peylin, P.: Plant functional type classification for Earth System Models: results from the European Space Agency's Land Cover Climate Change Initiative, Geosci. Model Dev. Discuss., 8, 429–462, doi:10.5194/gmdd-8-429-2015, 2015.

Zomer, R. J., Bossio, D. A., Trabucco, A., Yuanjie, L., Gupta, D. C. and Singh, V. P.: Trees and Water: Smallholder Agroforestry on Irrigated Lands in Northern India., 2007.

Zomer, R. J., Trabucco, A., Bossio, D. A. and Verchot, L. V.: Climate change mitigation: A spatial analysis of global land suitability for clean development mechanism afforestation and reforestation, Agric. Ecosyst. Environ., 126(1–2), 67–80, doi:10.1016/j.agee.2008.01.014, 2008.