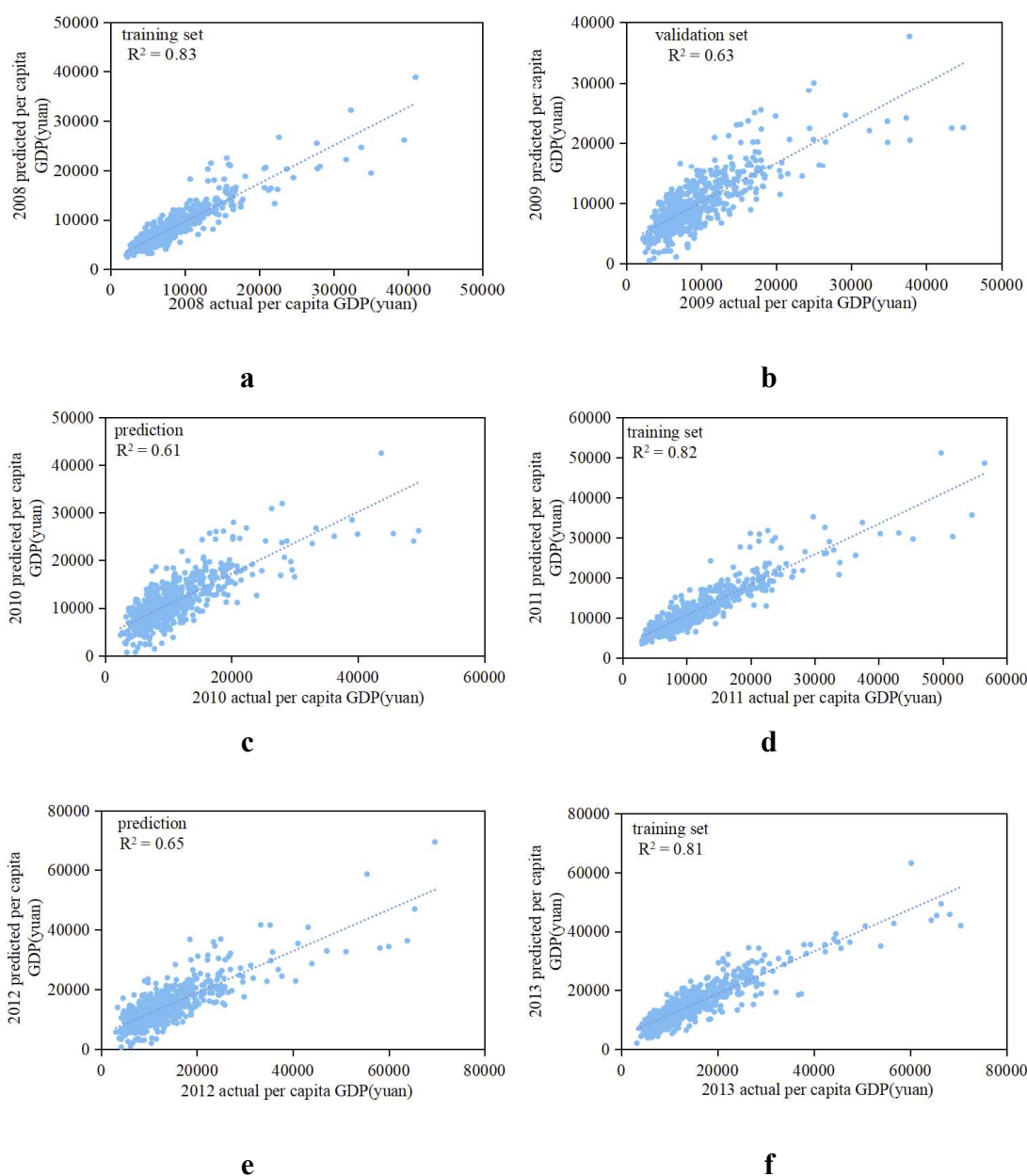
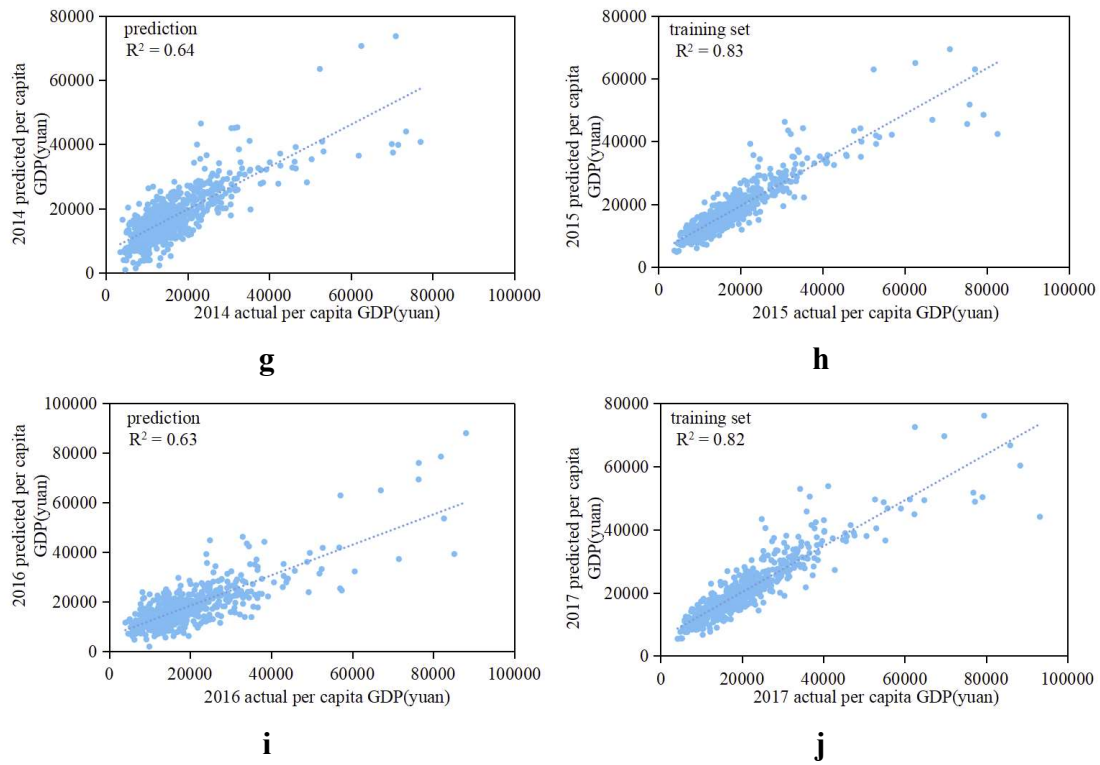


Supplementary Information:

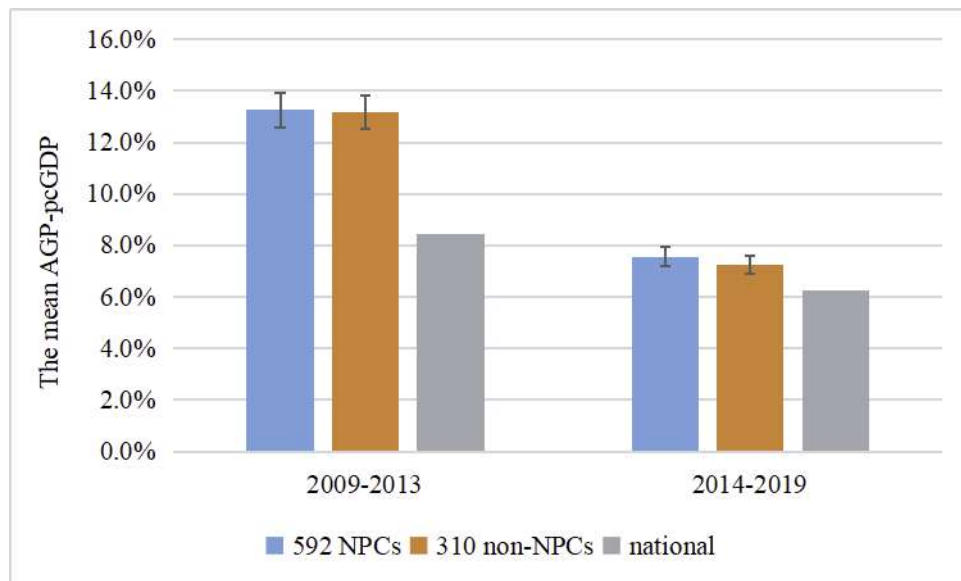
Evaluation of county-level poverty alleviation progress by deep learning and satellite observations

Yanxiao Jiang, Liqiang Zhang, Yang Li, Jintai Lin, Jingwen Li, Guoqing Zhou, Suhong Liu, Jing Cao, Zhiqiang Xiao





Supplementary Fig. 1 | Scatterplot for predicted and survey data for per capita GDP of each NPC over 2008-2017.



Supplementary Fig. 2 | Average AGR-pcGDPs of 592 NPCs, 310 adjacent non-NPCs, and the national average over 2009–2013 and over 2014–2019. Error bars represent 1 standard deviation across the counties.

Supplementary Table 1 | Coefficients of determination between predicted and survey data over 2008–2017 for per capita GDP of the NPCs and non-NPCs in each quantile range (QR). The number of non-NPCs is shown in parentheses.

	NPCs	non-NPCs		NPCs	non-NPCs		NPCs	non-NPCs
2 nd QR	0.924	0.976 (20)	7 th QR	0.999	0.999 (17)	12 th QR	0.993	0.987 (27)
3 rd QR	0.980	0.966 (22)	8 th QR	0.991	0.950 (22)	13 th QR	0.968	0.987 (22)
4 th QR	0.997	0.993 (17)	9 th QR	0.995	0.967 (22)	14 th QR	0.990	0.9617 (19)
5 th QR	0.999	0.981 (18)	10 th QR	0.988	0.962 (8)	15 th QR	0.946	0.992 (31)
6 th QR	0.997	0.999 (15)	11 th QR	0.993	0.999 (14)	16 th QR	0.973	0.940 (32)

Supplementary Table 2 | Quality evaluation of the county survey data in 2008-2017 using Benford’s law

First digit	1	2	3	4	5	6	7	8	9	Error*
Benford	30.10%	17.60%	12.50%	9.70%	7.90%	6.70%	5.80%	5.10%	4.60%	0
2008GDP	29.20%	22.71%	11.64%	6.87%	6.87%	5.53%	4.20%	3.82%	4.77%	14.95%
2009GDP	28.63%	22.14%	13.55%	7.06%	6.49%	5.73%	4.96%	3.82%	3.05%	15.75%
2010GDP	23.85%	22.90%	14.89%	10.11%	4.96%	4.58%	4.77%	4.96%	4.39%	20.78%
2011GDP	24.62%	14.12%	15.46%	11.07%	8.59%	4.96%	3.82%	3.82%	3.82%	19.76%
2012GDP	26.53%	13.17%	13.55%	15.27%	9.35%	6.49%	5.73%	2.67%	2.67%	20.72%
2013GDP	27.48%	12.79%	12.98%	14.89%	8.97%	9.35%	6.30%	4.39%	2.86%	19.76%
2014GDP	27.48%	14.69%	8.78%	11.45%	11.07%	9.35%	7.25%	6.11%	3.82%	20.06%
2015GDP	26.15%	12.98%	11.64%	13.17%	10.50%	9.35%	6.30%	5.73%	4.20%	19.68%
2016GDP	26.72%	13.55%	8.59%	12.79%	12.40%	8.21%	8.02%	4.58%	5.15%	23.73%
2017GDP	27.48%	14.89%	9.54%	8.97%	11.07%	11.64%	7.06%	4.96%	4.01%	19.12%

*Sum of the differences between the frequency of occurrence of each number in survey data and the frequency of each number in Benford’s law.

Supplementary Table 3 | Coefficients of determination (Cd) and normalized mean bias (NMB) for predicted and survey data for yearly GDP, population, and per capita GDP of each NPC.

	GDP (Cd/NMB)	Population (Cd/NMB)	Per capita GDP (Cd/NMB)
2008	0.92/0.031	0.91/0.001	0.83/0.001
2009	0.78/-0.013	0.80/0.023	0.63/0.032
2010	0.78/0.003	0.80/0.023	0.61/0.035
2011	0.92/0.025	0.90/0.012	0.82/0.003
2012	0.79/0.016	0.79/0.022	0.65/0.050
2013	0.93/0.022	0.92/-0.004	0.81/-0.003
2014	0.78/0.005	0.81/-0.032	0.64/0.041
2015	0.93/0.021	0.93/0.005	0.83/-0.003
2016	0.80/-0.009	0.76/0.024	0.63/-0.073
2017	0.93/0.018	0.88/0.034	0.82/-0.002

Supplementary Table 4 | Coefficients of determination between predicted and survey data over 2008–2017 for per capita GDP of the NPCs in Gansu, Guizhou, Shaanxi and Yunnan provinces.

	Gansu	Guizhou	Shaanxi	Yunnan
NPCs	0.96	0.99	0.96	0.97
non-NPCs	0.99	0.96	0.92	0.98

Supplementary Table 5 | Quality evaluation of survey data in all counties of Inner Mongolia in 2014, 2017 and 2018 using Benford's law.

First digit	1	2	3	4	5	6	7	8	9	Error
Benford	30.10%	17.60%	12.50%	9.70%	7.90%	6.70%	5.80%	5.10%	4.60%	0
2014GDP	30.69%	15.84%	6.93%	11.88%	4.95%	13.86%	6.93%	7.92%	0.99%	27.77%
2017GDP	35.64%	13.86%	10.89%	4.95%	7.92%	6.93%	8.91%	7.92%	2.97%	22.17%
2018GDP	30.10%	17.60%	12.50%	9.70%	7.90%	6.70%	5.80%	5.10%	4.60%	23.45%