

# Supporting Information

## **Annual variations of monsoon and drought detected by GPS: A case study in Yunnan, China**

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**Table S1.** GPS station locations and observation epochs used in this study.

Site	Longitude (°)	Latitude (°)	Height (m)	Duration (yr)
KUNM	102.8	25.0	1986.2	2007.0 – 2013.1
XIAG	100.3	25.6	1974.3	2007.0 – 2015.0
YNCX	101.5	25.1	1785.4	2011.0 – 2015.0
YNDC	103.2	26.1	1297.6	2011.0 – 2015.0
YNHZ	103.3	26.4	2263.9	2011.0 – 2015.0
YNJD	100.9	24.4	1244.6	2011.0 – 2015.0
YNJP	103.2	22.8	1250.1	2011.0 – 2015.0
YNLA	100.0	22.6	1107.9	2011.0 – 2015.0
YNLC	100.1	23.9	1559.5	2011.0 – 2015.0
YNLJ	100.0	26.7	3195.8	2011.0 – 2015.0
YNMH	100.5	22.0	1166.3	2011.0 – 2014.6
YNMJ	101.7	23.4	1281.7	2011.0 – 2015.0
YNML	103.4	24.4	1520.8	2011.0 – 2015.0
YNMZ	103.4	23.4	1275.3	2011.0 – 2015.0
YNRL	97.9	24.0	723.3	2011.0 – 2015.0
YNSD	99.2	24.7	1478.8	2011.0 – 2015.0
YNSM	101.1	22.7	1445.4	2011.0 – 2015.0
YNTC	98.4	25.0	1470.1	2011.0 – 2015.0
YNTH	102.8	24.1	1778.2	2011.0 – 2015.0
YNWS	104.3	23.4	1451.6	2011.0 – 2015.0
YNXP	101.9	24.1	1978.0	2011.0 – 2015.0
YNYA	101.3	25.7	1846.2	2011.0 – 2015.0
YNYL	99.4	25.9	1696.3	2011.0 – 2015.0
YNYM	101.9	25.7	1077.8	2011.0 – 2015.0
YNYS	100.8	26.7	2143.9	2011.0 – 2015.0
YNZD	99.7	27.8	3296.9	2011.0 – 2015.0

**Table S2.** Comparison of the empirical scaling factors of annual amplitudes between GPS-derived VCD with EWH and precipitation.

VCD	EWH		Precipitation	
	scaling factor	R <sup>2</sup>	scaling factor	R <sup>2</sup>
with ATML correction, Yunnan, present paper	18.1	0.62	13.3	0.38
without ATML correction, Yunnan, present paper	17.0	0.68	12.4	0.32
without ATML correction, the Horn of Africa, Birhanu and Bendick (2015)	8.6	0.76	13.8	0.64

**Table S3.** Comparison of the consistency between GPS-derived and GRACE-derived VCD.

Region	WRMS Reduction (%)	NSE
Yunnan, China, present paper	44	0.63
Europe, Chen (2015)	29	0.47
Amazon, Chen (2015)	46	0.64
Nepal, Fu and Freymueller (2012)	45	-
Global, Tesmer et al. (2011)	12	-