

## **CO<sub>2</sub> output rate estimate**

The output rate of CO<sub>2</sub> from the mantle wedge to the surface has been quantified here by using approach of *Sadofsky et al.* [2008] based on the total volcanic K<sub>2</sub>O flux through the CAVA and CO<sub>2</sub>/K<sub>2</sub>O in undegassed melts. The K<sub>2</sub>O flux is derived from the magma flux estimates provided by Kutterolf et al. [2008], which has been compiled from volcano edifice volumes [*Patino et al.*, 2000; *Carr et al.*, 2007] and volumes of pyroclastic rocks (widespread tephra layers) [*Kutterolf et al.*, 2008]. Several assumptions and uncertainties are involved in such flux estimates, which include uncertainties in age constraints of eruptive products, removal of volcanic deposits by erosion, and limited constraints on the amount of hidden magma flux, i.e., magma that does not reach the surface but solidifies in the crust to form an intrusion. Estimates on the proportions of erupted magma, cumulates, and intruded magma are provided by *Sadofsky et al.* [2008]. For more details, discussion and techniques employed for the flux estimates, see *Sadofsky et al.* [2008], *Kutterolf et al.* [2008], and references therein.

With regard to our aim of determining the CO<sub>2</sub> flux that originates from the mantle wedge, we use here only the least degassed, most MORB-like inclusions from Nejapa (P2-32d-4b, P2-32d-6a) and Granada (P2-58-2-59, P2-58-2-32). The average CO<sub>2</sub>/K<sub>2</sub>O ratio of those inclusions amounts to ~1.2. This CO<sub>2</sub>/K<sub>2</sub>O ratio is scaled by the K<sub>2</sub>O flux per arc segment (given in Table a2) to infer a total CO<sub>2</sub> output rate from the CAVA, assuming that the considered Nicaraguan melt inclusions are representative for the entire CAVA. The weighted average K<sub>2</sub>O flux amounts to 0.0219 g/m/s; which gives a CO<sub>2</sub> output of  $2.6 \times 10^2$  g/m/s, equivalent to  $2.8 \times 10^4$  g/s.

## **References**

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- Kutterolf, S., A. Freundt, and W. Perez (2008), The Pacific offshore record of Plinian arc volcanism in Central America, part 2: Tephra volumes and erupted masses. *Geochem. Geophys. Geosyst.*, 9, Q02S02, doi:10.1029/2007GC001791.

<b>Volcanoes</b>	<b>Segment length (km)</b>	<b>K<sub>2</sub>O flux (g/s) (volcanic edifices and tephras)</b>	<b>K<sub>2</sub>O flux (g/m/s) per arc segment length</b>
Tacana		150	
Tajumulco		437	
Western Guatemala segment	55	587	0.011
Cicabál		62	
Siete Orejas		304	
Cerro Que		37	
Santa María		126	
San Pedro		175	
Tolimán		128	
Atitlán		3997	
Acatenango		364	
Fuego		253	
Agua		425	
Pacaya		73	
Amatitlán		638	
Central Guatemala segment	145	6584	0.045
Tecuamburo		291	
Moyuta		192	
Ayarza		732	
Eastern Guatemala segment	85	1215	0.014
Apaneca		649	
San Mareclino		8	
Santa Ana		1870	
Conejo		8	
Cerro Verde		14	
Izalco		10	
Coatepeque		638	
W - Salvadorian segment	3197	3197	0.052
San Salvador		577	
Ilopango		1095	
San Vincente		346	
C - Salvadorian segment	2018	2018	0.026
Berlin		1174	
Tigre		106	
Taburete		43	
Tecapa		421	
Usulatán		59	
Chinameca		40	
Pacayal		272	
San Miguel		283	
Conchagua		103	

Conchaguita		3	
Meanguera		12	
E - Salvadorian segment	2515	2515	0.021
Cosigüina		551	
San Cristobal		190	
Casita		123	
Telica		72	
St. Clara		5	
Rota		32	
Malpaisillo Momo-lgs)		106	
Cerro Negro		3	
Las Pilas		50	
El Hoyo		29	
Momotombo		49	
Apoyeque		501	
Western Nicaraguan segment	166	1714	0.010
Nejapa		6	
Masaya		905	
Apoyo		596	
Mombacho		123	
Granada		9	
Zapatera		19	
Concepción		380	
Maderas		42	
Eastern Nicaraguan segment	137	2081	0.015
Orosi		68	
Cacao			
Rincón de la Vieja		224	
Miravaelles		169	
Tenorio		78	
Guanacaste segment	92	538	0.006
Arenal		22	
Alto Palomo		351	
Platanar		260	
Poas		262	
Tiribi		277	
Barva		608	
Irazú		747	
Turrialba		316	
Costa Rica Central segment	150	2843	0.019