

**This Supplementary Material includes
figures S1–S3 and Table S1.**

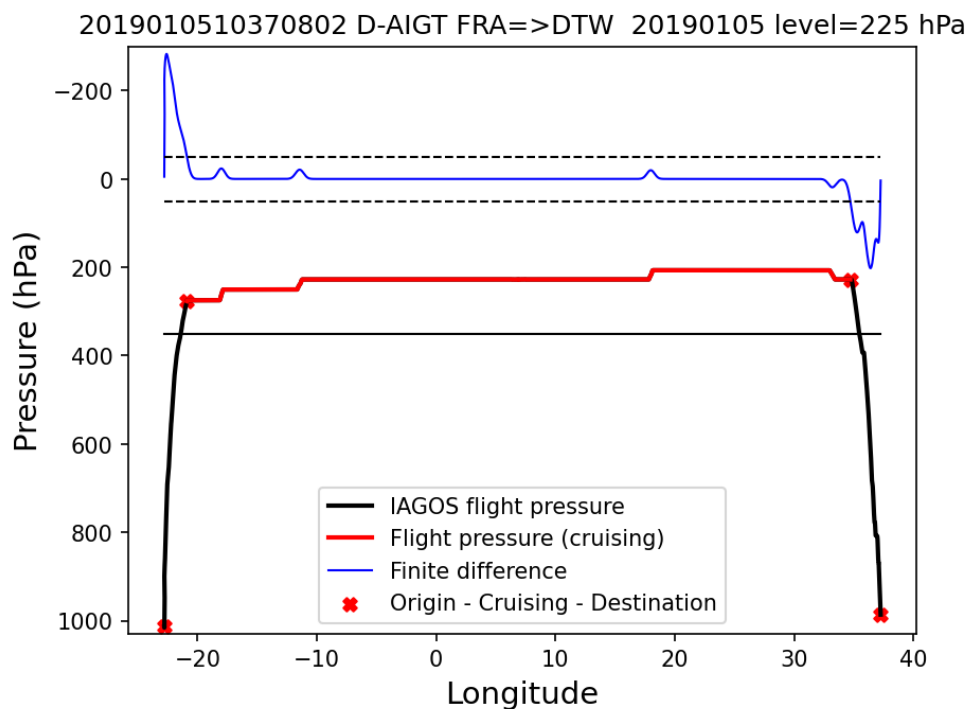


Figure S1. Cross-section of the flight pressure along the longitude of a sampled IAGOS flight from Frankfurt to Detroit airports. The cruising phase, detected from thresholds on the pressure (horizontal solid black line) and the absolute difference in pressure change between datapoints (horizontal dashed solid line), is shown in red. See main text for details.

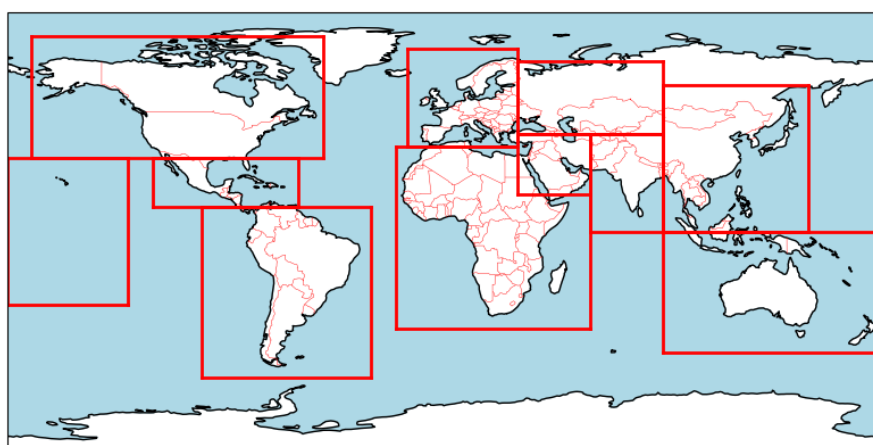


Figure S2. World regions considered to categorize IAGOS flights by origin and destination airports. The regions are (from west to east) Pacific, North America, Central America, South America, Africa, Europe, Central Asia, Middle East, South-East Asia, Asia, and Australasia.

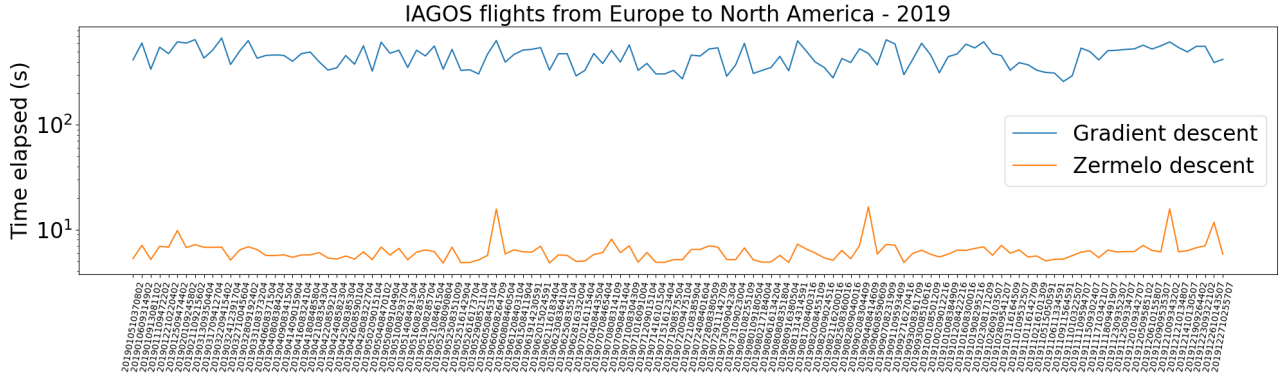


Figure S3. Computational time as a function of individual flights for the Europe to North America 2019 IAGOS flights and for our two optimization methods. Note that the y -axis is on a logarithmic scale. The python scripts are run on a 2.8 GHz AMD EPYC 7402P CPU.

	2018	2018	2019	2019	2020	2020	2021	2021
Aircraft / Airline	All	Sel	All	Sel	All	Sel	All	Sel
F-GLZU (A340-313)	564	444	0	0	0	0	0	0
F-GZCO (A330-203)	260	195	0	0	0	0	0	0
Total Air France	824	639	0	0	0	0	0	0
B-HLR (A330-343)	428	178	0	0	0	0	0	0
Total Cathay Pacific	428	178	0	0	0	0	0	0
B-18316 (A330-302)	182	28	0	0	0	0	0	0
B-18317 (A330-302)	1105	154	688	109	0	0	0	0
Total China Airlines	1287	182	688	109	0	0	0	0
N384HA (A330-243)	720	712	626	621	175	173	51	49
Total Hawaiian Airlines	720	712	626	621	175	173	51	49
D-AIGT (A340-313)	350	331	395	379	151	147	357	337
D-AIKO (A330-343)	402	251	583	433	297	149	447	351
D-AIHE (A340-642)	21	20	22	22	8	8	0	0
Total Lufthansa	773	602	1000	834	456	304	804	688
Grand total	4032	2313	2314	1564	631	477	855	737

Table S1. Total (All) and screened (Sel) number of IAGOS flights considered in this study for the different years in the period 2018 to 2021 and the different IAGOS-equipped aircraft. Yearly totals by airline and the grand total are also given.