The ETH Zurich flight emission project: Emissions 2016-2019

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Contents

Summary

The following report shows the evolution of the greenhouse gas emissions from flights from business trips undertaken by ETH Zurich staff and guests, provided that the expenses are covered by ETH Zurich, and by students as part of their curriculum for the period 2016 to 2019. Overall, the flight emissions have decreased in 2019 compared to the base period 2016-2018, and more than half of the departments have already met their pledged 2025 reduction targets. This conclusion should be interpreted with care since year-to-year variations in the flight activity and therefore emissions are large. The data however show that in 2019 almost all employment categories contributed to this decrease, but overall less burden for emissions reductions are put on early career researchers (doctoral students) compared to more established researchers and professors, and emissions from guests have been cut the most (in %).

For the base period, long-haul flights caused most of the emissions (86 %) although these only come from 38 % of the flights. For 2019, these numbers are 86 % and 41 %, respectively. Policies addressing or discouraging short distance flights are often aimed at flights that can be replaced by other means of transport. For the period 2016-2018, 38 % of the long-haul flights were also related to non long-haul flights, and 34 % of all short flights are related to a long-haul flight. Even thought most (94 %) flights recorded during the base period are economy class, 19 % of the emissions come from business and first class flights. This number decreased to 16 % in 2019.

These numbers show that there is still potential for halving the emissions from business (and first) class flights just by changing flight class, and by cutting short flights that are not connected to other flights.

Main results

- The total ETH Zurich flight emissions stayed relatively constant over the base period (2016-2018) but reduced by 9.6 % for the total emissions and 14.4 % when calculated as emissions per full-time-equivalent (FTE) in 2019. The reason for the emissions per FTE decreasing more than the total emissions is a gradual increase in staff at ETH Zurich. For the individual departments and administrative units, the range of the decrease in 2019 compared to the base period is -36.2 to +136.5 % for total emissions and -47.3 to +110.2 % for emissions per FTE.

- Averaged over the four years, the emissions from 1 professor (per FTE) equals 1.9 guests, 5.6 senior researchers, 7.7 doctoral students, 22.4 technical/administrative staff, or 78.3 BSc/MSc students. 16 % of the emissions in the base period come from flights taken by guests. Only one employment category, technical/administrative staff, increased their emissions in 2019 compared to the base period, but this is likely due to an under-reporting of their flights during the base period. The emissions from flights taken by professors contribute to around ∼28 % of the total ETH emissions. All categories of staff have reduced emissions in 2019, but the largest decrease occurred for guests.

- There is no clear relationship between the reduction targets the departments have set themselves and the actual reductions reached in 2019, but some departments have already met their pledged 2025 reduction targets.

- In the base period, the annual average distance flown per FTE is 9 479 km, equivalent to the distance between Zurich and Tokyo. This distance decreased by 10.3 % in 2019 compared to the base period.

- The majority (∼86 %) of the emissions, which come from around ∼37 % of the flights, are related to long-haul flights (distances >1 750 km).

- Mainly the short and intermediate distance flights decreased, while the number of long-haul flights increased from the base period to 2019.

1 Background

The ETH Zurich flight emissions are calculated using the Atmosfair method (Atmosfair, 2011) for the period starting in 2016, where information on flight date, flight number (making it possible to infer origin and destination), and flight class are provided for the calculations. From this, the distance (in km) and greenhouse gas emissions, given as tons of CO_2 equivalents (t CO_2e), are calculated. In addition, information about the status of the passenger, and which department and cost center paid for the flight are recorded. The status is divided into BSc/MSc students[1], doctoral students, senior researchers (including all non-professorial research staff above doctoral student), professors, guests, and technical and administrative staff. While data for 2016-2018 were manually collected, the collection process was automated from 2019 onwards. As a consequence, additional information about which flights belong to the same journey is available for the first period, while from 2019 only information about individual legs was retained.

A quality control of the original data revealed duplicate entries, emissions allocated to the wrong cost centre, missing flight data, and missing entries for the employment category for the 2016 to 2018 data. These known issues have now been addressed. In addition, the 2019 flight emissions have been recalculated with updated information from Atmosfair. These corrections and updates, leading to the current version of the data, resulted in slightly different values compared the ones published in earlier reports on the ETH Zurich flight emission data (Althaus and Graf, 2019, 2020; Medhaug, 2021). See Section 3 for more information about the corrections made to the data.

The ETH Zurich flight emission dataset now provides a prime opportunity to investigate who (on an employment status level) travels how much and how far each year, who reduces how much, and whether or not the departments are on track to meet their reduction targets.

Through a participatory process, in 2018 the ETH Zurich departments and administrative units set targets for reducing their flight emissions by 2025 using their average emissions for 2016-2018 as a base period. By 2025, emissions are expected to reduce by approximately 10 % solely from technology advances, which make planes more efficient. The department pledges initially ranged from 3 to 20 % reduction per full-time equivalent (FTE) in addition to these efficiency gains. Overall for ETH Zurich, the pledged reductions amounted to 11 % by 2025 relative to the base period. Taking the efficiency gains into account, the total reduction target was 21 %[2].

[1] Flights taken as part of a study exchange program, and paid for by the Student Exchange Office, are allocated to the department where the student was enrolled at the time.

[2] New and more ambitious emissions reductions were pledged by some departments in 2021, resulting in a pledged reduction range of 5-50 % and a reduction of 15 % for ETH Zurich as a whole. Combined with the efficiency gain, the new overall reduction target is 25 %.

2 Flight emissions

The flight emissions for ETH Zurich as a whole were relatively stable for the base period (Fig. 1), with an average of 16 578 t CO_2e, or 1.80 t CO_2e / FTE. The total flight emissions in 2019 were 9.6 % lower, while the emissions per FTE were 14.4 % lower, than the average for the base period. The larger reduction in the emissions per FTE is due to the gradual increase in FTE over the period (Table 1).

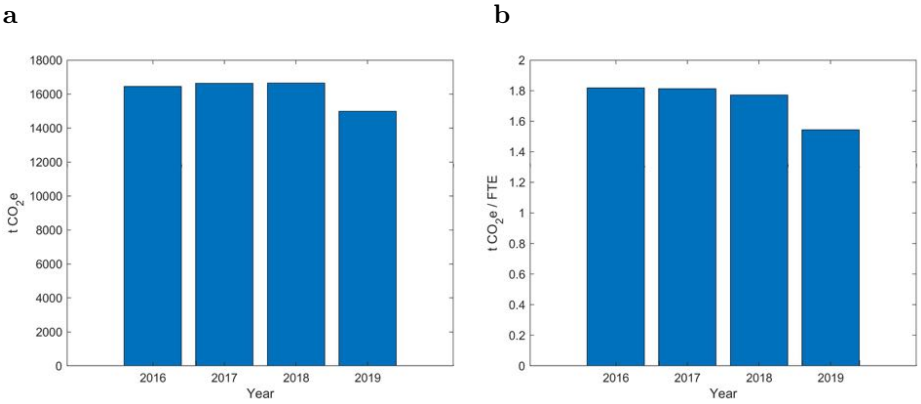

Figure 1: Annual ETH a) total flight emissions (in t CO_2e) and b) emissions per FTE for the period 2016-2019.

Table 1: The numbers of full-time equivalent ETH employees (No. FTE), and the total emissions (in t CO_2e) and emissions per FTE (in t CO_2e / FTE) per year.

Year	**No. FTE**	**Emissions**	
		total	per FTE
2016	9'043	16'446	1.82
2017	9'185	16'638	1.81
2018	9'398	16'651	1.77
2019	9'707	14'986	1.54

2.1 Emissions per department and unit

The contribution of the individual departments and units to the overall ETH emissions vary greatly and depend on both number of staff and traveling activity.

Table 2: Flight emissions for the individual units averaged over the base period (2016-2018) and for 2019 for total emissions (in t CO_2e) and emissions given per FTE (in t CO_2e / FTE). The change in emissions from the base period to 2019, Δ, is given in %.

Unit	**Total emissions**			**Emissions per FTE**		
	2016-2018	2019	Δ (%)	2016-2018	2019	Δ (%)
OE1	1'600	1'293	-19.2	3.87	3.19	-17.4
OE2	41	96	136.5	0.03	0.05	110.2
OE3	714	903	26.6	1.26	1.53	22.1
OE4	545	444	-18.5	0.89	0.74	-16.6
OE5	326	424	30.2	1.09	1.35	23.2
OE6	1'110	736	-33.7	1.38	0.91	-34.0
OE7	912	745	-18.3	2.73	2.25	-17.5
OE8	845	731	-13.5	3.08	2.45	-20.5
OE9	861	647	-24.8	1.80	1.17	-35.0
OE10	1'532	978	-36.2	3.80	2.00	-47.3
OE11	1'045	1'189	13.8	1.82	1.99	9.1
OE12	798	614	-23.0	2.79	2.07	-25.8
OE13	460	447	-2.8	1.99	1.83	-7.9
OE14	1'490	1'308	-12.2	2.07	1.87	-9.7
OE15	961	839	-12.7	2.93	2.45	-16.5
OE16	1'454	1'192	-18.0	2.33	1.86	-20.3
OE17	695	1'452	108.9	0.43	0.80	85.9
OE18	1'190	947	-20.4	1.88	1.41	-25.1
ETH	16'578	14'986	-9.6	1.80	1.54	-14.4

Table 2 shows the average annual total emissions and emissions per FTE for the different ETH units (16 departments and two administrative Units) for the base period and for 2019. The department sizes vary greatly and so does the general evolution of staff, and hence emissions per FTE is a better indicator than total emissions when comparing the departments. OE4 has the smallest emissions per FTE, with around half of the ETH average, and OE1 has the largest with 2.15 times the ETH average emissions per FTE for the base period. The difference in traveling activity can partly be related to the amount of field work done in a department, the number of excursions/field trips included in the study curriculum, international collaboration (including collaboration with ETH units abroad), and the frequency of visitors.

While the ETH-wide emissions per FTE in 2019 are lower than the in base

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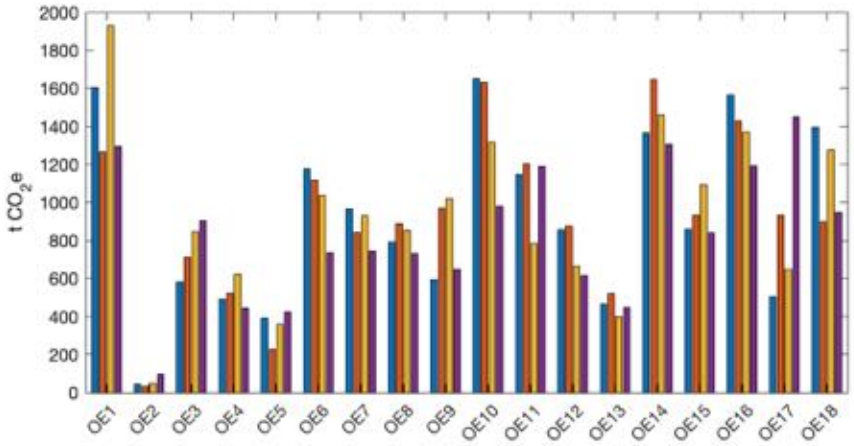

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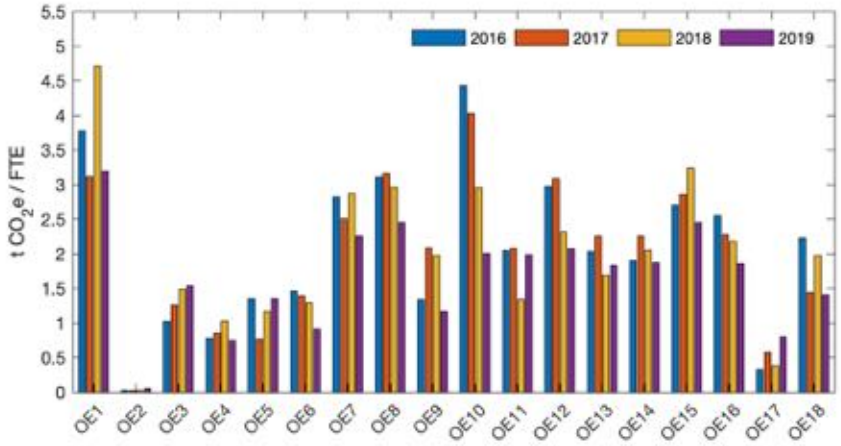

Figure 2: Annual a) total flight emissions (in t CO_2e) and b) emissions per FTE (in t CO_2e / FTE) for the different units for the years 2016 (in blue), 2017 (orange), 2018 (yellow), 2019 (purple).

period, the change varies considerably between the different departments and not all departments reduced their emissions in 2019 (Table 2 and Fig. 3a). The largest departmental decrease is found for OE10 (-47.3 %), which is one of the departments with the highest emissions during the base period, while the largest increase is found for OE5 (+23.2 %), which has one of the lowest emissions per FTE. Therefore, small changes in the absolute numbers for OE5 lead to a large percentage change. The year-to-year variations are quite large within the individual departments (Fig. 2), highlighting that one should be careful about drawing conclusions on the general evolution of the emissions based on a short period. For some departments, however, the total emissions seem to decrease (e.g. OE6, OE10, OE16) while others increase (OE3) each year. The largest increases are found for OE2 (+110.2 %) and OE17 (+85.9 %). Note, that some organizational units did not report their emissions during the base period, and hence the change in emissions between the base period and 2019 might be misleading, and the impact of the 2019 emissions will be inflated. If the missing base period emissions are considerable, that would imply that the total ETH emissions would also be higher. See Fig. 2b for the evolution of emissions for the different units, and Table 2 for the changes.

The departments have adopted different reduction targets and strategies for reaching them. Figure 3b shows the emission reduction targets set by the departments relative to their status at the end of 2019, i.e., their change in emissions per FTE in 2019 relative to the base period. The dots should be on or below the dashed line if all departments had already met their target (without plane efficiency gain taken into consideration). Some departments have already in 2019 reached – and surpassed – their reported 2025 targets. However, there is in general no relationship between the size of the reduction target and the 2019 emission reductions. This result should be interpreted with care due to the large year-to-year variations of flight emissions by the departments.

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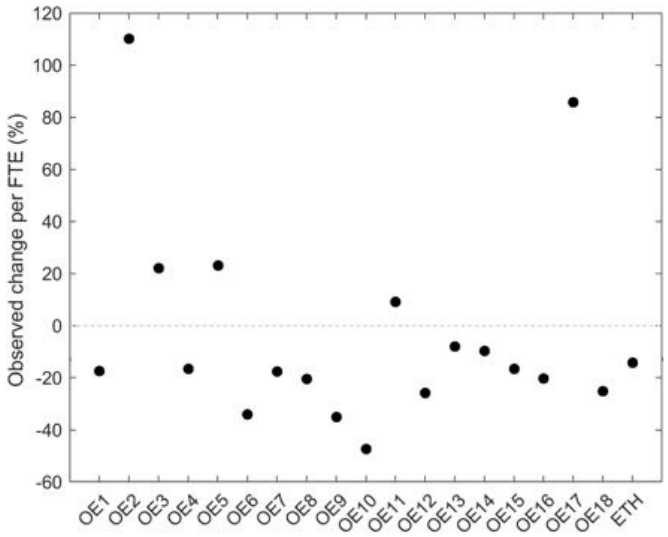

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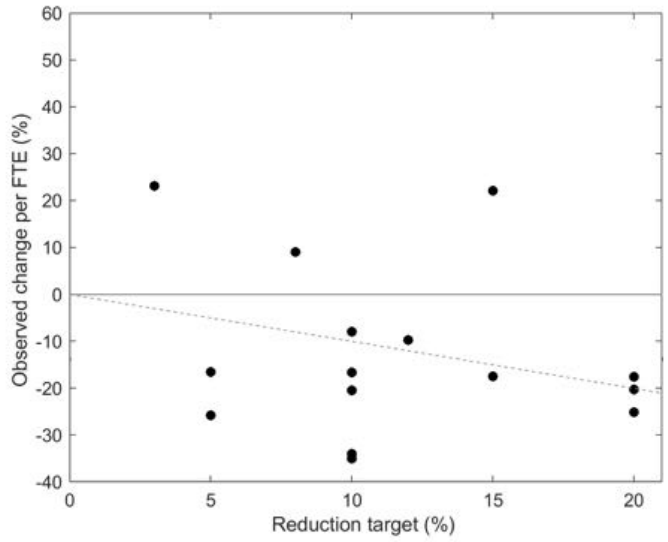

Figure 3: a) The change in flight emissions per FTE in 2019 relative to base period (given in %) for the different units. b) Scatter plot of the changes given in a) and the reported reduction targets for the same unit. The solid line indicates no change, and the dashed line indicates where the reductions equal the reduction targets. Note, OE2 and OE17 are omitted since not all sub-units have reported reduction targets.

2.2 Emissions per employment category

Figure 4 shows the breakdown of the annual emissions on the employment category of the traveller. A considerable part of the flight emissions for the base period (∼16 %) can be attributed to guests. Disregarding this category, the total internal emissions from staff and students have stayed relatively constant over the four years. The technical and administrative staff[3] contributed a larger portion of the emissions in 2019 than in the base period.

The evolution of the emissions broken down on employment category can be seen in Figure 5. This shows that for the total emissions, the professors account for the largest contributions followed by the doctoral students and senior researchers (Fig. 5a). Also the students contribute a non-negligible part of the total emissions. Taking into consideration the different sizes of the groups (Fig. 5b), averaged over the four years, the emissions from 1 professor (per FTE) equals 1.9 guests, 5.6 senior researchers, 7.7 doctoral students, 22.4 technical/administrative staff, or 78.3 BSc/MSc students. For BSc/MSc students, the FTE is based on the number of enrolled students (BSc, MSc, MA, CAS, MAS, and MBA), and for the doctoral students, it is based on the employment status and not the student enrollment status. Guest emissions per FTE are calculated as the total guest emissions divided by the number of FTE for professors. This is based on the assumption that a guest visits a group, and one group is considered more or less the same as one professorship.

Relative to the base period, all employment categories reduced their emissions for both the total emissions and emissions per FTE (Table 3), except for the technical and administrative staff. The emissions for the technical and administrative staff increased by more than 200 %. After 'Guests', 'Senior Researchers' is the employment group with the largest reductions. Although there are large reductions in the emissions from student flights in 2019 compared to the base period, the magnitude is misleading. The reduction is, at least partly, due to biannual excursions/field trips in the curriculum leading to large emissions from the students every other year, and 2019 was a year with less excursions. This is particularly evident for OE1, OE7 and OE18 (see Fig. 6 and 7).

It seems like the strategy that has been adopted by most departments is reducing the total emissions through restricting guest travels (Fig. 8) and reducing the impact of the emissions reductions on doctoral students, leading to the result that this employment category has reduced the least. On the opposite end, the technical and administrative staff have increased in most units (see Section 3 for caveat).

[3]Note that flights taken by technical and administrative staff might have been underrepresented in the 2016-2018 data. See Sect. 3 for more details.

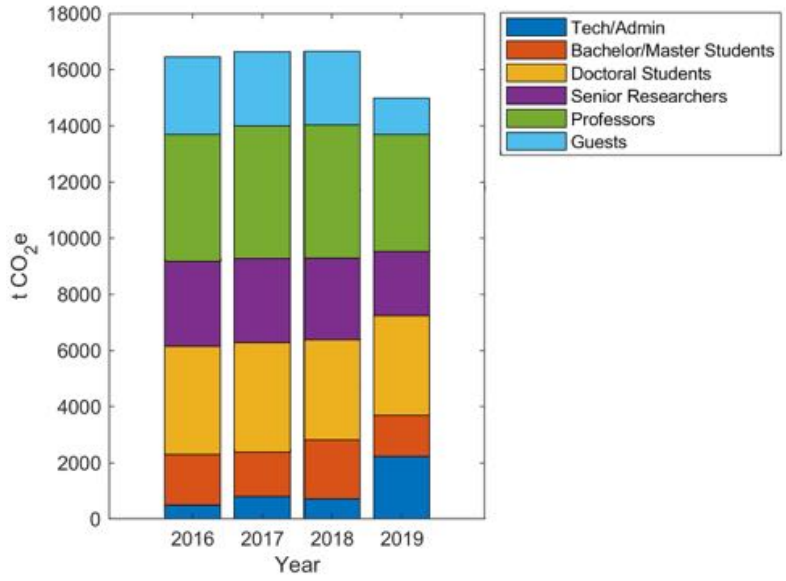

Figure 4: The breakdown of the total flight emissions (t CO_2e) based on employment category.

Table 3: Change in ETH-wide emissions per employment category in 2019 relative to the base period for total emissions and emissions per FTE (in %).

Employment category	**Δ Emissions**	
	total (%)	per FTE (%)
Tech/Admin	+232.9	+209.7
BSc/MSc Students	-19.8	-26.4
Doctoral Students	-6.3	-10.0
Senior Researchers	-22.9	-25.2
Professors	-10.7	-13.1
Guests	-51.4	-52.8

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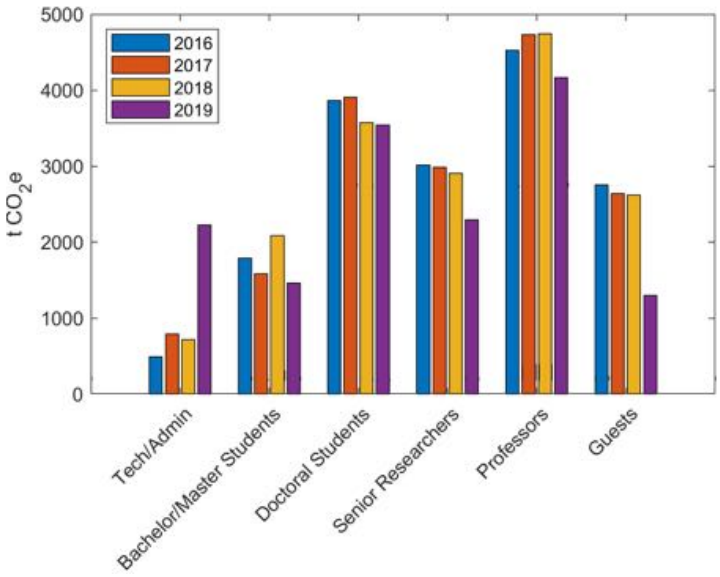

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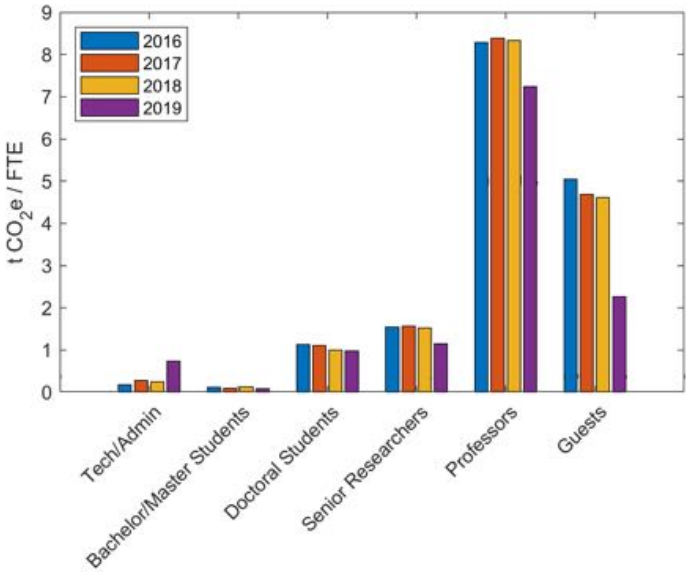

Figure 5: Flight emissions in a) t CO_2e and b) t CO_2e / FTE per year (in color) for the different employment categories. In b), guest emissions are calculated relative to the professor FTE.

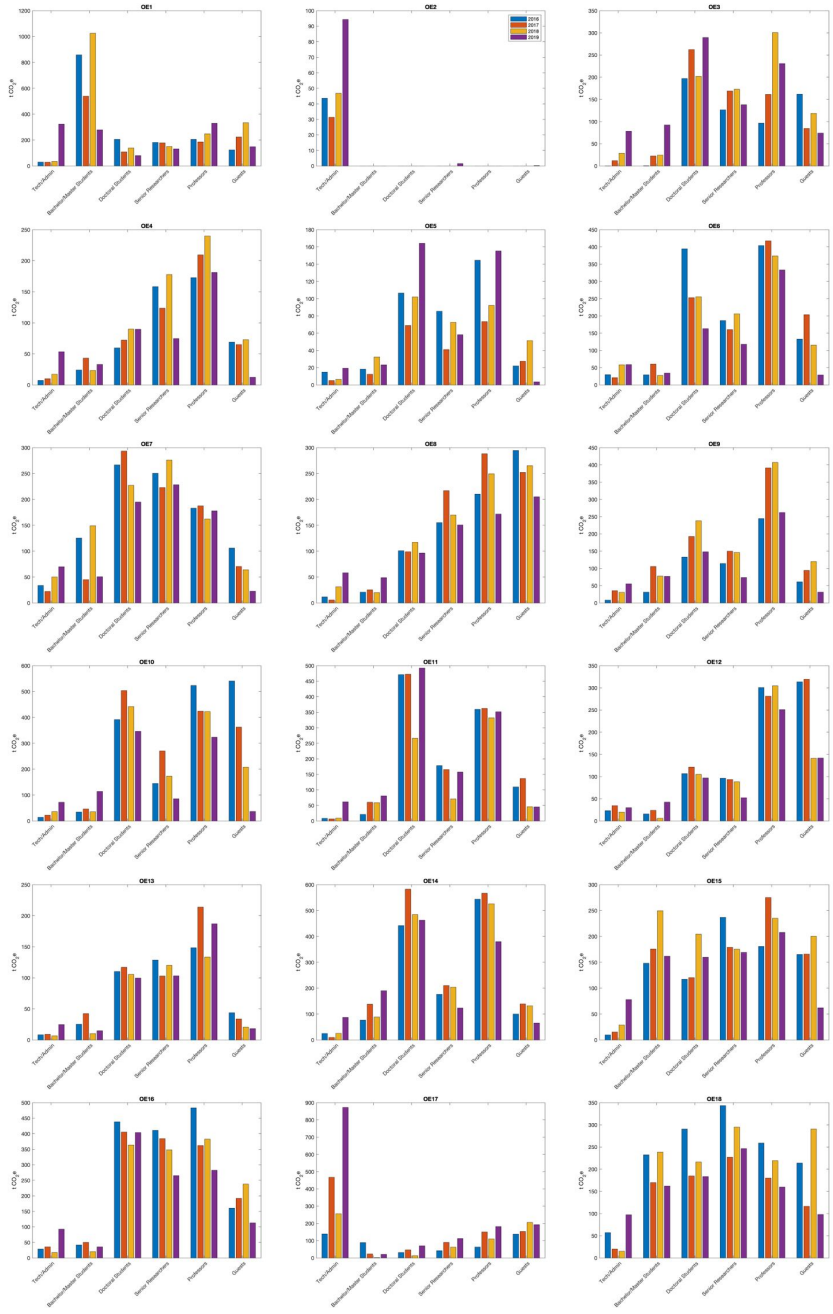

Figure 6: Annual flight emissions (in t CO_2e) for each employment category in the different units (the year is snow in color - see OE2).

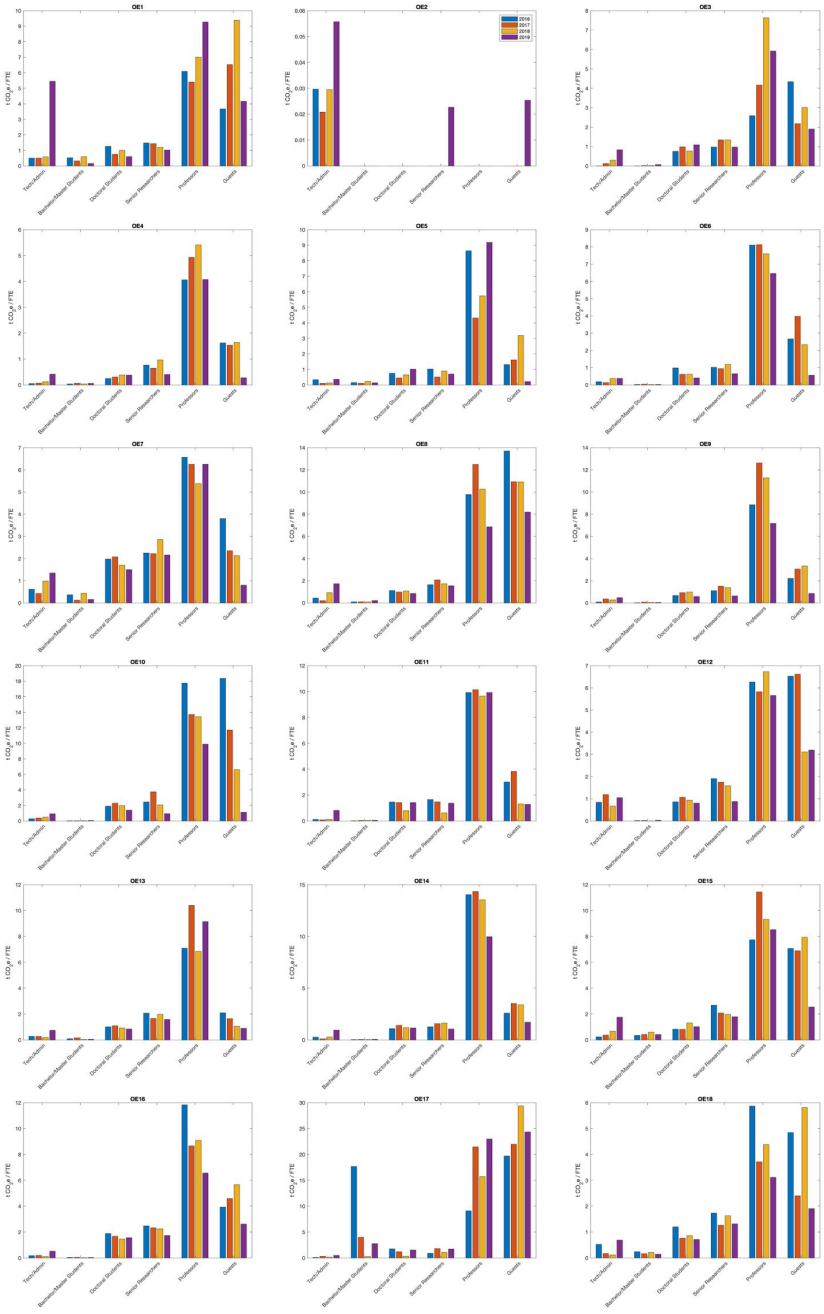

Figure 7: CO_2 emissions (t CO_2e / FTE) for the employment categories in the different departments per year (in color - see legend in b) OE2). The emissions for guest are divided by the FTE of professors.

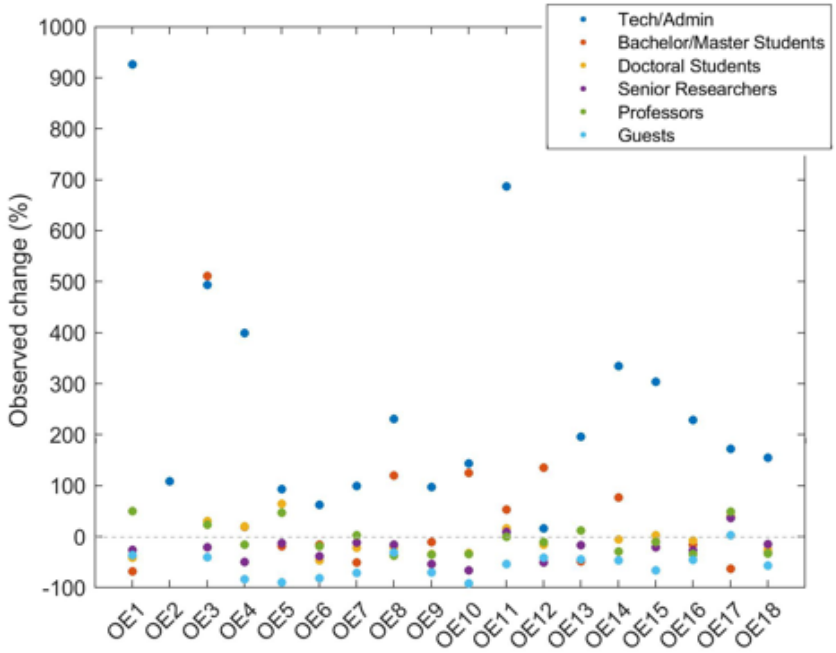

Figure 8: Change in 2019 emissions per FTE (in %) relative to the base period (2016-2018) related to employment category in the different departments. The color coding indicates the employment category.

2.3 Emissions related to flight distance and flight class

In total, ETH staff, guests and students annually traveled on average 87.3 million km during the base period (Fig. 9). This amounts to an average of 9 479 km / FTE per year, or almost the distance between Zurich and Tokyo (9 576 km) for every person employed at ETH. The distance flown has decreased in accordance with the emissions reductions in 2019 relative to the base period. For trips taken by ETH students and staff (excluding guests), the distance travelled increased in 2019 relative to the base period (Fig. 10). This is mainly due to the large increase for the technical and administrative staff.

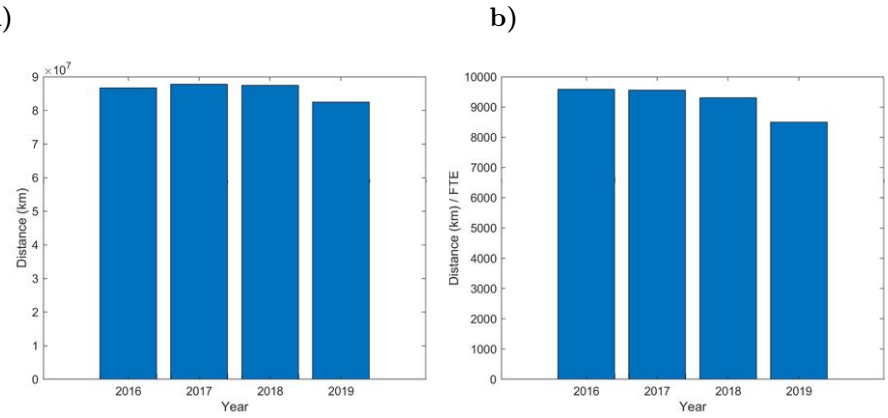

Figure 9: ETH wide a) total distance (in km) and b) distance per FTE flown per year

The largest contribution to the emissions comes from long-haul flights (>1 750 km). These emissions account for ∼86 % of the emissions but come from only ∼37 % of the total number of flights (Fig. 12). Even though the majority of the flights are economy class, business class flights contribute a considerable amount of the emissions relative to the number of flights and the distance flown (Fig. 13; See Figure 11 for a reference to what the distance categories indicate). The distribution of both number of flights and emissions from economy, business and first class vary between the departments and units (Fig. 14 and 15, respectively). Overall, however, economy class flights dominate, and very few flights are taken on first class.

The number of flights has gradually decreased over the period. For 2019, this was due to a reduction in short (<500 km) and intermediate (750-1 749 km) distance flights (Fig. 12d). The reduction in the number of short distance flights had only a small impact on the total emissions reductions (Fig. 12e)since the emissions are mainly related to the total distance (Fig. 12f). The number of long-haul flights (>1 750 km) increased in 2019 relative to the base period, but since the distance of the long-haul flights decreased, the number of business and

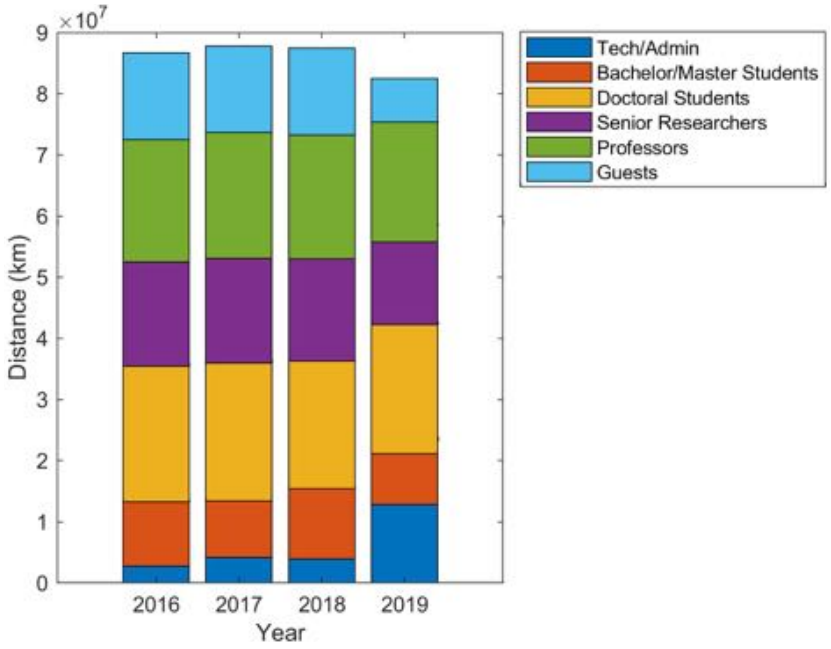

Figure 10: Distance flown (in km) per employment category for ETH as a whole

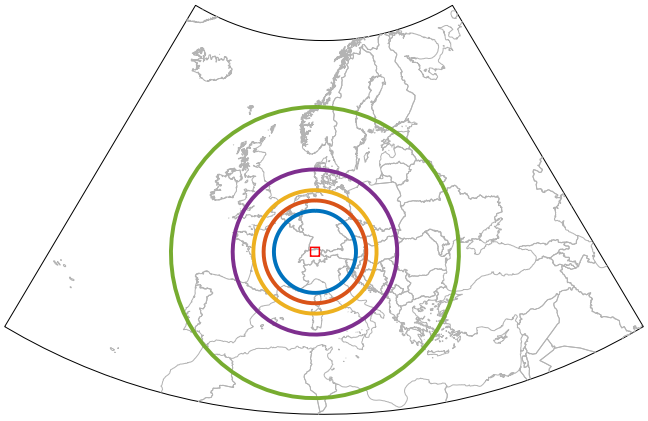

Figure 11: Illustration of what the distance classes represent when using Zurich as a starting point. Blue circle indicates the edge of 499 km from the origin, orange 624 km, yellow 749 km, purple 1 000 km, and green 1 749 km. Flights beyond the green circle are counted in the cyan class in the top panels of Figure 12.

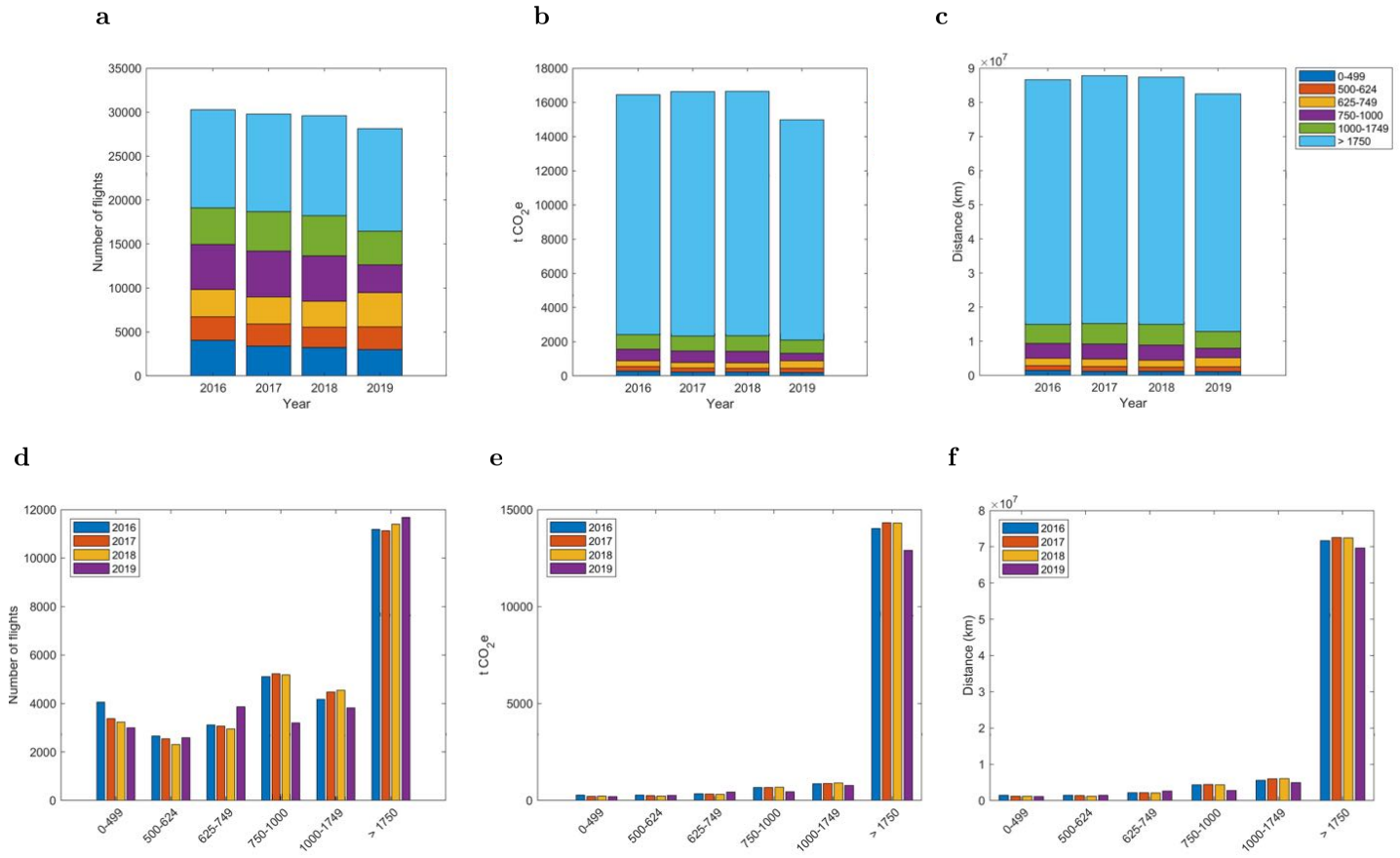

Figure 12: Annual number of flights (a and d), flight emissions in t CO_2e (b and e) and distance in km (c and f) for each distance category.

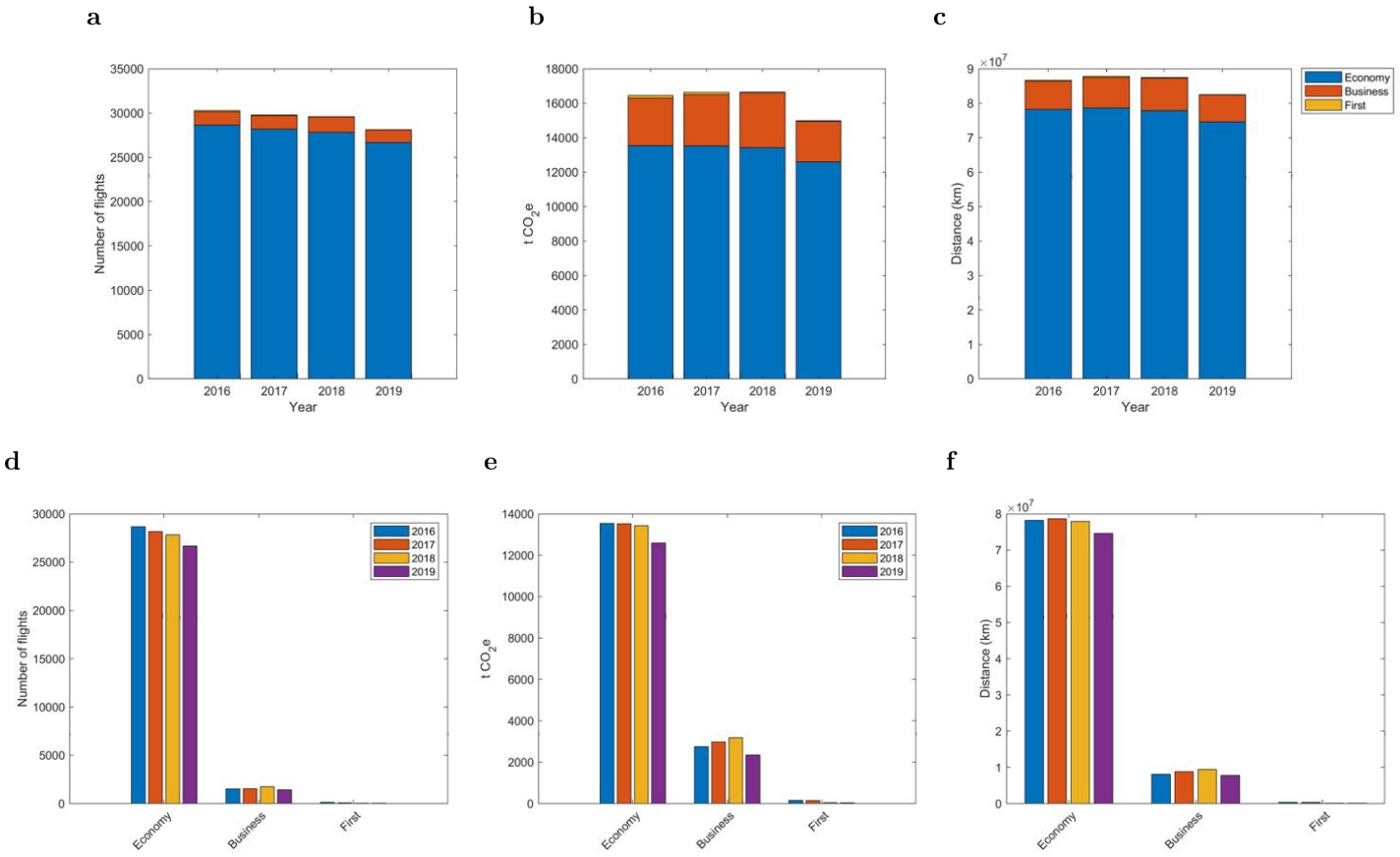

Figure 13: Annual number of flights (a and d), flight emissions in t CO_2e (b and e) and distance in km (c and f) per flight class.

first class flights decreased, and the emissions per km on business and first class flights decrease increased in (Fig. 19b), the overall emissions from long-haul flights decreased.

Most departments have suggested to adopt specific policies for reducing their emissions. These included among others to ban first class and to avoid travelling business class, which could be replaced by the same flight on less CO_2 intensive economy class, and to limit short flights, which could be replaced by other means of transportation. For ETH as a whole, business and first class flights amount to 18.6% of the flight emissions in the base period and 16.0 % in 2019, and short distance flights (<500 km) amount to 1.4 % of the emissions in the base period and 1.3 % in 2019. The number of flights and flight emissions by department for different distance and flight classes are shown in Fig. 14 - 17.

Not all short flights cover the full distance of a journey from start to finish but might be part of a longer trip. A journey is here identified as the same travel reimbursement claim. For 2016-2018, we can investigate how many of the short flights are related to a long distance flight, or what fraction of the short flights are related to multiple legs of short flights, potentially indicating a long flight.

During the base period there were 89 841 individual flights taken spread over 40 500 journeys. 11.9 % of these flights were in the distance category 0-499 km, 8.4 % 500-624 km, 10.2 % 625-749 km, 17.3 % 750-1 000km, 14.7 % 1 000-1 749 km and 37.6 % were >1 750 km.

- 33.5 % of 0-499 km flights are connected to long-haul flights.
- 19.4 % of 500-624 km flights are connected to long-haul flights.
- 14.6 % of 625-749 km flights are connected to long-haul flights.
- 14.0 % of 750-1 000 km flights are connected to long-haul flights.
- 22.3 % of 1 000-1 749 km flights are connected to long-haul flights.
- 37.9 % of all long-haul flights are related to a journey with more than one short to intermediate (all except long-haul) flight, but 75.4 % of long-haul flights are part of a journey consisting of two or more long-haul flights.
- 5.5 % of all short (0-499 km) flights are part of a trip with 3 or more short flights (indicating at least two legs for one direction) but no long-haul flights.
- 9.4% of all journeys contain 3 or more flights but no long-haul flights (indicating that these are also longer flights but come across as short journeys when only considering individual flights).
- 56.3 % of journeys consist of 2 flights, indicating a round trip.
- 9.7 % of all flights are single flight journeys.

- 1.1 % of all flights are single short distance (0-499km) journeys.
- 1.8 % of all flights are part of a journey consisting of 2 short distance (0-499 km) flights.

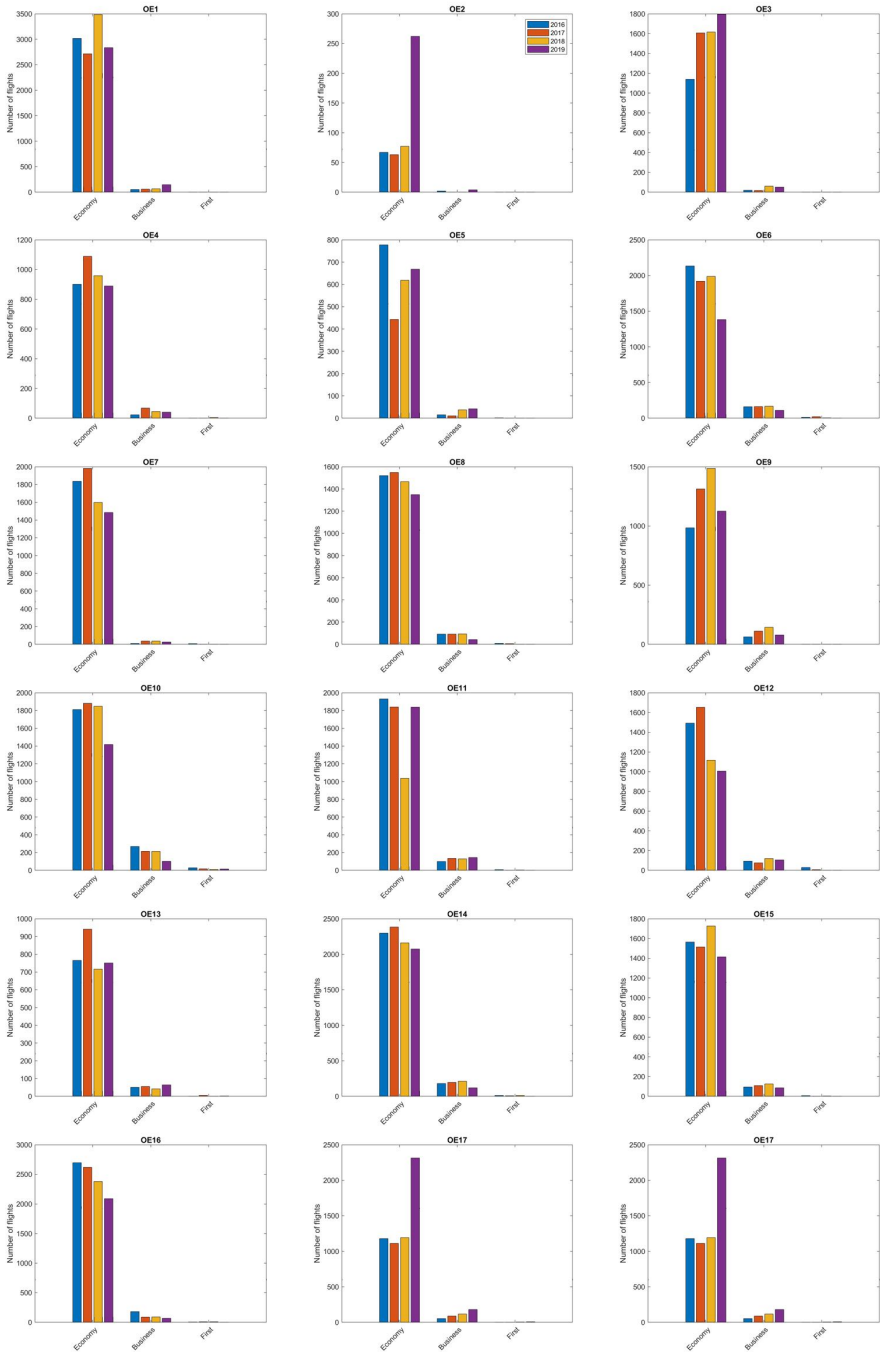

Figure 14: Number of flights for each flight class traveled in the different departments per year (in color - see legend in b) OE2).

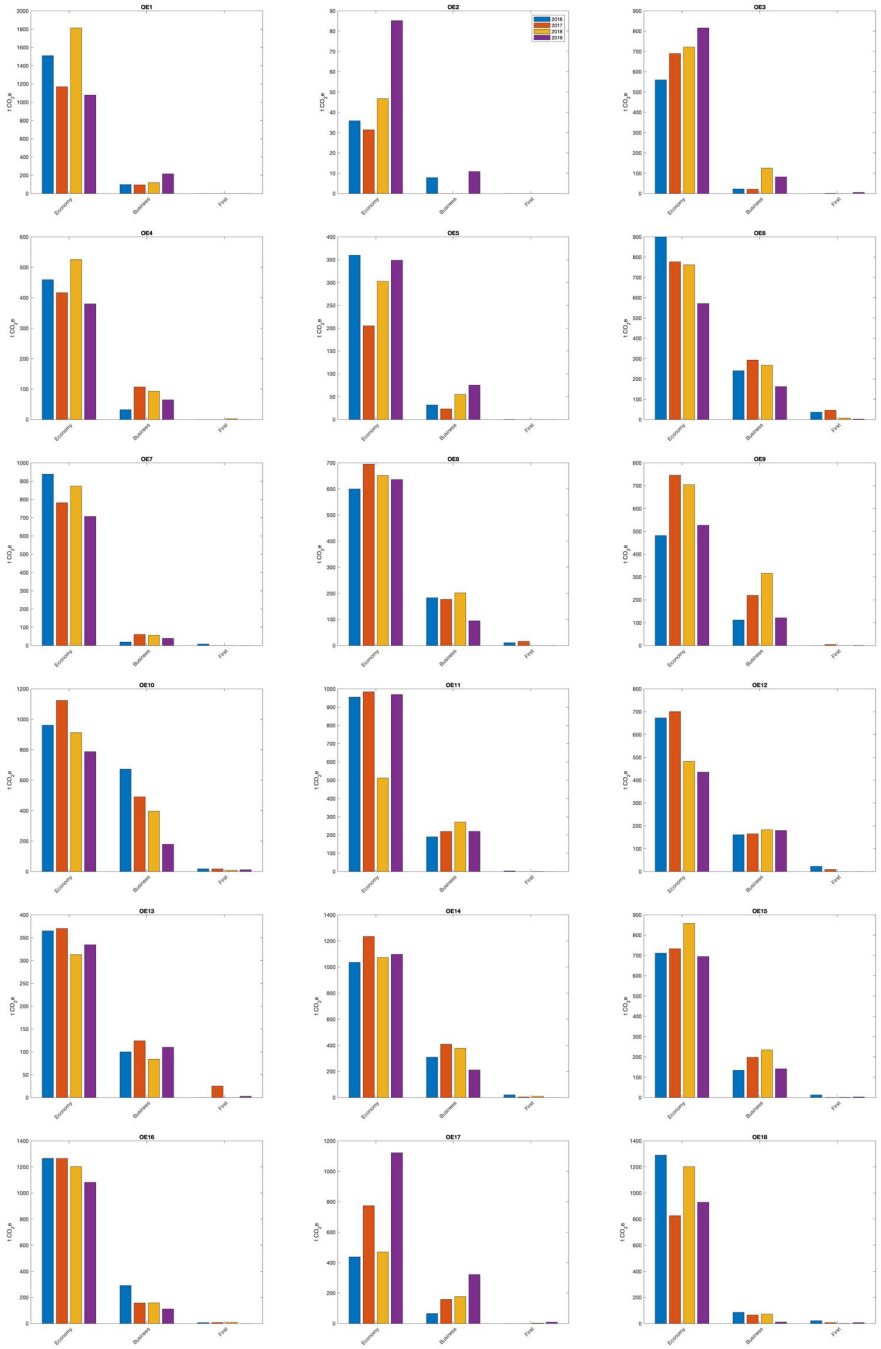

Figure 15: Total flight emissions (t CO_2e) for each flight class traveled in the different departments per year (in color - see legend in b) OE2).

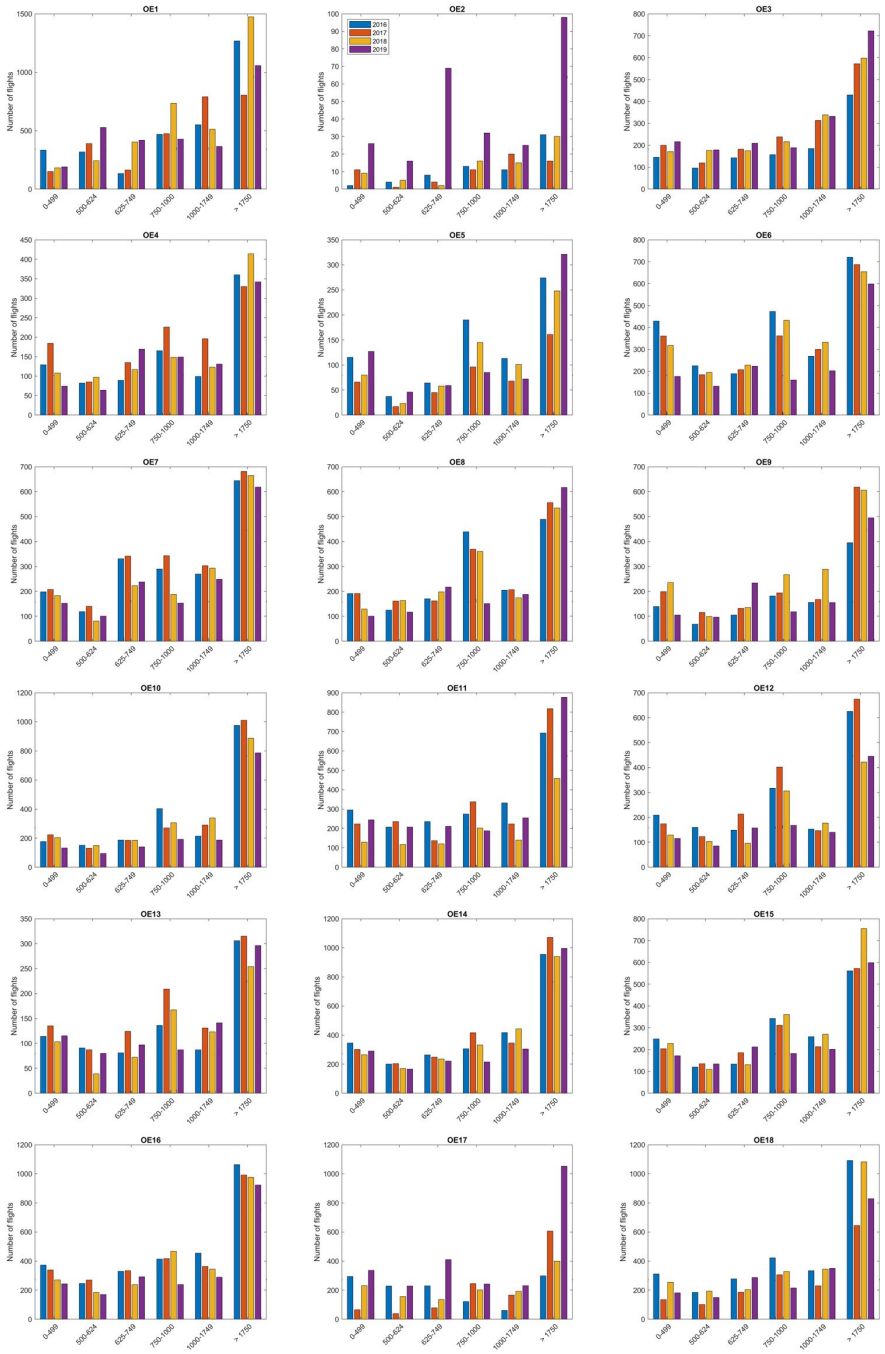

Figure 16: Number of flights per distance class traveled in the different departments per year (in color - see legend in b) OE2).

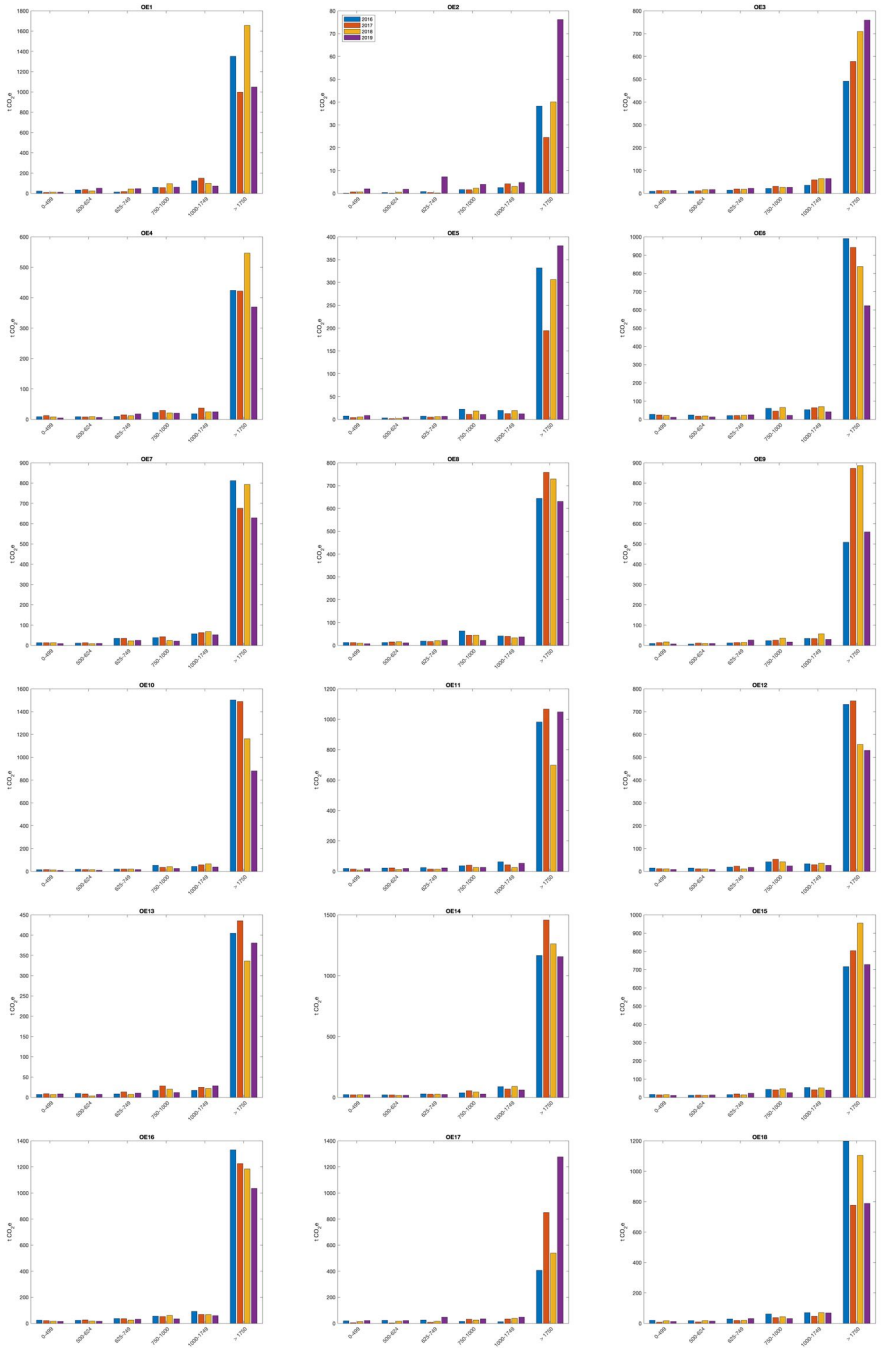

Figure 17: Total flight emissions (t CO_2e) per distance class traveled in the different departments per year (in color - see legend in b) OE2).

3 Quality control and corrections

The 2016-2019 ETH flight emissions have been quality controlled and updated compared to earlier versions of the data. This control led to duplicate entries being removed, missing calculations being included, wrongly allocated emissions to cost centers corrected, and employment category for all travellers being added to the 2016-2018 data. For 2019, the emissions were recalculated using updated flight information from Atmosfair.

3.1 2016-2018

Duplicates
In the updated data for 2016-2018, a total of 4 733 duplicated entries have been removed from the departments and units. For the departments, duplicates were mainly concentrated in the departments OE1, OE12, OE16, OE15, OE7, and OE17, but duplicate entries were removed from all departments.

Allocation to new cost centre
In addition, there has been a minor redistribution of wrongly allocated emissions between departments, where attribution of emissions to the wrong cost centre occasionally led to the emissions being attributed to the wrong department. This led to only minor changes in the overall emissions for the departments. In addition, flights taken as part of a study exchange program, paid for by the Student Exchange Office have been allocated to the department where the student was enrolled at the time.

New entries
One sub-unit of OE17 originally only reported detailed information for journeys taken between April and December 2018 but provided a summary for the number of flights to each continent for each year. This information was used to approximate the missing emissions for the base period. For January to March 2018, the emissions for April to June 2018 were duplicated. The now complete 2018 data were then duplicated for 2016 and 2017 since the number of trips and distances were roughly the same for the three years.

For another OE17 sub-unit, the original dataset only included emissions for 2017 due to corrupted files. New calculations have been made for flights taken in 2016 and 2018. This resulted in an additional 1747 flights being included.

Employment category
For around 25% of the entries, no employment category was given in the original dataset (red section in Fig. 18a), and in some cases, the same person was listed with different employment categories for the same year.

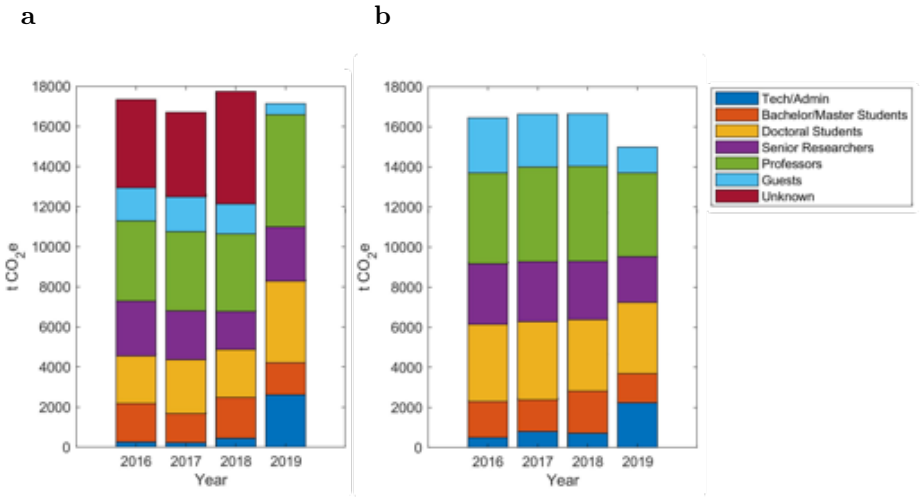

Figure 18: The breakdown of the total flight emissions (t CO_2e) based on employment category for the dataset a) before and b) after quality control.

To determine the employment category, whether or not a traveler was staff, guest or a student, the names of all travelers were controlled against ETH Human Resources records of employment status on 1. January each year. If a person could not be identified from these lists, then: 1) the ETH Research collection was searched for completed doctoral thesis or affiliation as co-author of publications, 2) the ETH web-page was scanned for current position, a personal ETH web-page containing CV indicating positions back in time, lists of group alumni or affiliated doctoral students, department websites containing information on status from articles on awards, or news indicating whether a traveler is a guest etc., 3) if still not identified, google and LinkedIn was used to identify the traveler.

The allocation to the status BSc/MSc students could only be verified for students also being employed as a "Hilfsassistent" in a specific group. Therefore, all names of travelers listed as students from the department lists were checked against the HR lists of employees to eliminate entries that should otherwise be listed in any of the other employment categories. If not detected, these were assumed to be students.

If none of the above points provided results, and the departments could not identify the traveler, the traveler was allocated to the category 'Guests'. In total, this control resulted in 28 525 changes to the employment category, where the majority was allocation for missing information (22 102 entries).

a **b**

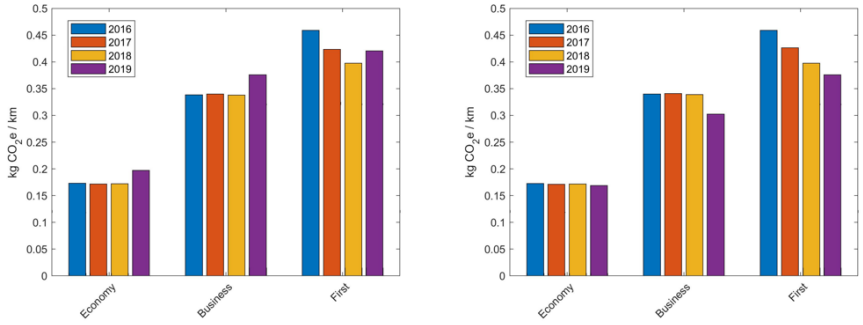

Figure 19: Flight emissions per km traveled (kg CO_2e / km) per flight classes each year for a) the pre-quality checked and b) post-quality checked emissions data. The color indicates the year.

3.2 2019

In the original data, there was a mismatch between the reduction in distance traveled compared to reductions in flight emissions for 2019 relative to the base period (Althaus and Graf, 2020). This mismatch came from emissions from too many flights being calculated using a too high flight class dependent emission factor per km traveled compared to what it should have been. This emission factor is normally only used when specific information about flight and plane is missing, which is not the case here. Therefore, the 2019 flight emissions have been recalculated with updated information from Atmosfair. This led to the 2019 emissions being reduced by 3.6 %. Figure 19 shows the flight emissions per km traveled (in kg CO_2e / km) broken down on flight class for both the old and new calculations.

After the updates following the quality check, the annual average ETH Zurich emissions decreased from 17 256 to 16 578 t CO_2e (3.6 %) for the base period, and the emissions for 2019 decreased from 17 140 to 14 986 t CO_2e

3.3 Uncertainty and implications

The total ETH wide emissions include uncertainties due to duplicate flights being entered into the system, flights being duplicated when the cost is shared between two or more units, wrongly duplicated flights, and unreported flights. For some administrative or staff units, no flight data was collected for the 2016-2018 period. Some of these units have also not reported data after 2018. Hence, the total ETH emissions are likely higher than reported. The seeming under-

representation of technical and administrative staff during the base period (Fig. 5) could indicate that the total emissions should be ∼1 600 t CO_2e higher (assuming the emissions from technical and administrative staff were the same in the base period as in 2019). If this is the case, the decrease in emissions for 2019 relative to the base period is larger than reported here. Another possibility for this seeming mismatch, is that technical and administrative staff are over-represented in 2019. This could be because the category in the reporting system is called 'Other'. Therefore, this category could be assumed to also represent undefined travellers, e.g. visiting scientists/professors or other affiliated travelers, that are not employed at ETH and should therefore be reported as guests.

Even after the quality control and updates, there are still uncertainties in the data and in the breakdown to department and employment category from wrong/missing allocation of cost centre (attributing emissions to the wrong group), allocation of emissions to students and guests, and due to unidentified duplicates. In addition, trips jointly booked for other travelers and later reimbursed (e.g. family members joining for sabbaticals booked on the same ticket, or joint bookings for travelers from several groups in connection with conferences etc) provide inflated emissions for some groups. It is likely that this occurs only rarely.

For OE10, there are considerable emissions related to bookings for an affiliated non-ETH unit, where not all should be counted in the ETH Zurich emissions. All of these emissions have been allocated to the category 'Guests' since it was not possible to determine whether the cost of a trip had been reimbursed after having been booked through ETH.

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