



Research

*Fédération
Aéronautique
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Cross-country soaring report 2008

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March 2009

The purpose of this study is to assess the state of cross-country soaring performance across gliding nations in an effort to draw useful conclusions for the creation of soaring development policy.

Not all cross-country flights are recorded for posterity. However, the rise of online cross-country competitions has encouraged an ever-increasing number of pilots to record and publish their soaring performance. The information now available on the internet, while not all-encompassing, presents a significant body of evidence for cross-country activity. At the least, we can regard this information as a "minimum evidence" of cross-country performance. With a bit of careful analysis, a number of interesting results can be drawn.

While the body of evidence available at present is in no way complete or authoritative, it is hoped that the analysis provided here can supply starting point for the evaluation of soaring activity across nations. The ever-increasing adoption of online championships can only improve our ability to refine this analysis in the future.

*This report has been compiled by the IGC Country Development Working Group.
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1. Participation

The data used in this analysis consists primarily of the collection of flights submitted to the OLC in 2008. A number of countries have well-evolved national online championships and in the case of France, United Kingdom and Denmark, the information has been integrated into the dataset. There has also been some data cleaning and adjustment, where this has been deemed necessary. The country membership figures being used in the analysis are from the 2008 IGC membership report.

The dataset is imperfect in a number of ways. Principally, the level of use of the OLC, or other online championships, is not uniformly guaranteed across nations and this creates problems in the direct comparison of data across countries. However, there are a number of conclusions to be made that, are significant indicators of current trends in cross-country activity.

As is apparent in figure 1.1, German pilots represent the largest portion of the dataset, but this is consistent with the country's membership numbers (table 1.1).

The first question that comes to mind looking at this data is how many people actually participate in cross-country flying? The numbers presented here represent a minimum of flying activity, in other words, we know that at least this amount of cross-country flights has taken place.

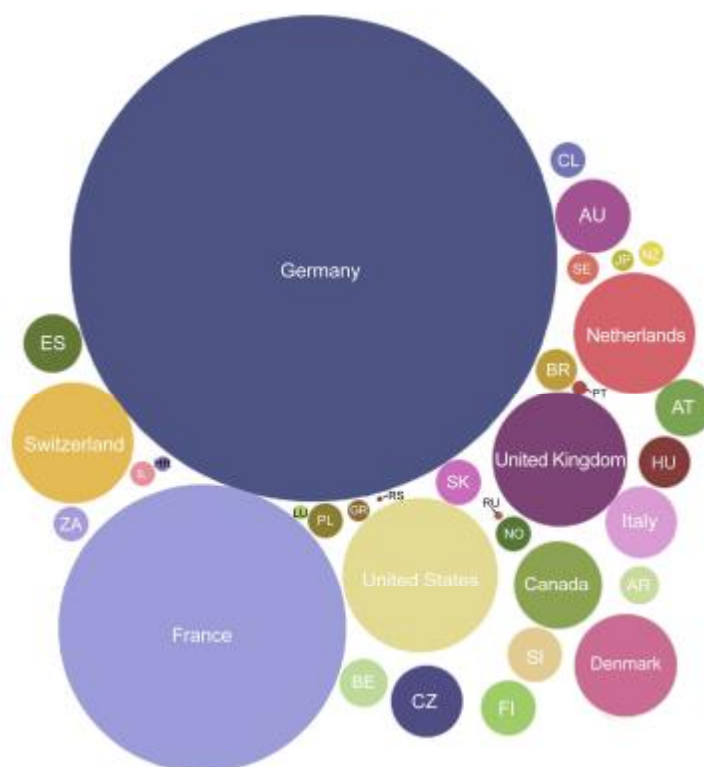


Figure 1.1 – Dataset pilot nationality

When we compare the figure of flights performed by pilots of a country to the published gliding membership numbers, we get a participation rate, i.e. the percentage of the country membership that chooses to participate in cross-country activity (Figure 1.2).

Table 1.1 – Pilot participation in dataset and country membership numbers

Country	Pilots	Country members	Country	Pilots	Country members	Country	Pilots	Country members
Argentina (AR)	50	165	Germany (DE)	7,701	30,792	Russia (RU)	3	250
Australia (AU)	186	2,436	Greece (GR)	13	95	Serbia (RS)	1	130
Austria (AT)	109	3,458	Hungary (HU)	85	892	Slovak Republic (SK)	63	715
Belgium (BE)	77	1,713	Israel (IL)	23	170	Slovenia (SI)	104	557
Brazil (BR)	56	400	Italy (IT)	163	1,734	South Africa (ZA)	42	582
Canada (CA)	244	1,075	Japan (JP)	16	663	Spain (ES)	112	514
Chile (CL)	40	152	Luxembourg (LU)	8	35	Sweden (SE)	30	2,321
Croatia (HR)	8	148	Netherlands (NL)	470	3,825	Switzerland (CH)	474	2,813
Czech Republic (CZ)	170	3,240	New Zealand (NZ)	21	797	United Kingdom (UK)	589	7,811
Denmark (DK)	333	1,683	Norway (NO)	39	1,332	United States (US)	790	29,192
Finland (FI)	96	2,244	Poland (PL)	43	2,274			
France (FR)	2,683	11,643	Portugal (PT)	6	70			

Pilots participating in cross-country

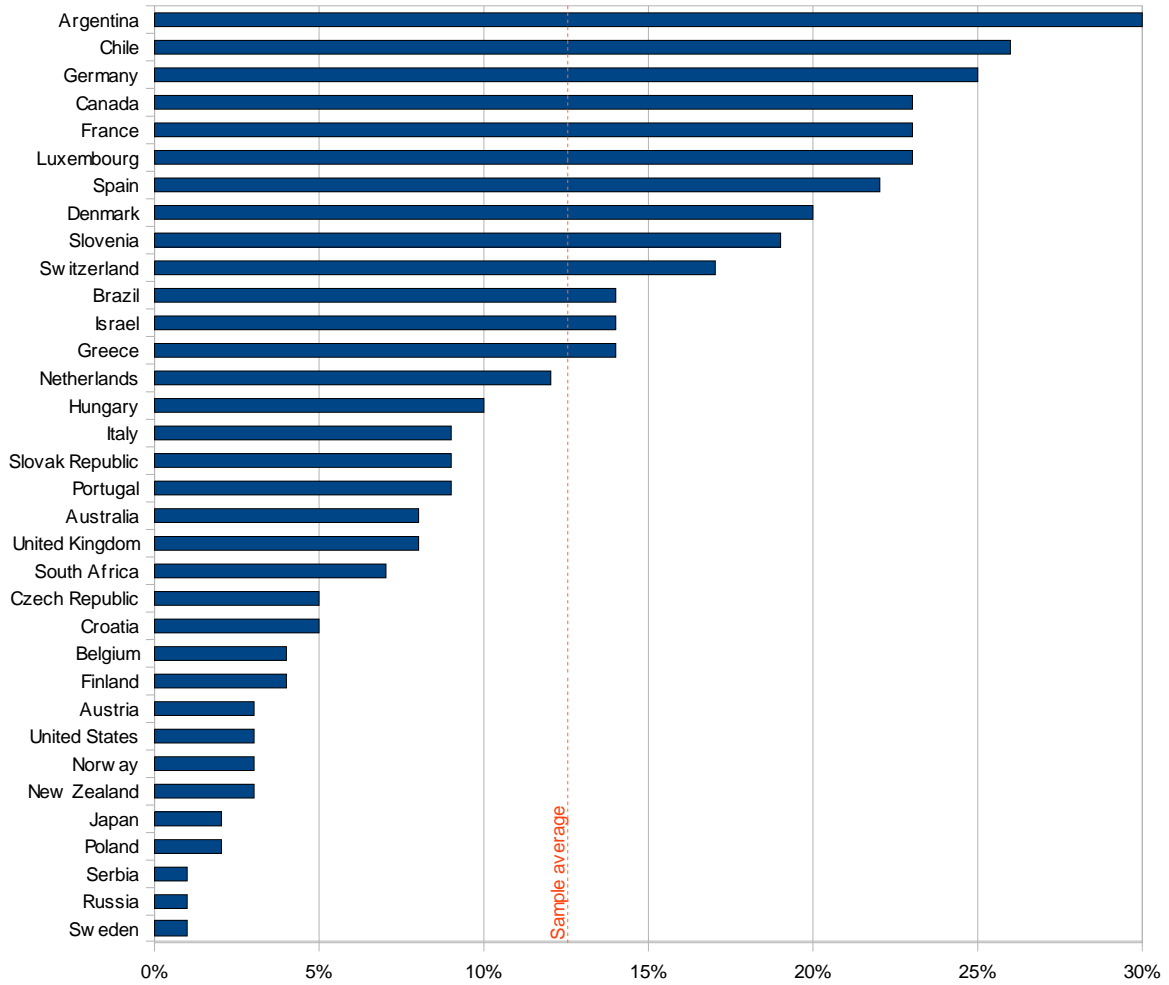


Figure 1.2 – Percentage of country membership participating in cross-country

Dataset sampling ratio according to global membership share

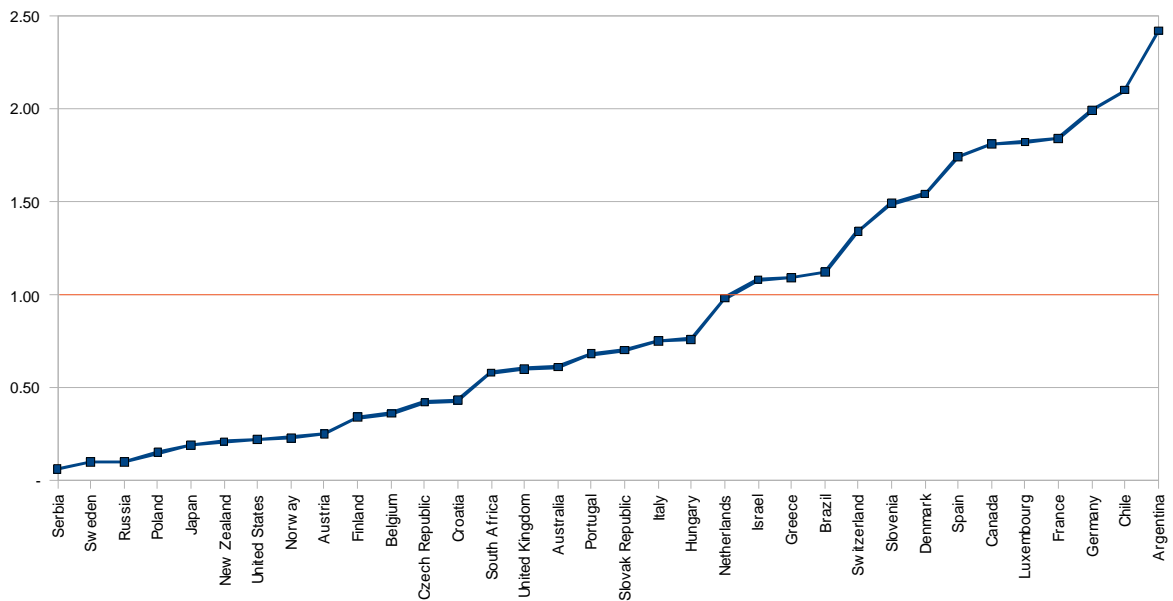


Figure 1.3 – Ratio of country pilots participating to country membership share

The obvious question raised when looking at this graph is whether what we are looking at is the true participation rate in cross-country, or whether it merely represents the popularity or not of the OLC (or national online championships in the case of some countries). Indeed, just by looking at the lower end of the graph, there are a number of nations we would expect to be performing better.

We can look at this information in a different way. By comparing a country's participation in the dataset to its share of total world membership, we can plot the same values as displayed in Figure 1.3. What we now effectively have is a participation sampling ratio for the study, which would imply the validity of our participation figures per nation. Countries above 1.00 can be characterized as being over-sampled, while the ones below are under-sampled. This is, of course, assuming that each nation has an equal ratio of its membership participating in cross-country.

The only thing we can say in certitude is that the truth is somewhere between these two different views of the participation numbers. There must be some national and weather factors that differentiate participation in cross-country across countries, while it is also true that online contest participation also differs due to local considerations. Last, in comparing numbers between nations we have to also take into account the possibility that membership numbers are counted in different ways by National Associations.

The only result on cross-country participation rates we can extract with certitude from this dataset is that in the least:

Participation in cross-country can be expected to reach at least 20% to 25% of total membership in a country with favorable conditions for soaring.

2. Performance

Figures 2.1 to 2.4 show the ranking of best performances achieved in the sample:

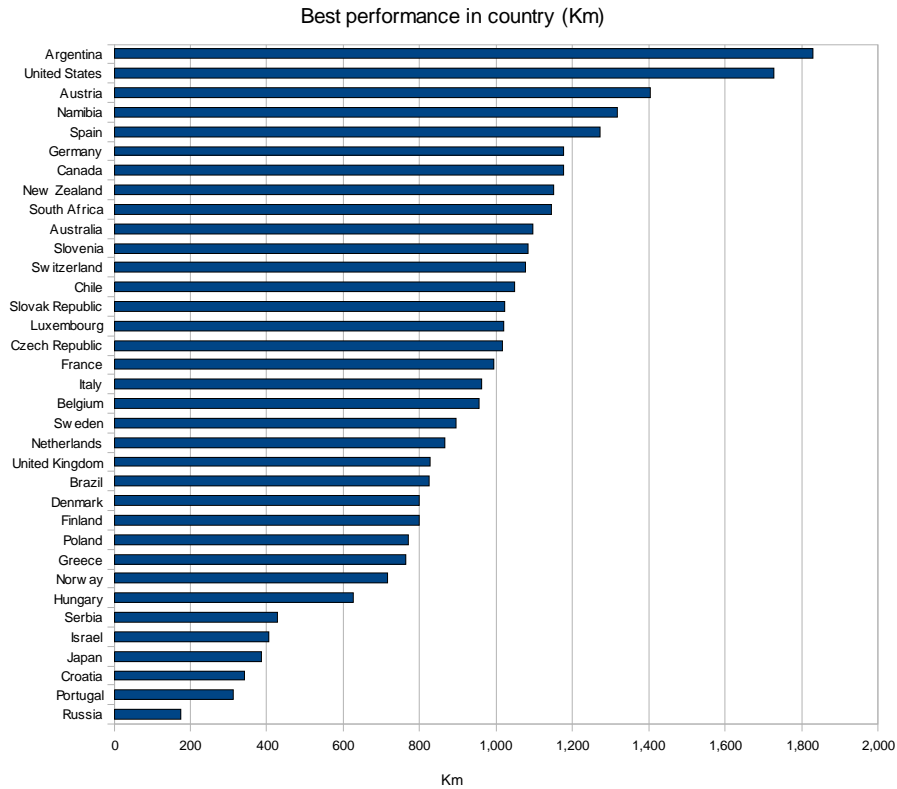


Figure 2.1 – Best distance performance achieved in country (km) in 2008

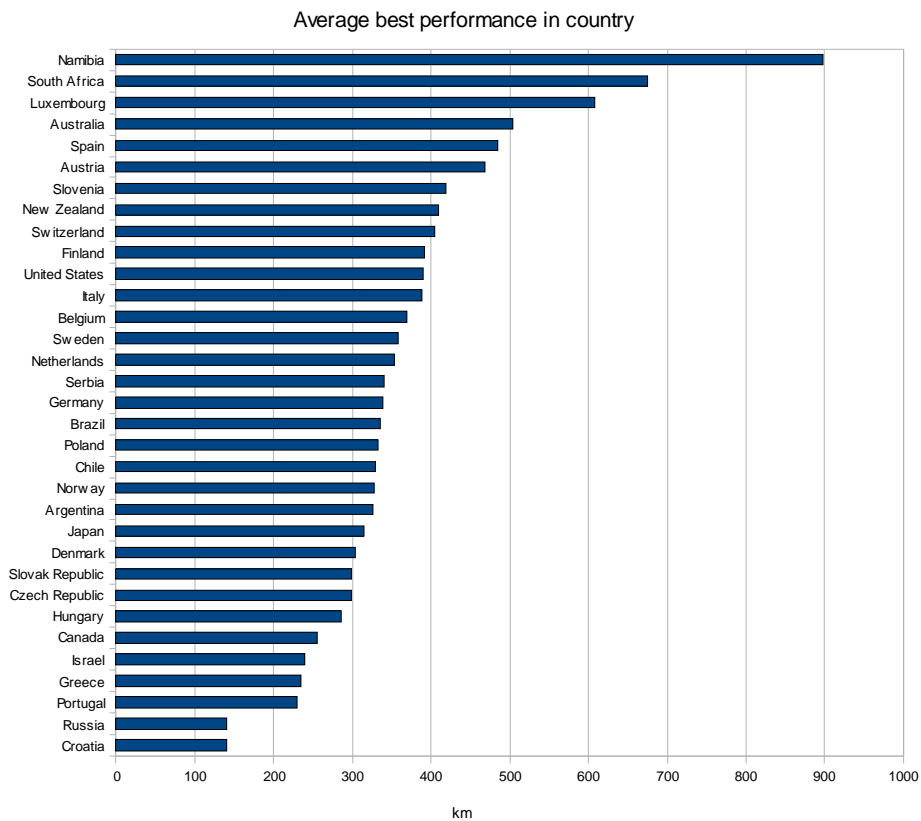


Figure 2.2 – Average of best performances of all pilots flying in country

Figures show the average of best performance for each pilot flying in the country. The chart does not contain figures for France and the United Kingdom

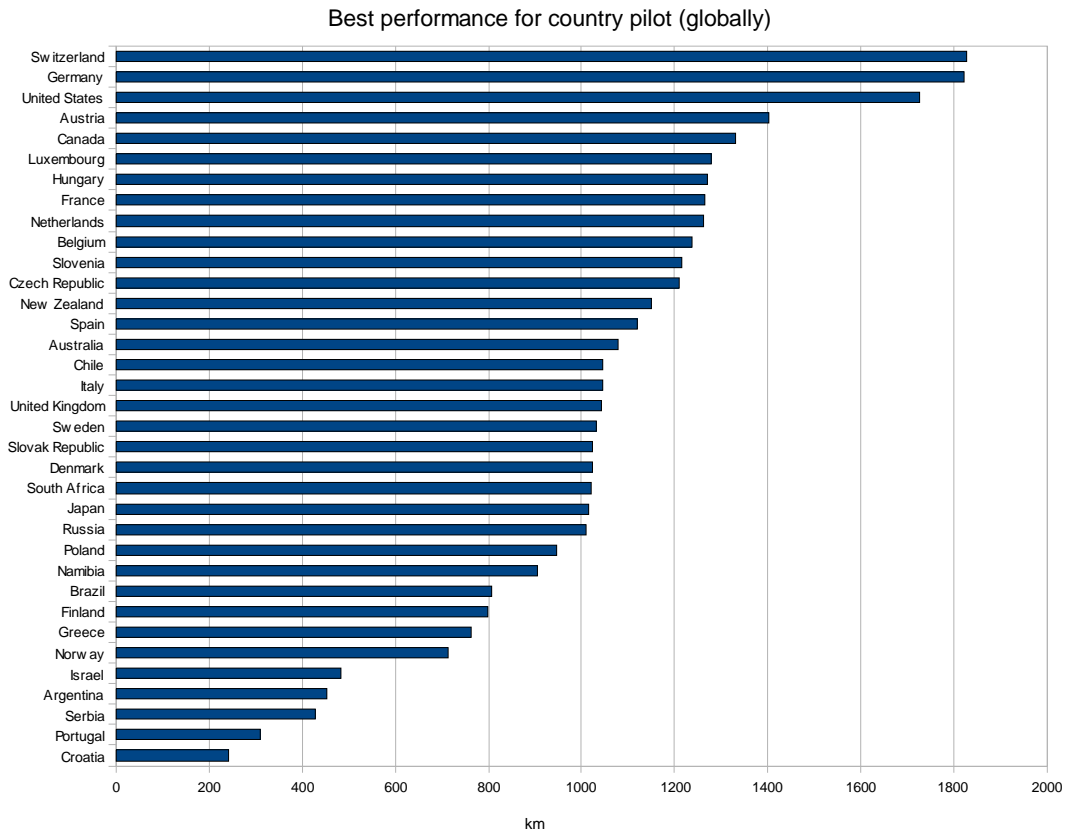


Figure 2.3 – Best performance achieved (km) for country pilot globally
 Flights taken into account include those that have taken place outside the pilot's country of origin.

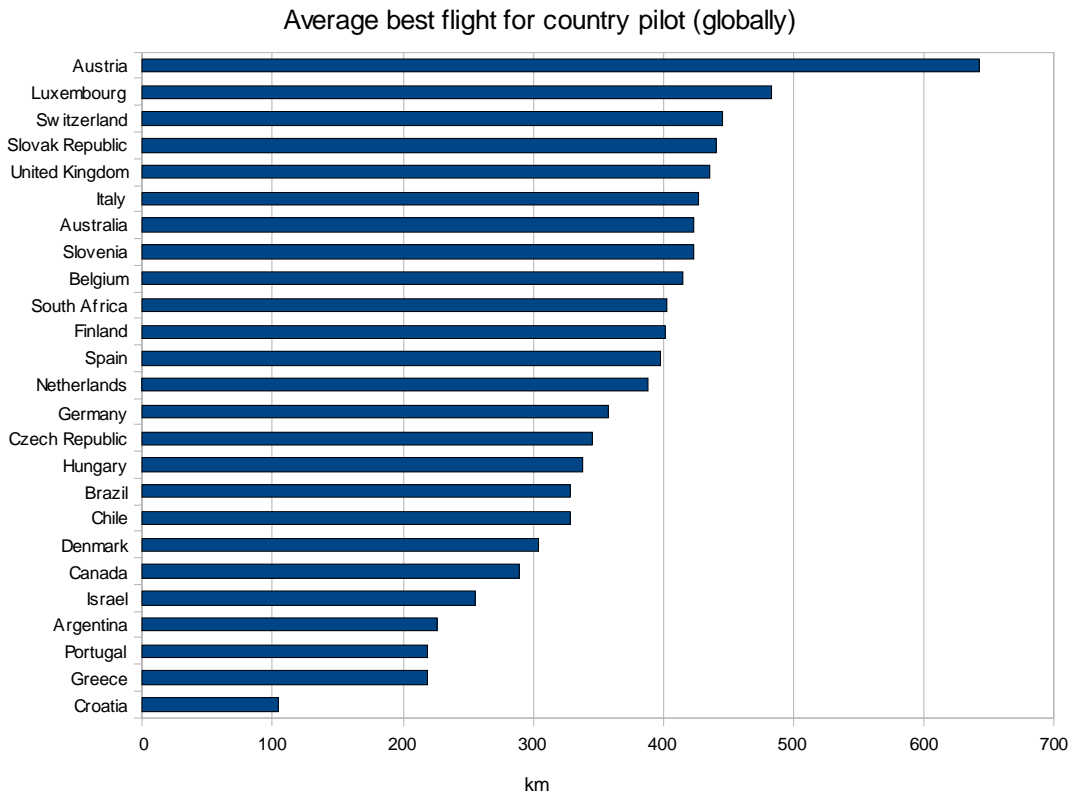


Figure 2.4 – Average of best flight per country pilot
 Data includes flights performed by country pilots globally. Only countries with a 3% participation in sample or more are included.
 The dataset excludes flights from FR, UK, DK national online championships.

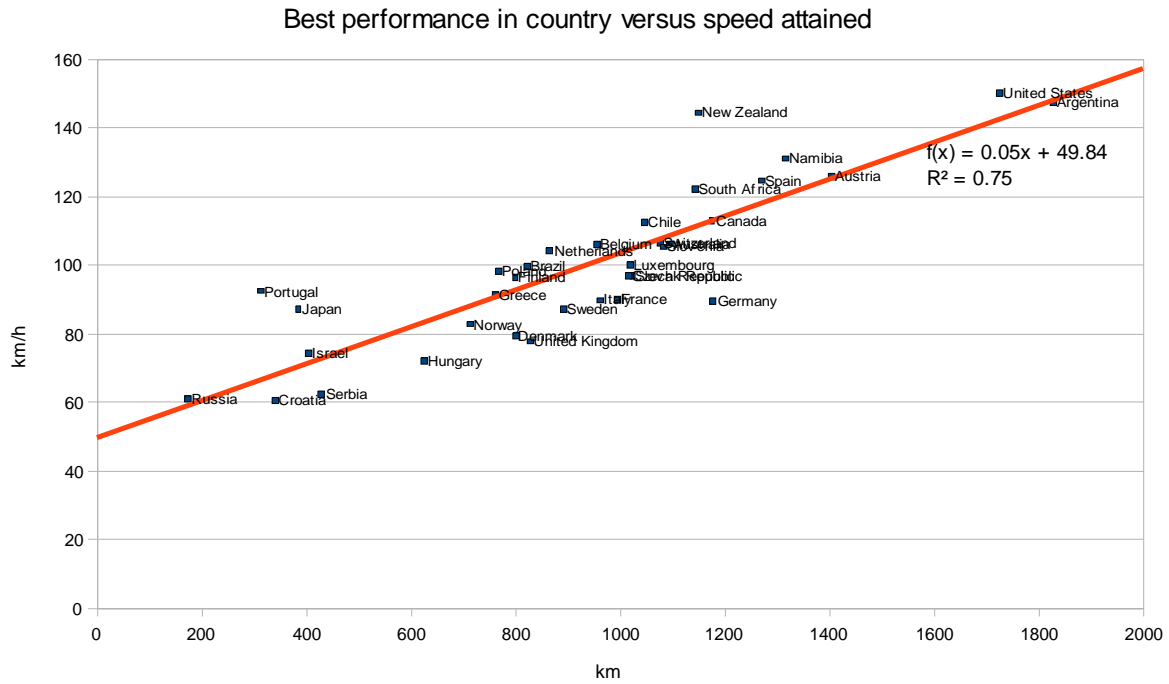


Figure 2.5 – Relationship of speed to distance of best performance in country
 Correlation (R^2) = 0.74. $f(x)$ indicates the function used to plot the trend curve.

Figures from the best performances in each suggest an extra 100 km of distance for every 5 km/h increase in speed, with 100 km/h required for a 1000 km flight

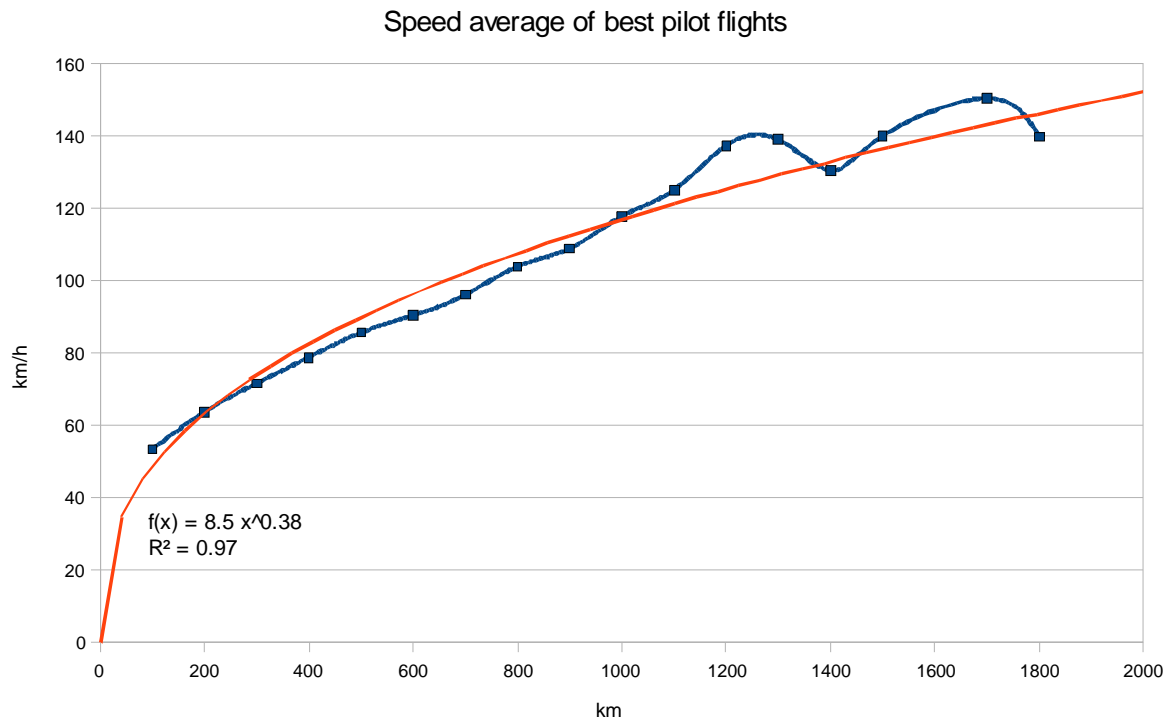


Figure 2.6 – Average speed of best pilot flight according to distance of performance
 Flights analyzed consist of the global sample of best flights per pilot. It excludes the dataset from FR, UK, DK

Figures from best pilot performances globally suggest an extra 100 km of distance for every 7 km/h increase in speed for flights below 1000 km, an extra 100 km of distance for every 4 km/h increase in speed for flights above 1000 km, with 120 km/h required for a 1000 km flight

3. Location

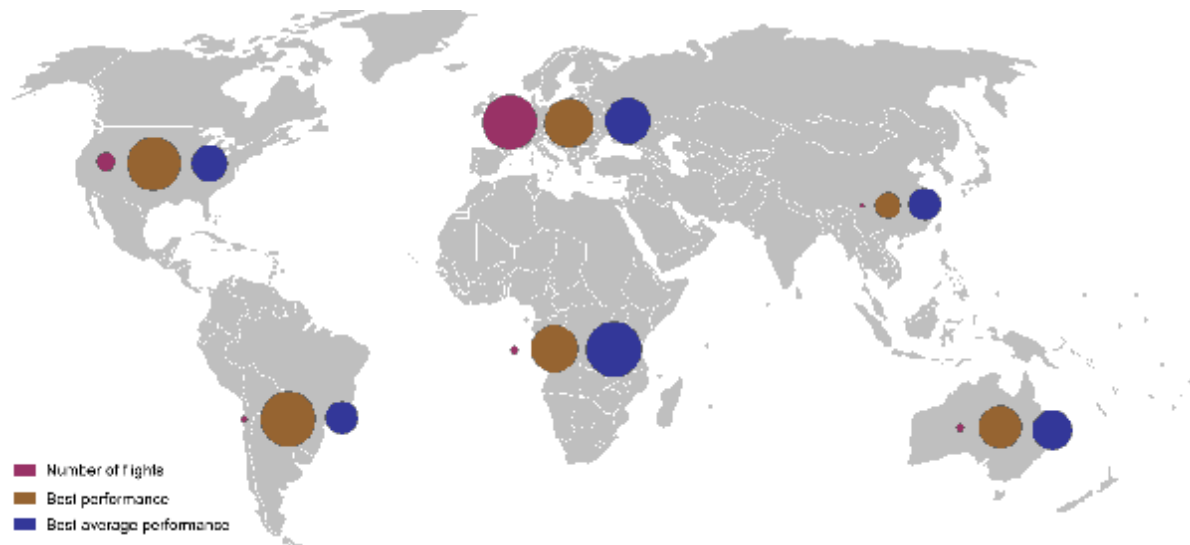


Figure 3.1 – Continental cross-country performance

Number of flights: total flights per continent (top: Europe). Best performance: country with best performance in continent (top: South America - Argentina). Best average performance: country with best average of top pilot performances in continent (top: Africa – Namibia)

Flight evidence suggests that while the majority of soaring activity takes place in Europe, no continent has an overall advantage in terms of soaring performances achieved. Europe, South America and Africa each share top spot in the metrics for: most flights, best overall performance and best average of top performances. While the amount of flight activity differs dramatically in each region, top performances achieved are comparable in size.

We can thus state that:

While the majority of flight activity takes place in Europe, this does not seem to correlate to the potential for soaring performance available in other continents. In other words, each region of the world offers good possibilities for cross-country.

If we further investigate the relationship between gliding movement size and potential for good soaring performances, this trend seems to be confirmed. Figure 3.2 shows membership penetration in each country, i.e. the number of pilots as related to the population of the country. We can compare this figure to the top performance achieved in the country, by local or foreign pilots. As is apparent in figure 3.3, there seems to be no direct relationship between membership penetration and maximum performance achieved. The trend line plotted shows a mathematical correlation of only 0.22, which is not significant.

In other words:

Flight evidence does not suggest a strong link between the success of a gliding movement and the maximum distances achieved in a country.

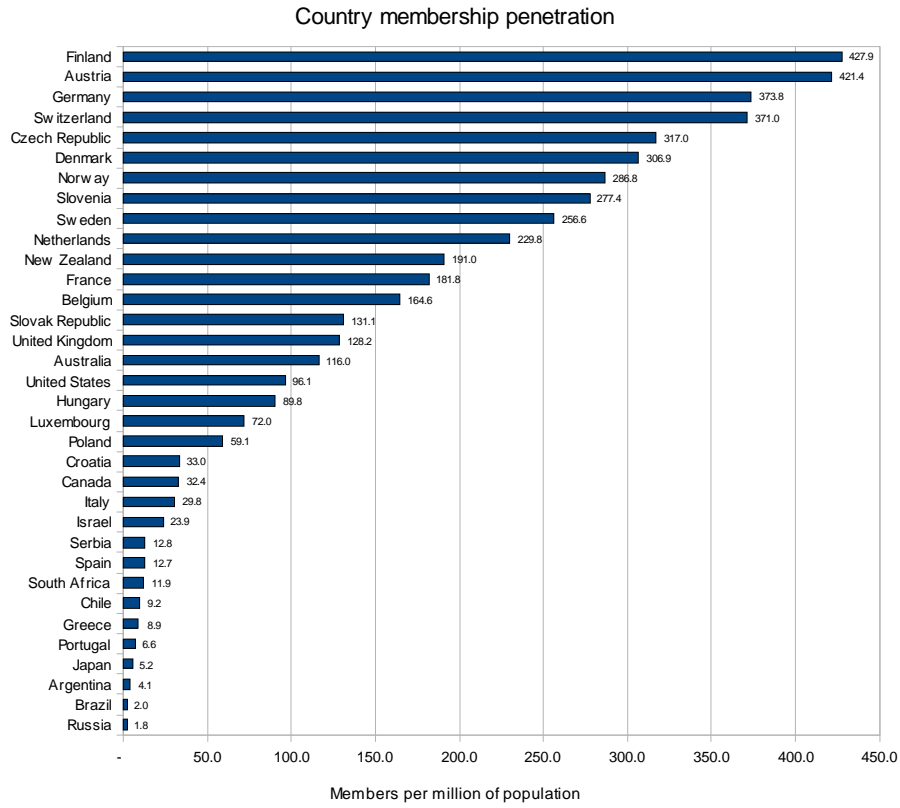


Figure 3.2 – Number of glider pilots in county as a fraction of total population
 Figures indicate pilots per million citizens. Membership figures from IGC country membership report 2008. Population figures from CIA Factbook.

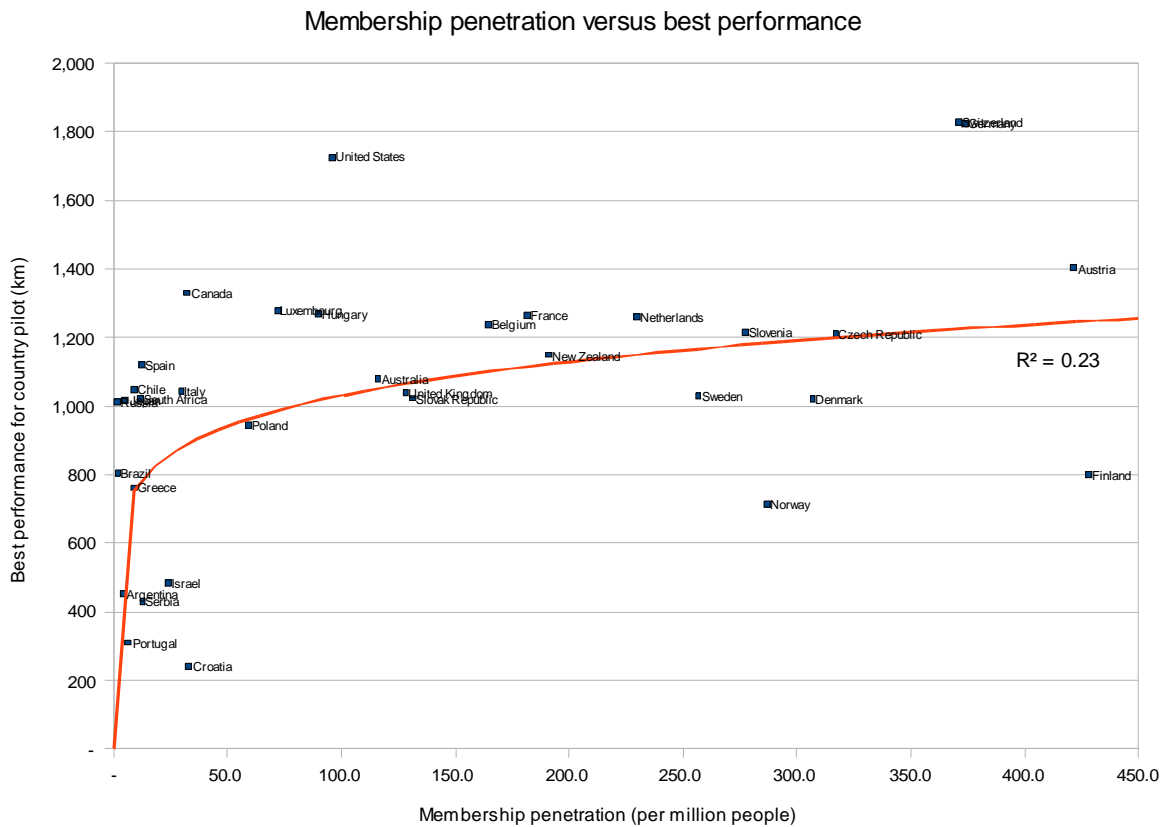


Figure 3.3 – Correlation of Membership penetration to best performance achieved in country
 Correlation (R^2).=0.23

Figures 3.4 to 3.6 show the activity in the OLC dataset in terms of airports:

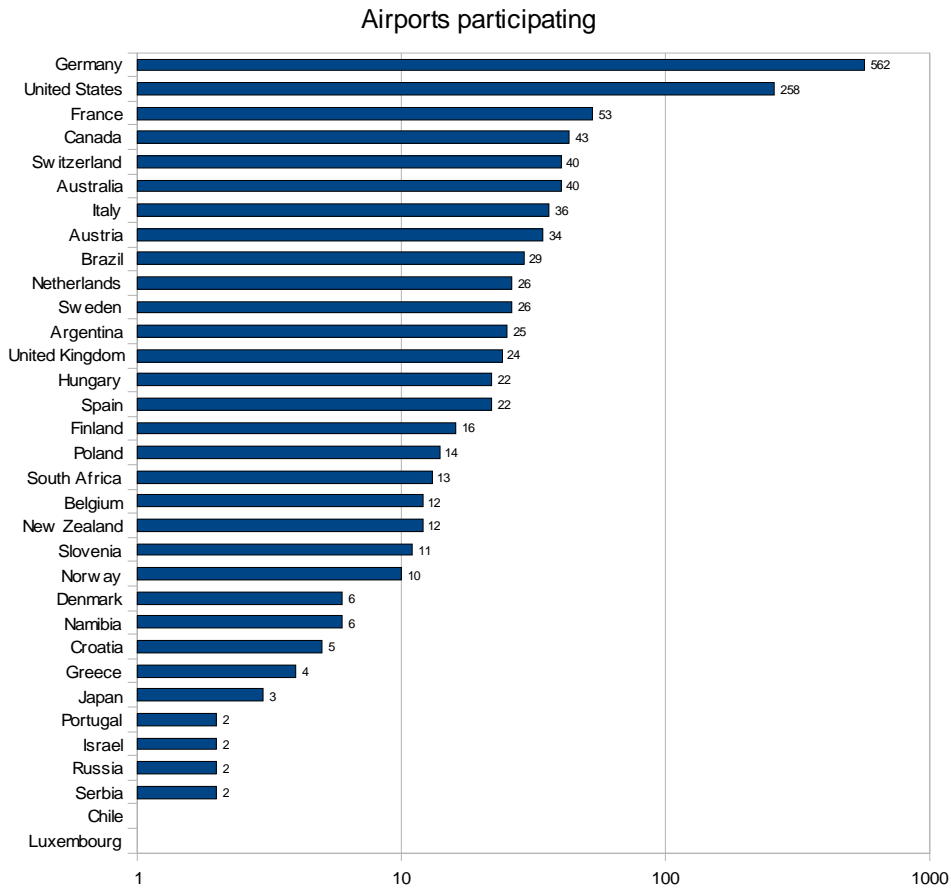


Figure 3.4 – Number of airport per country participating in dataset
 Scale of graph is logarithmic. Figures exclude data from FR, UK, DK national online championships

In figure 3.5 we can see the top 25 airfields in terms of number of pilots that have achieved their best flights at this location. This is an interesting metric of successful flight activity as it incorporates both the amount of flying but also the quality of flight performance taking place at a location. In other words, it is a good indicator of top locations in terms of how well they cater to the cross-country soaring community.

A comparison with the top airfields in terms of maximum performance achieved (figure 3.6) shows that there is not much in common between the two lists. Indeed it seems that:

At present, the most successful airfields in terms of overall cross-country activity are not the ones at which the best soaring performances are possible

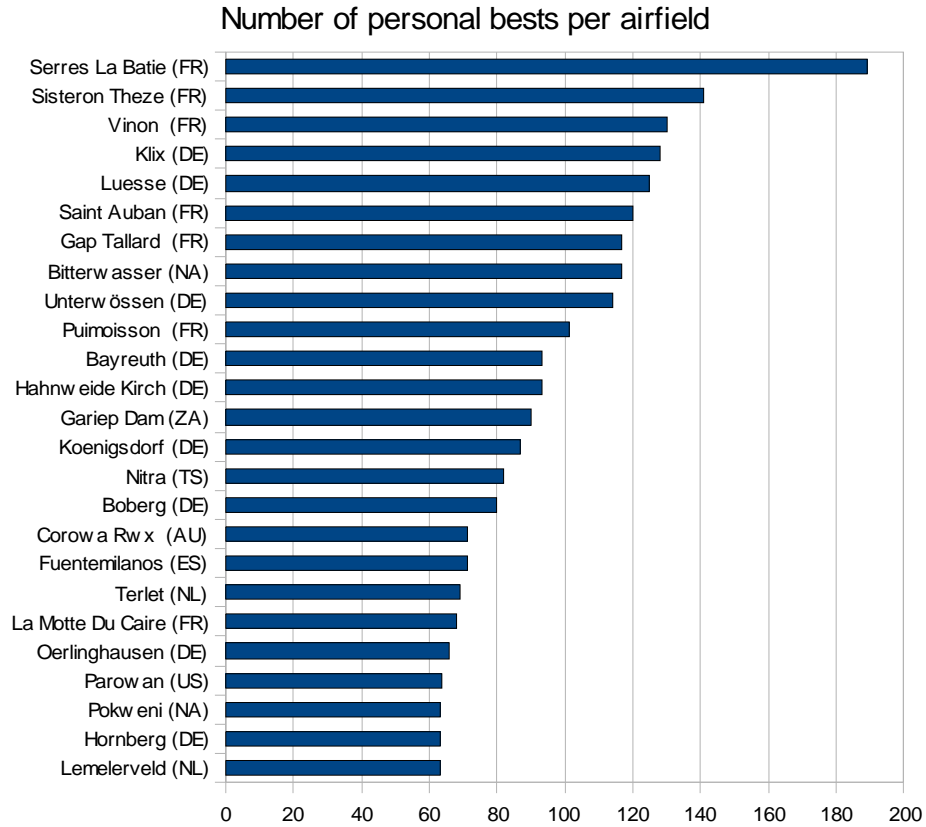


Figure 3.5 – Top 25 airfields ranked by number of personal best flights by pilots
 Figures exclude data from FR, UK, DK national online championships

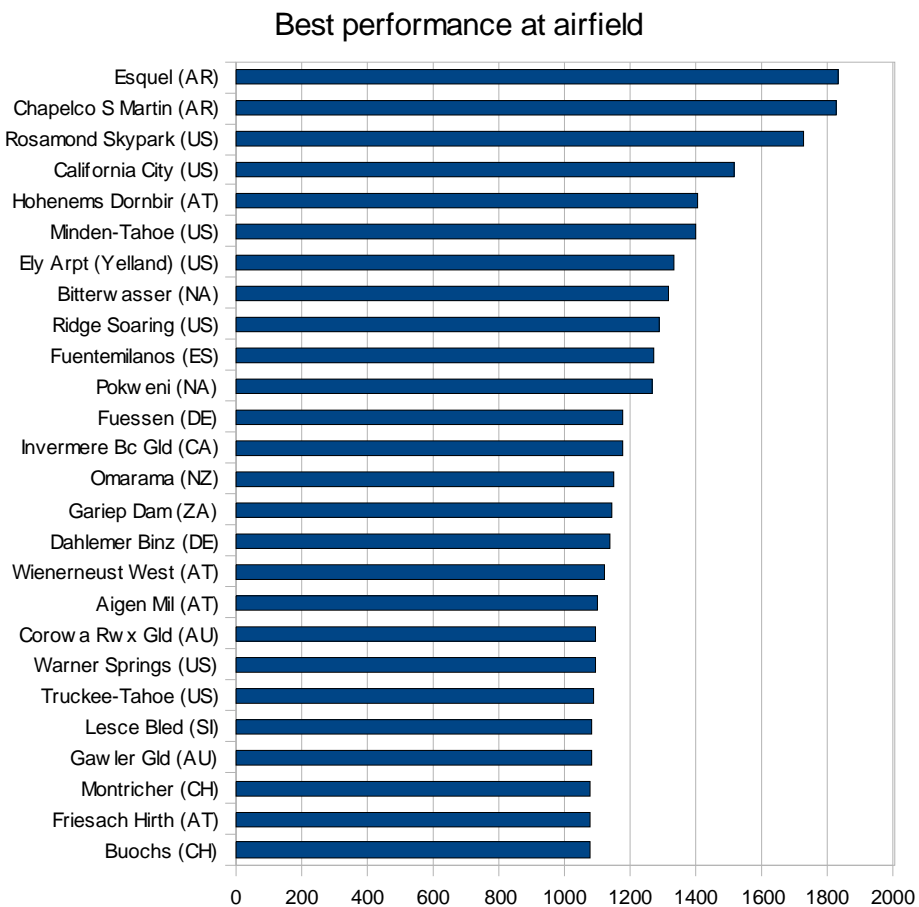


Figure 3.6 – Top 25 airfields ranked according to best performance (km) flown
 Figures exclude data from FR, UK, DK national online championships

4. Pilot mobility

Figures 4.1 to 4.4 attempt to quantify the amount of pilot mobility:

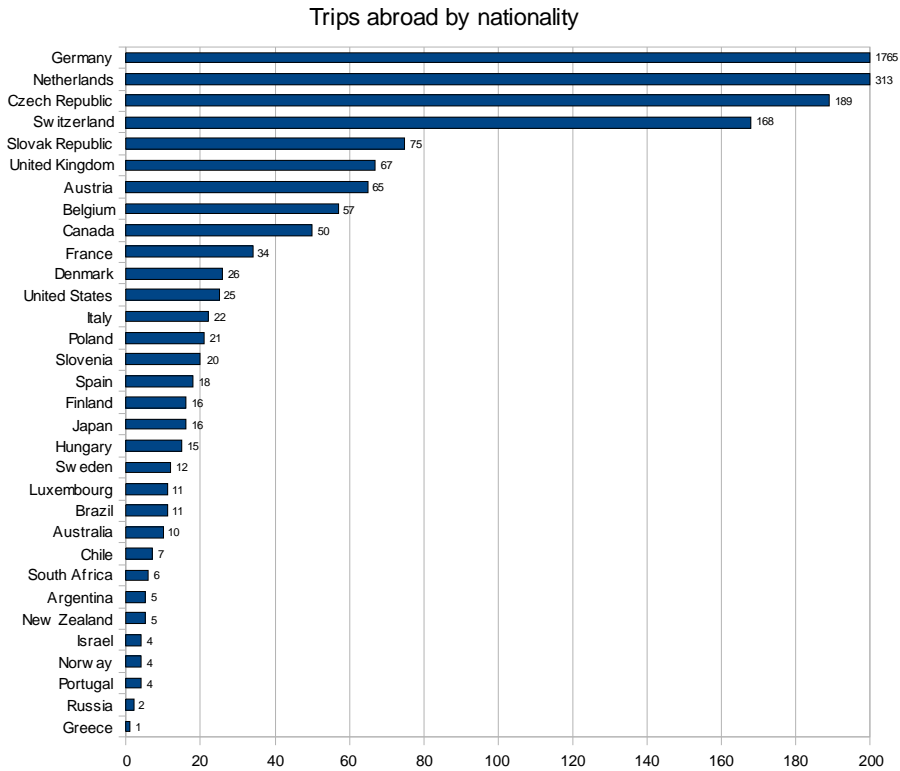


Figure 4.1 – Pilot mobility according to nationality

Chart shows number of pilot participations in foreign OLC championships. Data includes only flights registered in OLC

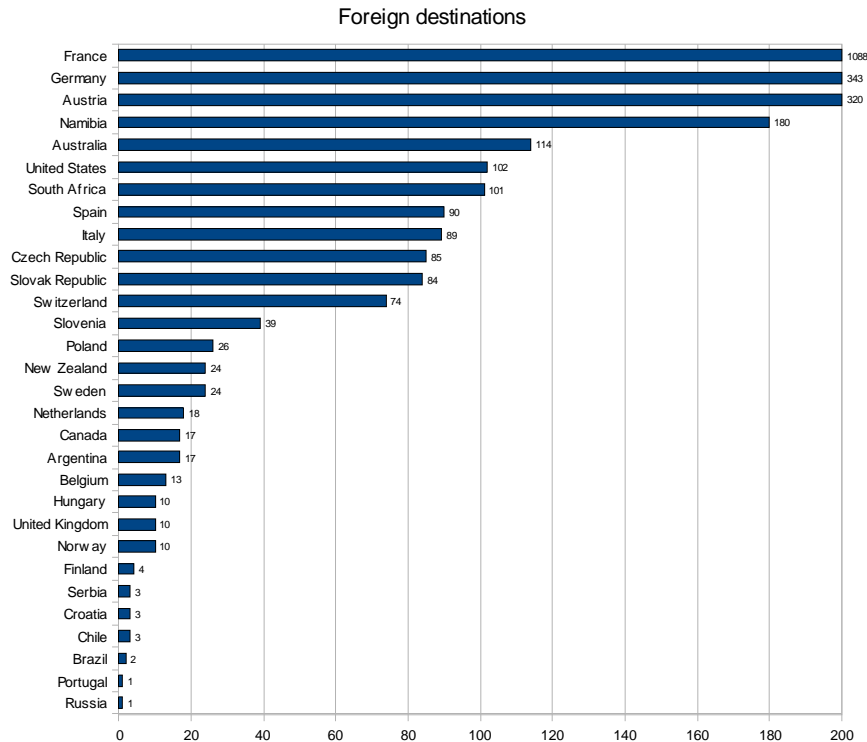


Figure 4.2 – Preference of destination for pilots flying from abroad

Chart shows number of pilot participations in foreign OLC championships. Data includes only flights registered in OLC

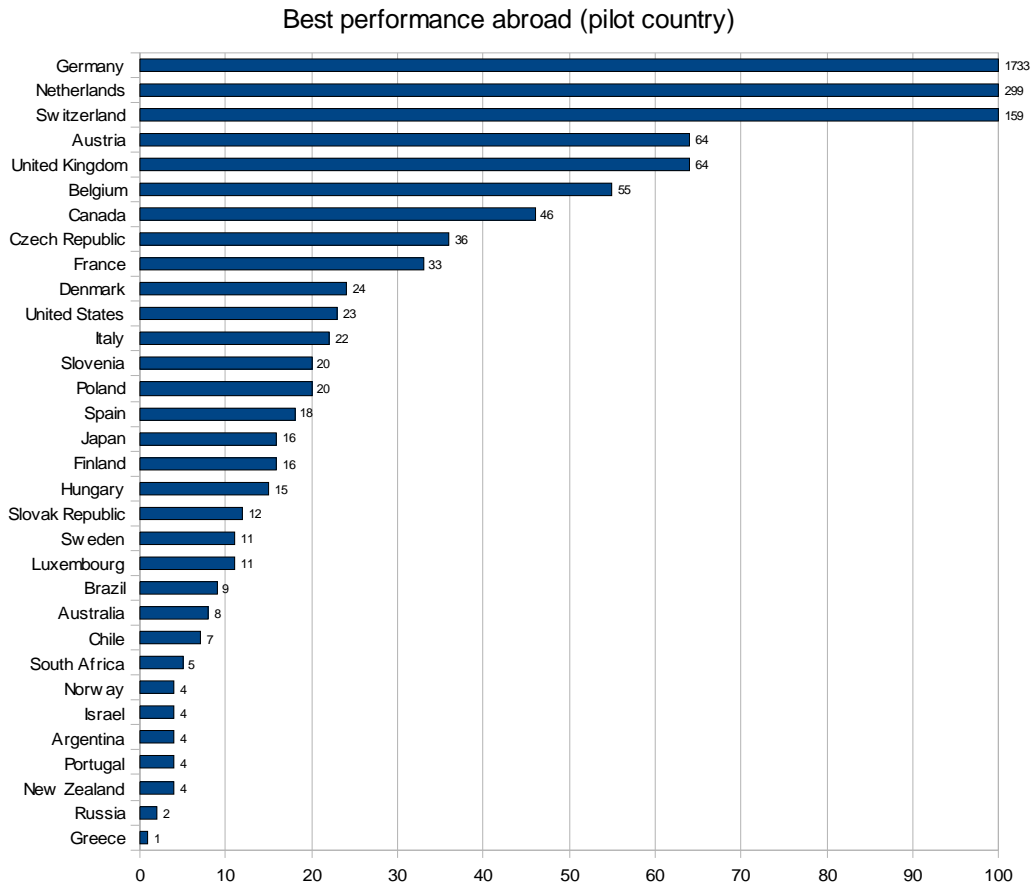


Figure 4.3 – Number of pilots achieving best personal performances abroad
 Figures indicate number of pilots according to nationality. Data includes only flights registered in OLC

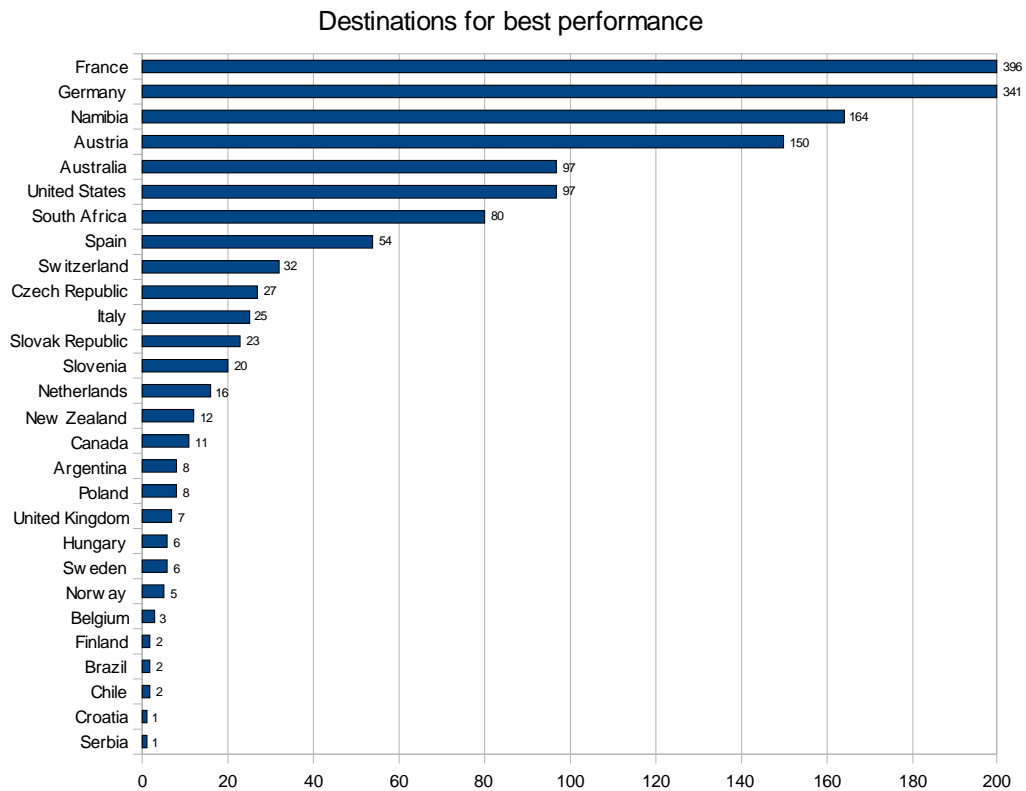


Figure 4.4 – Destination of pilots achieving best personal performances abroad
 Figures indicate number best flights achieved per country in which the flights were flown. Data includes only flights registered in OLC

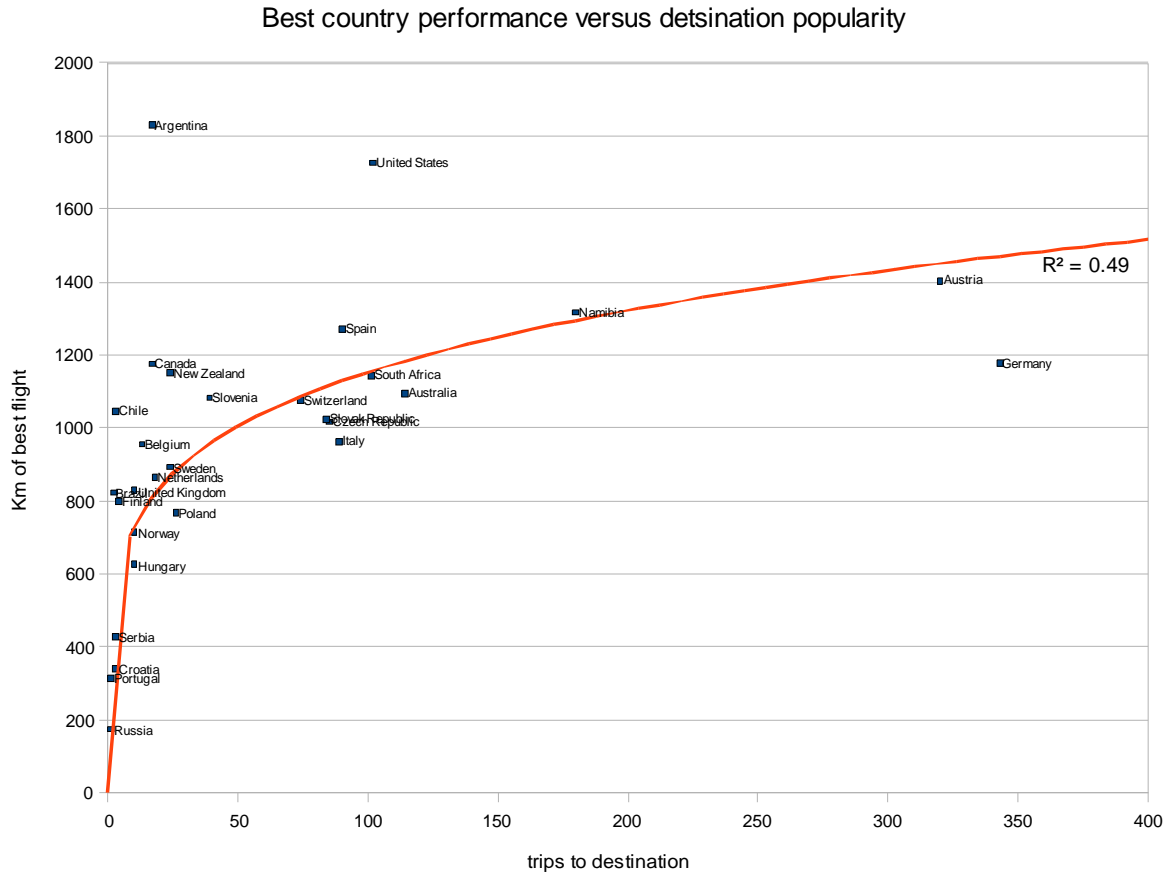


Figure 4.5 – Correlation of best performance achieved in country to number of foreign pilots flying there

Correlation (R^2).=0.49 Data on x-axis from figure 4.2. Data includes only flights registered in OLC

The above figure attempts to show the relationship between ‘soaring hotspots’ and their popularity as a destination. The mathematical correlation here is 0.49, which shows that there is some relationship between the two, however, it is only part of the story. While pilots will search out places where maximum soaring performances may take place as a foreign destination, this is only one of the factors in play.

Figures 4.6 to 4.8 show the relative performance of locals to foreign pilots:

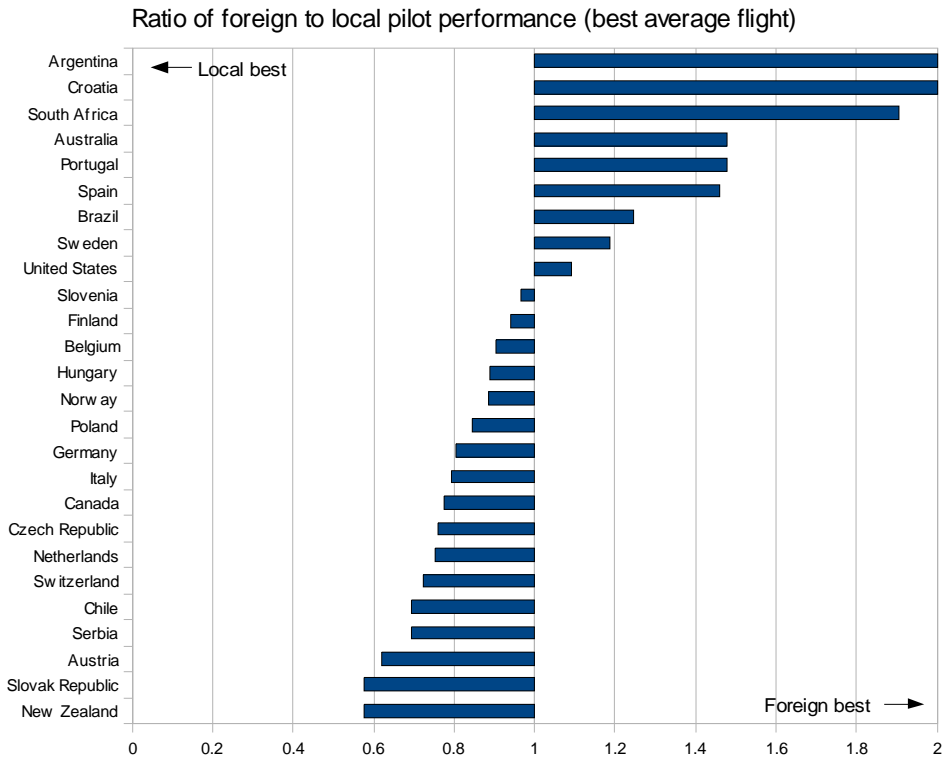


Figure 4.6 – Comparison of performance of local to foreign pilots for average of best flights
 The numbers represent the ratio of averages of best foreign flights to best local flights. Only countries with both local and foreign flights registered in OLC are included

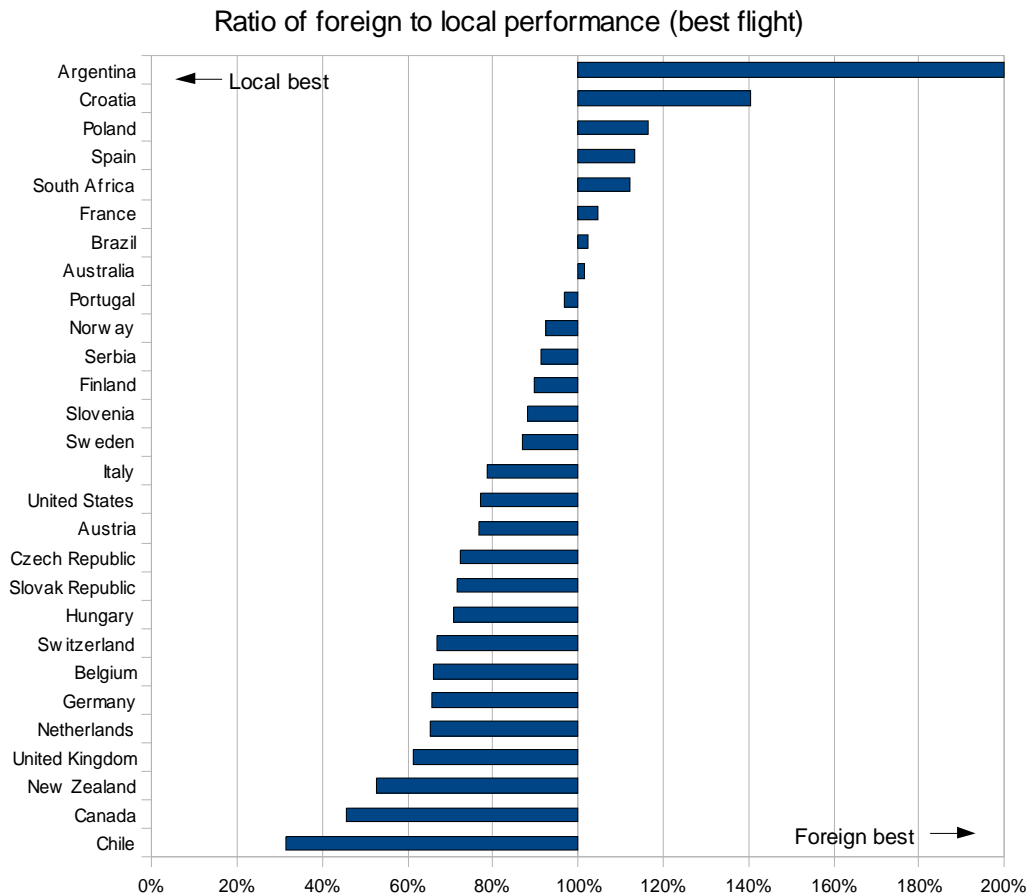


Figure 4.7 – Comparison of performance of local to foreign pilots for best flight achieved
 The numbers represent the ratio of best foreign flight to best local flight achieved in country. Only countries with both local and foreign flights registered in OLC are included

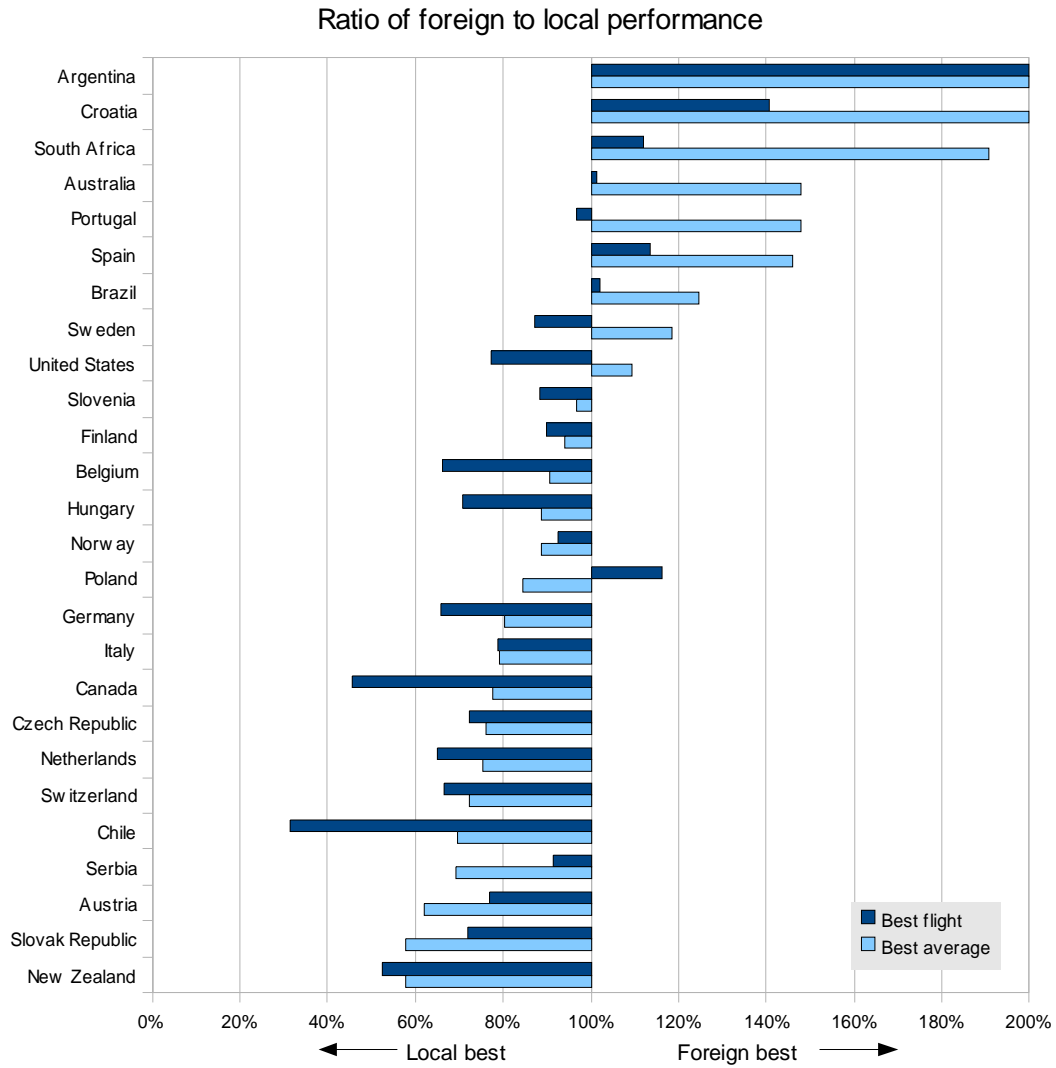


Figure 4.8 – Comparison of performance of local to foreign pilots

The numbers represent the ratio of foreign to local performances for both best flight and average of best flights flown in country. Only countries with both local and foreign flights registered in OLC are included