Canadian Space Agency | Agence spatiale canadienne

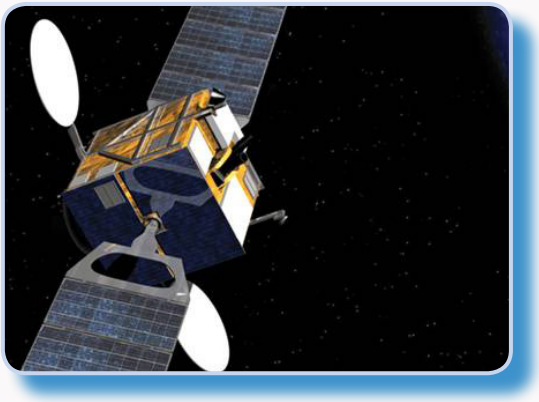
CSA ASC

STATE OF THE CANADIAN SPACE SECTOR

2011

Policy and External Relations

Canada



Long Range Optical Sensor (Credit: Neptec)

Neuroarm (Credit: MDA)

Chris Hadfield (Credit: CSA)

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Note to readers: The Annual Survey of the Canadian space sector has been undertaken since 1996. Comparative analyses of trends across time typically examine a 5-year period. Consequently, in this edition comparison and changes are reported for the 2007 to 2011 period. Readers should consult previous editions for information regarding results prior to 2007. Ce document est également disponible en français.

Cover Page: Canadarm (Credit: NASA)

MANDATE STATEMENT

About the Authors

The Policy & External Relations Directorate (PER) has the primary responsibility for leading the development and implementation of space policies. PER also manages the strategic relationships between the Canadian Space Agency and its domestic and international partners. Key mandates include the development and implementation of strategies relating to cooperative partnerships with domestic stakeholders (federal departments and provincial governments, industry and academia), international agencies and foreign industries. PER also plays a pivotal role in supporting the commercial initiatives of Canadian space companies in world markets - a core mandate of the CSA - and in providing stakeholders with strategic and timely information. As such, PER has been conducting the CSA's annual survey since 1996 to track the performance of the Canadian space sector.

About this Report

The State of the Canadian Space Sector report provides those working in the space sector, government and industry alike, with insight into the sector in which we operate. In turn, this information supports decision-makers in their endeavor to make informed and strategic choices for the future.

The survey questionnaire follows a census model that reaches out to approximately 200 organizations involved in space activities across Canada. The participants include small to medium enterprises, multinational space companies, not-for-profits, research centers, and universities across Canada. Information gathered from the survey questionnaire responses provides a solid source of longitudinal data on many indicators of performance.

For more information

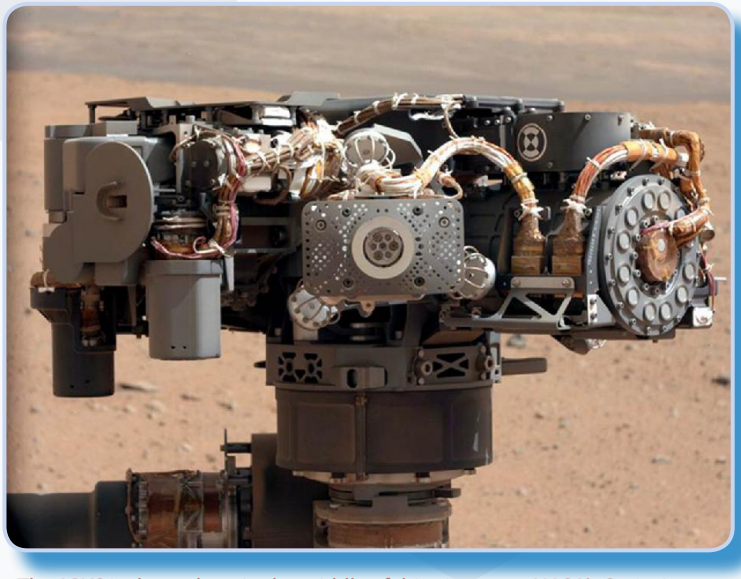
For more information about the Canadian Space Sector or for an electronic copy of this report, please go to our website: www.asc-csa.gc.ca.

Acknowledgments

The CSA wishes to acknowledge the contribution of the organizations, both public and private, without which this report would simply not have been possible.

Credit: NASA/JPL-Caltech

Pictured above is an artist's concept of the Curiosity Mars Rover, which has the Canadian-built Alpha Particle X-Ray Spectrometer (APXS) installed at the end of its robotic arm with four other instructments that will probe the rocks and soil of Mars.



Credit: NASA/JPL-Caltech/MSSS

The APXS is shown here in the middle of this picture on NASA's Curiosity rover, with the Martian landscape in the background. The image was taken by Curiosity's Mast Camera on the 32nd Martian day, or sol, of operations on the surface.

"...to promote the peaceful use and development of space."

MESSAGE FROM THE PRESIDENT

In presenting: ***The State of the Canadian Space Sector 2011***, our annual report on the health of Canada's Space Industry, I want to draw your attention to key data, which measures change in the space sector using a number of indicators, such as sector and category of business activity, regional differences, the value of export revenues and the strength of our manufacturing base.

The results for 2011 were mixed. After four years of successive and sustained growth, this year saw only modest growth pegged at 1.3% overall, with total revenues in the space sector edging to reach $3.483 Billion. Domestic revenues increased by 4.8%, while exports dropped by 2.2%. At the same time, after three years of growth, the space sector workforce stalled and shed 9% or 762 space-related positions, among them 471 highly qualified persons in 2011.

The marginally incremental growth in space sector revenues was evenly distributed among organizations, benefiting the Robotics, Earth Observation and Space Science sectors of the space economy. Collaboration among different space partners is at the core of Canada's commercialization of innovation and continued growth, as companies, universities and government agencies work together to leverage knowledge and resources. As examples, are the development of AIS SAT-1 for Norway, which involved input from the University of Toronto and Com Dev; and, Canada's contribution of the Alpha Particle X-Ray Spectrometer (APSX) instrument on NASA's Curiosity Mars Rover, which was developed in collaboration between the Canadian Space Agency, the University of Guelph and McDonald Dettwiler and Associates.

In 2011, the report includes more detailed reporting on the sources of government revenue received by organizations to perform space-related work (up from $319M in 2010 to $368M in 2011). The Canadian Space Agency, the Department of National Defence and the Natural Science and Engineering Council are captured as being major sources of this funding. The potential of space assets to deliver terrestrial benefits was demonstrated by collaboration between the Canadian Space Agency and the Canadian Institutes for Health Research, which funded the development and improvement of medical diagnostic tools that will help determine the health of Astronauts working on the International Space Station. These devices will be tested on the Station and one day may be adapted for use by Doctors in medical clinics to more quickly provide patients with accurate and timely diagnosis of their medical conditions.

The results of this annual survey: ***The State of the Canadian Space Sector 2011*** have been made possible by the generous collaboration and input of our partners, members of the Canadian Space Program.

Sincerely,

Steve MacLean

Dr. Steve MacLean
President, Canadian Space Agency

EXECUTIVE SUMMARY

- In 2011, the Canadian space sector generated **total revenues** of $3.483B, reflecting a 1.3% increase over 2010 results and continuing the upward trend of the past four years. In 2011, growth was evenly distributed among the surveyed organizations and less concentrated among top earners, as was the case for the 2010 results.

- Over the last five years, **total revenues** generated by the Canadian space sector have increased by 47% or, $1,111M. The Compound Annual Growth Rate (CAGR) from 2007 to 2011 was 8%;

- **Domestic revenues** reached $1.818B, growing at a rate of 4.8%. Non-governmental **sources of revenue** continue to make up the majority of domestic revenues with 80%. The remaining 20% of domestic revenues are derived from Canadian governments (federal, provincial, municipal), the majority of which is derived from federal sources, especially from the Canadian Space Agency;

- **Export revenues** in 2011 decreased by $38M, totaling $1.665B. Once again this year, significant gains were made in the export market by organizations operating in Quebec in terms of the percentage change over last year (increase of 32%). However, losses in the Atlantic region were significant enough to bring total export revenues below 2010 levels. Ontario continues to hold the majority of Canada's space export market with a 55% share of Canadian space-related export revenues;

Credit: INO

This image shows the NIRST instrument (New Infrared Sensor Technology) launched aboard SAC-D, an Argentine satellite. The microbolometer sensors, which are the heart of NIRST, were developed in collaboration between CSA and the Quebec-based company, National Optics Institute (INO).

Credit: Telesat

Characterization of ViaSat-1, a Communications Satellite, launched from Baikonur, Kazakhstan in 2011.

- The Canadian space sector **workforce** experienced a 9% drop over last year's results, losing 762 positions across the country and bringing the total space-related workforce to 7,494. Of the total workforce lost, 471 positions were classified as HQP (Highly Qualified Personnel - scientists, engineers and technicians);

- Regarding the **sectors** surveyed: **Satellite Communications** and **Navigation** decreased revenues by $26M and $35M respectively in 2011, with the sectors totaling $2,703M and $225M. **Space Sciences** made gains of an additional $66M, reaching $128M; **Robotics** experienced an increase of $20M, reaching $127M; and **Earth Observation** gained $15M over last year, reaching $271M in that sector;

- Regarding the **categories** surveyed: **Applications and Services** decreased revenues by $115M, dropping to $2,251M; **Space Segment** revenues gained $134M, reaching $757M; **Ground Segment** stalled with a decreased of $1M, with total revenues dropping to $409M; **Space Research** increased revenues by $27M, reaching $66M;

- Revenues derived from **manufacturing** have decreased from last year by $8M, now representing $679M of total space-sector revenues;

- **Defense** related revenues increased by $23M in 2011. Defense revenues represent $136M of total revenues, of which $90M were export related and $44M were domestic.

- **Space Research and Development expenditures** totaled $69M in 2011, with 44 organizations currently undertaking space R&D projects;.

EXECUTIVE SUMMARY (CONTINUED)

Export Revenues for 2011

- The strongest performing export markets for Canada's space organizations continue to be the U.S. and Europe, followed by Asia. Exports to Europe continued to drive growth, with a 4% increase over last year. However, exports to the U.S. decreased and revenues fell by 5%, or $43M, which led to an overall drop in total space-related export revenues globally of 2.2%.

Of the $1.665B in total exports:

- The U.S. market represented 48%, or $807M;
- The European market represented 33%, or $544M;
- The Asian market represented 9%, or $155M;
- The South American market represented 5%, or $83M;
- Oceania represented 3%, or $46M;
- Africa represented 1%, or $17M;
- Central America, Caribbean & Mexico represented 1%, or $14M.

Regional- Based Space Revenues

- The proportional share of total revenues across the country remains relatively stable from one year to the next, with gradual changes to the distribution by region emerging in the longer trend analysis:
  - In 2011, British Columbia increased its proportional share slightly, representing 6% ($209M) of total revenues. The province now has 2% less of total revenues than five years ago;
  - The Prairies have maintained 8% (now $274M) of total revenues for the last four years in a row;
  - Ontario's proportional share increased 1% over last year vis-à-vis other regions, now 69% ($2.4B) of total revenues. However, the province's share has declined compared to five years ago when 76% of Canadian space-related revenues were concentrated there;
  - Since 2007 when Quebec represented only 5% of total revenues, the province has gained steadily and now has 10% ($348M) of total space sector revenues;
  - Atlantic Canada's revenues vis-à-vis other regions decreased from 11% to 7% between 2010 and 2011, and is now back to the same level of proportional share demonstrated in 2007.

Credit: NASA

While attached to the end of Canadarm2, Dextre, the Canadian Space Agency's robotic handyman, performs his first official task on the International Space Station. Dextre successfully unpacked two critical pieces of equipment delivered by Japan's Kounotori2 spacecraft.

METHODOLOGY

In order to measure the changes taking place in Canada's space sector, the CSA undertakes an annual survey and publishes the results in the State of the Canadian Space Sector report. This edition profiles the space sector over the course of 2011, with most organizations reporting on a calendar year from January 1st 2011 to December 31st 2011 and the remainder reporting on a fiscal year running into March 2012. Data is provided in the following areas:

- Overall space revenues;
- Domestic vs. export revenues;
- Revenues of Canada's Top 30 organizations developing and/or using space to generate revenues;
- Revenues by sectors of activity (Satellite Communications, Robotics, Earth Observation, Space Science, and Satellite Navigation);
- Revenues by space categories (Space Segment, Ground Segment, Applications and Services, and Space Research);
- Revenues by region (British Columbia, Prairies, Ontario, Quebec and Atlantic Canada);
- Workforce characteristics.

Questionnaires were sent to approximately 200 private sector companies, research organizations and universities in Canada who have a defined strategic interest in the space industry.

It is important to note that the company-specific information used to compile this report remains strictly confidential and cannot be released in a manner other than in an aggregate form. Consequently, in certain circumstances, the authors are prevented from providing a more detailed explanation or in-depth analysis of the results.

Respondents are asked to categorize their space activities according to the following definitions:

DEFINITION OF CANADA'S SPACE SECTOR

The Canadian space sector is defined as organizations (private, public and academic) whose activities rely on the development and use of space assets and/or space data

Space Segment: Research and Development (R&D), manufacturing, testing, integration and launch of platforms (satellites, spacecraft and robotic systems), complete systems, subsystems and components

Ground Segment: R&D, manufacturing, testing, and integration of facilities on Earth for controlling space-based systems and satellites, for linking satellites to operational terrestrial networks and for processing satellite-derived data

Applications and Services: Development and/or provision of services and value-added products and technologies that are derived from the use of space systems and/or data, and the provision of consulting and engineering services

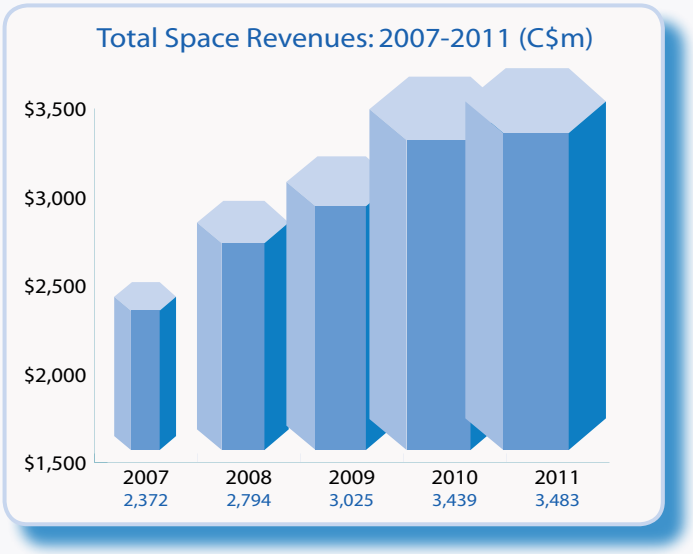
Fundamental Space Research: Primarily research related to non-commercial or pre-commercial space activities

RESULTS

Overall Revenues

In 2011, total revenues for the Canadian space sector reached an all-time high of $3.483B, a 1.3% increase ($45M) over revenues in 2010. Increases in government revenue streams and domestic, non-government streams accounted for growth in the space sector in 2011, while exports tempered overall results: **Domestic revenues increased** by 4.8% and **exports decreased** by 2.2%.

Over the last five years, total revenues generated by the Canadian space sector have increased by 47% or, $1,111M. The **average growth rate** of total revenues over the past five years**,** calculated using Compound Annual Growth Rate [1], is a respectable 8% (5.7% for domestic revenues and 10.9% for exports).



Revenues of Canada's Leading Space Organizations

In 2011, 97.7% of the total space revenues and 91% of space sector workforce were accounted for by the activity of the top 30 Canadian space organizations, a pattern constant in previous survey results regardless of changes in the composition or rank order of the top 30 organizations. By comparison, the top 10 organizations account for 86% of total space revenues and 71% of workforce.

56 organizations reported revenues in excess of $1M during 2011, compared with 50 reported in 2010 and 47 reported in 2009.

Universities and Research Centers

Universities and research centers represent a subset of the organizations canvassed for this study. Results for this subset vary substantially from the results of private companies. For example, universities and research centers rely much more heavily on domestic sources of funds, whereas private industry has a more even split between domestic and export revenues.

In 2011, universities and research centers accounted for $124M of domestic revenues, securing most of their funding from government sources with $110M in public funds for space activities.

In 2011, universities and research centers continued to access foreign markets and institutions for business and research grants at a similar rate as in 2010, with $4.4M in revenues derived from foreign sources. The European Space Agency, as well as American government and American companies, are the biggest sources of foreign funding for space-related activities at Canadian universities.

Domestic vs Export Revenues

Domestic revenues gained 2% proportional share of total revenues (vis-à-vis exports) when compared to 2010 results. Total space revenues are now 52% domestic and 48% export.

When corrected for inflation, over the past ten years from 2002- 2011, domestic revenues have experienced real growth of $539M, or 42%. By comparison, export revenues, corrected for inflation, have grown by $798M, or 92%.

1 See Statistics Canada for CAGR formula: http://www.ic.gc.ca/eic/site/cis-sic.nsf/eng/h_00003.html

RESULTS

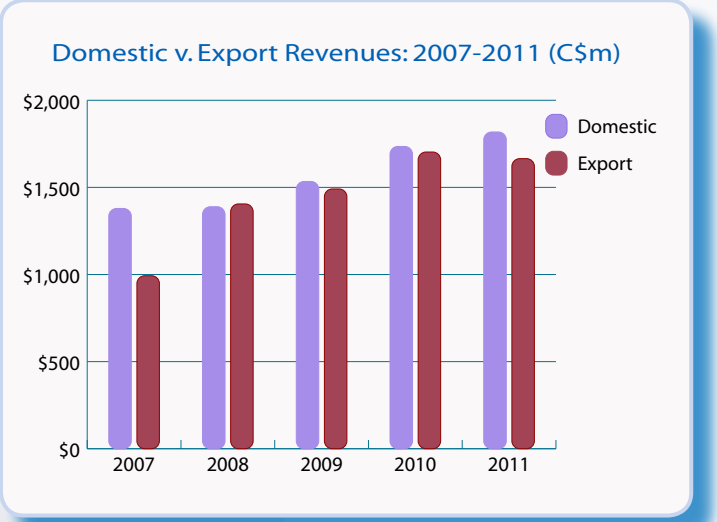
Domestic Revenues

Domestic revenues grew by 4.8% or, $83M between 2010 and 2011, reaching $1.818B in 2011.

In 2011, the majority of space sector revenues were derived from private (non-governmental) sources. The overall share of private/ public derived sources of domestic revenues yielded a ratio of 80%/20%.

In 2011, private (non-governmental) sources of revenue increased 2% (from $1,417M to $1,450M).

In 2011, public (government sources) increased by 16% (from $319M to $368M). The majority of the $368M that organizations received from **Canadian governments** was from federal sources. The Canadian Space Agency (CSA), Department of National Defence (DND), Natural Sciences and Engineering Research Council (NSERC), and Natural Resources Canada (NRCan) were among the top sources for revenue, reported by companies and universities in the annual survey.

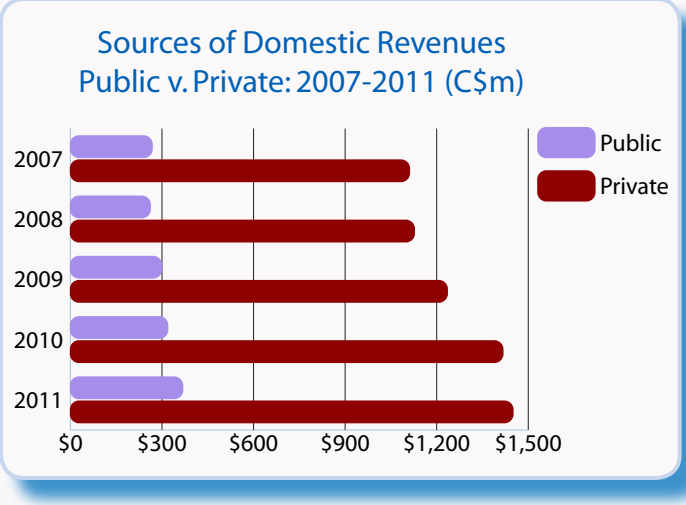


	2007	2008	2009	2010	2011
Domestic	1,379	1,389	1,534	1,735	1,818
Export	993	1,405	1,491	1,703	1,665

Export Revenues

Export revenues decreased by 2.2%, or $38M, to $1.665B, bringing revenues to a lower level than in 2010, but not falling below 2009 levels. Despite the drop in 2011, the five year trend analysis shows a very strong export market for Canadian space-related goods and services. The CAGR (Compound Annual Growth Rate) over the past five years was 11%.

- Despite losing 2 percentage points in proportional share to other regions this year, the **United States** remains the largest market for Canadian space exports, accounting for 48%, or $807M, of the $1.665B total exports. The American market decreased by 5%, or $43M, from 2010 to 2011. Decreased revenues in the USA brought down total export figures and masked the gains made elsewhere, such as in Europe.



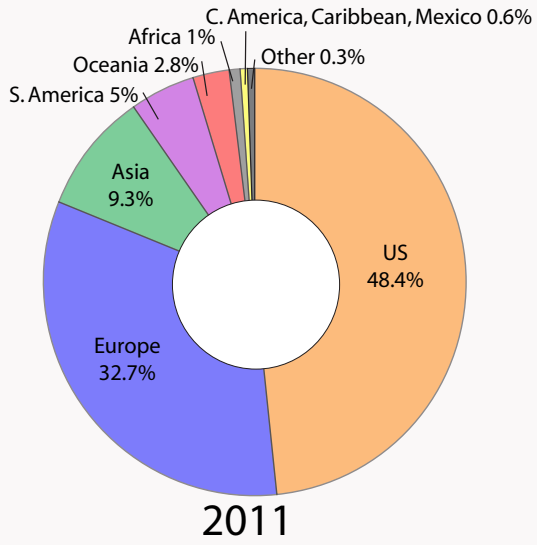
	2007	2008	2009	2010	2011
Public	268	262	299	319	368
Private	1,111	1,127	1,235	1,417	1,450

RESULTS

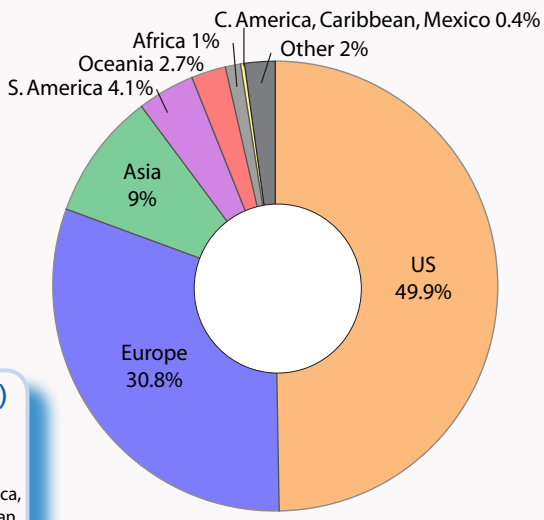
Export Revenues cont.

- Exports to Europe were strong for a second year in a row, increasing by 4%, or $19M, from $525M in 2010 to $544M in 2011. Revenues derived from **Europe** account for 33% of total space exports.
- Revenues in Asia were relatively flat for the third year in a row. Export revenues in **Asia** increased by 0.3%, or $1M, from $154M in 2010 to $155M in 2011. In 2011, Asia accounted for 9% of total exports compared to the 12% share it had five years ago in 2007.
- Total export revenues from **Oceania**, totalled $46M. The region saw exports drop by 16% in 2010 and then a further 2% in 2011. Oceania accounted for 2.8% of total export revenues.
- In 2011, the **South American** export market increased by 19% or $13M over 2010 results. The region accounted for 5% of total exports.
- Export revenues from **Africa** experienced a slight decrease of 3% over their 2010 results, totalling $16.5M. It is noteworthy that space-related exports to the region more than doubled in 2010. Results from 2011 could be seen as "holding steady" most of the gains made in the previous year. Africa accounted for 1% of total export revenues.

Proportion of Export Revenues

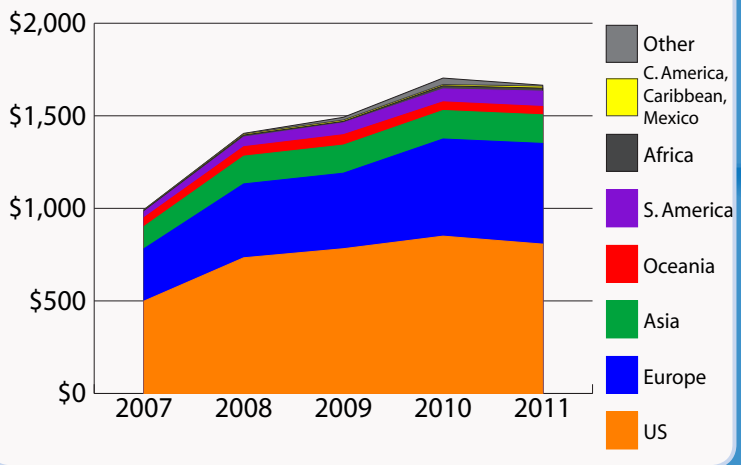


2011



2010

Sources of Export Revenues: 2007-2011 (C$m)



Figures available on Ten Year Trend page 19

RESULTS

Revenues by Space Categories

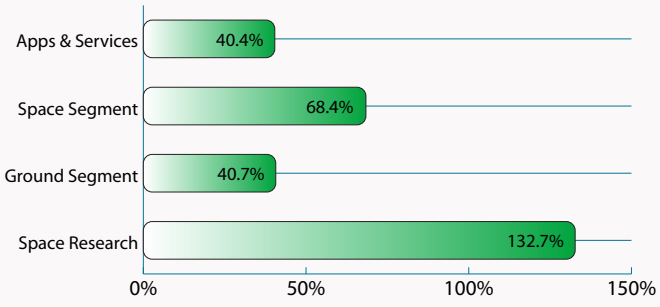
Space Segment: Revenues increased 21%, or by $134M in 2011, from $623M to $757M. In 2011, space segment revenues represented 22% of total space revenues.

Ground Segment: Revenues were flat, with a very slight 0.2% decrease, or $1M less than 2010 levels. Ground segment revenues totalled $409M in 2011 and represented 12% of total space revenues.

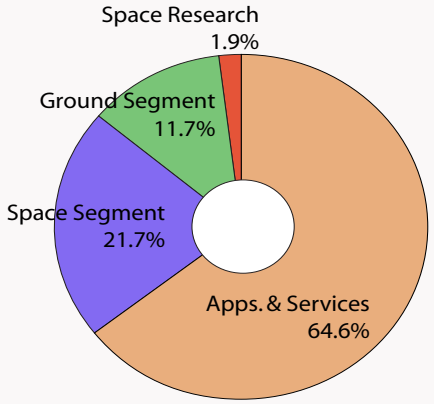
Applications and Services: Decreased revenues in Applications and Services in 2011, were the main cause for a slow down in total space sector growth in 2011, as opposed to last year when a boom in Applications & Services drove total revenues up an additional $375. Revenues in this category decreased at a rate of 5% in 2011, dropping from $2,366M in 2010 to $2,251M in 2011. Applications and Services represented 65% of total space revenues.

Space Research: The Space Research category increased from $40M in 2010 to $66M in 2011, as universities began to widen the definition of what has been traditionally treated as "space-related". Space research represented 2% of total space sector revenues in 2011.

Percentage Change of Revenues by Space Categories over the last 5 years (2007-2011)



Proportion of revenues by Space Categories: 2011

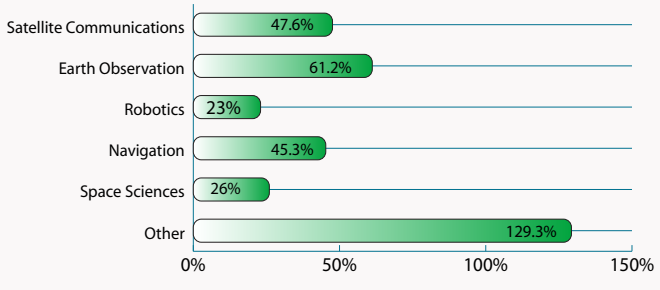


Revenues by Sectors of Activity

In 2010, growth had been dominated by increased revenues in Satellite Communications and Navigation sectors. To the contrary, in 2011 growth in the space economy was dominated by growth in Earth Observation, Space Science and Robotics sectors.

Satellite Communications: In 2011, Satellite Communications revenues were $2.703 Billion, a decrease of 1%, or $26M, from $2.729B to $2.703B. Despite this decrease, it should be noted that Satellite Communications did not lose much ground from the impressive gains that were made in the previous year, when revenues were up by $403M. The Satellite Communications sector represented 78% of total space sector revenues in 2011.

Percentage Change of Revenues by Space Sector of Activity over the last 5 years (2007-2011)



RESULTS

Revenues by Sectors of Activity cont.

Of the $2.703B in Satellite Communications, $1,953B (72%) was derived from activities in Applications and Services. Of the remaining 28%, the breakdown is as follows:

- $308M is generated from Ground Segment activities;
- $436M is generated from Space Segment activities;
- $5.7M is generated from Space Research activities;

Over the last 5 years, satellite communications revenues increased 48%, or $871M.

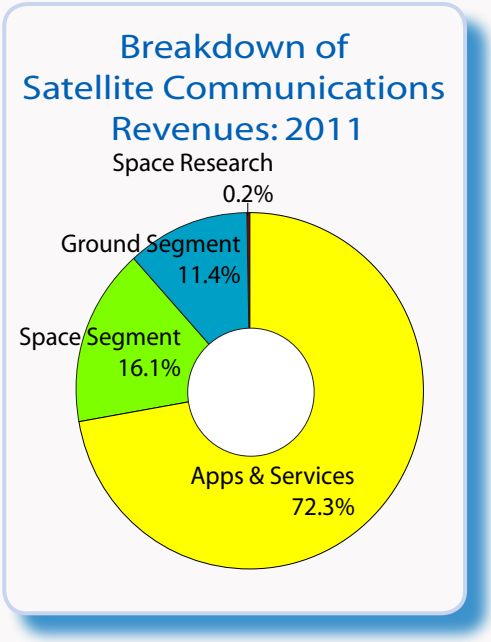
Earth Observation: This sector increased 6%, or $15M, in 2011 and represented 7.8% of total space sector revenues. Over the last five years, EO revenues have increased by 61%, or $103M.

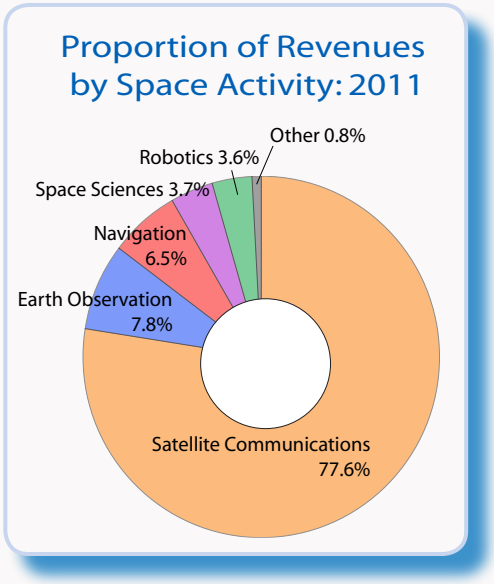
Robotics: Revenues from Robotics sector increased by 19%, or by $20M, from $106M to $127M, representing 3.6% of total space sector revenues. Since 2007, revenues from this sector have experienced an increase of 23%, or $24M.

Navigation: Revenues from navigation were weaker this year, decreasing by 14%, or by $35M, from $260M to $225M, and representing 6.5% of total space sector revenues. Over the last five years, revenues from navigation have increased by 45%, or $70M between 2007 and 2011.

Space Sciences: Revenues from space sciences more than doubled between 2010 and 2011, reaching $128M. Space science represents 3.7% of total space sector revenues, compared to 4.3% share of revenues the sector had in 2007.

Other: Revenues from this sector have grown by 17%, or by $4M, from $25M to $29M and represented less than 1% of total space sector revenues.





RESULTS

Revenues by Region

British Columbia: In 2011, British Columbia's revenues totalled $210M reflecting an increase of 19% ($33M). British Columbia's revenues represented 6% of total revenues for the entire space sector.

In 2011, the majority of British Columbia's gains were made on the domestic side which increased 34%, or $28M, of the $33M total increase in the Province. Exports increased at the rate of 5%, for an increase $5M.

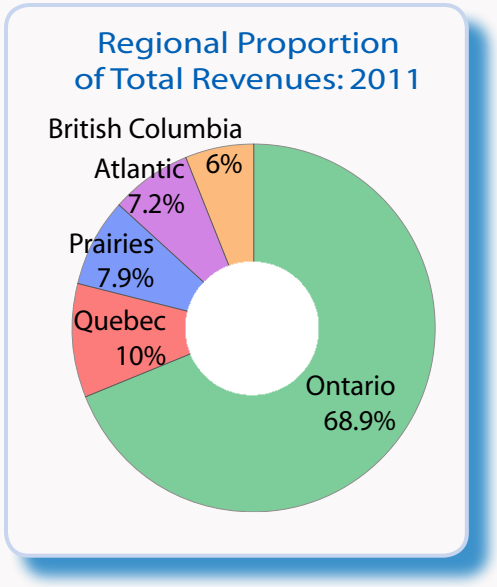
Between 2007 and 2011, B.C.'s total revenues increased by 52% (from $138M to $210M). This increase has been powered equally by the domestic revenues and exports. Domestic revenues grew by 46% since 2007 (from $75M to $109M). Export revenues grew by 59% over the last five years (from $63M to $100M).

Prairies (Alberta, Saskatchewan, and Manitoba): Revenues in the Prairie region stalled, deceasing by less than half a percentage point in 2011 (from $275M to $274M). The Prairie region continued to hold about 8% of Canada's total space revenues vis-à-vis other provinces. In 2011:

- Alberta decreased revenues, by 2.3% or $5M, compared to last year when the province increased revenues by 18%, and 2009 when revenues also decreased about 2%.
- Saskatchewan increased total revenues by 5% (from $38M to $39M).
- Manitoba increased total revenues for the third year in a row with gains of $2M, or 15%, over 2010.

The Prairie region has grown robustly over the last five years, doubling revenues from $137M in 2007 to $274M in 2011. This growth was powered by increased domestic revenues, which more than tripled in the last five years! Domestic revenues went from $24M in 2007 to $89M in 2011. Exports have increased 63% over the same five years, gaining $71M (from $113M to $184M).

Ontario: Total revenues for Ontario continued to generate the majority of space sector revenues in 2011, accounting



for 69% of all revenues and totalling $2.401B.

Revenues in Ontario grew by 3%, or $80M from 2010 to 2011. Domestic revenues increased by 5%, or $70M (from $1.412B in 2010 to $1.482B in 2011). Exports in Ontario only increased 1%, or $10M, (from $909M in 2010 to $919M in 2011).

From 2007 to 2011, Ontario revenues have increased steadily each year. Domestic revenues in Ontario have increased by 22%, or $265M; exports have increased by 57%, or $333M; and total revenues have increased by 33%, or $597M.

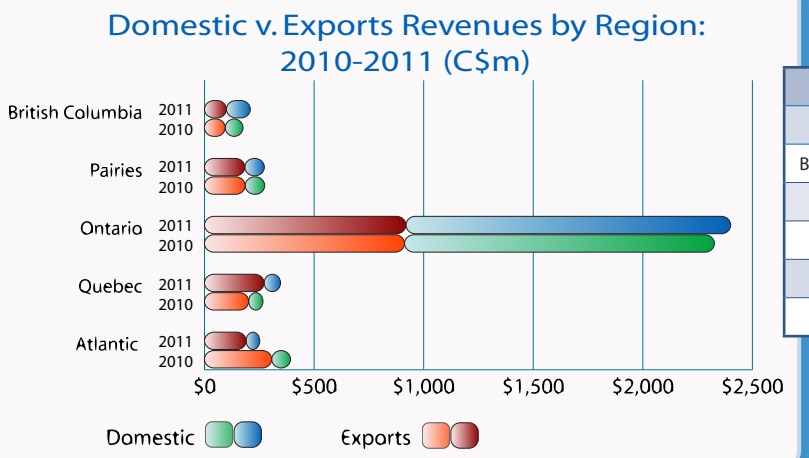
Quebec: In 2011, Quebec continued to increase revenues in both domestic sales and exports, with growth in total revenues outpacing all other regions in terms of percentage change over last years' results for the second year in a row. Total revenues increased 28%, or $76M; domestic revenues increased by 13%, or $8M; and export revenues increased by 32%, or $66M.

Revenues in Quebec are worth 10% of total space sector revenues across the country, second to Ontario.

Quebec has experienced four consecutive years of strong

RESULTS

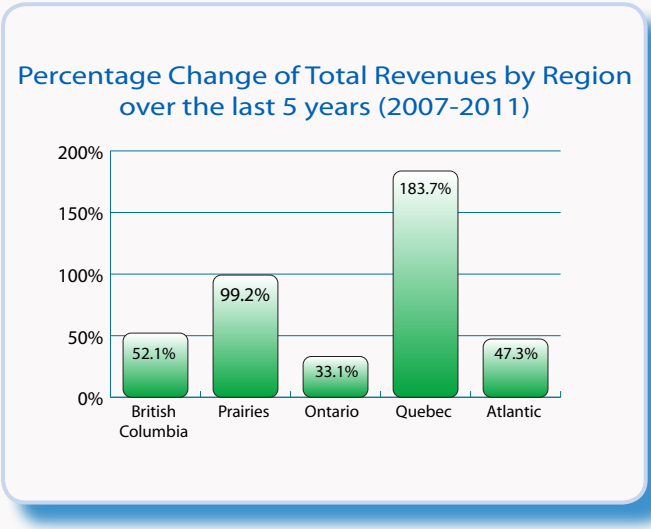
Revenues by Region cont.



	2010		2011	
	Exports	Domestic	Exports	Domestic
British Columbia	95	81	100	109
Prairies	186	89	184	89
Ontario	909	1,412	919	1,482
Quebec	206	67	272	75
Atlantic	307	86	190	62

growth; therefore producing a five year trend analysis that is very positive. Over the past five years, total revenues in Quebec have increased 184% (from $123M to $348M); domestic revenues have more than doubled (from $36M to $75M); exports have more than tripled (from $86M to $272M)

Atlantic Canada (New Brunswick, Newfoundland, Nova Scotia, PEI): In 2011, the Atlantic region saw revenues decrease by 36%, or $141M. This accounted for the majority of losses in 2011 and accounts for the rather slowed total growth of the space sector, despite big gains in other regions, such as Quebec. In other words, losses in the Atlantic region masked gains elsewhere, when looking at total space sector growth. It is important to note that the losses experienced in Atlantic this year were somewhat limited, and many organizations actually increased revenues.

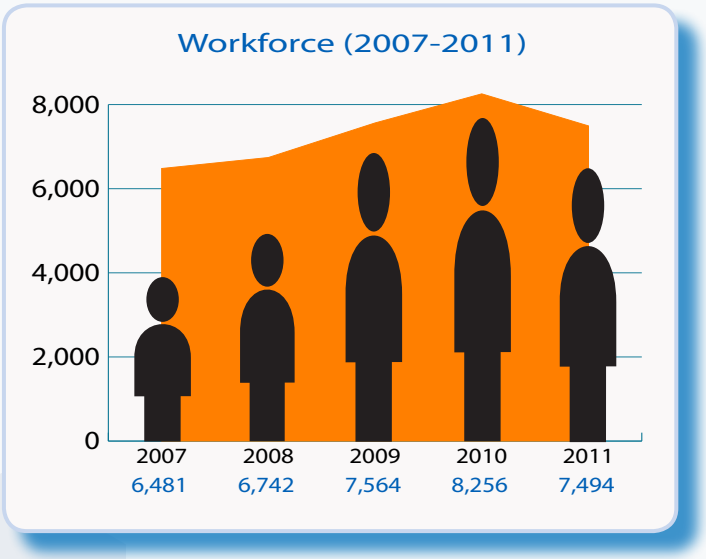


In 2011, domestic revenues decreased 28%, or $24M (from $86M to $62M), while exports decreased 38%, or $117M (from $307M to $190M). Revenue losses in Newfoundland account for most of the change in the region, decreasing revenues from $331M to $191M. Revenues in New Brunswick also decreased, dropping by 5%, or $3M. Conversely, revenues in Nova Scotia increased 24%, or $1M.

Looking at the five year trend analysis, total revenues in the Atlantic region have increased 47%, or $81M. Of this, domestic revenues have increased 130%, or $35M; and exports have increased 32%, or $46M.

SPACE SECTOR WORKFORCE

The Canadian space sector **workforce** experienced a drop in numbers in 2011, reversing much of the gain from the previous year. Workforce decreased 762 positions across the country for a total of 7,494 space-related employees.



Workforce Groups

Engineers and Scientists continued to comprise the largest category of employment in 2011, with 2,625 people, or 35%, of the total space sector workforce. Workers in the **Administration** category make up the second largest group of space sector workers with 1,948 people and 26% of total workforce. Technicians come in third with 1,248 people, or 17%. Management, marketing and sales and other employees make up the remainder.

The following charts and graphs provide a breakdown of the workforce by space employment categories and the distribution of employment groups working in the Canadian space sector in 2011.

Workforce Groups by Region: 2011

	Management	Engineers & Scientists	Technicians	Marketing and Sales	Administration	Others	TOTAL
B.C.	51.0	240.0	85.0	45.0	28.0	21.0	470.0 6%
Prairies	27.0	410.0	185.0	18.0	19.5	10.0	669.5 9%
Ontario	458.5	1,283.3	703.0	224.8	1,556.0	467.0	4,692.6 63%
Quebec	136.0	593.0	153.0	15.0	153.0	6.0	1,056.0 14%
Atlantic	18.0	99.0	122.0	49.0	191.0	127.0	606.0 8%
TOTAL	690.5	2,625.3	1,248.0	351.8	1,947.5	631.0	**7,494.1**

Workforce Groups by Region

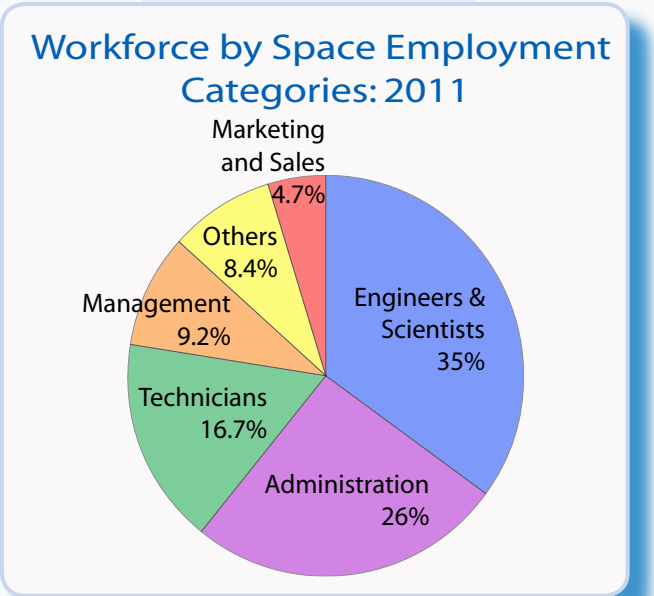
British Columbia represented 6% (or, 470 people) of Canada's space workforce in 2011, an increase of 7.3%, or 32 employees over last year.

The Prairies represented 9% (or, 670 people) of Canada's space workforce in 2011, a decrease of 18%, or 145 employees over last year.

Ontario represented 63% (or, 4,693 people) of Canada's space workforce in 2011, a decrease of 12%, or 658 employees.

Quebec represented 14% (or, 1,056 people) of Canada's space workforce in 2011, a decrease of 2%, or 16 employees.

Atlantic Canada represented 8% (or, 606 people) of Canada's space workforce in 2011, an increase of 4%, or 25 employees.

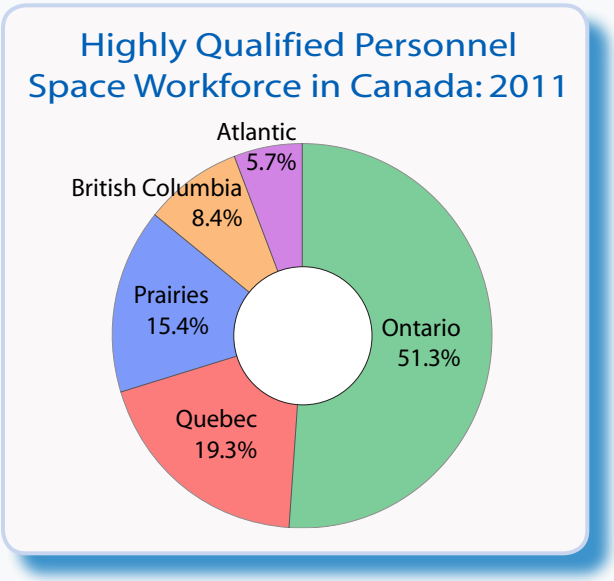


SPACE SECTOR WORKFORCE

HIGHLY QUALIFIED PERSONNEL (HQP)

The following table reports the percentage of Highly Qualified Personnel (HQP) in relation to each Canadian region, and relative to the national workforce. HQP measurement consists of tracking the number of employed engineers, scientists and technicians in the Canadian space sector. In 2011, while technicians maintained a stable workforce, the decrease in engineers and scientists was such that the HQP figure decreased overall. In 2011, there were 3,837 Canadian space workers who were categorized as HQP.

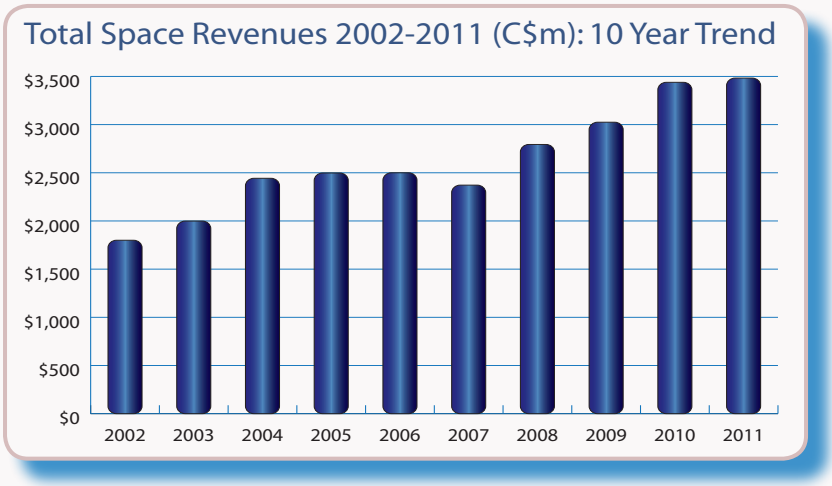
- 8% of Canada's total space sector HQP work in **B.C.** while 69% of B.C.'s space sector workforce are HQP;
- 15% of Canada's total space sector HQP work in the **Prairies** while 89% of the Prairies space sector workforce are HQP;
- 51% of Canada's total space sector HQP work in **Ontario** while 42% of Ontario's space sector workforce are HQP;
- 19% of Canada's total "Space Sector HQP" work in **Quebec** while 71% of Quebec's space sector workforce are HQP;
- 6% of Canada's total space sector HQP work in **Atlantic Canada** while 36% of Atlantic Canada's space sector workforce are HQP.



Highly Qualified Personnel (HQP) : Engineers, Scientists and Technicians						
	Total revenues by region (C$m)	Proportional Share of total revenue	Total n of workforce	Total n of HQP	% of HQP relative to its own provincial workforce	% of HQP relative to national HQP workforce
B.C.	$210M	6.0%	470	325	69.1%	8.4%
Prairies	$274M	7.9%	670	595	88.9%	15.4%
Ontario	$2,401M	68.9%	4,693	1,986	42.3%	51.3%
Quebec	$348M	10.0%	1,056	746	70.6%	19.3%
Atlantic	$252M	7.2%	606	221	36.5%	5.7%

TEN YEAR TREND: 2002-2011

Overall Results : 2002-2011*



Year	Overall Revenues	Domestic Revenues		Export Revenues		Workforce
	(C$)	(C$)	%	(C$)	%	n
2011	***3,483,148,034***	***1,818,014,849***	***52***	***1,665,133,185***	***48***	***7,494***
2010	3,438,582,107	1,735,256,380	50	1,703,325,727	50	8,256
2009	3,024,841,967	1,533,689,499	51	1,491,152,468	49	7,564
2008	2,793,722,219	1,388,532,603	50	1,405,189,616	50	6,742
2007	2,372,145,807	1,379,400,092	58	992,745,715	42	6,481
2006	2,500,364,235	1,400,914,765	56	1,099,449,470	44	6,678
2005	2,497,711,781	1,252,251,094	50	1,245,460,687	50	6,710
2004	2,442,685,155	1,234,981,072	51	1,207,704,083	49	7,179
2003	1,999,433,240	1,201,312,758	60	798,120,482	40	6,122
2002	1,800,139,269	1,072,633,400	60	727,505,869	40	5,789

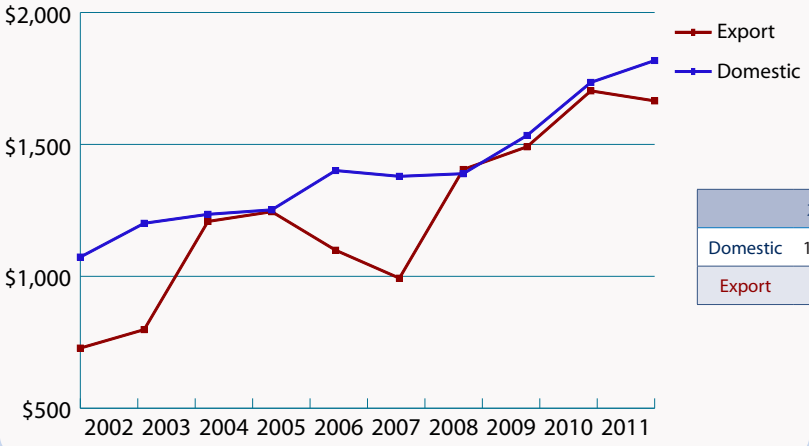
** This chart reflects values not inflation-adjusted.*

INFLATION ADJUSTED REVENUES : 2002-2011

Year	Overall Revenues	Domestic Revenues	Export Revenues
	(C$)	(C$)	(C$)
2011	***3,483,148,034***	***1,818,014,849***	***1,665,133,185***
2010	3,544,324,686	1,788,786,140	1,755,870,477
2009	3,172,495,246	1,608,568,847	1,563,955,030
2008	2,907,307,811	1,444,986,783	1,462,321,028
2007	2,554,781,921	1,485,602,785	1,069,179,136
2006	2,739,470,104	1,534,882,024	1,204,588,081
2005	2,795,113,742	1,401,356,341	1,393,757,401
2004	2,803,960,154	1,417,635,715	1,386,324,439
2003	2,337,529,823	1,404,450,192	933,079,631
2002	2,146,251,279	1,278,868,167	867,383,112

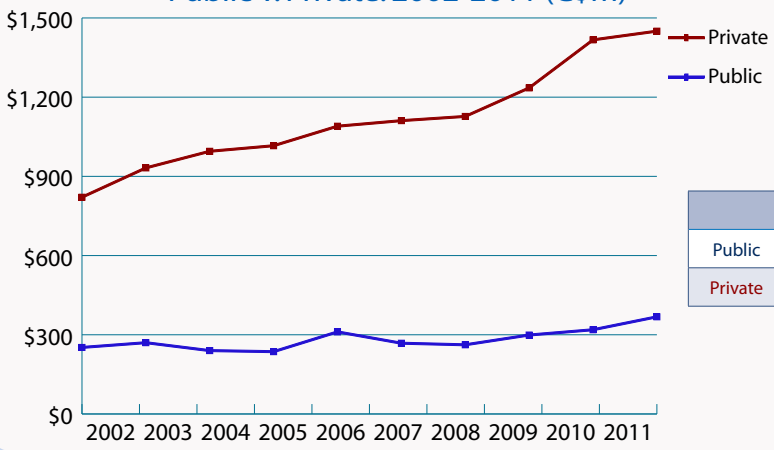
TEN YEAR TREND: 2002-2011

Domestic v. Export Revenues: 2002-2011 (C$m)



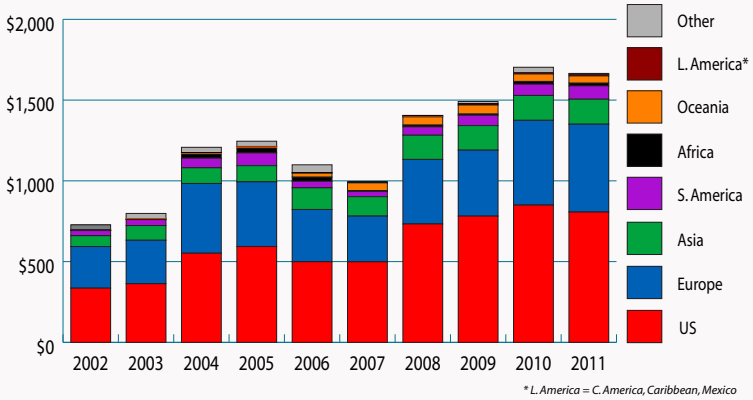
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Domestic	1,073	1,201	1,235	1,252	1,401	1,379	1,389	1,534	1,735	1,818
Export	728	798	1,208	1,245	1,099	993	1,405	1,491	1,703	1,665

Sources of Domestic Revenues Public v. Private: 2002-2011 (C$m)



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Public	252	270	240	236	311	268	262	299	319	368
Private	821	932	995	1,016	1,090	1,111	1,127	1,235	1,417	1,450

Sources of Export Revenues: 2002-2011 (C$m)



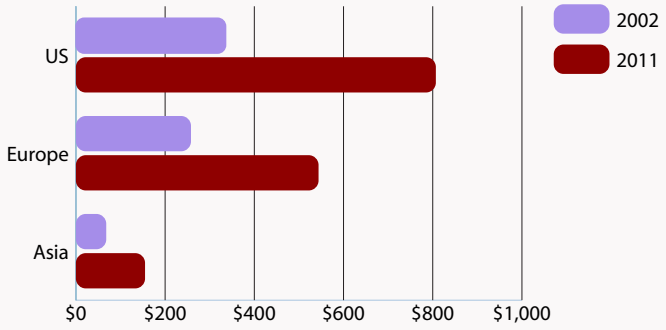
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
US	336	363	552	593	499	499	733	782	850	807
Europe	258	269	432	401	323	283	399	408	525	544
Asia	68	91	97	100	134	120	150	152	154	155
S. America	31	37	60	79	40	32	52	64	70	83
Africa	0	1	25	30	26	6	11	8	17	17
Oceania	2	2	4	6	24	48	51	56	46	45
L. America*	1	3	6	4	4	5	7	8	7	11
Other	32	32	33	33	48	0	2	14	34	5

** L. America = C. America, Caribbean, Mexico*

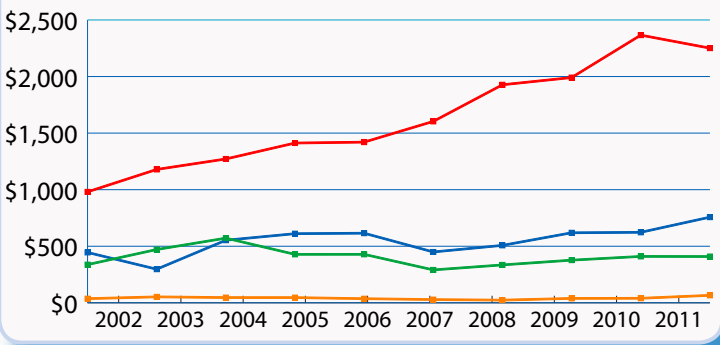
TEN YEAR TREND: 2002-2011

	2002	2011
US	336	807
Europe	258	544
Asia	68	155

Sources of Export Revenues: 2002-2011 (C$m)

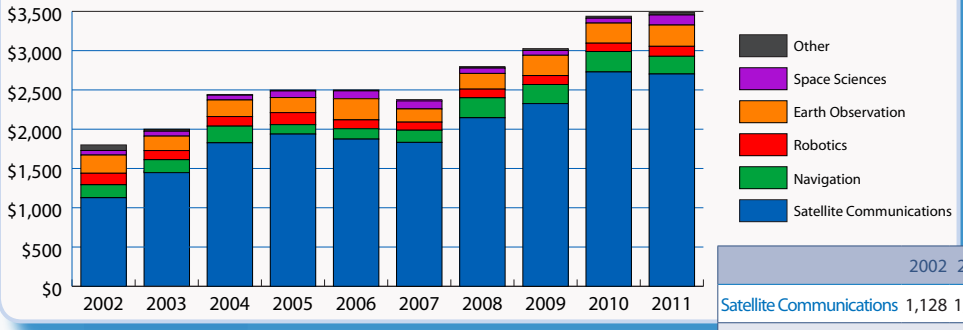


Total Revenues by Space Category: 2002-2011 (C$m)



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Space Segment	445	297	553	611	615	449	508	619	623	757
Ground Segment	338	471	572	428	428	291	335	377	410	409
Applications and Services	981	1,179	1,271	1,412	1,420	1,604	1,927	1,991	2,366	2,251
Space Research	37	53	46	46	37	29	24	39	40	66

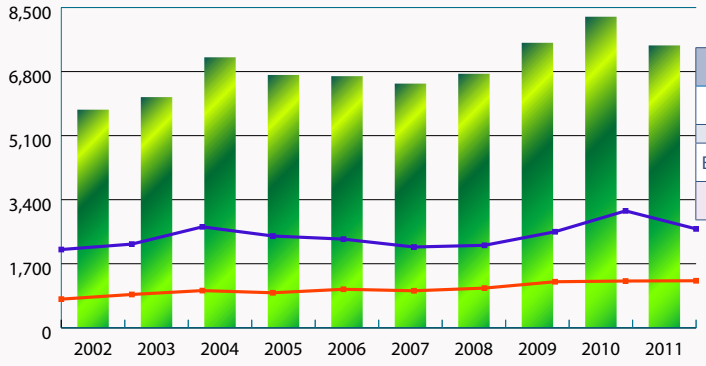
Revenues by Sectors of Activity: 2002-2011 (C$m)



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Satellite Communications	1,128	1,447	1,827	1,938	1,874	1,832	2,146	2,326	2,729	2,703
Navigation	165	165	212	120	132	155	254	243	260	225
Robotics	146	116	122	153	113	103	110	114	106	127
Earth Observation	232	184	211	192	269	168	200	258	256	271
Space Sciences	58	62	61	84	100	102	68	61	62	128
Other	71	26	9	11	12	13	16	24	25	29

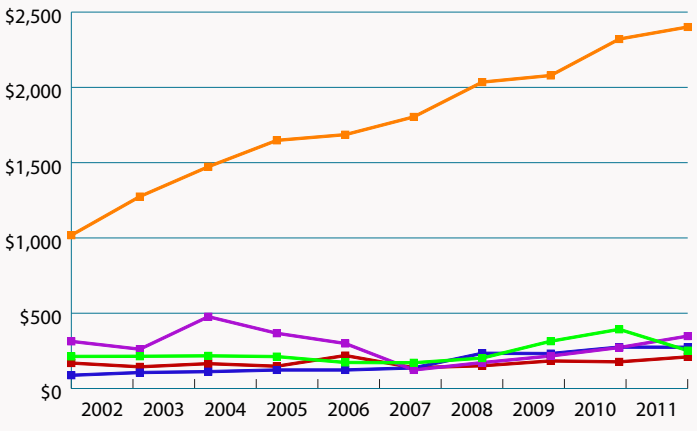
TEN YEAR TREND: 2002-2011

Workforce by Type of Employment: 2002-2011



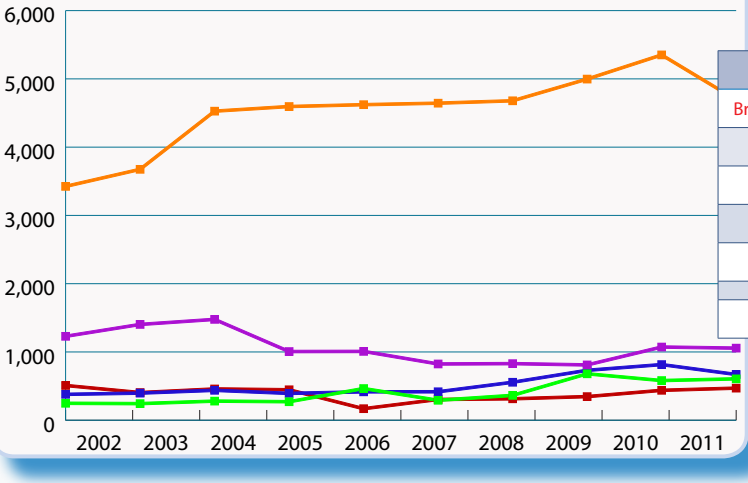
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Workforce	5,789	6,122	7,179	6,710	6,678	6,481	6,742	7,564	8,256	7,494
Engineers & Scientists	2,077	2,221	2,679	2,436	2,353	2,144	2,189	2,549	3,103	2,625
Technicians	760	884	987	929	1,022	982	1,053	1,222	1,241	1,248

Revenues by Canadian Region: 2002-2011 (C$m)

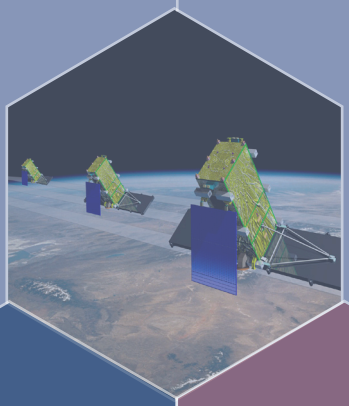


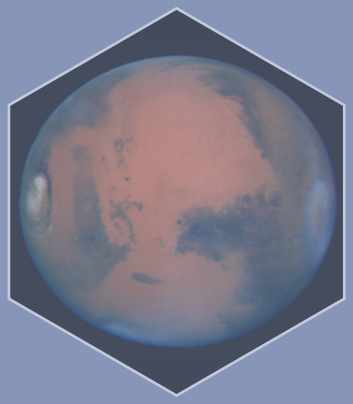
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
British Columbia	169	144	165	148	219	138	151	183	177	210
Prairies	88	106	112	123	123	137	234	232	275	274
Ontario	1,018	1,275	1,473	1,648	1,686	1,804	2,035	2,079	2,321	2,401
Quebec	313	261	477	367	299	123	172	216	272	348
Atlantic	213	214	217	212	173	171	202	314	393	252

Workforce by Canadian Region: 2002-2011



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
British Columbia	509	405	458	446	169	304	314	346	438	470
Prairies	379	397	438	393	416	417	556	731	815	670
Ontario	3,425	3,675	4,527	4,595	4,622	4,644	4,679	4,997	5,351	4,693
Quebec	1,229	1,403	1,477	1,006	1,008	824	829	810	1,072	1,056
Atlantic	248	243	280	271	464	292	364	680	581	606
TOTAL	5,789	6,122	7,129	6,710	6,678	6,481	6,742	7,564	8,256	7,494





Canadian Space Agency

John H. Chapman Space Centre
6767 Route de l'Aéroport
Saint-Hubert, Quebec J3Y 8Y9
Canada
www.asc-csa.gc.ca