The Private Sector in Meteorology- An Update

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1.0 Introduction and Background

A chapter I prepared in 1995, on "A History of Private Sector Meteorology" (Spiegler, D. B., 1996), appeared in *"Historical Essays on Meteorology 1919-1995"* (AMS, 1996, J. Fleming, Editor) as part of the 75th Anniversary of AMS. In the chapter, the state of the private sector as it existed at the time was described.

Since 1995, rapid technological advances in meteorological instrumentation, remote sensing, and model development, as well as in communication and delivery systems, have resulted in the private sector undergoing significant changes. Basically, this update, based on additional and new data, reflects many of the changes that have taken place. The primary reasons, among others, for the AMS interest in wanting to know the current state of the private sector are:

1. To be able to better serve the private sector, and
2. To be able to answer the even more numerous ongoing requests for information about the private sector from the media, commercial, and public interests.

The objectives and scope are given in section 2.0. The approach to the study is in section 3.0. Section 4.0 discusses the responses to a questionnaire that was sent to the companies and individuals in the private sector. Analysis of the data is presented in section 5.0. A summary and conclusions are in section 6.0.

2.0 Objectives and Scope

The general objective is to bring the information on the private sector up-to-date. That includes the estimated size of the market, the estimated number of firms in the United States that have meteorologists on staff, the estimated number of meteorologists working as meteorologists in these firms, as well as the estimated number of individual meteorological consultants in the private sector. Using the data from 1995, the estimated size of the market was $940 Million, plus or minus about $160 million.

Additional objectives include:

1. The portion of the private sector market engaged in providing services and the portion of the market related to products – both software and hardware based. Software based products would include, among others, custom tailored products, including weather graphics. Hardware based products would include, among others, weather instruments, satellites, weather radar, lightning detection, etc.
2. The update specification of the various market segments
3. The estimated revenues from meteorologically related products and services for companies in each of the segments.
4. The estimated number of meteorologists working in the private sector.
5. The job functions of the working meteorologists in the private sector.
6. The industries and businesses targeted by private sector meteorology companies.
7. The noticeable trends in the private sector in the past 11 years.
8. The preliminary projections for the future of the private sector, based on current business and foreseeable trends.

Due to practical constraints, the scope of this survey is limited to the private sector meteorology business (Industrial meteorology) in the United States, meaning that specific *customers* of private sector firms who use weather and climate prediction and analysis services and/or products *provided by* the private sector (e.g. meteorological instrumentation, remote sensing equipment, etc) were not part of the survey. It does include companies whose main business areas are other than meteorology, but who have meteorologists on staff involved in applied Research and Development (R&D), product development, software development, management, etc. A number of

aerospace, agricultural, insurance, and energy companies who employ the meteorologists were identified and contacted for the survey.

The perceived role of the government with the private sector was not within scope of this study.

The TV broadcast meteorology portion of the private sector is a separate consideration. There are 210 TV markets in the U.S, with 3 or more stations in many of the markets. It was beyond the scope of the project to survey this market segment in detail, but it was addressed and useful information is presented herein.

3.0 Approach

The major work tasks in the approach were:

- Determine firms who employ meteorologists in the private sector. Resources for determining firms in the private sector included:
    - The NWS Industrial Meteorology web page which contains Commercial Weather Vendor Web Sites Serving the U.S.
    - Bulletin of the AMS Professional Directories (CCM and non-CCM)
    - Industrial Corporate Members of the AMS
    - National Weather Association NWA Industrial Corporate Members
    - AMS CCM Directory
    - Exhibitor List for AMS Annual Meeting

  The first of these resources contains the web site addresses. To find other websites, I simply put the company name in the Google search bar.
- Determine appropriate main contact in the firm.
- Develop a questionnaire encompassing obtaining the desired information driven by the objectives of the survey.
- Send the questionnaire, via e-mail, to a large number (over 100) of the firms and contacts identified[1].
- Perform follow-up as necessary for firms who had not responded. Two extensions for responses by firms were given.
- Access available information from web sites for companies who failed to respond
- Organize and assimilate the information obtained from the companies responding and from firms whose web sites provided information.
- Coordinate with AMS headquarters personnel regarding AMS member information relative to the private sector.
- Coordinate with the Chair of the AMS Board for Private Sector Meteorologists – James Block regarding his assessment of trends.
- Reassess the validity of the Private Sector market segments, from the chapter on a history of the private sector that appeared in the AMS book mentioned in the Introduction, and determine what changes, if any, are indicated.

1 The scope of this survey is not intended to be inclusive of all meteorological firms and all private sector meteorologists. It does address the large majority of firms of various sizes and does include recognition of individual consulting meteorologists.

- For the TV broadcast meteorology segment, no questionnaires were sent. Nevertheless, an approach was developed to create a reasonable estimate of the size and characteristics of that segment.

This report is based on an analysis and assessment of the information obtained from the private sector firms and from research, using internet web sites, for those firms to whom questionnaires were sent, but who did not respond. For the broadcast TV market, research and personnel communications were used to develop the data.

3.1 Questionnaire Design

The basic criteria for the design of the questionnaire was to gain the information desired to meet the objectives in a way that simplified both the job of the person completing the questionnaire as well as the analysis of the information provided. The first page requests contact information and background and current information about the number of meteorologists and CCMs. (See Appendix – "Questionnaire"). It also asks about products and services offered and annual U.S. revenues from them.

The second page focuses on the Industries Served by the company and the third page on the Job Functions/Activities for the meteorologists in the firm. These pages list both the possible industries and the possible job functions/activities. This format allows the responder to put an X next to those items that apply to their company. The rationale for this approach is that it puts all the possible choices before him/her, thereby greatly simplifying the process and shortening the time it takes to complete the questionnaire. And it did not require the responder to write sentences to answer questions.

3.2 Market Segments

In 1995, the ten market segments shown below were identified.

1) Weather Instrumentation/Remote Sensing;
2) Weather Forecasting Services;
3) Weather Data/Graphics Providers;
4) Staff Meteorologists in Industrial Companies (public utilities, airlines, etc.);
5) General Meteorological Consulting Services (research and development, studies, modeling, - excluding environmental-only businesses)
6) Forensic Meteorology

7) Specialty Companies (weather modification, lightning detection, weather radars, wind profilers, etc.)

8) Environmental Consulting only (air-quality studies and analysis, modeling, monitoring, permitting, environmental impact statements)
9) Weather system developers, providers, system integrators(weather workstations, software, system integration); and

10) Media Meteorology (excluding local TV meteorologists only)

The segments were evaluated from responses and the review of company web sites.

3.3 Broadcast TV Market

This segment was not included in the original assessment of the private sector market in 1995 because a separate chapter in the book *"Historical Essays on Meteorology 1919-1995"* written by Roy Leep was devoted to TV meteorology. Given the constraints described earlier, the approach to assessing the current market for local TV meteorologists was as follows.

Two methods were used to estimate the number of TV meteorologists in the U.S.

a. First, the Nielson Media designated market areas (DMAs) ranked by the number of homes with TV was accessed. There are a total of 210 DMAs. Then, both the number of TV stations with local meteorologists on staff was estimated and the number of meteorologists at the station, as a function of market ranking. Major markets generally have more stations, and likely employ more meteorologists than lower ranked markets.

b. Three sources were accessed – the List of AMS Certified Broadcast Meteorologists (CBMs), the List of AMS Television Seal Holders, and the list of the National Weather Association's (NWA) Broadcast Seal of Approval Holders.
For each of these sources, the number of inactive and deceased members was subtracted from the total in each group. Then, a procedure described in the analysis in section 5.0 of this report was used to estimate the market size.

The next section (4.0) discusses the responses received and lists the companies who have web sites, but did not respond.

4.0 Responses Received from Firms in the Private Sector and Companies Contacted With Only Web Site Information Available

Over 250 companies were identified as commercial weather meteorological firms using the resources listed at the start of section 3.0. All those with web sites were analyzed to determine the sites that clearly had viable businesses and employed meteorologists. A number of the web sites are sites that use the free weather information from a variety of sources to provide weather data and information as a "Pass-through" service. Some of these pass-through sites allow for more user-friendly access and formats than standard weather data acquisition sites. Nearly all of the Pass-through sites and several others have no contact information available.

Based on a review of the weather-related web sites, the segments of the private sector in meteorology were modified some from those listed earlier from the 1995 study. Changes are in **bold** type in table 1. The table also contains the numbers corresponding to the official AMS expertise categories that are part of the AMS membership forms. The expertise categories are important for classifying the types of experience the meteorologists have for each of the private sector segments.

A total of 109 questionnaires were e-mailed to companies and 40 responses were received. Most of the companies have business in more than one segment, and many have business in several segments.

The response deadline was extended twice, totaling about one month in extra time. Non-responding firms were re-contacted two times over a 2-week period. For many of the companies who did not respond after the first and second e-mailings, telephone calls were placed to the contact persons. The calls resulted in receiving a subsequent response for only a few firms. Of the firms that did not respond, a number of the web sites[2] were accessed to obtain pertinent information that provided input to the analysis discussed in the next section (5.0).

[2] A sampling of web sites for companies of different sizes and within different segments, were accessed. Budgetary and time considerations did not allow for all web sites to be analyzed for data. Professional judgment, similarities of a company with others within its segment, and experience were used to develop general estimates for that grouping of firms.

Table 1

SEGMENTS OF PRIVATE SECTOR IN METEOROLOGY- with AMS Expertise No.'s

1. Weather Instrumentation – Remote Sensing - 90, 149, 248

2. Weather Forecasting Services
   10, 32, 33, 35, 130 (&5) 140, 148 (&5), 150 (&5) 163, 165 (&5) 170, 180, 192, 197 (&5), 215 (&7), 245 (&11), 249

3. Weather Data/Graphics providers - 122, 145

4. Staff Meteorologists in Industrial Companies - 143

5. Meteorological Consulting Services & Weather and **Climate Research/Studies**
   30, 57, 50, 40, 60, 70, 100, 110, 120, 125, 130, 140, 147, 148, 150 (&2) 160, 162, 165, 171, 180, 190, 192 (&2) 197 (&2), 220 (&2), 240, 230, 249, 250

6. Forensic Meteorology - 124, 146 (&11)

7. Specialty Companies (e.g. weather modification, lightning detection, wind profilers, biometeorology, etc.)
   200, 210, 215, 265,

8. Environmental Consulting and Engineering – air quality monitoring - 20, 80, 102

9. Weather System Developers, providers, integrators – 248, 122, 145

10. Media Meteorology a. (excluding local TV meteorologists only) - 105, 198, 249
    b. Local TV meteorologists

11. **Weather Risk Management** – 123, 146 (&6), 245 (&2), 263

12. **Weather Education** – 195, 217

Some areas of expertise apply to more than one category. For those areas, the alternate segment is shown in ( ).

5.0 Analysis of the Information Received, Web Site Company Data, TV Market, and AMS Supplied Data

Of the 40 companies who responded, some of them provided data regarding annual revenues, while others did not. Nevertheless, it was feasible for most of those who did not provide financial data, to estimate the annual revenues from either the number of meteorologists in the company and/or information from similar size companies within a

market segment who did provide such data. Based on the information obtained, the financial data, the industries served, and the job functions and activities of the meteorologists within the companies are discussed in the following subsections. Also, the local broadcast TV market segment is addressed based on the approach described in section 3.3 of this report.

5.1 Financial Information

a. *Companies contacted*

The solid financial data available from responding companies is a total of $253 Million. Estimates of the annual sales revenues for other companies who responded totaled $346 Million. The grand total from the 40 responding companies is estimated at $599 Million. The confidence factor for this estimate for the 40 responding firms is high.

Estimating sales revenues for the other companies contacted from information on their web sites will not be as accurate as the numbers from those that did respond. For some of the companies, it is simply not worthwhile to venture a guess because of insufficient information contained on the web site. Annual estimated sales revenues for the companies who did *not* respond to the questionnaire, but whose web sites contained good information, together with professional experience with companies within the segments, allowed for reasonable estimates to be made. But, there is a larger margin of error than for those companies who responded, but did not provide sales revenue data. The companies who run the sites are paid by the ads placed, instead of being paid by subscribers, so that estimating revenues is near impossible. The total estimated sales revenues are nearly $332 Million from those companies for which estimates are feasible. This estimate is considered to be conservative because it does not include the companies for which it was not feasible to make a reasonable estimate. The combined estimated sales revenues, from the 109 companies contacted, and for which either solid data exists or estimates were feasible, are $931 Million. The actual total revenues for the 109 companies contacted is very likely more than $1 Billion.

b. *Local TV Meteorologists*

The local TV meteorologists represent a major segment of private sector meteorology. To get to an estimate of the market size, average TV meteorologist's salaries for market ranks 1-10, 11-25, 26-50, 51-100, 100-150, and 151-210 were estimated and multiplied

by the number of stations within the market ranks and the number of meteorologists at the stations. A reasonable estimate of the number of meteorologists at the stations was based on the rationale described in section 3.3 a. above. Using this approach, the total estimated gross salaries are $134 Million. That total was then multiplied by a factor for General and Overhead (G&A) expenses and fees charged by the station to advertisers who sponsor the TV weather segments. The multiplier factor used is a relatively conservative 2.5 resulting in an estimated market size of $335 Million. When the local TV meteorologists segment is added to the prior total, the estimated market size for the private sector becomes $1.33 Billion, plus.

c*. Individual Consultants*

Individual consultants do not have a corporate framework because they operate as independent contractors. A conservative assumption of the number for this segment is about 300. Assuming an average of $100,000 annual income adds another $30 Million.

d. *Products and Services Revenue Amounts*

For companies that offer weather instrumentation and remote sensing hardware, and companies that provide weather graphic display systems and weather software, the annual revenues are much more from products than from services. For example, for those responding and providing revenue data, the product sales were $192.6 Million and Services accounted for $60.6 Million or about 24% of revenues.

There are some major companies whose business are primarily services. Prominent among them are AccuWeather, AER, Inc., The Weather Channel and WSI, Inc. Estimated sales for these companies and others who responded, but did not include revenue data account for more than 68% of the total of $346 Million. When adding the revenues for products and sales for the 40 companies who responded to the questionnaire, they are nearly evenly distributed with services accounting for about 49.6% and products about 50.4%. Individual meteorological consultants are estimated to have revenues that total about $30 Million. That is likely a conservative estimate. It increases the services segment of the private sector to more than 50% of the total revenues. When adding the local TV segment of $335 Million – nearly all services, the total for services becomes $651 Million.

Assuming the remainder of the private sector companies who did not respond, have nearly the same ratios for products and services as for those who did respond, that conservative total of $332 Million would be split evenly between products and services. That computation results in services responsible for $812 Million and products totaling $484 Million of the resulting in a total estimated market size of about $1.3 Billion.

Because not all the companies in the private sector who have meteorologists on staff were contacted, for reasons discussed earlier, and because there are perhaps another 50 or more companies with meteorologists in the U. S., it is reasonable to state that the total current market for the Private Sector in Meteorology, may very likely exceeds $1.5 Billion. There is a margin of error associated with the estimate, but based on all the information accessed and analyzed, it is unlikely to be less than $1.5 Billion and a reasonable assumption is that it is10-20% or more higher. That would result in a high confidence current estimate between $1.65 and $1.8 Billion for the private sector. And it may conceivably be as high as $2 Billion. The meteorological services and products portions were approximately 50% for each for the 40 companies that responded. One could use a different assumption the number of companies who have meteorology businesses who were not contacted and come up with a different estimate of the total market size.

5.2 Meteorologists in the Private Sector

Professional meteorologists are as defined by the criteria for full member status in the AMS as stated in sections 4.a and 4.c of the membership application:

4a., B.S. or higher degree in the atmospheric or related oceanic or hydrologic sciences.

4c. Twenty semester hours of credit in the atmospheric or related oceanic or hydrologic sciences at an accredited institution of higher learning with three years of professional experience in the last five years.

There are AMS full members who have a degree in another science. They are accepted for full member status by AMS if “currently engaged in an activity in which his or her knowledge is applied to the advancement of the atmospheric or related sciences”. But this AMS category of members is not included in the “meteorologist in the private sector” determinations for this report.

The number of professional members who chose the private sector as their affiliation type in their response to AMS when renewing membership for 2006 was 1,082. The AMS believes that this number is on the low side, perhaps significantly low. An examination of the listings on the AMS web site for the number of seal holders for broadcast TV shows a total of 1,423. Eliminating those who are inactive, and those who are deceased, results in a total of 991 active seal holders. In addition, there are 167 Certified Broadcast Meteorologists (CBMs) giving a total of 1,158 members from AMS in the broadcast TV segment.

A study of the information from the National Weather Association's (NWAs) web site regarding their Broadcast Seal of Approval reveals that there are a total of 517 meteorologists who have the NWA Broadcasters Seal of Approval. However, there is overlap between the three programs. To get an estimate of the amount of overlap, 100 NWA seal holder names were compared with the lists of AMS Seal holder and CBM names. There were 43 names on the NWA list that were not on the AMS lists resulting in a 43 % overlap. Using that percentage for the total of 517 active NWA Seal holders results in 222 additional broadcast meteorologists with one or more seals. Adding the 222 to the 1,158 gives a total of 1,380 broadcast meteorologists having seals. Using the number of local TV meteorologists determined by the method outlined in section 3.3 a. above resulted in 1,614 local TV meteorologists. The difference between 1,614 and 1,380 local TV meteorologists is 234 and this number is believed to represent local TV meteorologists who do not have seals.

Another consideration when trying to determine the number of meteorologists in the private sector is that some broadcast meteorologists have indicated their primary affiliation is the private sector and some as "other". To refine the number the AMS staff provided data that helped me study the membership overlap between "media" and "private sector" (from two different response items on the AMS membership forms): only 182 AMS members in the media designated themselves as "private sector" meteorologists. Thus, there were 900 non-media AMS members identifying themselves on the survey as in the private sector—yielding a preliminary total of 2,280 private sector meteorologists overall. Adding the number of local TV meteorologists (1,614) results in a preliminary total of 2,514 private sector meteorologists.

According to AMS, about 70% of the total professional members (8,631) designated an area of expertise. If 900 represents only 70% of the AMS private sector non-media professional

membership, then the actual total in that category would be approximately 1,286. There are also some meteorologists working in the private sector who are not members of the AMS or the NWA.

According to AMS staff, in the academic sector, a surprisingly small percentage (~33%) of meteorologists working in that sector as instructors/professors and/or researchers are members of the AMS. From a practical, reasonable, and business point of view, private sector meteorologists are more likely to join a professional organization (the membership is useful in business as a credential and very useful in the media). A percentage closer to 50% is perhaps a more reasonable assumption. If 50% of the non-media private sector meteorologists join AMS and nearly all the media meteorologists do, the result is about 2,572 non-media and 1,614 media meteorologists—a total of 4,186 that could serve as a likely low-end estimate of the number of private sector meteorologists. Most of the potential error in that number depends on the unknown rate at which private sector-meteorologists join AMS. If they join at the seemingly low rate of meteorologists in academia, the estimate jumps to 5,472.

The number of meteorologists in a company range from 1 to well over 100. The largest number of meteorologists among firms that responded is for The Weather Channel (TWC) and AccuWeather, with each having approximately the same numbers of meteorologists. TWC has no CCMs on staff, while AccuWeather has 3 CCMs. The next most meteorologists from responding firms is for AER, Inc. followed by WSI, Inc. They reported having 3 and 4 CCMs, respectively. There are a number of employees in these major weather industry companies who may perform meteorologically related job functions, but who are not professional meteorologists by the criteria used by the AMS to define professional meteorologists. These employees are not being considered as private sector meteorologists. The number of active CCMs is 364 – about 5% of the number of private sector professional meteorologists.

5.3 Job Functions of Meteorologists in the Private Sector

Page 3 of the questionnaire lists 19 job functions/activities for those working in the private sector – a few of which are not mainly meteorologically oriented, such as “Sales”, “Line Management”, and “System Management”. Responses from the firms contacted indicate

that meteorologists do work in all of the categories. Table 2 summarizes the job functions and activities for meteorologists within the 40 companies responding. Consulting, Weather Analysis, and Weather Prediction have the highest numbers, but nearly 63% of the companies have forensic meteorology activities, and half or more have meteorologists performing product development, business development, technical marketing, and weather education activities.

The predominant job activities for those in private sector segments 2, 5, 10, and 11 (see table 1) are Weather Analysis and Prediction (1 and 2), Consulting (5), Applied Research (11), Product Development (6). But some meteorologists in those segments also get involved in Business Development (11), Technical Marketing, (8) and different Management roles (15).

Weather Data/Graphics Providers have meteorologists who also have computer skills. Meteorologists within these companies also do Product Development (6) activities, Business Development (7) and Technical Marketing (8) activities according to responses.

Forensic meteorologists are involved in Weather Analysis (1), Consulting (5), Business Development (7), Applied Research (11), Weather Event Reconstruction (12a) and Expert Testimony (12b). Meteorologists in Specialty Companies perform Product Development (6), Technical Marketing (8) and Management (15) functions.

Table 2 Meteorologist Job Functions/Activities Summary for 40 Companies Responding to Questionnaire

Job Functions/Activities (meteorologists)

1. Weather Analysis	29
2. Weather Prediction (up to 2 weeks)	28
3. Long Range Weather Prediction (> 2 weeks to 1 yr.)	15
4. Climate Prediction (> 1 year)	7
5. Consulting	32
6. Product Development	23
a. Value added weather graphics	18
b. Numerical model prediction development	13
c. Statistical model prediction development	15
d. New Analysis technique(s)	14
e. Tailored software for weather displays and computations	16
7. Business Development	21
8. Technical marketing	20
9. Sales	18
10. Basic Research	18
11. Applied Research	21
12. Forensic Met.	25
a. Weather event reconstruction	22
b. Expert testimony	21
13. Climate Analysis	15
14. Statistical Analysis	13
15. Management	15
a. Line management	13
b. Project management	18
c. Program management	15
d. System management	15
16. Air Quality Analysis	7
17. Air Quality Prediction (model applications)	5
18. Technical Report Writing	17
19. Weather Education	20
a. Course preparation	13
b. Course instruction	14
20. Other (list)	2**

** System Development
System Engineering

The meteorologists in Environmental Consulting and Engineering firms are involved in Consulting (5), Business Development (7) and Air Quality Analysis and Prediction activities (16 and 17) as well as Technical Report Writing (18). Companies that design weather information systems and provide them to customers integrating them into the customer's operations use the meteorologists for Product Development, (6) Business Development, Technical Marketing, and Sales (7,8, and 9) plus Management functions (15).

Media meteorologists are mostly providing Weather Analysis and Prediction functions (1 and 2), but are also involved in Weather Education (19). Firms who provide Weather Risk Management products and services have their meteorologists performing Weather Analysis and Prediction, and Long Range Weather Prediction (1, 2, and 3) services. Finally, Weather Education (6) is usually a part of what some companies, individuals, and broadcast meteorologists provide as part of their products and services.

5.4 Industries Served by the Private Sector Segments

Examination of the individual responses of companies reveals that the private sector does serve all the industries listed on page 2 of the questionnaire. Table 3 summarizes, from the 40 responding private sector meteorology companies, the number of companies serving each of the 19 industries. Almost three quarters of the companies serve the Energy industry, and two thirds serve the Legal profession. Other industries, served by 60% or more of the private sector, are Transportation, Insurance, and Risk Management. Half or more of the private sector provide services to Agriculture, Construction, Emergency Management, and the Media.

Based on responses from companies, the weather sensitive industries including transportation and energy are served mostly by the weather forecasting services segment (2) and the consulting-research and studies segment (5). Many of these same companies serve the legal profession (forensic meteorology – segment 6) and the insurance industry (segments 6, and 11-weather-risk management). Instrumentation and remote sensing companies (segment 1) serve the environmental industry, and media components as well as governmental agencies. Weather data and graphics providers (segment 3) serve nearly all the industries.

Summary of Number of Companies in Private Sector in Meteorology, of 40 Companies Responding to Questionnaire, Serving Industries Listed.

Industries Served	Number of Private Sector Companies (of 40 firms responding)
1. Agriculture	23
2. Chemical	9
3. Commerce	19
4. Commodities	17
5. Construction	22
6. Education	19
7. Emergency Management	22
8. Energy	29
a. Gas	21
b. Electric	26
c. Oil and/or Gas Exploration	12
9. Environmental	19
10. Insurance	25
11. Legal	27
12. Manufacturing	14
13. Media	22
a. Newspapers	13
b. Radio	16
c. TV	18
14. Recreation	18
15. Retail	10
16. Risk Management	24
17. Sailing/Boating	14
18. Sports	11
19. Transportation	26
a. Aviation	18
b. Rail	13
c. Shipping	13
d. Trucking	11
20. Other (list)	5*

*Wireless, Internet,
National Meteorological Hydrological Services
Road Maintenance
U.S. Government agencies – 2
Military

Meteorologists within industrial firms themselves (segment 4) clearly serve the industry their firm is in. They basically fall into 3 major industrial categories – Energy, Transportation, and Risk Management. Specialty companies (segment 7) virtually serve all industries on the list, except Education, Legal, and Retail. The companies in the Environmental segment (8) serve the energy industry, the chemical industry, legal firms, and the environmental industry itself. The companies who have developed weather systems (workstations) (segment 9) serve the media, aviation and shipping, insurance, governmental agencies, and the general public through newspapers and the internet.

Media meteorology companies (segment 10) naturally serve the media industry. Most of these companies leverage their capability to also provide forecasting services to weather sensitive industries and several also supply forensic meteorological services. Companies that offer Weather Risk Management products and services (Segment 11) target customers mostly in the energy, commodities, and insurance industries. Pure Weather Education firms (segment 12) were not found, but a number of companies provide such services and products as part of their capability. The customers for the weather education component include book publishers, schools, museums, the legal and insurance profession, as well as the energy industry.

5.5 Notable Trends

Based on results presented in the prior sub-sections and information from web sites, the following trends have been observed since 1995:

- The total revenues in the private sector have increased to between $1.65 Billion and $1.8 Billion, and may be as high as $2 Billion from the $940 Million (+~80%) in 1995[3].
- There has been a proliferation of free weather data, graphics, and forecasts on internet web sites from a number of sources – the National Weather Service (NWS), weather industry companies such as WSI, TWC, AccuWeather and many smaller companies, plus web sites with no contact information other than the sites themselves.

Examples of "free weather" and "pass-through" weather type internet sites are: About.com weather, Alert Weather Services, Inc., Anything Weather.com, America's Weather, Aviation Weather.com, Burk Weather Center, Weather Information

[3] The local Broadcast TV market was not included in the 1995 survey. The estimated local TV market size was likely of the order of $100-150 Million. Thus, the actual increase would be about 60%.

Network, the Weather Underground, Wright-Weather, LLC, Wx-USA, WeatherQuests, Weather for You.com, and many more listed on the commercial weather vendor websites serving the U.S.

- There has been a concomitant large reduction in the need for dedicated weather workstations for the U. S. Air Force, U.S. Navy, and the Federal Aviation Agency (FAA) and a corresponding decline in that business area of the companies offering them.
- Major acquisitions and mergers have taken place, prominent among them are WSI and TWC, Weather Services Corporation and Kavouras became Meteorlogix and then DTN/Meteorlogix, and AccuWeather bought WeatherData, Inc.
- Weather Risk management and the commodities market companies which had been growing rapidly in the mid to late 90's declined rapidly after the Enron scandal, but has been showing a strong increase in recent years. Secretary of Commerce, Don Evans pointed out in July 2003 in his speech at the Earth Observation summit that the weather risk management industry is growing rapidly. And it continues to grow. The number of weather instruments traded was $2 Billion in 2004, $8 Billion in 2005 and is projected to be $40 Billion in 2006[4].
- The meteorological services section appears to have grown significantly with total dollars estimated at $651 Million before adding the local TV market segment. Total market size for products and services were $940 million +/- $160 Million 1995 when the large system companies dominated.
- The forensic meteorological services market has increased because analysis shows there are now many companies - 63% of the responding firms offering such services and experience indicate more individuals are also offering forensic meteorological services.
- The number of private sector meteorologists has increased to an estimated 7,200. The approximate estimate of 2,200 in 1995 did not account for meteorologists who were not members of AMS. It is certainly safe to say that the number of professional meteorologists in the private sector is over 5,000.

5.6 **Five-Year Projections for the Private Sector**

[4] Personal Communication with James Block, Chair of the AMS Board of Private Sector Meteorologists

From experience we know that projecting future trends based on past performance can be unwise in many instances. Nevertheless, market conditions and changes suggest that it is likely that the private sector in meteorology should continue to grow. It is reasonable to expect that estimated growth would be for revenues to increase by 10-25% or more in about the next 5 years to a total size more than a $2.0 - 2.8 Billion. The number of meteorologists in the private sector is also likely to increase – perhaps to about 9,000. Consolidation of weather companies will probably continue as the larger firms acquire attractive companies. Companies not currently in the meteorology business may evaluate the market and consider participation.

The recent number of extreme weather events – record setting precipitation accompanied by extensive flooding, record number of hurricanes and damages, etc. will lead to continued steady, and perhaps accelerated, growth in the forensic meteorology segment.

A summary and conclusions are in the next section – 6.0.

6.0 Summary and Conclusions

The AMS interest in updating the information on the private sector in meteorology from that contained in a chapter on “A History of Private Sector Meteorology” in the book *“Historical Essays on Meteorology 1919-1995”* published by AMS in 1996 led to this determination of the current status.

A questionnaire was developed and sent to more than 100 companies in the private sector. Forty responses were received. For the other firms, their web sites were evaluated and information from the sites was input to the study. In addition, the Broadcast Meteorology segment of the private sector was addressed through accessing the AMS and NWA web sites regarding currently active broadcast meteorologists and through the Nielson Media designated market areas (DMAs) ranked by the number of homes with TVs.

The total current Private Sector Meteorology market exceeds $1.5 Billion. Based on all the information accessed and analyzed, the margin of error in this estimate may be conservative by 10-20% or more, resulting in a total market size between $1.65 and $1.8

Billion, and perhaps as high as $2 Billion. It is estimated that there are about 5,000 Private Sector meteorologists in 2006 – a minimum of 4,186 and a reasonable upper number of 5,472 depending on the rate at which private sector-meteorologists join AMS. The number of active CCMs is 364 – about 7% of the number of private sector meteorologists.

One of the pages of the questionnaire was devoted to the job functions and activities of the meteorologists with the companies where they are employed. Responses indicate that, in general, job activities for those are meteorologically related. The most common are Weather Analysis and Prediction, Consulting, Applied Research, and Product Development. But many of the firms indicated that meteorologists also get involved in Business Development, Technical Marketing, and different Management roles.

Another page of the questionnaire focuses on the industries served by the private sector. Nineteen industries were specified. Responses and the study of web sites of other firms indicate that all 19 industries are served by the private sector. Not surprisingly, weather sensitive industries, transportation, and energy companies led the frequency of those served by the private sector. The legal and insurance industries, the media industry and weather risk management, are also heavily served by the private sector.

Trends for the recent past include a proliferation of free weather data, forecasts, and information on internet web sites; a concomitant decline in the need for dedicated weather workstations, which was a major portion of the private sector market in 1995; major acquisitions and mergers, including WSI and TWC, and DTN/Meteorlogix - the new entity for what was formerly Weather Services Corporation and Kavouras, and AccuWeather bought WeatherData Inc.; a strong resurgence of the Weather Risk management and the Commodities market companies which grew rapidly in the mid to late 90’s and then declined after the Enron scandal; significant growth for the meteorological services section with total dollars estimated at $651 Million for the 40 companies that responded. For the total market, the estimated service portion of the revenues is $750 Million to $900 Million. (Total market size for products AND services was about $940 million in 1995 when the large system companies dominated).

Two areas not addressed in this study that are important to consider for completing the picture of the current and future states of private sector in meteorology are 1. A survey of

a representative sampling of the industries served by the private sector, and the interplay of the roles of government and the private sector and any legislation that could affect the roles of each.

Another consideration is a public relations plan to raise the visibility of the private sector, CCMs, and the AMS itself.

The study reported herein supports the thinking that continued strong growth for Private Sector meteorology is likely for at least the next 5 years.

David B. Spiegler, CCM
and
Fellow of the AMS

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References

1996: American Meteorological Society, *Historical Essays in Meteorology 1919-1995* Fleming, J. R. Editor

2005: Bureau of Labor Statistics – Atmospheric Scientists section website: http://www.bls.gov/oco/ocos051.htm

 Questionnaire For Determining Current State of the Private Sector in Meteorology for the AMS - 2006

Company Name and Address

Title

Telephone No.
Fax No.

E-mail Address

Web Address

No. Years in Business

No. of Meteorologists on Staff

No. of CCMs on Staff

Meteorology Related Products Offered*

Meteorology Related Services Offered*

Annual Revenues from Meteorology Products in U.S.
Annual Revenues from Meteorology Services in U.S.

* Add pages if necessary

Questionnaire For Determining Current State of the Private Sector in Meteorology for the AMS - 2006

Company Name

Industries Served

Check all that apply with an X
In the box next to the industry served

1. Agriculture
2. Chemical
3. Commerce
4. Commodities
5. Construction
6. Education
7. Emergency Management
8. Energy
a. Gas
b. Electric
c. Oil and/or Gas Exploration
9. Environmental
10. Insurance
11. Legal
12. Manufacturing
13. Media
a. Newspapers
b. Radio
c. TV
14. Recreation
15. Retail
16. Risk Management
17. Sailing/Boating
18. Sports
19. Transportation
a. Aviation
b. Rail
c. Shipping
d. Trucking
20. Other (list)

Questionnaire For Determining Current State of the Private Sector in Meteorology for the AMS - 2006

Company Name

Job Functions/Activities (meteorologists)

Check all that apply with an X in the last column on the page

1. Weather Analysis
2. Weather Prediction (up to 2 weeks)
3. Long Range Weather Prediction (> 2 weeks to 1 yr.)
4. Climate Prediction (> 1 year)
5. Consulting
6. Product Development
a. Value added weather graphics
b. Numerical model prediction development
c. Statistical model prediction development
d. New Analysis technique(s)
e. Tailored software for weather displays and computations
7. Business Development
8. Technical marketing
9. Sales
10. Basic Research
11. Applied Research
12. Forensic Met.
a. Weather event reconstruction
b. Expert testimony
13. Climate Analysis
14. Statistical Analysis
15. Management
a. Line management
b. Project management
c. Program management
d. System management
16. Air Quality Analysis
17. Air Quality Prediction (model applications)
18. Technical Report Writing
19. Weather Education
a. Course preparation
b. Course instruction
20. Other (list)