

SD COUNTERMEASURES WEBSITE UPDATE

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Where does someone go to learn about SD countermeasures? The USAF SD Countermeasures Website is the place! The USAF SD Countermeasures website has been operational for approximately two years. This presentation will describe the basic features of the website, identify many of the new programs now available for researchers and teachers, summarize the numerical results of those using the site, as well as reasons they use it, and finally, provide a peek into the future plans of the site.

Spatial Disorientation Countermeasures Website Overview

Most people are familiar with the term spatial disorientation or SD. Several recent aircraft mishaps have brought it to the forefront of the aviation community once more, but details as to the nature of SD are never explained in the media. It may be of interest to know that the most commonly accepted definition of SD was first published almost 40 years ago.¹ This may make SD a young science in terms of refereed journal articles, but the interest appears to be growing. Most of the published papers have occurred within the past decade.² However, unless you know someone experienced in this particular field, there's a good chance you have no idea where to begin researching the topic. The purpose of this paper is to report on the most recent effort to change the current situation. This report contains the most recent results from USAF efforts to make details of SD available throughout the research community while at the same time, making relevant information available to the aviator.

It is well known that researchers often must go to great lengths to find relevant reference materials and related research documents. This search is the first step of the scientific investigation. Because SD research covers a broad spectrum of inter-related disciplines, from visual and vestibular studies through cognitive research to aircraft display symbology, the task of where to begin looking for information is even more difficult. As a first step to alleviate this informational disconnect, the Air Force Research Laboratory (AFRL) Human Effectiveness (HE) Directorate's Spatial Disorientation Countermeasures (SDCM) program launched the SDCM Knowledge Management Website (www.spatiald.wpafb.af.mil) in March of 2001. The

website includes many interesting articles, videos and slide presentations. It also connects users to other pertinent sites via a variety of links. (Figure 1)

The www.spatiald.wpafb.af.mil site has three primary functions: (1) provide an easily accessible, comprehensive reference site for all individuals interested in SDCM, (2) provide easily accessible, public domain SDCM training and presentation materials, and (3) provide a location for cross-flow of information and ideas relating to SDCM. Although it is a military maintained site, it is available to anyone who has access to the internet.

The diverse disciplines associated with SDCM and the esoteric nature of some of the relevant research makes it unlikely that one library or reference text has available the many published papers and journal articles relating to SD. Additionally, many of the information sources are unavailable in electronic format. As such, a comprehensive literature search was performed. This search, which is still ongoing, identified an enormous quantity of material related to SDCM. This material has been compiled into an ever-growing database that is easily searched through the SD website.

The collected materials include peer-reviewed articles, National Transportation Safety Board (NTSB) accident reports, government technical reports, and excerpts from Air Combat Command Accident Investigation Board reports. In the past, this information was only available to individuals who had the time and funding to travel to the physical locations where the materials were stored. This inconvenience was due to the fact that much was only in printed format. These materials are now available to aircrew, researchers, students, educators, and anyone else with an interest in SDCM.

A commonly cited deficiency is a lack of current and relevant SDCM educational materials. For example, a common request from flight surgeons and flight safety officers is materials useable for briefings and safety-related presentations. Available on the website are four original training animations that demonstrate and explain SD illusions and consequences. Two of the presentations are for civil aircraft and two pertain to military situations. All four explain in clear, unambiguous terms the causes of the illusions and possible solutions.

Additionally, over a dozen presentations initially presented at the 2000 Recent Trends in Spatial Disorientation Research Symposium in San Antonio, Texas have been posted on the website. These downloadable materials are available to use as templates or building blocks for new briefings. In the near future, recent presentations from the Defense Advanced Research Projects Agency (DARPA)/Defense Sciences Office Knowledge Acquisition Workshop of December 2001 will be posted. This workshop contained several novel approaches toward preventing the SD problem.

Finally, because visitors to the website have the ability to pose questions or request assistance, facilitation of the critical exchange of ideas necessary to developing better methods of mitigating the effects of SD is a strong point of the website. The wide spectrum of SD makes it difficult, at best, to predict where the newest SDCM technique or equipment will come from. This 'cross-pollenization' is a necessity in any complex field.

SDCM Website Activity

Although it is difficult, if not impossible, to characterize the backgrounds or interests of individuals accessing the SDCM website based on the type of impersonal statistics available to us, it is useful to examine the data for other possible generalizations that can be made. Figure 1 shows the activity since the launch of the SDCM website in March of 2001. The gaps in the data are due to server data collection errors with the statistics package.

As can be seen from Figure 2, the SDCM website has progressed from a modest 800 sessions in the opening month of its availability to a high of 5365 sessions in October 2001. The SD website has progressed to an average slightly below 4000 sessions per month.

The origins of the visitors to the SDCM website are widely varied, as shown by Figures 3 and 4. As would be expected, most of the users of the site originated in the United States initially, with the remainder of the sessions originating in Europe and Asia. (Figure 3)

Because of the preponderance of visits of North American origin, the graph in Figure 2 has excluded those sessions, which make up 89% of the first month's activity. The remainder is split between Europe and Asia.

Figure 4 shows the makeup of session origins 18 months after the site was launched. Not only can we see that activity has increased fivefold, but once again, North America (primarily the United States and Canada) is the source of most of the sessions on the SDCM website. Of the remaining visits, every continent is showing activity, with the exception of South America.

There is obviously a significant amount of interest in the area of SD and SDCM, both nationally and internationally. Based on specific questions and feedback received from the website, the interest is not limited to just one field. Aircrews want access to SDCM tools and instructional materials. Researchers want access to indexed references and aircrew members. Students want access to references, researchers, and aircrew. This site is one source to answer to all of those requests.

Current capabilities of the SDCM website make it much easier to facilitate the needs of these groups, and the future additions will go far to improve the depth and breadth of services. In the near future, the AFRL SDCM website is planning to offer an "Ask the Expert" section, where specific inquiries from users can be forwarded to experts in the applicable field, and the answers will be posted for all visitors to review. Additionally, the site has plans to feature real time web-based briefings, downloadable training/briefing materials based on the AFRL SDCM textbook (soon to be released), and downloadable archived briefing videos.

SD has been identified as an aircrew killer. It has been characterized in many ways, but a very apt analogy is to liken it to *cancer*. The term *cancer* brings to mind a large number of specific diseases that cover a wide variety of symptoms and treatments. In the same way, the term SD should bring to mind a spectrum of phenomena that covers vestibular through visual to cognitive issues. Likewise, the search for SD countermeasures should

not dwell on just a single aspect of SD, but should utilize information and expertise from a range of disciplines. The AFRL SDCM website is a first step towards this multidisciplinary approach.

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References:

1. Benson, A. J. (1965). Spatial disorientation in flight. In J.A. Gilles (Ed.), *A textbook of aviation physiology* (pp. 1086-1132). Oxford: Pergamon.
2. Previc, F. H., & Ercoline, W. R. (2001). Trends in spatial disorientation research. *Aviation, Space, and Environmental Medicine*, in press.72, 1048-1050.

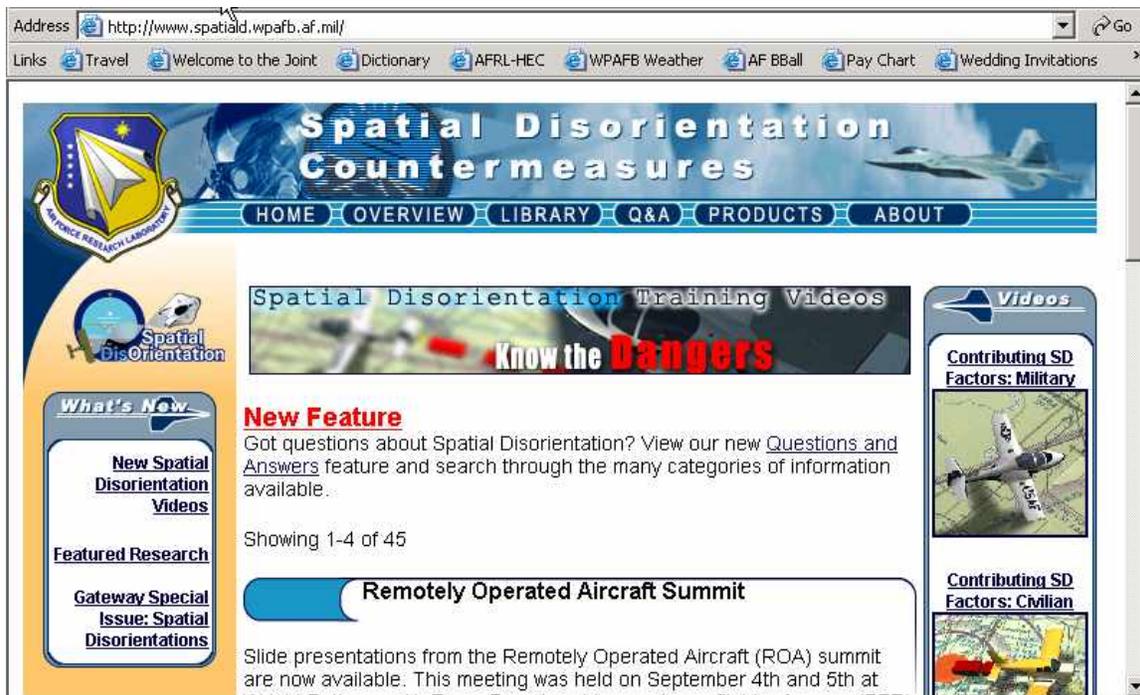


FIGURE 1

Total SDCM Website Sessions Served (Mar 2001 to Oct 2002)

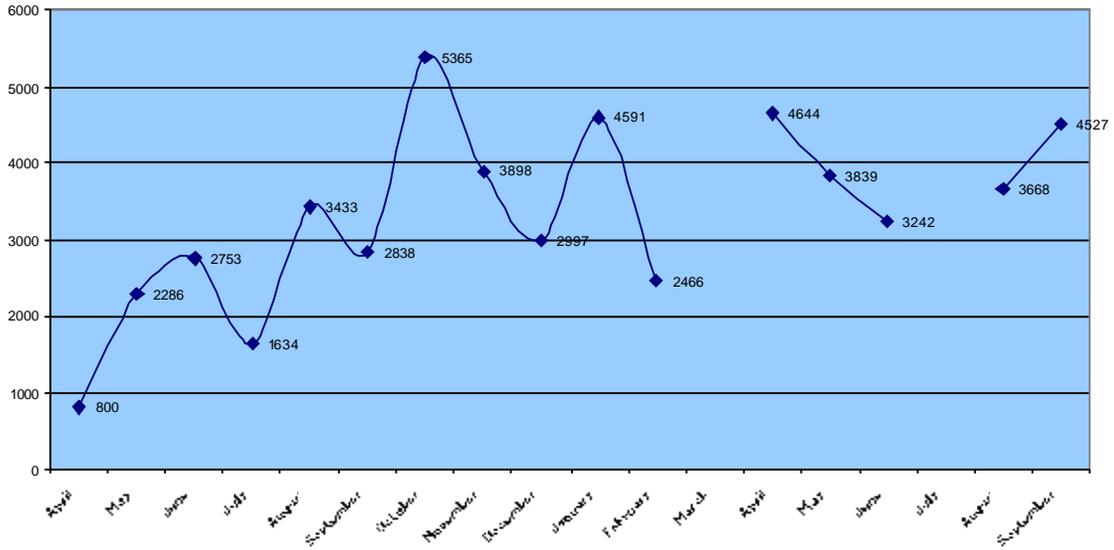


FIGURE 2

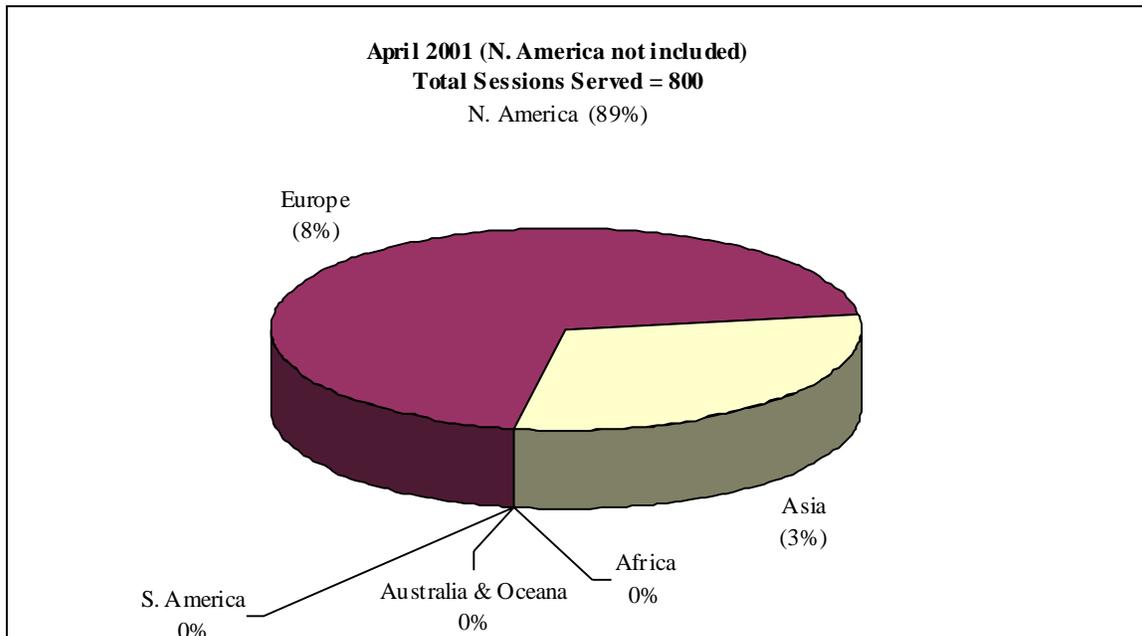


FIGURE 3

September 2002 (N. America not included)

Total Sessions Served = 4527

N. America = (48%)

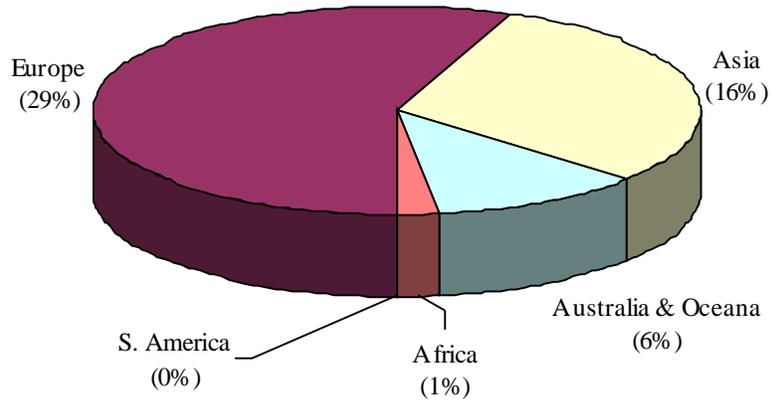


FIGURE 4