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Garada

SAR Formation Flying

Annex 13. Garada Project Publications, Presentations and Publicity

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Revision History

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2. Book Chapters

Shivaramaiah, N.C., & Dempster, A.G., 2012. Baseband Hardware Designs in Modernised GNSS Receivers, chapter in *Global Navigation Satellite Systems - Signal, Theory and Applications*, ISBN 978-953-307-843-4, edited by Global Navigation Satellite Systems - Signal, Theory and Applications, InTech, Rijeka, Croatia, pp33-52

3. Refereed Journals Articles

Li, Y., Glennon, E., Li, R., Jiao, Y., & Dempster, A.G., 2012. Development of a spaceborne GPS receiver for precise relative navigation of formation flying small satellites, *Lecture Notes in Electrical Engineering*, vol 161, 2012, pp 467-476

Ta, T.H., Shivaramaiah, N.C., Dempster, A.G., & Presti, L.L., 2012. Significance of cell-correlation phenomenon in GNSS matched filter acquisition engines, *IEEE Transactions on Aerospace and Electronic Systems*, vol 48, no 2, Article number 6178061, pp 1264-1286

Wu, J. & Dempster, A.G., 2011. The BOC-Gated-PRN, A Multipath Mitigation Technique for BOC(n,n) Waveforms. *IEEE Transactions on Aerospace and Electronic Systems*, vol 47, no 2, pp 1136 - 1153

Wu, J. & Dempster, A.G., 2011. Strobe Correlators" using "W2-pulses. *Signal Processing*, vol 92, no 5, ISSN 0165-1684 <http://dx.doi.org/10.1016/j.sigpro.2011.10.017>

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Wu, J. & Dempster, A.G., 2011. Tailored spreading symbols in 'Strobe Correlators' using 'W2-pulses'. *Signal Processing*, doi:10.1016/j.sigpro.2011.10.017

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Cheong, J.W., 2011. Towards multi-constellation collection detection of weak signals: A comparative experimental analysis. *Proc. ION-GNSS*, Portland, Sept 21-23,

Cheong, J.W., Dempster, A.G., & Rizos, C., 2011. Hybrid of collective detection with conventional detection for weak signal acquisition. *IGNSS Symp.*, Sydney, Australia, 15-17 November, paper90, <http://www.ignss.org/Conferences/PastPapers/2011ConferencePastPapers/2011PeerReviewedPapers/tabid/108/Default.aspx>.

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Choudhury, M., Wu, J., Cheong, J., Dempster, A.G., 2013, Initial test results of Namuru multi GNSS spaceborn receiver, <i>International GNSS Society Symp.</i>, 16-18 July, Gold Coast, Australia.
Gauthier, J.P. & Dempster, A.G., 2012. Attitude Measurement Errors in Bistatic SAR, <i>Proc IGARSS, IEEE</i>, Munich.
Giorgi, G., Buist, P.J., Teunissen, P.J.G., Verhagen, S., 2011. GNSS-based Attitude Determination: Aerospace and Formation Flying, 'Inside GNSS', July/ August issue 2011
Glennon, E.P., Parkinson, K., Mumford, P.J., Shivaramaiah, N.C., Dempster, A.G., Jiang, Y. & Wang, J., 2011. A-RAIM vs. R-RAIM: A Comparative Study, <i>IGNSS Conf.</i>, Sydney, Australia, 15-17 November.
Jiao, Y., Li, Y., Wang, J., Zhou, H., & Rizos, C., 2011. High accuracy single point positioning method with prediction mode, International Global Navigation Satellite Systems Society, IGNS Symposium 2011, November 2011, University of New South Wales, Sydney, NSW, Australia
Jiao, Y., Li, Y., Wang, J., Zhou, H., 2011. Relative positioning method of using single-frequency ionosphere-free model for formation flying missions, <i>Journal of National University of Defense Technology</i>,
Jiao, Y., Li, Y., Wang, J., Zhou, H., & Rizos, C., 2011. An accurate single point positioning method with prediction mode for LEO satellites. <i>IGNSS Symp.</i>, Sydney, Australia, 15-17 November, paper46, http://www.ignss.org/Conferences/PastPapers/2011ConferencePastPapers/2011PeerReviewedPapers/tabid/108/Default.aspx.
Li, B., Zhang, J., Mumford, P. & Dempster, A.G., 2011. How good is Assisted GPS? <i>Proc IGNS 2011</i>, Sydney, 15-17 Nov
Li, R., Jiao, Y., Li, Y. & Rizos, C., 2011. Simulation platform for relative navigation using GPS carrier phase measurements for satellite formation flying missions. <i>IGNSS Symp.</i>, Sydney, Australia, 15-17 November, paper41, http://www.ignss.org/Conferences/PastPapers/2011ConferencePastPapers/2011PeerReviewedPapers/tabid/108/Default.aspx.
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Nadarajah, N., Teunissen, P.J.G., Verhagen, S., Buist, P.J., Steigenberger, P., 2012. Instantaneous attitude determination using COMPASS/BeiDou-2 regional navigation satellite system, <i>Proceedings of the 6th ESA Workshop on Satellite Navigation User Equipment Technologies (NAVITEC'12)</i>
Parkinson, K.J., Mumford, P.J., Glennon, E.P., Shivaramaiah, N.C., Dempster, A.G., & Rizos, C., 2011. A low cost Namuru V3 receiver for spacecraft operation. <i>IGNSS Symp.</i>, Sydney, Australia, 15-17 November, paper 72, http://www.ignss.org/Conferences/PastPapers/2011ConferencePastPapers/2011PeerReviewedPapers/tabid/108/Default.aspx.
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Sarwar, A., Glennon, E.P., & Rizos, C., 2011. Proposing a multi-GNSS Assisted GNSS: Concept & Performance. *IGNSS Symp.*, Sydney, Australia, 15-17 November, paper51, <http://www.ignss.org/Conferences/PastPapers/2011ConferencePastPapers/2011PeerReviewedPapers/tabid/108/Default.aspx>.

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Verhagen, S., Teunissen, P.J.G., 2012. Ambiguity resolution performance with GPS and Compass for LEO formation flying, *Advances in Space Research*, DOI: 10.1016/j.asr.2013.03.007

Wu, J., Lei, B., Dempster A. G., Rizos, C., 2013, QZSS LEX Receiver Design, *International GNSS Society Symp.*, 16-18 July, Gold Coast, Australia.

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Zhang, S., Zhang, K., Wu, S. & Li, B., 2011. Network-based RTK Positioning Using Integrated GPS and GLONASS Observations, *IGNSS Symp.*, Sydney, Australia, 15-17 Nov

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Al-Shaery, A., Lim, S., & Rizos, C., 2011. Assessment of network-based positioning performance using GPS alone versus GPS and GLONASS combined. *24th Int. Tech. Meeting of the Satellite Division of the U.S. Inst. of Navigation*, Portland, Oregon, USA, 20-23 September, 2341-2349.

Cheong, J.W., Wu, J., Dempster, A.G., & Rizos, C., 2012. Assisted-GPS based snap-shot GPS receiver with FFT-accelerated collective detection: Time synchronisation and search space analysis. <i>25th Int. Tech. Meeting of the Satellite Division of the U.S. Inst. of Navigation</i>, Nashville, Tennessee, USA, 18-21 September, 2357-2370.
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Qiao, L., Rizos, C., & Dempster, A.G., 2012. GNSS/star sensor integrated orbit and attitude determination system for Garada mission. <i>25th Int. Tech. Meeting of the Satellite Division of the U.S. Inst. of Navigation</i>, Nashville, Tennessee, USA, 18-21 September, 685-692.
Shivaramaiah, N. C., Mumford, P. & Parkinson K., 2011. Baseband Hardware Design for Space-grade Multi-GNSS Receivers, <i>International GNSS Symposium</i>, Sydney, 15-17 Nov.
Shivaramaiah, N.C., Dempster, A.G., & Rizos, C., 2011. On efficient wideband GNSS signal design. <i>ION Int. Tech. Meeting</i>, San Diego, California, USA, 24-26 January, 1163-1172.
Shivaramaiah, N. C. & Dempster, A. G., 2011. Cognitive GNSS Receiver Design: Concepts and Challenges, <i>ION GNSS 2011'</i>, Portland, OR, Sep 19-23 pp 2782-2789
Wu, J. and Dempster A. G. (2011). Data compression for Assisted-GPS signal processing. <i>Proceedings of the 24th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS 2011)</i>, September 20 - 23, 2010
Wu, J., Shivaramaiah, N. C. & Dempster, A. G., (2011).Development of a GNSS software receiver platform. <i>IGNSS Symp.</i>, Sydney, Australia, 15-17 November, paper 55, http://www.ignss.org/Conferences/PastPapers/2011ConferencePastPapers/2011NonReviewedPapers/tabid/109/Default.aspx.
Wu, J., Choudhury, M., Cheong, J.W., Shivaramaiah, N.C., & Dempster, A.G., 2013, Galileo IOV Satellites Receiver Development, <i>International GNSS Society Symp.</i>, 16-18 July, Gold Coast, Australia.
Yu, K., Rizos, C., & Dempster, A.G., 2012. Error analysis of sea surface wind speed estimation based on GNSS airborne experiment. <i>25th Int. Tech. Meeting of the Satellite Division of the U.S. Inst. of Navigation</i>, Nashville, Tennessee, USA, 18-21 September, 1941-1946.

6. Non-Refereed Conference Papers



Alam, N., Yu, K., & Dempster, A., 2012. On the achievable accuracy for estimating the ocean surface roughness using multi-GNSS bistatic radar. <i>12th Australian Space Science Conference (ASSC) 2012.</i>, Melbourne, Australia, 24-27 September.
Alam, N., Yu, K., & Dempster, A., 2012. Cramer-Rao lower bound for ocean surface roughness estimation using multi-GPS bistatic radar, <i>Australian Space Science Conference</i>
Choudhury, M., Glennon, E., Dempster, A.G. & Mumford, P., 2012. Characterization of the Namuru V3.2 Spaceborne GPS Receiver, <i>Proc ASSC</i>, Melbourne, Australia, 24-27 Sep.
Choudhury, M., Cheong, J.W., Wu, J., Shivaramaiah, N.C., & Dempster, A.G., 2013. Initial Test Results of Namuru Dual-GNSS Spaceborne Receiver. <i>IGNSS Symposium.</i>, Outrigger Gold Coast, Australia, 16-18 July, 2013.
Dempster, A. G., Tsitas, S., Middleton, R., Cohen, M., 2011. “Garada” SAR Formation Flying: an Australian Space Research Program Project, 4th International Conference on Spacecraft Formation Flying Missions & Technologies (SFFMT 2011), St-Hubert, Québec, 18-20 May 2011
Lei, B., Wu, J., Dempster, A.G., & Rizos, C., 2013. QZSS LEX Receiver Design, <i>International GNSS Society Symp.</i>, 16-18 July, Gold Coast, Australia.
Nadarajah, N., Teunissen, P.J.G., Raziq, N., 2012. Instantaneous GPS-Galileo Attitude Determination: Single-Frequency Performance Under Satellite-Deprived Environments, submitted to <i>IEEE Transaction on Vehicular Technology</i>
Nadarajah, N., Teunissen, P.J.G., Buist, P.J., 2012. Attitude determination of LEO satellites using an array of GNSS sensors, <i>submitted to IEEE Fusion</i>, 2012
Nadarajah, N., Teunissen, P.J.G., Raziq, N., 2012. Instantaneous GPS-Galileo Attitude Determination: Single-Frequency Performance Under Satellite-Deprived Environments, <i>under second review for IEEE Transaction on Vehicular Technology</i>
Nadarajah, N., Teunissen, P.J.G., 2012. Instantaneous GPS/COMPASS/Galileo Attitude Determination: A Robustness Analysis under Constrained Environment, to be presented in <i>ION Pacific PNT 2013</i>
Parkinson, K.J., Glennon, E.P., Dempster, A.G. & Rizos, C., 2011. Improving GNSS antennas using Electromagnetic Band Gap structures. <i>Proc IGNSS 2011</i>, Sydney, 15-17 Nov
Parkinson, K.J., Glennon, E.P., Shivaramaiah, N.C., Dempster, A.G. & Rizos, C., 2013, Namuru GNSS Receiver Development at UNSW, <i>IGNSS Symposium.</i>, Outrigger Gold Coast, Australia, 16-18 July.
Qiao, L., Rizos, C., & Demspter, A.G., 2012. Satellites orbit design for the Australian Garada project. <i>12th Australian Space Science Conf.</i>, Melbourne, Australia, 24-27 September.
Qiao, L., Glennon, E., Dempster, A.G., Chaoui, S., 2013. Using Cubesats as Platforms for Remote Sensing With Satellite Navigation Signals. <i>International Geoscience and Remote Sensing Symposium (IGARSS 2013)</i>, Melbourne, Australia 21-26 July 2013.
Wang, T., Su, C., Dempster A.G., et al, 2013. A novel micro-deformation monitoring system for large scale structure. <i>33rd IEEE International Geoscience and Remote Sensing</i>



<i>Symposium.</i> , Melbourne, Australia,21-26 July
Wang, T., Zhang H., Yang L.S., Dempster A.G., et al , 2013. Landslide monitoring system based on spread-spectrum continuous wave radar, 2013. <i>33rd IEEE International Geoscience and Remote Sensing Symposium.</i> , Melbourne, Australia,21-26 July
Wang, T., Wu Q., Dempster A.G., et al , 2013. A Novel Deformation Monitoring System Based on Pseudolite Technology. <i>International Global Navigation Satellite Systems Society Symposium</i> , Outrigger Gold Coast, Australia,16-18 July
Wu, J., Shivaramaiah, N.C. & Dempster A. G. , 2011. Development of a GNSS Software Receiver Platform. <i>Proc IGNSS 2011</i> , Sydney, 15-17 Nov
Wu, J., Choudhury, M., Cheong, J.W., Shivaramaiah, N.C. & Dempster A. , 2013, Galileo IOV Satellites Receiver Development, <i>International GNSS Society Symp.</i> , 16-18 July, Gold Coast, Australia.
Yang, Y., Li, Y., Rizos, C., Dements, A.G., & Yue, X. , 2012. Relative navigation architecture for near earth multiple spacecraft missions using GNSS measurements. <i>12th Australian Space Science Conf.</i> , Melbourne, Australia, 24-27 September.
Yang, Y., Yue, X., Li, Y., Dempster, A.G., & Rizos, C. , 2012. CubeSail for near-earth object observation. <i>12th Australian Space Science Conf.</i> , Melbourne, Australia, 24-27 September.
Yang.Y., Li Y., Dempster, A.G., & Rizos, C. , 2013. Ionospheric path delay modelling for spacecraft formation flying. <i>International Global Navigation Satellite Systems Society IGNSS Symposium</i> , Outrigger Gold Coast, Qld Australia, 16-18 July.
Yu, K., Rizos, C., & Dempster, A.G. , 2012. Performance of GNSS-based altimetry using airborne experimental data. <i>Workshop on Reflectometry using GNSS and Other Signal of Opportunity (GNSS+R)</i> , West Lafayette, Indiana, USA, 10-11 October, procs published at http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6408261&tag=1 .
Yu, K., Rizos, C., & Dempster, A.G. , 2012. "Forest change detection based on GNSS signal strength measurements," submitted to 2013 <i>IEEE International Geoscience and Remote Sensing Symposium (IGARSS)</i> , Melbourne, Australia, 21-26 July 2013

7. Non-Refereed Magazine Articles

Dempster, A., 2011. Why Have GPS on Satellites? *Position*, no 56, pp 16-18

Zhang, J., Li, B., Dempster, A.G., & Rizos, C., 2011. Evaluation of high sensitivity GPS receivers. *Coordinates*, 7(3), 7-12.

8. Opinion Pieces

Dempster, A., 2010. "Australia's space star is looking brighter", The Sydney Morning Herald. <http://www.smh.com.au/opinion/politics/australias-space-star-is-looking-brighter-20101123-1851b.html>

Dempster, A., 2012. Australia's satellite scarcity leaves us vulnerable, *ABC The Drum*, 7 August, <http://www.abc.net.au/unleashed/4179922.html>

Roesler, G., 2013. "A satellite to save Australia? We should have one of those", The Conversation. <http://theconversation.com/a-satellite-to-save-australia-we-should-have-one-of-those-13770>

9. Invited Lectures

Dempster, A., 2011. *ACSER: A New Opportunity for Australia's Future in Space?* IEEE Geoscience and Remote Sensing Society ACT&NSW Chapter Presentation, UNSW, 5 July

Dempster, A., 2011. *Garada: SAR Formation Flying*, Progress in Radar Research (PIRR 2011), Adelaide, 5-6 May

Dempster, A., 2011. *A Remote Sensing Satellite for Australia?* NewSat Satellite Seminar and Teleport Tour, NewSat Teleport, Perth, 19 April

Dempster, A., 2012. *Current & Future Activities at ACSER*, American Institute of Aeronautics and Astronautics, Sydney University, 12 March.

Dempster, A., 2013. *The Garada SAR Formation Flying Project*. Australian Space Development Conferences (ASDC), Adelaide Hilton, July 8-10 2013

Glennon, E.P., & Rizos, C., 2011. *Multi-GNSS Carrier Phase Measurements: A Receiver Designer's Perspective*. Pres. General Assembly Int. Union of Geodesy & Geophysics (IUGG) "Earth on the Edge: Science for a Sustainable Planet", Melbourne, Australia, 28 June – 7 July.

Rizos, C., 2011. *GNSS as an Atmosphere and Sea Surface Observing Technology: Prospects and Plans, Promises and Challenges*. Pres. at the Int. Workshop on GNSS Remote Sensing for Future Missions & Sciences, Shanghai, P.R. China, 7-9 August.

10. Presentations

Alam, N. , 2012. On the achievable accuracy for estimating the ocean surface roughness using multi- GNSS bistatic radar. <i>12th Australian Space Science Conf.</i> , Melbourne, Australia, 24-27 September.
Buist, P.J., Verhagen, S., Giorgi, G., Teunissen, P.J.G., Nadarajah, N. , 2011. "GNSS-based Formation Flying – Functional Model for the GARADA project" . <i>IUGG</i> in Melbourne, Australia, 28 June - 7 July 2011
Buist, P.J., Teunissen, P.J.G., Verhagen, S., Giorgi, G. , 2011. "GNSS-based Relative Positioning and Attitude Determination for a SAR Formation Flying Mission", <i>AOGS 2011</i> organized by Asia Oceania Geosciences Society Taipei, Taiwan, 8- 12 August 2011
Buist, P.J., Teunissen, P.J.G., Verhagen, S. , 2011. "GNSS-based Relative Positioning and Attitude Determination for a Formation Flying Mission", <i>Delft Nanosatellite Symposium</i> , Delft University of Technology, 1 September 2011
Glennon, E. , 2011. "A GPS Receiver Designed for CubeSat Operation", <i>Australian Space Sciences Conference</i> , 26-29 September 2011, Canberra, ACT
Mumford, P. , 2012. Development of a software GNSS receiver with carrier-phase output. <i>12th Australian Space Science Conf.</i> , Melbourne, Australia, 24-27 September.
Nadarajah, N., Teunissen, P.J.G., Odijk, D. , 2011. "GNSS-based attitude determination for remote sensing platforms", <i>ACRS-2011</i> , Taipei, Taiwan, 2-7 October 2011
Qiao, L. , 2011. "Design and Analysis of Satellite Orbits for the Garada Mission", in <i>IGNSS Symposium 2011</i> , 15-17 November, Sydney, Australia
Qiao, L. , 2012. Satellites Orbit Design for the Australian Garada Project. <i>12th Australian Space Science Conf.</i> , Melbourne, Australia, 24-27 September.
Sobhanmanesh, F. , 2012. Performance evaluation of SAR raw data compression methods in presence of non-ideal channel characteristics. <i>12th Australian Space Science Conf.</i> , Melbourne, Australia, 24- 27 September.
Teunissen, P.J.G., Nadarajah, N., Giorgi, G., Buist, P.J. , 2011. "Low-Complexity Instantaneous GNSS Attitude Determination with Multiple Low-Cost Antennas", <i>ION-GNSS-2011</i> , Portland, Oregon, United States, 19-23 September 2011
Tsitats, S. , 2011. "Garada: SAR Formation Flying", 11 th <i>Australian Space Sciences Conference</i> , 26-29 September 2011, Canberra, ACT
Tsitats, S. , 2012. Garada SAR formation flying requirements, space system baseline and spacecraft design. <i>12th Australian Space Science Conf.</i> , Melbourne, Australia, 24-27 September.
Wu, J. , 2011. "Development of a GNSS software receiver platform". <i>IGNSS Symp.</i> 2011, 15-17

November, Sydney, Australia
Yang, Y. , 2012. Relative navigation architecture for near earth multiple spacecraft missions using GNSS measurements. <i>12th Australian Space Science Conf.</i> , Melbourne, Australia, 24-27 September.
Yu, K., Rizos, C., & Dempster, A.G. , 2011. "Sea surface roughness estimation using signals from multiple GNSS satellites". <i>IGNSS</i> , UNSW, Sydney, NSW, November 2011
Yu, K. , 2012. "Sea surface wind speed estimation based on GNSS signal measurements", poster presentation at <i>IEEE International Geoscience & Remote Sensing Symposium (IGARSS)</i> , Munich, Germany, 24 July 2012.
Yu, K. , 2012. "Sea Surface altimetry based on airborne GNSS signal measurements", <i>oral presentation at the International Society for Photogrammetry & Remote Sensing (ISPRS) Congress</i> , Melbourne, Australia, 28 August 2012.
Yu, K. , 2012. "Sea surface altimetry using airborne Lidar data and GNSS signal measurements", <i>invited oral presentation in the Department of Electrical & Computer Systems Engineering at Monash University</i> , Melbourne, Australia, 31 August 2012.
Yu, K. , 2012. 'Performance of GNSS-based altimetry using airborne experimental data', <i>Workshop on Reflectometry Using GNSS and Other Signals of Opportunity</i> , Purdue University, West Lafayette, Indiana, USA, 10 October 2012
Yu, K. , 2012. 'GNSS Reflectometry', <i>GNSS Remote Sensing Workshop</i> , University of New South Wales, 5 December 2012
Yu, K. , 2012. 'GNSS Based Sea State Estimation', <i>GNSS Remote Sensing Workshop</i> , University of New South Wales, 5 December 2012

11. Workshops

"GPS Workshop" , 6 th - 8 th August 2012. Hanoi, Vietnam
"GNSS Signals and Receivers" , 27 th August 2012. Beijing, China
"Disaster Management Workshop" . 6 th December 2011. University of New South Wales, Sydney, Australia. http://www.acser.unsw.edu.au/events.html
"Garada SAR Workshop" . 7 th December 2011. University of New South Wales, Sydney, Australia. http://www.acser.unsw.edu.au/events.html
"GNSS Remote Sensing Workshop" . 5 th December 2012. University of New South Wales, Sydney, Australia. http://www.acser.unsw.edu.au/events.html
"GNSS Position Calculations" , 9 th - 14 th September 2013. Hanoi, Vietnam

12. Media Articles

23 rd November 2010, Sydney Morning Herald. Australia's space star is looking brighter. http://www.smh.com.au/opinion/politics/australias-space-star-is-looking-brighter-20101123-1851b.html
22 nd July 2011, The Drum ABC. Small space has a big future. http://www.abc.net.au/unleashed/2806192.html
16 th August, GPS World. The Role of GNSS in SAR Formation Flying. http://www.gpsworld.com/tech-talk-blog/the-role-gnss-sar-formation-flying-11984
8 th June 2012. Breakfast on Radio Adelaide. Australia's place in the great space race. http://radioadelaidebreakfast.wordpress.com/2012/06/08/australias-place-in-the-great-space-race/
11 th July 2012. ABC Adelaide Radio. Professor Andrew Dempster interviewed on GPS Technology. http://www.garada.unsw.edu.au/res/ABC%20Adelaide_Andrew%20Dempster.mp3
7 th August 2012. The Drum ABC. Australia's satellite scarcity leaves us vulnerable. http://www.abc.net.au/unleashed/4179922.html
14 th January 2013. Microwave Journal. BAE Systems Australia tackles new space challenge. http://www.microwavejournal.com/articles/18966-bae-systems-australia-tackles-new-space-challenge
7 th March 2013. The Conversation. Explainer: what is GPS? http://theconversation.com/explainer-what-is-gps-12248
9 th April 2013. UNSW Uniken. The case for space. http://uniken.unsw.edu.au/features/case-space
9 th April 2013. The Sydney Morning Herald. The need for an Australian space program. http://media.smh.com.au/news/science/the-need-for-an-australian-space-program-4174256.html
9 th April 2013. SBS World News Australia. Australia enters space race. http://www.youtube.com/watch?v=B4g1KcuWamE&feature=youtu.be
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