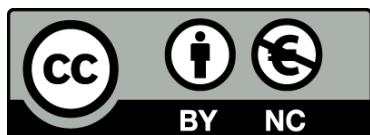




UNIVERSITAT DE
BARCELONA

**Estudio de sistemas convectivos mesoscalares
en la zona mediterránea occidental mediante
el uso del radar meteorológico**

Tomeu Rigo Ribas



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REFERENCIAS

PUBLICACIONES REALIZADAS POR EL AUTOR

- Barrera, A., M., Barriendos, M.C. Llasat, and T. Rigo, 2003: Classification of weather types for strong rainfall events producing floods during the end of the Little Ice Age (ad 1840-1870) in Catalonia: a meteorological approach using old instrumental records. *Proceedings of Paleofloods, Historical Data and Climatic Variability* (Thorndycraft, V.R., G. Benito, M. Barriendos, and M.C. Llasat, editors), 281-288
- Barriendos, M., M.C. Llasat, A. Barrera, and T. Rigo, 2003: The study of flood events from documentary souces: Methodological guidelines for historical source identification and flood characterization in the iberian peninsula. *Proceedings of Paleofloods, Historical Data and Climatic Variability* (Thorndycraft, V.R., G. Benito, M. Barriendos, and M.C. Llasat, editors), 87-92
- Bech, J., and T. Rigo, 2004: Experience of the operational use of the EHIMI radar processing tool in Catalunya. 1st Voltaire Workshop, Barcelona. Proceedings. Ljubljana, Slovenia, 85-91
- Llasat, M.C., Rigo, T., and Barriendos, M., 2003: The 'Montserrat-2000' flash-flood event in comparison with spring floods in the Northeast of the Iberian Peninsula since the 14th century. *Int. J. Climatol.*, 23, 453-469
- Llasat, M.C., T. Rigo, and J.M. Montes, 2000: Orographic role in the temporal and spatial distribution of precipitation. The case of the internal basins of Catalonia (Spain). *Proceedings of the EGS Plinius Conference*, Maratea, Italy, October 1999: 41-55
- Llasat, M.C., J. De Batlle, T. Rigo, y M. Barriendos, 2001: Las Inundaciones del 10 de Junio del 2000 en Cataluña. *Revista Ingeniería del Agua*, vol. 8, nº1, marzo. ISSN: 1134-2196. D.L: CS-180-1998. Valencia, España, 53-66
- Llasat, M.C., F. Martín, O. Carretero, T. Rigo, and J. de Batlle, 2002: Diagnosis of a Strong Convective Event Produced in Catalonia on June 2000. *Mediterranean Storms. 3rd Plinius Conference 2001*. Ed: Roberto Deidda, Alberto Mugnai, Franco Siccardi. Consiglio Nazionale delle Ricerche. Italy. ISBN: 88-8080-031-0, 67-70.
- Llasat, M.C., E. Ferrari, T. Rigo, and, P. Mancuso, 2000: Floods over the Calabria Region (Italy) and its comparison with Meteorological Aspects of Heavy Rainfalls in Catalonia (Spain). *Proceedings of the Séminaire International Hydrologie des Régions Méditerranéennes*. Montpellier 2000, PHI-V / Documents Techniques en Hydrologie / nº 51 367-372

Referencias

- Rigo, T., and M.C. Llasat, 2002: The use of automatic raingauges and/or meteorological radar for identifying convective rainfall. *Proceedings of the 4th Plinius Conference on Mediterranean Storms*, Mallorca, Spain, 2-4 October 2002, 4 pp.
- Rigo, T., and M.C. Llasat, 2002: Analysis of Convection in Events with High Amounts of Precipitation using the Meteorological Radar. *Proceedings of the 4th EGS Plinius Conference* held at Mallorca, Spain, October 2002. Edited by Agustí Jansà and Romualdo Romero. ISBN: 84-7632-792-7. D.L.:PM00178-2003, 4 pp.
- Rigo, T., and M.C. Llasat, 2002: Analysis of Convective Structures that produce Heavy Rainfall Events in Catalonia (NE of Spain), using Meteorological Radar. Proceedings of *Second European Conference on Radar Meteorology* (ERAD) 2002: 1-4 Copernicus GmbH 2002, 45-48
- Rigo, T., y M.C. Llasat, 2003: Una aplicación del Radar Meteorológico para la Previsión a corto plazo de células convectivas. El caso del 10 de Junio de 2000 en Cataluña. *3ª Asamblea hispano-portuguesa de Geodesia y Geofísica*. Valencia (España), 4-8 febrero 2002, Proceedings, Tomo III, ISBN: 84-9705-297-8, ISBN: 84-9705-364-8, 1404-1407
- Rigo, T., and M.C. Llasat, 2003: Flash Floods and Heavy Rain Events in Catalonia. Analysis of the 1996-2000 Period. *Hydrology of the Mediterranean and Semiarid Regions*. Proceedings of the international symposium held at Montpellier, April, 2003. IAHS Publ. nº 278, 269-275.
- Rigo, T., M.C. Llasat, M. Barriendos, and A. Barrera, 2003: Flood Events in the Llobregat Basin: a comparison between the Flash Flood of June 2000 and events that have occurred since the 14th Century. *Palaeofloods, Historical Data and Climatic Variability: Applications in Flood Risk Assessment*, Barcelona. Edited by V.R. Thorndycraft, G. Benito, M. Barriendos and M.C. Llasat, ISBN-84-921958-2-7, Proceedings of the PHEFRA International Workshop held in Barcelona, 16th-19th October 2002, 275-280.
- Rigo, T., and M.C. Llasat, 2004: A Methodology for the Classification of Convective Structures using Meteorological Radar: Application to Heavy Rainfall Events on the Mediterranean Coast of the Iberian Peninsula. *Natural Hazards and Earth System Sciences*, Ed. European Geosciences Union, 4, nº 1, pp. 59-68
- Rigo, T., and M.C. Llasat, 2003: Features of Convective Systems in the NW of the Mediterranean Sea. *5th Plinius Conference on Mediterranean Storms* (European Geosciences Union, EGU), Proceeding, 7 pp.
- Rigo, T., J. De Batlle, y M.C. Llasat, 2001: Una Comparación de Episodios de Inundaciones en Cataluña no Otoñales (Junio de 2000, Septiembre de 1996 y Enero de 1996). *El Tiempo*

Referencias

- del Clima. Proceedings, Valencia, 2001. Asociación Española de Climatología (AEC), Serie A, nº 2, 401-412
- Rigo, T., and M.C. Llasat, 2000: A Winter Flood Event in Spain: the January 1996 case. Geophysical Research Abstracts. European Geophysical Society, vol.2. ISSN 1029-7006.

REFERENCIAS CONSULTADAS

- Agarwal, N. and E.N. Anagnostou, 2002: Investigating Improvements in Precipitation Classification from Ground Based Weather Radar Observations. *Hydrologic Processes Journal* (En revisión)
- Aguado, F., J.L. Camacho, E. Gutiérrez, J.M. Gutiérrez, y F. Pérez, 1995: Cost 75; Weather radar systems. International Seminar. Brussels, Sept. 1994. Ed. Collier, 29-35
- Alberoni, P.P., V. Levizzani, R.J. Watson, A.R. Holt, S. Costa, P. Mezzasalma, and S. Nanni, 2000: The 18 June 1997 Companion supercells: Multiparametric Doppler radar analysis. *Meteorol. Atmos. Phys.*, **75**, 101-120
- Álvarez, E., 1999: Climatología de descargas eléctricas. IV Simposio Nacional de Predicción. Memorial "Alfonso Ascaso", Madrid 15-19 Abril 1996, 6 pp.
- Arús, J., 2001: Reventones de tipo cálido en Cataluña. V *Simposio Nacional de Predicción*. Memorial "Alfonso Ascaso". Madrid 20-23 Noviembre 2001, 6 pp.
- Barriendos, M., 1994: El clima histórico de Catalunya. Aproximación a sus características generales (ss. XV-XIX), Departamento de Geografía Física, Universidad de Barcelona, España. Tesis de Doctorado inédita, 500 pp.
- Barriendos, M., and J. Martín-Vide, 1998: Secular Climatic Oscillations as Indicated by Catastrophic Floods in the Spanish Mediterranean Coastal Area (14th-19th Centuries). *Climatic Change*, **38**, 473-491.
- Barriendos, M., and M.C. Llasat, 2003: The study of climatic anomalies by means of zonality and NAO indices. The case of 'Malda' anomaly in the Western Mediterranean Basin (AD 1760-1800). *Climatic Change*, **61**, 191-216.
- Bartels, D.L., J.M. Skradski, and R.D. Menard, 1984: Mesoscale convective systems: A satellite data-based climatology. NOAA Tech. Memo. ERL ESG 8, Dept. Of Commerce, Boulder, CO, 63 pp
- Bech, J., B. Codina, J. Lorente, and D. Bebbington, 2003: The sensitivity of single polarization weather radar beam blockage correction to variability in the vertical refractivity gradient. *J. of Atmos. and Ocean. Tech.*, **20**, 845-855

Referencias

- Bech, J., B. Codina, J. Lorente, and D. Bebbington, 2002: Monthly and daily variations of radar anomalous propagation conditions: How “normal” is normal propagation. Proceedings of ERAD, 1-4 Copernicus GmbH 2002, 35-39
- Berenguer, M., G.W. Lee, D. Sempere-Torres, and I. Zawadzki, 2002: A variational method for attenuation correction of radar signal. Proceedings of ERAD, 1-4 Copernicus GmbH 2002, 11-16
- Berga, L., 1995. La problemática de las inundaciones en Catalunya, in Berga, L. (ed.). El agua en Catalunya, 237-256.
- Biggerstaff, M.I., and S. Listemaa, 2000: An Improved Scheme for Convective/Stratiform Echo Classification using Radar Reflectivity. *Journal of Appl. Meteorology*, **39**, 2129-2150
- Blanchet, G. and J.C. Deblaere, 1993: L'épisode pluvio-orageux catastrophique de septembre 1992 dans le sud-est de la France: analyse pluviométrique et météorologique. Rev. de Géographie de Lyon, 68, 2-3: 129-138
- Brázdil, R., R. Glaser, C. Pfister, J.M. Antoine, M. Barriendos, D. Camuffo, M. Deutsch, S. Enzi, E. Guidoboni, and F.S. Rodrigo, 1999: Flood events of selected rivers of Europe in the Sixteenth Century. *Climatic Change*, **43**, 239-285.
- Burgess, D., and P.S. Ray, 1988: Principles of Radar. Mesoscale Meteorology and Forecasting. (Ed. P.S. Ray). American Meteorological Society, 85-117
- Burgess, D., and L.R. Lemon, 1990: Severe Thunderstorm Detection by Radar. Radar in Meteorology. (Ed. D. Atlas). American Meteorological Society, 619-647
- Burgueño, A., 1986: Distribución de la intensidad de la lluvia y de su duración en Barcelona. Memoria para optar al grado de Doctor en Ciencias Físicas, Universidad de Barcelona.
- Campins J, Calvo J, Jansa` A. 1997. The Tramontane wind: dynamic diagnosis and HIRLAM simulations. Proceedings on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean, Ed. INM-UIB, Palma de Mallorca, april 1997, 503–508.
- Cana, L., E. Hernandez, R. García, and D. Grisolía-Santos, 1999: Mesoscale convective systems during 1990-94: characteristics and synoptic environment. *Mediterranean Storms*, Proceedings, 1st EGS Plinius Conference, Maratea, Italy, 14 – 16 October 1999, 67-75
- Carretero, O., F. Martín, and F. Elizaga, 2002: Radar-based perspective of different convection episodes in the western Mediterranean areas. *Mediterranean Storms*, Proceedings, 3rd EGS Plinius Conference, Baja Sardinia, Italy, October 2001.
- Carretero, O., y F. Martín, 2001: Comparación de dos episodios de convección en la Península Ibérica a través de tácticas de identificación de células radar. V Simposio Nacional de Predicción. Memorial "Alfonso Ascaso". Madrid 20-23 Noviembre 2001, 6 pp.

Referencias

- Cerro, C., B. Codina, J. Bech, and J. Lorente, 1997: Modeling Raindrop Size Distribution and Z(R) Relations in the Western Mediterranean Area. *Journal of Applied Meteorology*, **36**, 1470-1479
- Chappell, C.F., 1986: Quasi-stationary convective events. *Mesoscale Meteorology and Forecasting*. (Ed. P.S. Ray). Amer. Meteor. Soc., 289-310.
- Chakina, N.P., and L.V. Berkovich, 1997: Diagnostic and numerical studies of a case of cyclogenesis over the Mediterranean and Black seas. *INM/WMO International Symposium on cyclones and hazardous weather in the Mediterranean*, Palma de Mallorca, 14-17 April 1997, Spain, 125-130.
- Chisholm, A.J., and J.H. Renick, 1972: Supercell and multicell Alberta hailstorms. Abstracts Intern. Conf. on Cloud Physics, London, England, 67-68
- Circe, M., y F.Martín, 2003: Identificación y seguimiento automático de estructuras convectivas a partir de datos de radares meteorológicos. Nota técnica del STAP, nº 39. Instituto Nacional de Meteorología.
- Clavero, P., J. Martín Vide, i J.M. Raso Nadal, 1996: Atles climàtic de Catalunya. Termoplumiometria. Generalitat de Catalunya (Departament de Politica Territorial i Obres Públiques), Institut Cartogràfic de Catalunya i Departament de Medi Ambient, Barcelona.
- Codina, B., M.Aran, S. Young, and A. Redaño, 1997: Prediction of a Mesoscale Convective System over Catalonia (Northeastern Spain) with a Nested Numerical Model. *Meteorol. Atmos. Phys.*, **62**, 9-22
- Collier, C.G., 1989: Applications of Weather Radar Systems. Ellis Horwood Ltd., ISBN 0-7458-0510-8, 249 pp.
- Conway, B.J., 1999: An Overview of Nowcasting Techniques. SAF Training Workshop: Nowcasting and Very Short Range Forecasting. EUTMETSAT. EUM p 25, 1999. ISBN 92-9110-030-7, 34-43
- Corradini, C., 1985: Analysis of the effects of orography on surface rainfall by a parameterized numerical model. *J. of Hydrology*, **77**, 19-30
- Corral, C., D. Sempere, P. Malgrat, and J. Raso, 1997: Comparison between radar and raingauges rainfall estimates in a hydrological perspective. A case study. Proceedings on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean, Ed. INM-UIB, Palma de Mallorca, april 1997, 113-121
- Corral, C., 1996: Avaluació de la pluja per radar a l'àrea de Barcelona. Aplicació hidrològica a una conca. Tesina d'especialitat ETSECCPB (UPC).
- Cucurull, L., 2001. The use of Global Navigation Satellite (GNSS) signals in Numerical Weather Prediction (NWP). Tesis de doctorado. Universidad de Barcelona.

Referencias

- De Leonibus, L., P. Rosci, and F. Zauli, 1999: Nefodina: a tool for automatic detection of severe convective phenomena. Proceedins *SAF Training Workshop: Nowcasting and Very Short Range Forecasting*. EUTMETSAT. EUM p 25, 1999. ISBN 92-9110-030-7, 148-157
- DeMott, C.A., R. Cifelli, and S.A. Rutledge, 1995: An Improved Method for Partitioning Radar Data into Convective and Stratiform Components. Proceedings on the 27th Conference on Radar Meteorology, American Meteorological Society, 233-236
- Dimitrievski, V., 1997: Mediterranean cyclones and catastrophic floods in Republic of Macedonia. Proceedings *on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean*, Ed. INM-UIB, Palma de Mallorca, april 1997, 481-487
- Dinku, T., E. Anagnostou, and M. Borga, 2002: Improving radar-based estimation over complex terrain. *J. of Appl. Meteor.*, **41**, 12, 1163-1178
- Dolz, J., 1993. The problem of floods in Spain. Report of the US-Spanish joint workshop on Natural Hazards. NSF-UPC, Barcelona.
- Doswell III, Ch. A., H. E. Brooks, and R. A. Maddox, 1996: Flash Flood Forecasting: An Ingredients-Based Methodology. *Wea. Forecasting*, **11**, 560-581.
- Doswell III, Ch. A. and D. W. Burgess, 1993: Tornadoes and tornadic storms: A review of conceptual models. Published in: *The Tornado: Its Structure, Dynamics, Prediction, and Hazards* (1993 - C. Church et al., Eds.), Geophysical Monograph **79**, Amer. Geophys. Union, 161-172
- Doswell III, Ch. A., 1994: Flash flood-producing convective storms: Current understanding and research. *Report of the proceedings*, U.S.-Spain Workshop on Natural Hazards (Barcelona, Spain), National Science Foundation, 97-107
- Doswell III, Ch. A., 2001: Severe Convective Storms-An Overview. Severe Convective Storms (Ed. Ch. A. Doswell III). AMS Meteorological Monograph Series, Vol. 28, n. 50, 1-26
- Doswell III, C. A., and J. Krácmar, 1996: Is the "Stratiform Precipitation" Associated with a Mesoscale Convective System Really Stratiform?. <http://www.cimms.ou.edu/~doswell>
- Doswell III, C. A., C. Ramis, R. Romero, and S. Alonso, 1997: Diagnosis of two heavy rainfall cases in the Western Mediterranean. Proceedings *on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean*, Ed. INM-UIB, Palma de Mallorca, april 1997, 415-424
- Elbaz-Poulichet, F., J.L. Seidel, A. Devez, S. Van Exter, C. Casellas, M. Voltz, and P. Andrieux, 2003: Dynamic and origin of trace elements in a Mediterranean river (la Peyne)- relations to lithology, discharge, and agricultural practices. Proceedings of the international symposium held at Montpellier, April, 2003. IAHS Publ. n° 278, 410-416

Referencias

- Elizaga F., F. Martín, I. San Ambrosio, and O. Carretero, 2002: Operational forecasting of severe convective storms at the Spanish Meteorological Service (INM). ECSS Conference 2002 Prague, august 2002
- Estrela, T., C. Marcuello, and M. Dimas, 2000: Las aguas continentales en los países mediterráneos de la Unión Europea. Report of the CEDEX, Ministerio de Fomento, Madrid, Spain, 293 pp.
- Fletcher, J.O., 1990: Early Developments of Weather Radar during World War II, Radar in Meteorology, (Ed. D. Atlas). American Meteorological Society, 3-6
- Fovell, R. G., and Y. Ogura, 1988: Effects of vertical wind shear on numerically simulated multi-cell storm structure. *J. Atmo. Sci.*, **45**, 3846-3879.
- Fritsch, J.M., R.J. Kane and C.R. Chelius, 1986: Contribution of mesoscale convective weather systems to the warm season precipitation in the United States. *J. Appl. Meteor.*, **25**, 1333-1345
- Fujita, T.T., 1986: DFW Microburst. Satellite and Mesometeorology Project, Department of Geophysical Sciences, The University of Chicago, Ill.
- Fujita, T.T., and J. McCarthy, 1990: The Application of Weather Radar to Aviation Meteorology. Radar in Meteorology. (Ed. D. Atlas). American Meteorological Society, 657-681
- Galway, J.G., 1956: The Lifted Index as a Predictor of Latent Instability, *Bull. Amer. Meteor. Soc.*, **37**, 528-529
- Ganoulis, J., 2003: Risk-based floodplain management: A case study from Greece. *Int. J. River Basin Management*, **1**, 41-47
- García-Moya, J.A., and del Río, P., 2001: HIRLAM at INM. Plans for the next future. *HIRLAM newsletter*, **38**, 35-37, June 2001
- Gayá, M., C. Ramis, R. Romero, and C.A. Doswell III, 1997: Tornadoes in the Balearic Islands (Spain): Meteorological settings. Proceedings on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean, Ed. INM-UIB, Palma de Mallorca, april 1997, 525-534
- George, J.J., 1960: Weather Forecasting for Aeronautics. Academic Press. 673 pp.
- Genovés, A., A. Jansà, and J. Estarellas, 1997: First evaluation of orographic factor in Western Mediterranean cyclogenesis. Proceedings on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean, Ed. INM-UIB, Palma de Mallorca, april 1997, 273-282
- Gibergans, J., 2001: Aplicación de métodos hidrometeorológicos para la predicción de la precipitación diaria. Memoria de Tesis Doctoral. Universidad de Barcelona.

Referencias

- Gibergans, 1994: Aproximación a una tipología de lluvias extremas: análisis de las precipitaciones superiores a 100 mm en 24 horas. Tesis de licenciatura. Universidad de Barcelona
- Gil, V., A. Genovés, M.A. Picornell, and A. Jansà, 2002: Automated database of cyclones from the ECMWF model: preliminary comparision between west and east Mediterranean basins. *Proceedings of the 4th Plinius Conference on Mediterranean Storms*, Mallorca, Spain, 2-4 October 2002, 4 pp.
- Gil Olcina, A., y A. Morales Gil, 1989: Avenidas fluviales e inundaciones en la Cuenca del Mediterráneo, Instituto Universitario de Geografía de la Universidad de Alicante, 586 pp
- Gray, M.E.B., and C. Marshall, 1998: Mesoscale Convective Systems over the UK, 1981-97. *Weather*, **53**, nº 11, 388-396
- Grimalt, M. 1992. Geografia del risc a Mallorca, Institut d'Estudis Balearics.
- Gruppo Nazionale per la Difesa dalle Catastrofi Idrogeologiche, 1994: Rapporto di Evento. Savona-22 settembre 1992, Genova-27 settembre 1992. Consiglio Nazionale delle Ricerche, Italy, 142 pp.
- Gutiérrez Marco, E., 1990: Renovación Hardware y Software de la Red de Radares: Mejoras en la Operatividad de los GPV. Proceedings de *IV Simposio Nacional de Predicción. Memorial "Alfonso Ascaso"*. (Ed. I.N.M.)
- Hand, W. H., 1996: An object oriented technique for nowcasting heavy showers and thunderstorms. *Meteorol. Appl.*, **3**, 31-41.
- Henry, S. G., 1993: Analysis of thunderstorm lifetime as a function of size and intensity. Preprints, 26th Conference on Radar Meteorology, Norman, OK. 3 pp.
- Henry, S. G., and J. W. Wilson, 1993: Developing thunderstorm forecast rules utilizing first detectable cloud radar-echoes. Preprints, Fifth International Conference on Aviation Weather Systems, Vienna, VA. 4 pp.
- Houze, R., 1993: Cloud Dynamics. International Geopysic series, Vol. 53. Academic Press
- Houze Jr., R. A., 1997: Stratiform Precipitation in Regions of Convection: A Meteorological Paradox?. *Bull. Of the Amer. Met. Soc.*, **78**, 10, 2179-2196
- Houze, R. A., Jr., B. F. Smull, and P. Dodge, 1990: Mesoscaleorganization of springtime rainstorms in Oklahoma. *Mon. Wea. Rev.*, **118**, 613-654
- Huet, P., X. Martín, J.L. Prime, P. Foin, C. Lourain, and P. Cannard: 2003. Retour d'expérience des Crues de septembre 2002 dans les Départements du Gard, de l'Hérault, du Vaucluse, des Bouches-du-Rhône, de l'Ardèche et de la Drôme. Inspection Générale de l'Administration, Conseil Général du Ponts et Chaussées, Conseil Général du Génie Rural des eaux et des forêts, Inspection Général de l'Environnement.

Referencias

- Instituto Nacional de Meteorología, 2002: Guía resumida del clima en España 1971-2000.
- Jacobbeit, J., H. Wanner, J. Luterbacher, C. Beck, A. Phillip, and K. Sturm: 2003. Atmospheric circulation variability in the North-Atlantic-European area since the mid-seventeenth century. *Clim. Dyn.*, **20**, 341–352
- Jacobs, B.J., W.E. Raatz, and M. Jaeneke, 1999: Automatic Identification and Prognosis of Convection Based upon Pixel Attributes. Proceedins *SAF Training Workshop: Nowcasting and Very Short Range Forecasting*. EUTMETSAT. EUM p 25, 1999. ISBN 92-9110-030-7, 107-116
- Jansa, A., A. Genoves, J. Campins, and M.A. Picornell, 1995: Mediterranean cyclones and Alpine heavy-rain flood events. *MAP Newsletter*, num 3, 35-37.
- Jansá A., A. Genoves, M.A. Picornell, J. Campins, R. Riosalido, and O. Carretero, 2001: Western Mediterranean cyclones and heavy rain. Part 2: Statistical approach. *Meteorol. Appl.*, **8**, 43-56.
- Jansà, A., 1990: Notas sobre análisis meteorológicos mesoscalar en niveles bajos. Instituto Nacional de Meteorología, 70 pp.
- Jansà, A., 1997: A general view about Mediterranean Meteorology: cyclones and hazardous weather. *INM/WMO International Symposium on cyclones and hazardous weather in the Mediterranean*, Palma de Mallorca, April 1997, 33-42
- Jansà, A., A. Genovés, R. Riosalido, and O. Carretero, 1996: Mesoscale cyclones vs heavy rain and MCS in the Western Mediterranean. *MAP Newsletter*, **5**, 24-25
- Jardí, M., M. Barriendos, y J.C. Peña, 1998: Aspectos geomorfológicos de las rieras del Maresme (Barcelona) a través de la documentación histórica. Actas de la V Reunión Nacional de Geomorfología, Granada 1998, 211-220
- Johnson, J.T., P.L. Mackeen, A. Witt, E.D. Mitchell, G.J. Stumpf, M.D. Eilts, and K.W. Thomas, 1998: The Storm Cell Identification and Tracking (SCIT) Algorithm: An Enhanced WSR-88D Algorithm. *Wea. Forecasting*, **13**, 263-276
- Joss, J., and A. Walvogel, 1990: Precipitation Measurement and Hydrology. Radar in Meteorology. (Ed. D. Atlas). American Meteorological Society, 577-606
- Joss, J., and U. Germann, 2000: Solutions and problems when applying qualitative and quantitative information from weather radar. *Phys. Chem. Earth (B)*, **25**, 837-841
- Kallos, G., V. Kotroni, K. Lagouvardos, S. Nickovic, D. Jovic, O. Kakaliagou, A. Papadopoulos, and M. Varinou, 1997: Torrential rains in the North-eastern Mediterranean. *INM/WMO International Symposium on cyclones and hazardous weather in the Mediterranean*, Palma de Mallorca, April 1997, 369-376
- Katz, I., and P.J. Harney, 1990: Radar Meteorology at Radiation Laboratory, MIT, 1941 to 1947. Radar in Meteorology. (Ed. D. Atlas). American Meteorological Society, 16-21

Referencias

- Kessler, E., 1985: Severe Weather. Handbook of Applied Meteorology (Ed. D. Houghton). John Wiley & Sons. 133-204
- Llasat, 1983: Intensidad de la lluvia y distribución de la precipitación convectiva. Tesis de licenciatura, Universidad de Barcelona.
- Llasat, M.C. y M. Puigcerver, 1985: Un intento de aplicación a la Península Ibérica de un modelo empírico de precipitación. *Revista de Geofísica*, **41**, 135-144
- Llasat, M.C., and J. Barrantes, 1996: Catastrophic rainfalls in the West Mediterranean Area. *Meccanica*, **31**, 397-406.
- Llasat, M.C., 2000: Long-term variability of floods in Mediterranean areas. Mediterranean Storms. EGS Plinius Conference Siena 2000. GNDCI Publ. Nº 2547 ISBN 88-8080-030-2, 3-18.
- Llasat, M.C., and M. Puigcerver, 1997: Total Rainfall and Convective Rainfall in Catalonia, Spain. *International Journal of Climatology*, **17**, 1683-1695
- Llasat, M.C., 1991: Gota fría. Ed. Marcombo. ISBN 84-267-0829-3.165 pp.
- Llasat, M.C., and D. Sempere-Torres, 2001: Heavy Rains and Floods in West Mediterranean Areas: A Climatic Feature. Geophysical Research Abstracts. European Geophysical Society, vol.3. ISSN: 1029-7006.
- Llasat, M.C., 2000: Les Inundacions del 9-10 de Juny del 2000 a Catalunya: Anàlisi Termodinàmic. VI Jornades de Meteorologia Eduard Fontserè. "Aiguats del 10 de Juny de 2000." ISBN: 84-930328-1-6. D.L: B-50493-2000. Barcelona, 77-86.
- Llasat, M.C., 1987: Episodios de Lluvias Copiosas en Cataluña: Génesis, Evolución y Factores Coadyuvantes. Publicacions de la Universitat de Barcelona, nº40 Barcelona, España, 543 pp.
- Llasat, M.C., 1983: Intensidad de la lluvia y distribución de la precipitación convectiva. Memoria de tesina de licenciatura. Universidad de Barcelona.
- Llasat, M.C., and M. Puigcerver, 1994: Meteorological factors associated with floods in the northeastern part of the Iberian peninsula. *Natural Hazards*, **9**, 81-93.
- Llasat, M.C., 2001: An objective classification of rainfall events on the basis of their convective features: application to rainfall intensity in the northeast of Spain. *International Journal of Climatology*, **21**, 11, 1385-1400.
- Llasat, M. C., C. Ramis, and L. Lanza, 1999: Storm Tracking and Monitoring Using Objective Synoptic Diagnosis and Cluster Identification from Infrared Meteosat Imagery: A Case Study, *Meteor. and Atmosph. Phys.*, **71**, 139–155
- Lobanova, M., 2003: Application of past information for reducing flood risk (the case of Lensk city). *Palaeofloods, Historical Data and Climatic Variability: Applications in Flood Risk Assessment*, Barcelona. Edited by V.R. Thorndycraft, G. Benito, M. Barriendos

Referencias

- and M.C. Llasat, ISBN-84-921958-2-7, Proceedings of the PHEFRA International Workshop held in Barcelona, 16th-19th October 2002, 231-236
- López Gómez, A., 1983. Las lluvias catastróficas mediterráneas. *Estudios Geográficos*, **44**, nº 170-171, 11-29.
- Lowell, S.C., 1945: Condensation and precipitation. Handbook of Meteorology (F.A. Berry, Bollay, E., and Norman, R.B., Ed.), McGraw-Hill Book Company, 252-263
- MacKeen, P. L., H.E. Brooks, and K. L. Elmore, 1999: Radar reflectivity-derived thunderstorm parameters applied to storm longevity forecasting. *Weather and Forecasting*, **14**, 289-295.
- Maddox, R., 1980: Mesoscale Convective Complexes. *Bull. Amer. Meteor. Soc.*, **61**, 1374-1387.
- Maddox, R.A., C.F. Chapell and L.R. Hoxit, 1979: Synoptic and meso-a scale aspects of flash-flood events. *Bull. Amer. Met. Soc.*, **60**, 2, 115-123.
- Maddox R.A., D.M. Rodgers and K.W. Howard, 1982: Mesoscale Convective Complexes over the United States during 1981-Annual Sumary. *Monthly Weather Rev.*, **110**, 1501-1514
- Marshall, J.S., and W.M.K. Palmer, 1948: The distribution of raindrops with size. *J. Atmos. Sci.*, **5**, 165-166
- Martín León, F. y de Esteban, L., 1994: Manual de Interpretación Radar. Publicación interna del Instituto Nacional de Meteorología.
- Martín, F., R. Riosalido, y L.de Esteban, 1995: Estudio del tornado de Siguenza. Análisis de los ingredientes para la formación de tormentas severas. Nota Técnica del STAP N° 25. Instituto Nacional de Meteorología.
- Martín, F., and O. Carretero, 2001: Tropical-like heavy rains over the Spanish Mediterranean regions: A radar-based perspective. Prepint, 30th International Conference on Radar Meteorology, American Meteorological Society, 19-24 July 2001, Munich, Germany. P6.11, 253-254.
- Martín F., 2003: Las gotas frías/DANAs. Ideas y conceptos básicos. Publicación del INM, 12 pp.
- Martín F., O. Carretero, I. San Ambrosio, and F. Elizaga, 2002: Identification and analysis of a supercell storm in the Mediterranean area from radar-based perspective. ECSS Conference 2002 Prague, august 2002
- Martín, F., 1999: Caracterización de la actividad tormentosa peninsular y áreas limítrofes durante el periodo estival de 1994. IV Simposio Nacional de Predicción. Memorial "Alfonso Ascaso", Madrid 15-19 Abril 1996, 6 pp.
- Martín, F., O. Carretero, P. Castro y R. Riosalido, 1998: Sistemas Convectivos de Mesoescala-97. Caracterización a partir de las imágenes de satélite. Nota técnica del STAP nº28, Instituto Nacional de Meteorología. Mayo 1998

Referencias

- Martín, F., O. Carretero, I. San Ambrosio, y F. Elizaga, 2003: Identificación y análisis de una supercélula severa en el área mediterránea desde el punto de vista radar. 3^a Asamblea Hispano-Portuguesa de Geodesia y Geofísica. Valencia, 4-8 febrero 2002.
- Martín, F., I. San Ambrosio, y O. Carretero, 2002: Nota Técnica N° 37 del STAP. Supercélula severa en el área mediterránea. Enero 2002. Publicación INM.
- Martín, F., O. Carretero, and F. Elizaga, 2002: Lightning and radar data observations of convective perturbations in the western Mediterranean areas. *Mediterranean Storms*. Proceedings of the 3rd EGS Plinius Conference, Baja Sardinia, Italy, October 2001.
- Martín, F., F. Elizaga, O. Carretero, y I. San Ambrosio, 2001: Diagnóstico y Predicción de la Convección Profunda Nota Técnica del STAP N° 35. Mayo 2001 Publicación interna del STAP/INM.
- Martín Vide, J., 1987: Característiques climatològiques de la precipitació en la franja costera mediterrània de la Península Ibèrica. Barcelona, Institut Cartogràfic de Catalunya, 245 pp. + 6 mapas
- Marwitz, J.D., 1972a: The structure and motion of severe hailstorms. Part I: Supercell storms. *J. Appl. Meteor.*, **11**, 166-179.
- Marwitz, 1972b: The structure and motion of severe hailstorms. Part II: Multi-cell storms. *J. Appl. Meteor.*, **11**, 180-188.
- Marwitz, 1972c: The structure and motion of severe hailstorms. Part III: Severely sheared storms. *J. Appl. Meteor.*, **11**, 189-201.
- Marzano, F.S., E. Picciotti, and G.Vulpiani, 2002: Reconstruction of rainrate fields in complex orography from C-band radar volume data. ERAD 2002, 1-4 Copernicus GmbH 2002, 227-232
- McCoy, E.A., 2003: Finding factors for fatal flash floods in Missouri. Proceedings on 17th Conference on Hydrology, Long Beach, CA, February 2003, 4 pp.
- Miller, D. and J. M. Fritsch, 1991: Mesoscale convective complexes in the western Pacific region. *Mon. Wea. Rev.*, **119**, 2978-2992
- Montes, J.M., 1997: Classificació espai-temporal dels episodis pluviomètrics a partir d'un paràmetre físic caracteritzador de la pluja. Memoria de la tesina de licenciatura. Universitat de Barcelona
- Morán, F., 1984: Apuntes de termodinámica atmosférica. Publicaciones Serie B. Instituto Nacional de Meteorología, 345 pp.
- Ninyerola, M., X. Pons, and J.M. Roure, 2000: A methodological approach of climatologi-cal modelling of temperature and precipitation through GIS techniques. *International Journal of Climatology*, **20**, 1823-1841.

Referencias

- Olcina, J., 1994: Tormentas y granizadas en las tierras alicantinas. Instituto Universitario de Geografía de la Universidad de Alicante, 317 pp
- Parker, M.D., and R.H. Johnson, 2000: Organizational Modes of Midlatitude Mesoscale Convective Systems. *Monthly Weather Review*, **128**, 3413-3436
- Parker, M.D., S.A. Rutledge, and R.H. Johnson, 2001: Cloud-to-Ground lightning in linear mesoscale convective systems. *Monthly Weather Review*, **129**, 1232-1242
- Pascual, R., 1999: Estudio de precipitaciones intensas en la comarca catalana del Maresme. Nota Técnica del CMT de Cataluña N°1. INM. 48 pp.
- Pascual, R., y Terradellas, E., 1999: Caso de precipitaciones convectivas muy intensas con nubes de desarrollo moderado: Cataluña 21-9-95. Parte I: estudio mediante datos de teledetección. *IV Simposio Nacional de Predicción, Memorial "Alfonso Ascaso"*, Ministerio de Medio Ambiente, INM, ISBN 84-8320-083-X, 87-94
- Picornell, M.A., A. Jansà, A. Genovés, and J. Campins, 2001: Automated database of mesocyclones from the HIRLAM(INM)-0.5° analyses in the Western Mediterranean. *Int. J. Climatol.*, **21**, 335–354
- Porrà, J.M., D. Sempere-Torres, and J.D. Creutin, 1998: Modeling of drop size distribution and its applications to rainfall measurements from radar. Preprints, *Stochastic Methods in Hydrology: Rain, Landforms and Floods*, Guanajuato, Mexico, 25-28 March 1996, Edited by V. K. G. O.E. Barndorff-Nielsen, V. Perez-Abreu, E. Waymire, World Scientific Corporation, no 7, 73-84.
- Puigcerver, M., S. Alonso, J. Lorente, M.C. Llasat, A. Redaño, A. Burgueño, and E. Vilar, 1986: Preliminary aspects of rainfall rates in the north east of Spain. *Theoretical and Applied Climatology*, **37**, 97-109
- Purdom, J.F.W., 1999: Use of Satellite Remote Sensing Data for Nowcasting and Short Range Forecasting. *Proceedings from SAF Training Workshop: Nowcasting and Very Short Range Forecasting*. EUTMETSAT. EUM p 25, 1999. ISBN 92-9110-030-7, 44-63
- Ramis, C., J. Arús, J.M. López and A.M. Mestres, 1997: Two cases of severe weather in Catalonia (Spain). An observational study. *Meteorol. Applicat.*, **4**, 207-217
- Ramis, C., S. Alonso, and M.C. Llasat, 1995: A comparative studies between two cases of extreme rainfall events in Catalonia. *Surv. in Geoph.*, **16**, 141-161
- Ramis, C., M.C. Llasat, A. Genovés, and A. Jansà, 1994: The October-87 Floods in Catalonia. Synoptic and Mesoscale Mechanisms. *Met. Applic.*, **1**, 337-350.
- Rico Sinobas, M., 1850: Fenómenos meteorológicos en la Península Ibérica desde el siglo IV hasta el XIX. Royal Academy of Medicine of Madrid, Manuscripts, 23-4-15.
- Riosalido, R., 1994: STArPc: Software para Tratamiento y Análisis de datos radar en PC. Nota Técnica STAP nº 18. INM

Referencias

- Riosalido, R., 1997: Mesoscale Convective Systems in Western Mediterranean Area: A Satellite View. *Proceedings of the Simposio Internacional INM/OMM sobre Ciclones y Tiempo Adverso en el Mediterráneo*, Palma de Mallorca, Spain, 14-17 April 1997. 353-359.
- Riosalido, R., J. Ferraz, E. Álvarez, A. Cansado, F. Martín, F. Elízaga, J.L. Camacho, and A. Martín, 1997: A flash flood event in the Spanish Pyrenees: the Biescas case. *Proceedings on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean*, Ed. INM-UIB, Palma de Mallorca, april 1997, 151-158
- Riosalido, R., J. Ferraz, E. Alvarez, A. Cansado, F. Martín, F. Elízaga, A. Martín, J. L. Camacho, y A. Mestre, 1998: Estudio meteorológico de la situación del 7 de Agosto de 1996 (Biescas). Nota Técnica STAP num. 26, Instituto Nacional de Meteorología, Madrid, 90 pp.
- Riosalido, R., O. Carretero, F. Elizaga y F. Martín, 1999: Predicción Inmediata de Sistemas Convectivos de Mesoescala. Campaña Experimental Otoño 1998. Nota Técnica STAP n °32. Instituto Nacional de Meteorología. Marzo 1999.
- Riosalido R., F. Elizaga, O. Carretero y F. Martín, 1998: Climatología de Sistemas Convectivos de Mesoescala en las proximidades de la Península Ibérica: Aplicaciones a la predicción de lluvias torrenciales. Proyecto CICYT CLI95-1776. Nota Técnica STAP n °29. Instituto Nacional de Meteorología. Mayo 1998
- Riosalido, R., J. Ferraz, E. Alvarez, A. Cansado, F. Martín, F. Elízaga, J.L. Camacho, and A. Martín, 1997: A flash flood event in the Spanish Pyrenees: the Biescas case. *INM/WMO International Symposium on cyclones and hazardous weather in the Mediterranean*, Palma de Mallorca, April 1997, 151-158.
- Romero, R., C. A. Doswell III, and R. Riosalido, 2001: Observations and fine-grid simulations of a convective outbreak in northeastern Spain: Importance of diurnal forcing and convective cold pools. *Mon. Wea. Rev.*, **129**, 2157-2182
- Rosenfeld, D., E. Amitai, and D.B. Wolff, 1995: Classification of Rain Regimes by the Three-Dimensional Properties of Reflectivity Fields. *Journal of Appl. Meteorology*, **34**, 198-211
- Rossby, C.-G., 1945: The Scientific Basins of Modern Meteorology. *Handbook of Meteorology* (Ed. Berry, F.A., Bollay, E. y Beers, N.R.). New York, McGraw-Hill
- San Ambrosio, I., 2001: Primera valoración de algoritmos para la estimación de la probabilidad de ocurrencia de granizo. *V Simposio Nacional de Predicción*. Memorial "Alfonso Ascaso". Madrid 20-23 Noviembre 2001, 6 pp.
- San Ambrosio, I., F. Elizaga y F. Martín, 2000: Predicción Inmediata de Sistemas Convectivos de Mesoescala. Campaña 1999. Nota Técnica STAP n °34. Instituto Nacional de Meteorología. Mayo 2000.

Referencias

- San Ambrosio, I., F. Martín León, and F. Elizaga, 2003: A radar-based operational tool for identification of hailstorms: preliminary results. Mediterranean Storms. Proceedings of the *4th EGS Plinius Conference*, Mallorca, October 2002, Ed. UIB, 4 pp.
- Sánchez, J. L., J. L. Marcos, and E. García: 2001. Construction and Assessment of a Logistic Regression Model Applied to Short Term Forecast of Thunderstorms in Leon (Spain). *Atmos. Res.*, **56**, 57- 71
- Sánchez, J. L., R. Fraile, J. L. de la Madrid, M. T. de la Fuente, P. Rodríguez, and A. Castro., 1996: Crop damage: the hail size factor. *J. Appl. Meteor.*, **35**, 535-1541
- Sánchez, J. L., J. L. Marcos, J.T Fernández, and E. García, 2001: Criteria for Selecting Meteorological Variables To Be Used In Statistical Models For A Short-Term Forecast Of Thunderstorms And Hailstorms. *Proceedings of "Symposium on Precipitation Prediction: Extreme Events and Mitigation"*. Albuquerque. New Mexico. Am. Meteorol. Soc., Boston. pp 280-283
- Sánchez-Diezma, R., 2001: Optimización de la medida de lluvia por radar meteorológico para su aplicación hidrológica. Tesis doctoral, Universitat Politècnica de Catalunya, Barcelona, 313 pp.
- Schiesser, H.H., R.A. Houze Jr, and H. Huntrieser, 1995: The mesoscale structure of severe precipitation systems in Switzerland. *Monthly Weather Review*, **123**, 2070-2097
- Schmidt, J. M., 1991: Numerical and observational investigations of long-lived, MCS-induced, severe surface wind events: The derecho. Ph.D. dissertation, Colorado State University, 196 pp.
- Sempere-Torres, D., J.M. Porrà, and J.-D. Creutin, 1998: Experimental evidence of a general description for raindrop size distribution properties. *Journal of Geophysical Research*, **103**, n° D2, 1785-1797
- Sempere-Torres, D., C. Corral, J. Raso, and P. Malgrat, 1999: Use of weather radar for combined sewer overflows monitoring and control. *Jour. Of Environmental Engineering*, **125**, n°4, 372-380
- Sempere-Torres, D., and M.C. Llasat, 2001: What about a Super Site in West Mediterranean? The interest of Catalunya through the Case Study of June The 10, 2000. *Geophysical Research Abstracts*. European Geophysical Society, vol.3. ISSN: 1029-7006.
- Sénési, S., V. Ducrocq, R.-M. Thépenier and C. Calas, 1999: MSG and the Nowcasting of Convective Systems: Relevance of Instability Indices and other Convection-Related Diagnostics. *Proceedings from SAF Training Workshop: Nowcasting and Very Short Range Forecasting*. EUMETSAT. EUM p 25, 1999. ISBN 92-9110-030-7, 64-74
- Showalter, A.K., 1953: A Stability Index for Thunderstorm Forecasting. *Bull. Amer. Meteor. Soc.*, **34**, 250-252

Referencias

- Showalter, A.K., 1945: Quantitative Determination of Maximum Rainfall. Handbook of Meteorology (Ed. Berry, F.A., Bollay, E. and Beers, N.R.). 1015-1027.
- Skamarock, W. C., M. L. Weisman, and J. B. Klemp, 1994: Three-dimensional evolution of simulated long-lived squall lines. *J. Atmos. Sci.*, **51**, 2563-2584.
- Smith, P.L., 1990: Precipitation Measurement and Hydrology: Panel Report. Radar in Meteorology. (Ed. D. Atlas). American Meteorological Society, 607-618
- Steiner, M., R. A. Houze, Jr., and S. E. Yuter, 1995: Climatological characterization of threedimensional storm structure from operational radar and rain gauge data. *J. Appl. Meteor.*, **34**, 1978-2007.
- Sureda, V., 1995: De Fontserè fins a l'actualitat. I Jornades de Meteorologia Eduard Fontseré (Ed. ACAM), 65-68.
- Swingle, D.M., 1990: Weather Radar in the United Status Army's Fort Monmouth Laboratories, Radar in Meteorology. (Ed. D. Atlas). American Meteorological Society, 7-15
- Terradellas, E., 1997: Main features of the distribution of the atmospheric electric activity in Catalonia and the surrounding Mediterranean area. Proceedings on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean, Ed. INM-UIB, Palma de Mallorca, april 1997, 535-540
- Terradellas, E., 1999: Focalización de la convección estival en Cataluña. Dentro del IV Simposio Nacional de Predicción, Memorial "Alfonso Ascaso", Ministerio de Medio Ambiente, INM, ISBN 84-8320-083-X, 133-142
- Thorndycraft, V.R., G. Benito, M. Barriendos and M.C. Llasat, editors, 2003. Paleofloods, Historical Data and Climatic Variability. Applications in Flood Risk Assessment.
- Tudurí, E., and C. Ramis, 1997: The environments of significant convective events in the Western Mediterranean. *Weather Forecasting*, **12**, 294-306
- Velasco I. and Fritsch J.M. 1987: Mesoscale Convective Complexes in the Americas. *Journal of Geophysical Research*, **92**, 9591-9613.
- Vis, M., F. Klijn, K.M. de Bruijn and M. Van Buuren, 2003: Resilience strategies for flood risk management in the Netherlands. *Int. J. River Basin Management*, **1**, 33-40
- Vucetic, V., 1997: Severe bora along the Adriatic coast. Proceedings on the INM/WMO International Symposium on Cyclones and Hazardous Weather in the Mediterranean, Ed. INM-UIB, Palma de Mallorca, april 1997, 517-524
- Waldvogel, A., B. Federer, P. and Grimm, 1979: Criteriafor the Detection of Hail Cells. *J. Appl. Meteor.*, **18**, 1521-1525
- Weisman, M. L., 1992: The role of convectively generated rear-inflow jets in the evolution of long-lived mesoscale convective systems. *J. Atmos. Sci.*, **49**, 1826-1847.

Referencias

- Weisman, M. L., and R. Przybylinski, 1998: Mesoscale convective systems: squall lines and bow echoes. COMET. <http://meted.ucar.edu/convection/mcs/index.htm>
- Weisman, M.L., and J.B. Klemp, 1986: Characteristics of Isolated Convective Storms. Mesoscale Meteorology and Forecasting, ed. P.S. Ray, American Meteorological Society, Boston, Massachussets, 331-358
- Yuter, S.E., and R.A. Houze Jr., 1995: Three-Dimensional Kinematic and Microphysical Evolution of Florida Cumulonimbus. Part I: Spatial Distribution of Updrafts, Downdrafts, and Precipitation. *Month. Weat. Rev.*, **123**, 1921-1940

Revisar si hi són!

- Marzano *et al.*, 2002
Corradini, 1985
Bech *et al.*, 2003
Martín-León (2001)
Aguado *et al.*, 1995
Bech and Rigo, 2004