GESTÃO DE PROJECTOS DE I&D - VISÃO GLOBAL DA CANDIDATURA (INVESTIGADORES)

(R&D PROJECTS - RESEARCHERS)

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Voltar ao Projecto

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Referência do projecto
Project reference
PTDC/MAT/64924/2006

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1. Identificação do projecto –
1. Project description

Financiamento solicitado
Requested funding
104.940,00 Euros

Área científica principal
Main Area
Mathematics

Área científica Secundária
Secondary area
Environmental Sciences and Technologies

Título do projecto (em português)
Project title (in portuguese)
extremos espaciais (EXES)

Título do projecto (em inglês)
Project title (in english)
spatial extremes

Palavra-chave 1
Processos Estocásticos

Keyword 1
Stochastic Processes

Palavra-chave 2
teoria de valores extremos

Keyword 2
extreme value theory

Palavra-chave 3
avaliação de risco

Keyword 3
risk evaluation

Palavra-chave 4
precipitação atmosférica por área

Keyword 4
areal rainfall

Objectivos sócio-económicos
Socio-economic objectives
Environment

Data de início do projecto
Starting date
01-01-2007

Duração do projecto em meses
Duration in months
36

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2. Instituições participantes –
2. Participating institutions

Instituição Proponente
Principal Contractor
Fundação da Faculdade de Ciências da Universidade de Lisboa (FFC/FC/UL)
Campo Grande - Edificio C7 -1º Piso
1749-016Lisboa

Instituições Participantes
Participating Institutions
(vazio)
(void)

Unidade de Investigação
Principal Research Unit
Centro de Estatística e Aplicações (CEA/FC/UL)
Faculdade de Ciências, BL C2, Piso 2 - Campo Grande
1749-016Lisboa

Instituição de Acolhimento

Host Institution

Faculdade de Ciências da Universidade de Lisboa (FC/UL)
Rua Ernesto de Vasconcelos - Edifício C5 - Campo Grande
1749-016Lisboa

3. Orçamento
3. Proposal Budget

Instituição Proponente
Principal Contractor

Fundação da Faculdade de Ciências da Universidade de Lisboa

DESCRIÇÃO DESCRIPTION	2007	2008	2009	2010	2011	TOTAL
Recursos Humanos Human resources	0,00	0,00	0,00	0,00	0,00	**0,00**
Missões Missions	7.200,00	24.200,00	7.200,00	0,00	0,00	**38.600,00**
Consultores Consultants	13.300,00	13.300,00	9.000,00	0,00	0,00	**35.600,00**
Aquisição de serviços e manutenção Acquisition of services and maintenance	650,00	650,00	650,00	0,00	0,00	**1.950,00**
Outras despesas correntes Other current expenses	2.000,00	2.000,00	2.000,00	0,00	0,00	**6.000,00**
Despesas gerais Overheads	5.230,00	8.490,00	3.770,00	0,00	0,00	**17.490,00**
TOTAL DESPESAS CORRENTES **TOTAL CURRENT EXPENSES**	**28.380,00**	**48.640,00**	**22.620,00**	**0,00**	**0,00**	**99.640,00**
Equipamento Equipment	3.000,00	2.300,00	0,00	0,00	0,00	**5.300,00**
TOTAL	**31.380,00**	**50.940,00**	**22.620,00**	**0,00**	**0,00**	**104.940,00**

Instituições Participantes
Participating Institutions
(Não se encontram registadas Instituições Participantes para este projecto)
(No Participating Institution has been registered for this project)

Orçamento Global
Global budget

DESCRIÇÃO DESCRIPTION	2007	2008	2009	2010	2011	TOTAL
Recursos Humanos Human resources	0,00	0,00	0,00	0,00	0,00	**0,00**
Missões Missions	7.200,00	24.200,00	7.200,00	0,00	0,00	**38.600,00**
Consultores Consultants	13.300,00	13.300,00	9.000,00	0,00	0,00	**35.600,00**
Aquisição de serviços e manutenção Acquisition of services and maintenance	650,00	650,00	650,00	0,00	0,00	**1.950,00**
Outras despesas correntes Other current expenses	2.000,00	2.000,00	2.000,00	0,00	0,00	**6.000,00**
Despesas gerais Overheads	5.230,00	8.490,00	3.770,00	0,00	0,00	**17.490,00**
TOTAL DESPESAS CORRENTES **TOTAL CURRENT EXPENSES**	**28.380,00**	**48.640,00**	**22.620,00**	**0,00**	**0,00**	**99.640,00**
Equipamento Equipment	3.000,00	2.300,00	0,00	0,00	0,00	**5.300,00**
TOTAL	**31.380,00**	**50.940,00**	**22.620,00**	**0,00**	**0,00**	**104.940,00**

Plano de financiamento
Finance plan

DESCRIÇÃO DESCRIPTION	2007	2008	2009	2010	2011	TOTAL
Financiamento solicitado à FCT Requested funding	31.380,00	50.940,00	22.620,00	0,00	0,00	**104.940,00**
Financiamento próprio Own funding	0,00	0,00	0,00	0,00	0,00	**0,00**

Outro financiamento público Other public-sector funding	0,00	0,00	0,00	0,00	0,00	**0,00**
Outro financiamento privado Other private funding	0,00	0,00	0,00	0,00	0,00	**0,00**
Total do Projecto **Total of the project**	**31.380,00**	**50.940,00**	**22.620,00**	**0,00**	**0,00**	**104.940,00**

4. Justificação do orçamento
4. Budget justification

4.1. Justificação dos recursos humanos
4.1. Human ressources justification
(vazio)
(void)

4.2. Justificação de missões
4.2. Mission justification

Tipo	Local	Nº de deslocações	Custo envolvido (€)
Participação em congressos	***	23	23,6

Justificação

The line of research described in the proposal is becoming a topic of great interest internationally. It is of prime importance to maintain good international ties. Since much research is going on in Northern Europe, traveling in both directions is essential. We have budgeted 1 visit to the US (2000 euros in 2008), 4 visits in EU each year (16*1500 euros) and 2 trips inside P each year (6*600 euros). Moreover we plan to organize an international workshop with 20 participants (15,000 euros).

Custo total: 23,6

4.3. Justificação de consultores
4.3. Consultants justification

Nome	Instituição	Fase do projecto	Custo envolvido (€)
Holger Drees	University of Hamburg	2 visits of 1 week per year	9000

Justificação

Professor Drees is a specialist in stochastic processes connected with extremes and a former co-author. His visits are essential to the project.

Nome	Instituição	Fase do projecto	Custo envolvido (€)
Holger Rootzen	Chalmers university, Sweden.	1 visit of 1 week in 2008 or 2009	1500

Justificação

As explained in 4.2 international cooperation is of prime importance to this particular project. To give an idea we list some people with whom we cooperated in the past on similar projects and who are currently thinking about research problems similar to the ones in our proposal.

Professor Rootzen is editor of the journal extremes and expert in the field.
Once again: the list of consultants is preliminary and depends on availability and current focus.

Nome	Instituição	Fase do projecto	Custo envolvido (€)
John Einmahl	university of Tilburg, The Netherlands	2 visits in each year of the project	9000

Justificação

Professor Einmahl is a specialist in statistical problems connected with extremes for stochastic processes and a former co-author. His visits are essential to the project.

Nome	Instituição	Fase do projecto	Custo envolvido (€)
Jonathan Tawn	University of Lancaster	visit of 1 week in 2007 or 2008	1500

Justificação

As explained in 4.2 international cooperation is of prime importance to this particular project. To give an idea we list some people with whom we cooperated in the past on similar projects and who are currently thinking about research problems similar to the ones in our proposal.
Professor Tawn is a specialist in applications of extremes, in particular in spatial problems.
Once again: the list of consultants is preliminary and depends on availability and current focus.

Nome	Instituição	Fase do projecto	Custo envolvido (€)
Juerg Huesler	University of Bern	1 visit of 1 week in 2008 or 2009	1500

Justificação

As explained in 4.2 international cooperation is of prime importance to this particular project. To give an idea we list some people with whom we cooperated in the past on similar projects and who are currently thinking about research problems similar to the ones in our proposal.

Professor Huesler is a renowned specialist in non-stationarity in extremes.
Once again: the list of consultants is preliminary and depends on availability and current focus.

Nome	Instituição	Fase do projecto	Custo envolvido (€)
Liang Peng	Georgia institute of technology, Atlanta	visits of 3 weeks in 2007 and 2008	8600

Justificação

Professor Peng is a specialist in optimal statistical procedures for extremes in finite- and infinite-dimensional space and a fomer co-author. His visits are essential for the project.

Nome	Instituição	Fase do projecto	Custo envolvido (€)
Martin Schlather	Helmuth Schmidt university, Hamburg	1 visit of 1 week in 2007 or 2009	1500

Justificação

As explained in 4.2 international cooperation is of prime importance to this particular project. To give an idea we list some people with whom we cooperated in the past on similar projects and who are currently thinking about research problems similar to the ones in our proposal.

Professor Schlather has developed spatial models for extremes that seem quite useful.
Once again: the list of consultants is preliminary and depends on availability and current focus.

Nome	Instituição	Fase do projecto	Custo envolvido (€)
Michael Falk	university of Wuerzburg	1 visit of 1 week in 2007 or 2009	1500

Justificação

As explained in 4.2 international cooperation is of prime importance to this particular project. To give an idea we list some people with whom we cooperated in the past on similar projects and who are currently thinking about research problems similar to the ones in our proposal.
Professor Falk specializes in the probabilistic aspects of high-dimensional extremes.
Once again: the list of consultants is preliminary and depends on availability and current focus.

Nome	Instituição	Fase do projecto	Custo envolvido (€)
Thomas Mikosch	university of Copenhagen	1 visit of 1 week in 2007 or 2008	1500

Justificação

As explained in 4.2 international cooperation is of prime importance to this particular project. To give an idea we list some people with whom we cooperated in the past on similar projects and who are currently thinking about research problems similar to the ones in our proposal.

Professor Mikosch operates in the area connecting extreme value theory with risk theory and insurance.
Once again: the list of consultants is preliminary and depends on availability and current focus.

Custo total: 35600

4.4. Justificação de aquisição de serviços e manutenção
4.4. Acquisition of services and maintenance justification

Tipo	Custo envolvido (€)
secretarial, administrative and technical services	1950

Justificação

The amount of 650 euros per year is requested for part-time secretarial and administrative services related to web facilities, software use and installation and data acquisition.

Custo total: 1950

4.5. Justificação de outras despesas correntes
4.5. Current expenses justification

Tipo de despesa	Custo envolvido (€)
books, paper, ton	6000

Justificação

The amount requested is meant for books, possibly renting of space for the workshop in 2008 and minor expenses such as paper, toner and ink cartridges, photocopies etc.

Custo total: 6000

4.6. Justificação do Equipamento
4.6. Equipment justification

4.6.1. Equipamento já disponível para a execução do projecto
4.6.1 Available equipment

Tipo de equipamento	Fabricante	Modelo	Ano
computer	Pentaq	PIV	2001
monitor	Sony	A420-19"	2001
portátil	toshiba	satellite P20-541	2004
computer	Compaq	PRESÁRIO 6233	2003
monitor	Compaq	S7500	2003

4.6.2. Discriminação do equipamento a adquirir
4.6.2. List of new equipment requested

Tipo de equipamento	Fabricante	Modelo	Custo envolvido (€)
3 PC, 1 workstation	Dell/Compaq/other	Intel/AMD dual core	5000

Justificação

A workstation is needed for the very computer-intensive aplications and simulations connected with the project. One computer is provided for each member of the group.

Printer	HP/Canon/Epson/other	LaserJet	300

Justificação

One printer for the whole group is the minimum requirement.

Custo total: 5300

5. Equipa de investigação
5. Research team

5.1 Lista de membros
5.1. Members list

Nome Name	Função Role	Grau académico Academic degree	%tempo %time
Laurentius Franciscus Maria de Haan	Inv. Responsável	DOUTORAMENTO	50
Ana Maria Santos Ferreira Gorjão Henriques	Investigador	DOUTORAMENTO	40
Cláudia Margarida Pedrosa Neves	Investigador	DOUTORAMENTO	50
Luísa da Conceição dos Santos do Canto e Castro de Loura	Investigador	DOUTORAMENTO	50

Total: 4

6. Projectos financiados
6. Funded projects

(Sem projectos financiados)
(No funded projects)

7. Indicadores previstos
7. Expected indicators

Indicadores de realização previstos para o projecto
Expected output indicators

DESCRIÇÃO DESCRIPTION	2007	2008	2009	2010	2011	**Total**
A - Publicações **Publications**						
Livros Books	0	1	0	0	0	**1**
Artigos em revistas internacionais Papers in international journals	2	2	2	0	0	**6**
Artigos em revistas nacionais Papers in national journals	1	1	1	0	0	**3**
B - Comunicações **Communications**						
Comunicações em encontros científicos internacionais Communications in international meetings	4	4	4	0	0	**12**
Comunicações em encontros científicos nacionais Communications in national meetings	4	4	4	0	0	**12**
C - Relatórios **Reports**	3	3	3	0	0	**9**
D - Organização de seminários e conferências **Organization of seminars and conferences**	3	3	3	0	0	**9**
E - Formação avançada **Advanced training**						
Teses de Doutoramento PhD theses	0	0	0	0	0	**0**
Teses de Mestrado Master theses	0	0	0	0	0	**0**
Outras Others	0	0	0	0	0	**0**
F - Modelos **Models**	0	0	0	0	0	**0**
G - Aplicações computacionais **Software**	0	0	1	0	0	**1**
H - Instalações piloto **Pilot plants**	0	0	0	0	0	**0**
I - Protótipos laboratoriais **Prototypes**	0	0	0	0	0	**0**
J - Patentes **Patents**	0	0	0	0	0	**0**
L - Outros **Other**						
application project	0	0	1	0	0	**1**
	0	0	0	0	0	**0**
	0	0	0	0	0	**0**

Acções de divulgação da actividade científica
Scientific activity spreading actions
(Estimula-se a apresentação e propostas neste âmbito que possibilitem a aproximação da actividade científica ao grande público)
(It is strongly desired the presentation of proposals within this subject that will approach science to the general public.)

Extreme value theory tries to assess the occurrence frequency of important (e.g. disastrous) events that are quite unlikely to occur. This could be the collapse of a bridge or a building, a flood or extreme drought, damage by windstorms etc. Hence there is potential public interest. We are already preparing an applied paper about severe rainfall in a certain province. We intend to organize two public lectures during the three years of the project. More importantly we try to seize an opportunity when it appears. For example the principal investigator has given a public lecture in Lisbon on

February 22, 2006 for a rather numerous and interested audience. This occurred in the framework of a Gulbenkian professorship. Also a letter on the use of modern extreme value theory is being published in the Annals of applied meteorology. We intend to look for similar opportunities.

8. Anexo técnico
8. Technical addendum

8.1. Resumo
8.1. Abstract

Resumo (em português)
Abstract (in portuguese)

O objectivo desta proposta é adquirir, gradualmente, uma melhor compreensão da estrutura dos processos max-estáveis e permitir, deste modo, que eles se tornem mais úteis no que respeita às aplicações. Apresenta-se, de seguida, uma lista de algumas questões específicas.\n1. Existem duas caracterizações do processos max-estáveis: uma que utiliza funções espectrais determinísticas e outra que utiliza processos estocásticos auxiliares (tal como se explica no "estado da arte"). Pretendemos estabelecer uma conecção precisa entre as (propriedades das) duas caracterizações. Por exemplo: é possível construir uma classe muito útil de funções espectrais a partir de uma densidade de probabilidade unimodal (de Haan e Pereira [1]). Qual é a classe correspondente de processos estocásticos auxiliares? Ou reciprocamente: é possível escolher como processo estocástico auxiliar uma martingala exponencial (cf. de Haan e Ferreira [2]) secção 9.8). Quais são as correspondentes funções espectrais? Qualquer das duas caracterizações é útil: a determinística talvez, principlamente, para obter resultados teóricos, a representação estocástica, principalmente para utilizar nas aplicações.\n2. De acordo com de Haan e Pickands [3] um processo max-estável estacionário é caracterizado por um grupo de isometrias lineares de L_+[0,1]. Até ao momento só se explorou a translacção. Tencionamos adquirir um conhecimento mais profundo da estrutura deste grupo de isometrias lineares de modo a construir uma classe mais vasta e mais flexível de processos max-estáveis.\n3. (uma questão relacionada) Como se poderá caracterizar a classe de processos auxiliares associada a processos max-estáveis estacionários? Por exemplo, se o processo estocástico auxiliar for a martingala exponencial, o processo max-estável resultante é estacionário (de Haan e Ferreira [2], secção 9.8). Isto é um resultado surpreendente que exige uma investigação mais aprofundada.\n4. Num contexto espacial, planeamos investigar tanto os processos estacionários em translacção como os processos isotrópicos.\n5. É bem sabido que toda a distribuição de valores extremos de dimensão finita está ligada a uma distribuição generalizada de Pareto (no caso unidimensional cf. Pickands [4], Balkema e de Haan [5]). Na verdade, no contexto dos extremos em processos estocásticos, é possível definir um processo generalizado de Pareto correspondente, designado por processo estável de excursão em de Haan e Ferreira ([2], Capítulo 9). Pretendemos explorar não só uma definição intrínseca, como as propriedades e a utilidade desta nova classe de processos estocásticos.\n6. Planeamos desenvolver aplicações dos processos max-estáveis a, por exemplo, valores extremos da pluviosidade total numa certa região, tomando por base as observações em estações de monitorização dispersas. Irá ser necessário desenvolver modelos paramétricos específicos para a dependência espacial, baseados na teoria dos processos max-estáveis. Acreditamos que esta é uma forma nova e promissora de abordar problemas espaciais deste tipo.\n7. Alguns problemas teóricos:\n a. Qual é o processo max-estável limite do processo ARCH a tempo contínuo considerado em de Haan e Karandikar [6]? Ver também Hult e Lindskog [7].\n b. Desenvolver um procedimento para testar se um processo estocástico pertence ou não ao domínio de atracção de algum processo max-estável (cf. Einmahl, de Haan e Li [8]).\n c. Normalidade assimptótica de um estimador para a probabilidade de um conjunto de "falha" ou "extremo" (cf. de Haan e Sinha [9] e de Haan e Ferreira [2], secção 10.5).\nREFERÊNCIAS:\n[1] L. de Haan and T.T. Pereira (2006). Spatial extremes: models for the stationary case. Ann. Statist. 34, 146-168.\n[2] L. de Haan and A. Ferreira (2006). Extreme value theory: an introduction (417 pp.). Springer, Boston.\n[3] L. de Haan and J. Pickands (1986). Stationary min-stable stochastic processes. Probab. Theory Related Fields 72, 477-492.\n[4] J. Pickands III (1975). Statistical inference using extreme order statistics. Ann. Statist. 3, 119-131.\n[5] A.A. Balkema and L. de Haan (1974). Residual life time at great age. Ann. Probab. 2, 792-804.\n[6] L. de Haan and R. Karandikar (1989). Embedding a stochastic difference equation in a continuous time process. Stoch. Processes Appl. 32, 225-235.\n[7] H. Hult and F. Lindskog (2006). Extremal behavior of stochastic integrals driven by regularly varying Lévy processes. Ann. Probab., to appear. \n[8] J.H.J. Einmahl, L. de Haan and D. Li (2004). Weighted approximations of tail copula processes with application to testing the multivariate extreme value condition. Ann. Statist., to appear. \n[9] L de Haan and A. Sinha (1999). Estimating the probability of a rare event. Ann. Statist. 27, 732-759.

Resumo (em inglês)
Abstract (in english)

The purpose of this proposal is to gradually gain a better understanding of the structure of max-stable processes and to make them in this way more useful for application. Also we propose to develop more useful parametric models. We list a number of specific questions.\n1. There are two characterisations of max-stable processes: one using deterministic spectral functions and another using auxiliary stochastic processes (as explained in the “state of the art”). We want to establish a concrete connection between (the properties of) the two characterisations. For example: a useful class of spectral functions can be constructed starting from an arbitrary unimodal probability density (de Haan and Pereira [1]). What is the corresponding class of auxiliary stochastic processes? Or conversely: one can choose the auxiliary stochastic process to be the exponential martingale (cf. de Haan and Ferreira [2], section 9.8). What are the corresponding spectral functions? Both characterisations are useful: the deterministic one perhaps mainly for obtaining theoretical results, the stochastic representation mainly for applications.\n \n2. According to de Haan and Pickands [3] a stationary max-stable process is characterised by a group of linear isometries of L_+ [0,1]. Up to now only the shift has been explored. We intend gain more insight into the structure of this group of linear isometries in order to construct a much wider and more flexible class of max-stable processes.\n3. (a related question) How can we characterise the class of auxiliary processes connected with stationary max-stable processes? For example, if the auxiliary stochastic process is the exponential martingale, the resulting max-stable process is stationary (de Haan and Ferreira [2], section 9.8). This is a surprising result that calls for further research.\n4. In a spatial context we plan to investigate both shift stationary and isotropic processes.\n5. It is well-known that every finite-dimensional extreme-value distribution is connected to a so-called generalised Pareto distribution (for the one-dimensional case cf. Pickands [4], Balkema and de Haan [5]). Indeed in the context of extremes of stochastic processes one can define a corresponding generalised Pareto process called an excursion stable process in de Haan and Ferreira ([2], Chapter 9). We wish to explore an intrinsic definition, properties and use of this new class of stochastic processes.\n6. We plan to develop applications of max-stable processes to e.g. extreme values of the total rainfall in a certain area, based on observations at isolated monitoring stations. It will be necessary to develop specific parametric models of spatial dependence based on the theory of max-stable processes. This is believed to be a new and promising way of dealing with spatial problems of this kind.\n7. Some theoretical problems:\n a. What is the limiting max-stable process of the continuous time ARCH process of de Haan and Karandikar [6]? See also Hult and Lindskog [7].\n b. Develop a procedure to test whether a stochastic process is in the domain of attraction of any max-stable process (cf. Einmahl, de Haan and Li [8]).\n c. Asymptotic normality of an estimator for the probability of a “failure” or “extreme” set (cf. de Haan and Sinha [9] and de Haan and Ferreira [2], section 10.5).\nREFERENCES:\n[1] L. de Haan and T.T. Pereira (2006). Spatial extremes: models for the stationary case. Ann. Statist. 34, 146-168.\n[2] L. de Haan and A. Ferreira (2006). Extreme value theory: an introduction (417 pp.). Springer, Boston.\n[3] L. de Haan and J. Pickands (1986). Stationary min-stable stochastic processes. Probab. Theory Related Fields 72, 477-492.\n[4] J. Pickands III (1975). Statistical inference using extreme order statistics. Ann. Statist. 3, 119-131.\n[5] A.A. Balkema and L. de Haan (1974). Residual life time at great age. Ann. Probab. 2, 792-804.\n[6] L. de Haan and R. Karandikar (1989). Embedding a stochastic difference equation in a continuous time process. Stoch. Processes Appl. 32, 225-235.\n[7] H. Hult and F. Lindskog (2006). Extremal behavior of stochastic integrals driven by regularly varying Lévy processes. Ann. Probab., to appear. \n[8] J.H.J. Einmahl, L. de Haan and D. Li (2004).

Weighted approximations of tail copula processes with application to testing the multivariate extreme value condition. Ann. Statist., to appear. \n[9] L de Haan and A. Sinha (1999). Estimating the probability of a rare event. Ann. Statist. 27, 732-759.

8.2. Objectivos
8.2. Objectives

Descrição dos Objectivos do Projecto
Project Objectives (description)

The long term objective of the proposal is to clarify some intriguing aspects of the theory of extremes for stochastic processes in order to make the theory more suitable for applications. Moreover we intend to do one or two applied projects, thus showing the usefulness of the results. In the finite this has proved to be the best way to show how important problems of this kind can be solved.\n

Descrição dos Objectivos do Investigador Responsável
Principal Investigator Objectives (description)

The long term objective of the principal investigator is to develop an integrated theory of extreme values ranging from one-dimensional to finite-dimensional space and now to infinite-dimensional space, i.e. to stochastic processes. And in each case to develop probabilistic and statistical theory, as well as applications. The spatial development should be the crowning achievement of a development of more than 60 years.

8.3. Estado da Arte
8.3. State of the Art

Descrição do Estado da Arte
State of the Art (description)

Extreme value theory has been developed first in the one-dimensional situation (probabilistic part around 1940, statistical part around 1980), then in the higher-dimensional situation (probabilistic part in the 1970's, statistical part around 1990) and finally in the context of stochastic processes. We focus on the latter. There are three streams of development in spatial extremes.\n1. The study of extremes of basically parametric stochastic processes e.g. Gaussian processes. This was initiated by J. Pickands III in the 1960's, highlighted in the book of V.I. Piterbarg [1] and continued by e.g. Patrik Albin (Chalmers university).\n2. Taking the extremes of finite-dimensional marginals as a basis of the analysis. This is sometimes done in a Bayesian set-up, for example by D. Cooley, D. Nychka and P. Naveau [2]. This provides an operational basis for spatial extremes.\n3. Development of extreme value theory sui generis for stochastic processes.\nThis started with a representation of "max-stable" processes called "spectral" representation, connecting max-stable processes with certain classes of real functions (de Haan [3], de Haan and Pickands [4], Resnick and Roy [5]). This representation has been worked out further in view of applications by Smith [6], Coles [7], Coles and Tawn [8], Schlather [9] and de Haan and Pereira [10].\nMax-stable processes with continuous sample paths were studied by Giné, Hahn and Vatan [11]. See also Resnick and Roy [5]. Giné, Hahn and Vatan [11] provided a somewhat similar characterization that formed a basis for further theoretical development.\nNext the research became more directed to statistical aspects. The domains of attraction of max-stable processes were characterized by de Haan and Lin [12], estimators of the relevant characteristics of the max-stable process were developed, based on observations of a process in the domain of attraction. Weak consistency (de Haan and Lin [13]) and asymptotic normality (Einmahl and Lin [14]) were established.\nMeanwhile the "spectral representation" of a max-stable process has lead to a different more stochastic representation: the max-stable process can be generated by another stochastic process with simpler properties. The exact result can be found in Chapter 9 of de Haan and Ferreira [15].\nAn important field of application of max-stable processes is: regional properties of extreme rainfall, for example assessing the probability of disastrous rainfall. Extreme levels of chemical pollutants in the air is another area of application. \nREFERENCES:\n[1] V.I. Piterbarg (1996). Asymptotic methods in the theory of Gaussian processes and Fields. AMS translations of mathematical monographs, 148. Porvidence, R.I.\n[2] D. Cooley, D. Nychka and P. Naveau (2006). Bayesian spatial modelling of extreme precipitation return levels. J. Amer. Statist. Assoc., to appear.\n[3] L. de Haan (1984). A spectral representation for max-stable processes. Ann. Probab. 12, 1194-1204.\n[4] L. de Haan and J. Pickands (1986). Stationary min-stable stochastic processes. Probab. Theory Related Fields 72, 477-492.\n[5] S.I. Resnick and R. Roy (1991). Random USC functions, max-stable processes and continuous choice. Ann. Appl. Probab. 1, 267-292.\n[6] R. Smith (1990). Max-stable processes and spatial extremes. Unpublished notes.\n[7] S.G. Coles (1993). Regional modelling of extreme storms via max-stable processes. J. Roy. Statist. Soc. Ser. B, 55, 797-816.\n[8] S.G. Coles and J.A. Tawn (1996). Modelling extremes of the areal rainfall process. J. Roy. Statist. Soc. Ser. B, 58, 329-347.\n[9] M. Schlather (2002). Models for stationary max-stable random fields. Extremes 5, 33-44.\n[10] L de Haan and T.T. Pereira (2006). Spatial extremes: models for the stationary case. Ann. Statist. 34, 146-168.\n[11] E. Giné, M.G. Hahn and P. Vatan (1990). Max-infinitely divisible and max-stable sample continuous processes. Probab. Theory Related Fields 87, 139-165.\n[12] L. de Haan and T. Lin (2001). On convergence towards an extreme-value distribution in C[0,1]. Ann. Probab. 29, 467-483.\n[13] L. de Haan and T. Lin (2003). Weak consistency of extreme-value estimators in C[0,1]. Ann. Statist. 31, 1996-2012.\n[14] J.H.J. Einmahl and T. Lin (2006). Asymptotic normality of extreme value estimators on C[0,1]. Ann. Statist. 34, 469-392.\n[15] L. de Haan and A. Ferreira (2006). Extreme value theory: an introduction (417 pp.). Springer, Boston.

8.4. Resultados e Repercussões
8.4. Results and Repercussions

Divulgação de Resultados (descrição)
Diffusion of Results (description)

Our results will be published mainly in international journals and books. Also we shall announce our results in conferences, workshops and seminars. We shall seek cooperation with meteorologists for a pilot study.

Repercussões (descrição)
Repercussions (description)

Our results will hopefully have an impact on building codes, insurance policies, strengthening of flood prevention etc.

8.5. Regionalização
8.5. Regionalization

Região Region	Percentagem Percent
Norte	25
Centro	0
Lisboa e Vale do Tejo	75
Alentejo	0
Algarve	0
Região Autónoma dos Açores	0
Região Autónoma da Madeira	0

Descrição
Description

The 25% participation of researchers outside Lisbon does not completely reflect the impact throughout the country. In other parts of Portugal quite q few people are working in extreme value theory and some are interested in extremes for stochastic processes. We hope to maintain contact and to cooperate where possible. \n

8.6. Tarefas
8.6. Tasks

Lista de tarefas (1)
Task list (1)

Designação da tarefa Task denomination	Data de início Start date	Data de fim End date	Pessoas * mês Person * months
spatial extremes	01-01-2007	31-12-2009	144

(Os detalhes de cada tarefa estão disponíveis clicando na designação correspondente)
(Details for each task are available by clicking on the corresponding denomination)

8.7. Referências Bibliográficas
8.7. Bibliographic references

Ano Year	Publicação Publication
1984	L. de Haan (1984). A spectral representation for max-stable processes. Annals of Probab. 12, 1194-1204.
1990	E. Giné, M.G. Hahn and P. Vatan (1990). Max-infinitely divisible and max-stable sample continuous processes. Probab. Theory Related Fields 87, 139-165.
1996	S.G. Coles and J.A. Tawn (1996). Modelling extremes of the areal rainfall proces s. J. Roy. Statist. Soc. Ser. B, 58, 329-347.
2006	D. Cooley, D. Nychka and P. Naveau (2006). Bayesian spatial modelling of extreme precipitation return levels. J. Amer. Statist. Assoc., to appear.
2006	L. de Haan and A. Ferreira (2006). Extreme value theory: an introduction (417 pp .). Springer, Boston.

8.8. Artigos Anteriores
8.8._ Previous Articles

Ano Year	Artigo (endereço na *Internet* - URL) Paper (Link in the Internet - URL)
1986	L. de Haan and J. Pickands (1986). Stationary min-stable stochastic processes. Probab. Theory Related Fields 72, 477-492.
2001	L. de Haan and T. Lin (2001). On convergence towards an extreme-value distribution in C[0,1]. Ann. Probab. 29, 467-483.
2003	L. de Haan and T. Lin (2003). Weak consistency of extreme-value estimators in C[0,1]. Ann. Statist. 31, 1996-2012.
2006	L de Haan and T.T. Pereira (2006). Spatial extremes: models for the stationary case. Ann. Statist. 34, 146-168.
2006	L. de Haan and A. Ferreira (2006). Extreme value theory: an introduction (417 pp.). Springer, Boston.

9. Ficheiros Anexos
9. Attachments
(vazio)
(void)

terça-feira, 20 de Janeiro de 2015