



Enabling Grids for E-scienceE

# 2<sup>nd</sup> EGEE NA4 SSC Workshop Complex Science SSC

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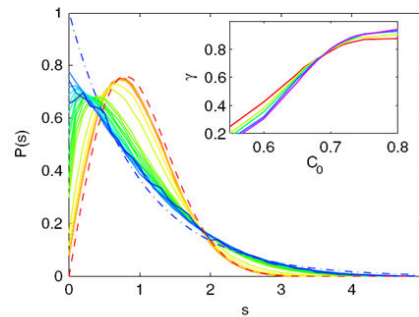
[www.eu-egee.org](http://www.eu-egee.org)



- Using computer experiments and analytical methods we study the dynamics of
  - Spreading of diseases
  - Financial networks (cross-correlation matrices)
  - Rumor and information propagation
  - Traffic flow patterns
  - Climate systems
- and deduct
  - Immunization strategies
  - Optimal paths and lengths
  - Best practices
  - Risk management
  - Prediction of extreme events

NOVEL MATERIALS

Light localization with changing topology-switches



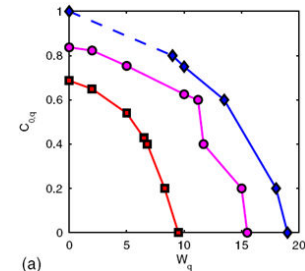
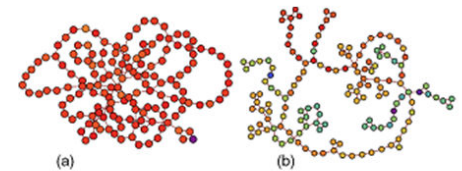
Extended waves – Wigner  
Localized --Poisson

$$\gamma = \frac{\int_2^\infty P(s)ds - \int_2^\infty P_W(s)ds}{\int_2^\infty P_P(s)ds - \int_2^\infty P_W(s)ds}$$

L. Jahnke, J. W. Kantelhardt,  
R. Berkovits, and S. H. PRL (2008)

Optical communication network composed of fibers and beam splitters

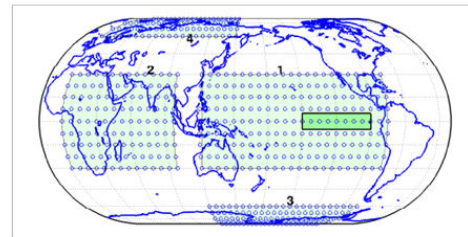
Mott-Anderson localization due to topology-light localized!!



(a)

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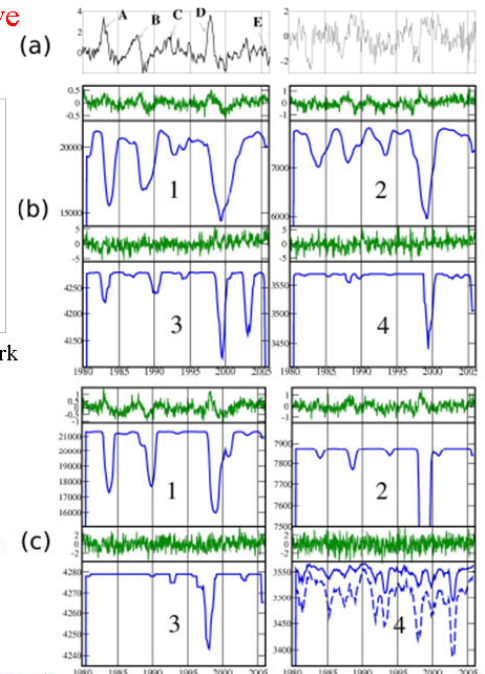
Climate networks are very sensitive to El Nino



Sea surface temperature network

5km height temperature network

Yamasaki, Gozolchiani, SH (PRL 2008)

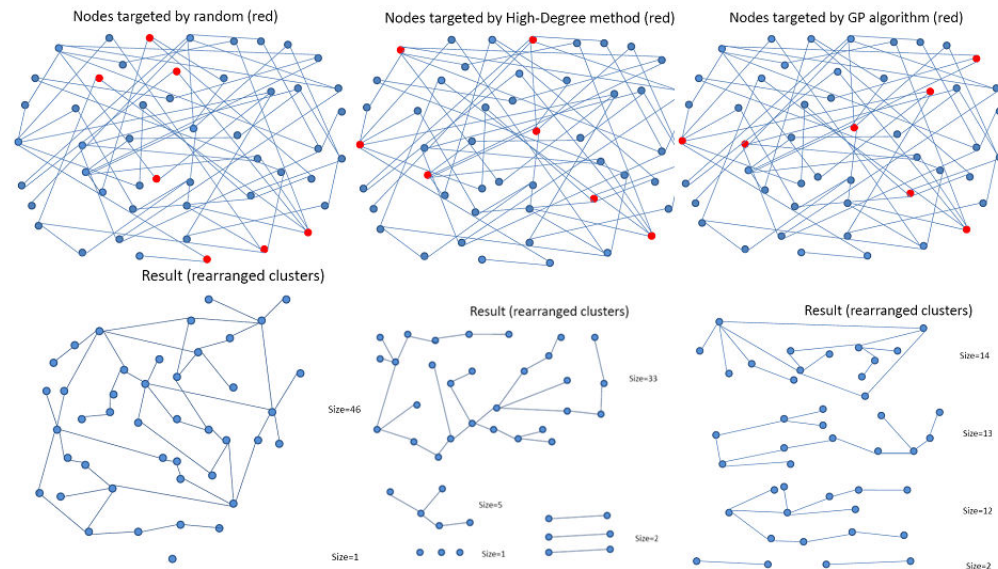


Challenge: Predicting El-Nino and other extreme events

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NOVEL EFFICIENT IMMUNIZATION STRATEGIES  
Comparing random, targeted, and equal graph partition (EGP) strategies

Random scale - free network:  $N=50$   $\lambda=2.5$ ; REMOVE SEVEN NODES



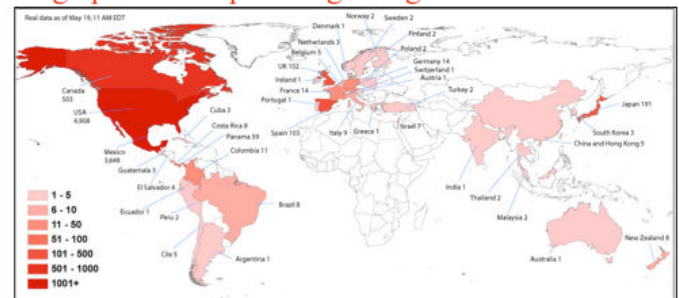
Best Method

- and deduct
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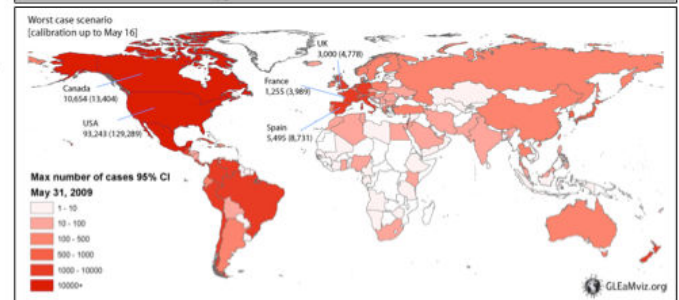
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SPREADING OF DISEASES (SWINE FLU, SARS, etc.)  
Modeling epidemics spreading using networks

Current situation



Worst case scenario  
(model prediction)





- **We plan to**
  - increase the usage of Grid technology within the SSC through
    - training events, workshops, personal contact
    - dissemination of success stories
  - develop and deploy a scientific gateway
    - registration of new users (single point of entry)
    - interface to common tools and code samples
    - communication with help desk
  - build a distributed data repository
    - various accessibility levels based on VO roles
    - support for metadata using AMGA tool
    - encryption of data using the hydra service
  - port applications to the EGI Infrastructure
  - build parallel and hybrid versions of algorithms using
    - MPI and/or OpenMP

Activity	FTEs	Description
SSC Coordination	1	Coordinate activities within the SSC to ensure that Project aims are met
Training and Dissemination Plan	2	Strengthen the usage of the EGI Infrastructure through the arrangement of training events and the dissemination of success stories
Scientific gateway development and deployment	2	Develop a single point of entry for EGI Infrastructure users stemming from the Complex Science Community
Front Desk	1	Provide First Line Support to user community and interface with GGUS
Scientific database implementation	2	Create a database of useful scientific data with specific levels of accessibility using the AMGA tool for metadata associations
Grid applications porting	2	Develop Grid workflows to leverage existing applications and build parallel algorithms on top of them

Institute	Country	NGI	Expertise
AUTH	Greece	HellasGrid	Operation, Development, Application Support
BIU	Israel	IAG	Development, Application Support, User Support
UNIPA	Italy	IGI	Operation, Application Support, User Support
JLUG	Germany	D-Grid	Operation, Development, User Support
UA	Portugal	INGRID	Operation, Development
SU	Sweden	SNIC	Development, Application Support
UW	Poland	PL-Grid	Development, User Support
UCD	Ireland	Grid-Ireland	Operation, Development, User Support
BU	USA		Application Support



