GNSS Knowledge Map

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COLCIENCIAS

Seminario Taller Regional GNSS 2008

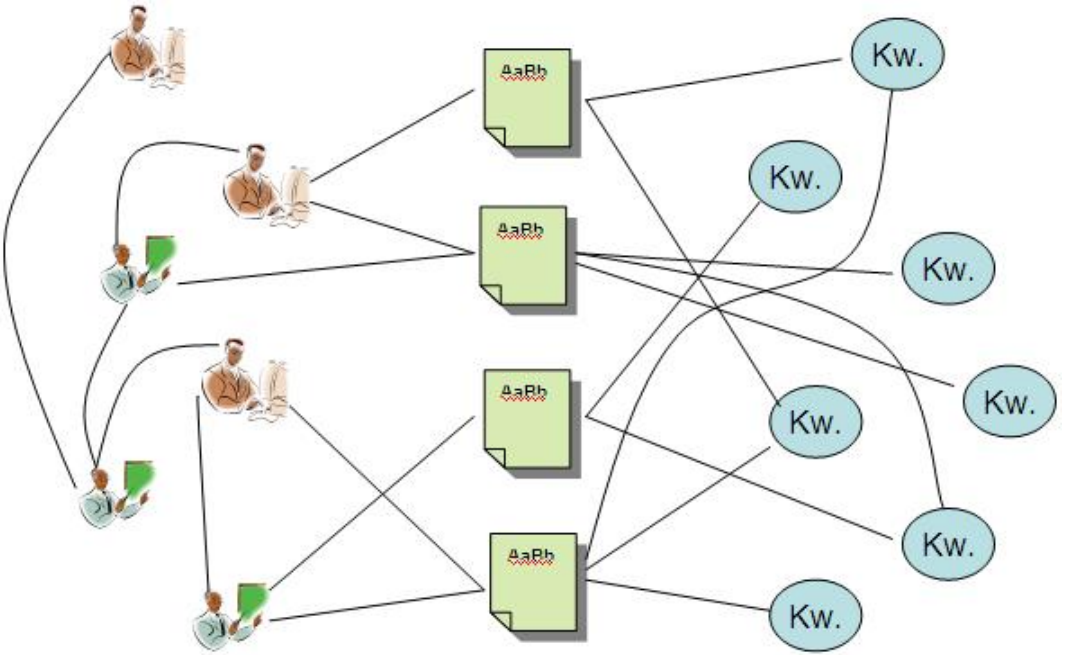
Medellín-Colombia

Scientometrics[1]

- Theoretical Reconstruction: The idea is to use mathematical and computational models that help in the construction of the phenomenological structures.
- What is a knowledge map?
  - Co-word analysis (keywords)
  - Relations among concepts
- Emergence of Research Areas
- Scientometrics as a policy making tool

[1] Chavalarias D. & Cointet J-P. (2008) Scientometrics Vol. 75 No. 1

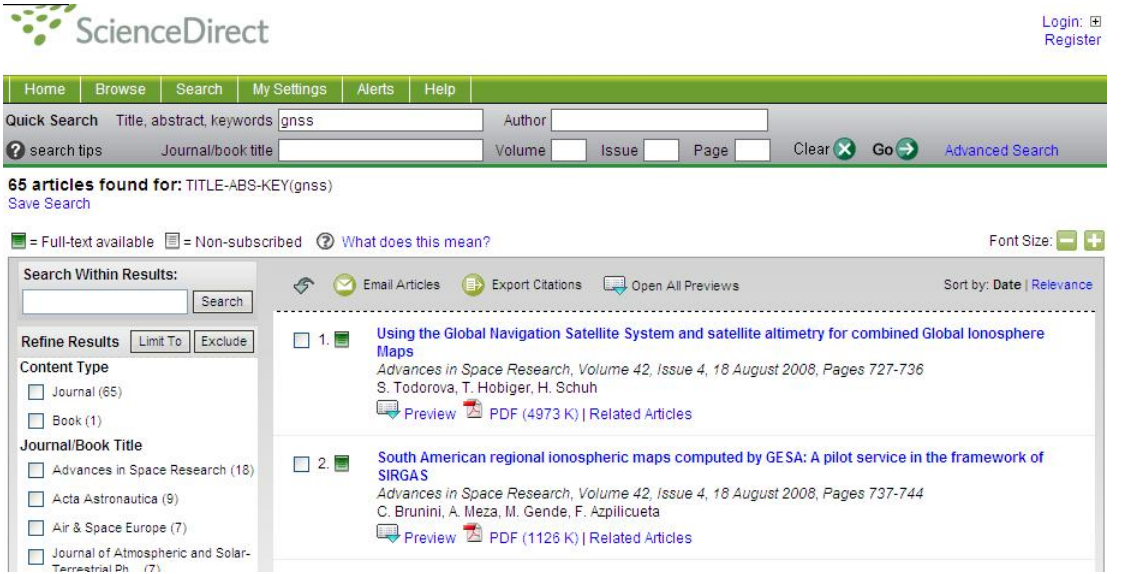
Makers of scientific activity



Authors → Medium → Knowledge

Building the data-base

- RIS Format: The RIS file format is a tagged format for expressing bibliographic citations. It is supported by a number of reference managers.

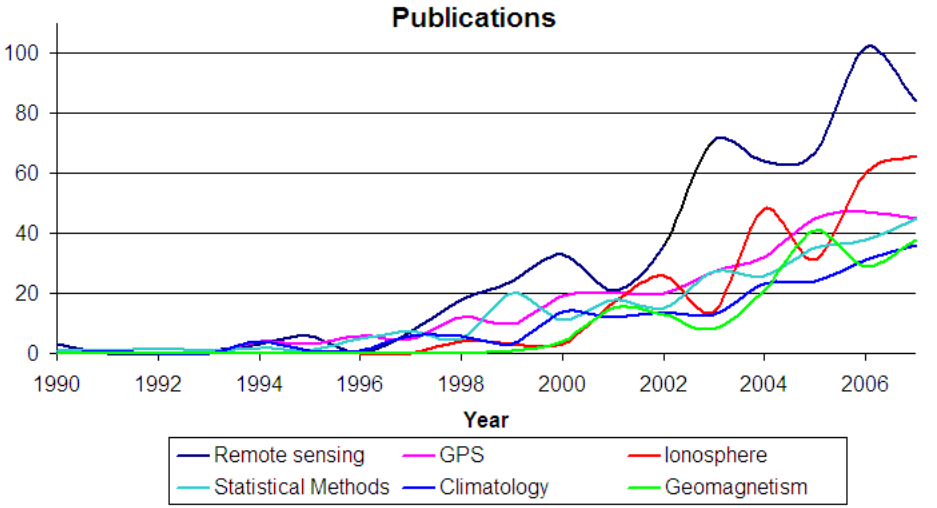


GNSS and Related Areas

Data features

- 45.000 Authors
- 21.000 different titles
- More than 100 journals
- 600 items related to navigation satellite systems (final selection)

GNSS and Related Areas



Proximity measure[2]

Let i and j be two keywords, then:

- n_i= number of articles mentioning i
- $n_{i,j}$ number of articles mentioning i adn j

The proximity measure must fulfill:

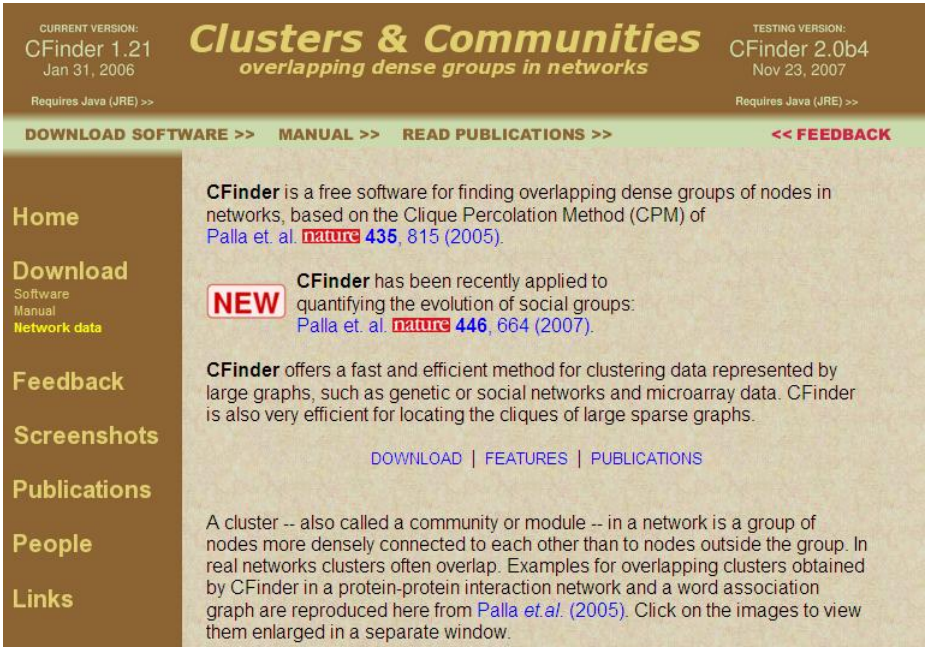
- $P(i,j) = 0$ iff $n_{i,j} = 0$
- $\lim_{\frac{n_{i,j}}{n_i} \to 0} P(i,j) = 0$, general topics
- $P(i,j) = 1$
- $D_{n_{i,j}} P(i,j) > 0$ and $D_{n_i} P(i,j) < 0$

Then,

$$P(i,j) = \frac{n_{i,j}^2}{n_i n_j} \tag{1}$$

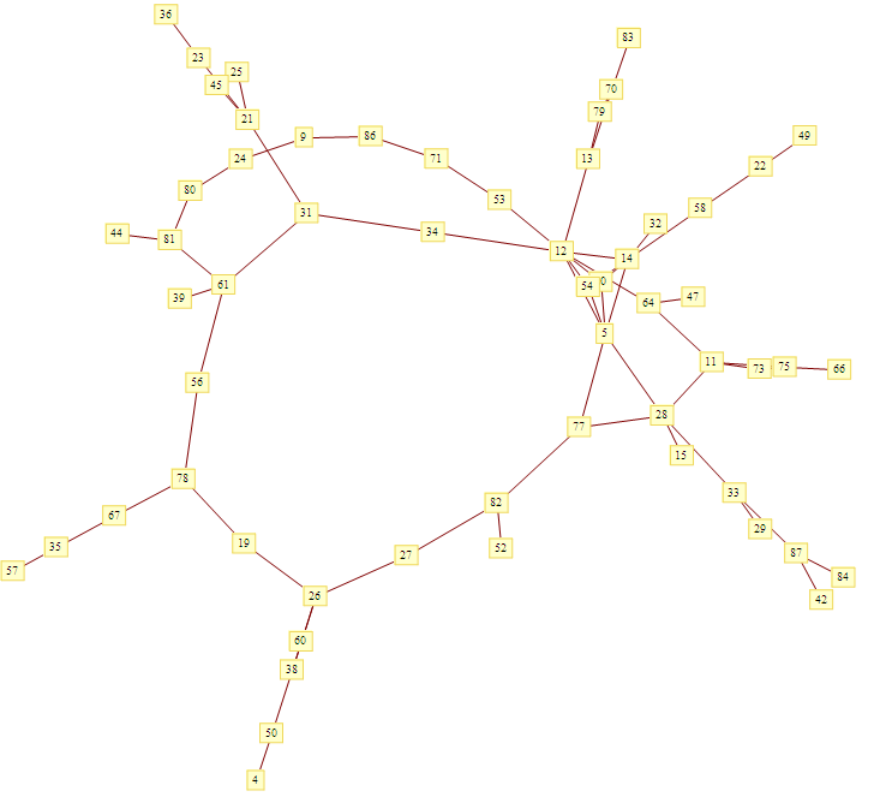
[2]Chavalarias D. & Cointet J-P. (2008) Scientometrics Vol. 75 No. 1

Clustering - K-clique percolation[3]



[3]Palla, G., Derenyi, I., Farkas, I., Vicsek, T. (2005), Uncovering the overlapping community structure of complex networks in nature and society, Nature, 435:814.

Clusters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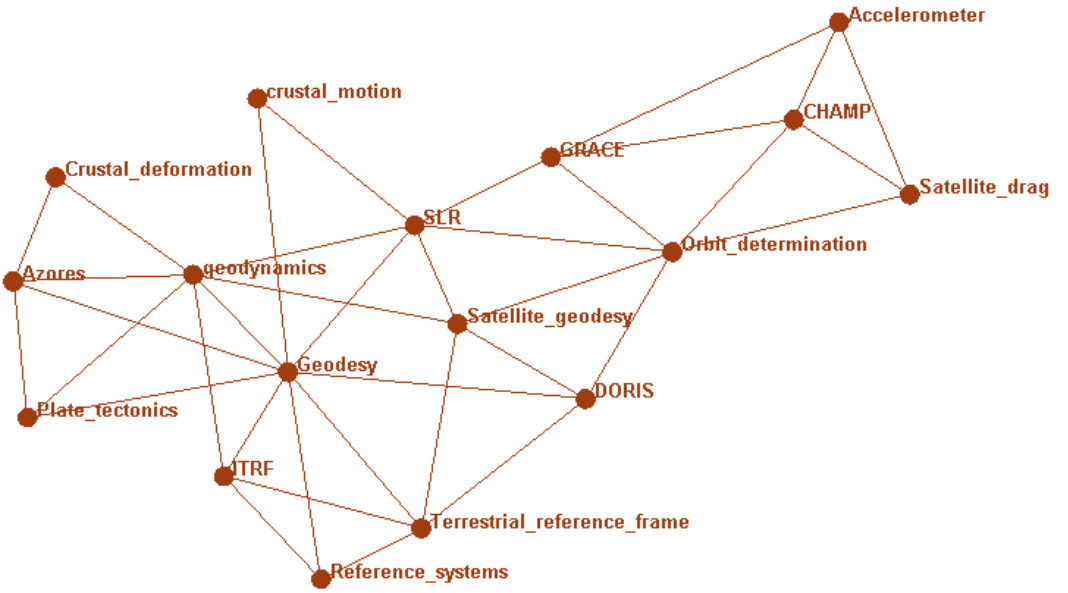
C11 - Geodesy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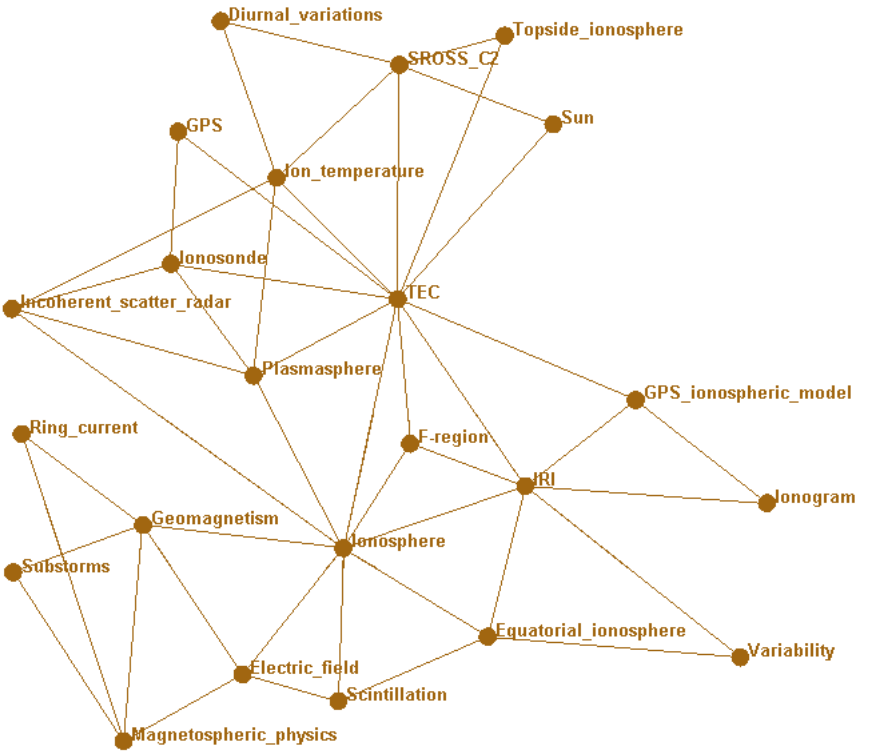
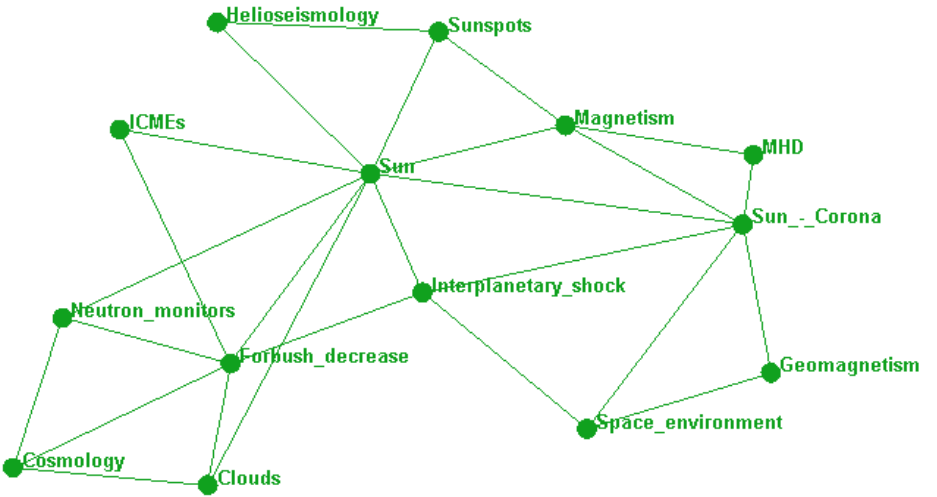
CHAMP
GRACE
Crustal_deformation
Satellite_drag
SLR
Orbit_determination
Azores
geodynamics
Satellite_geodesy
Geodesy
DORIS
Plate_tectonics
ITRF
Terrestrial_reference_frame
Reference_systems

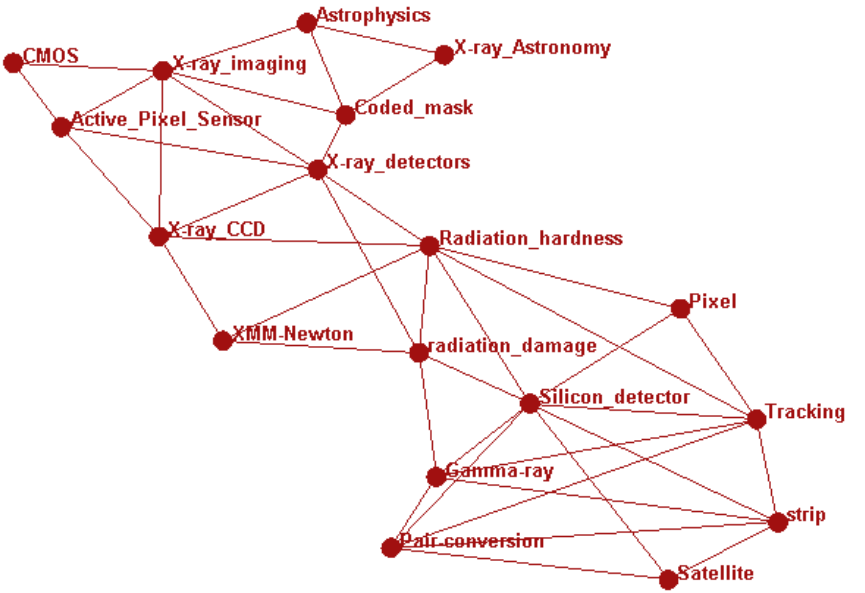
C12 - Ionosphere



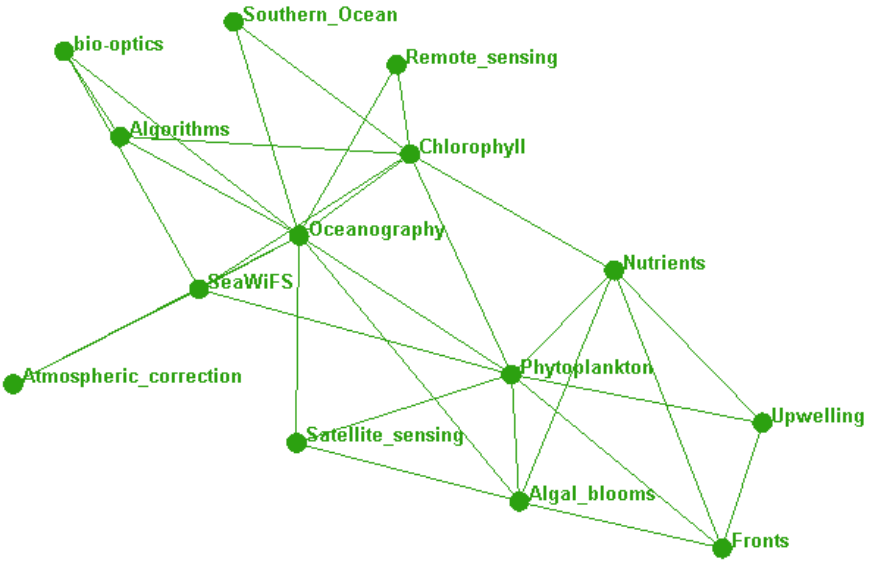
C14 - Aeronomy



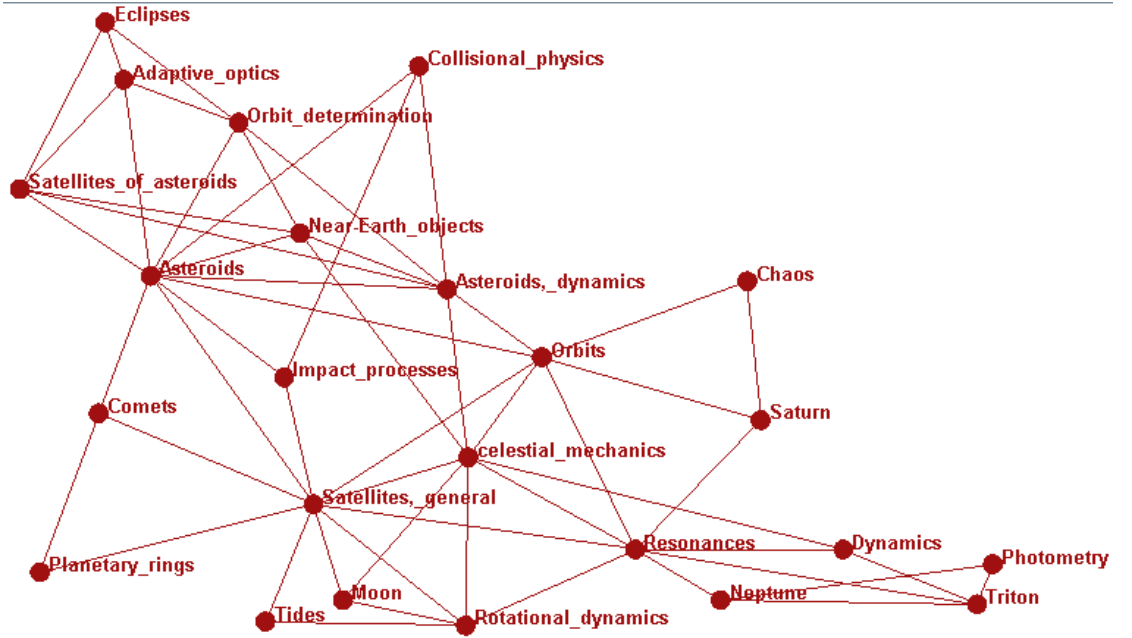
C23 - Astro-Imagery



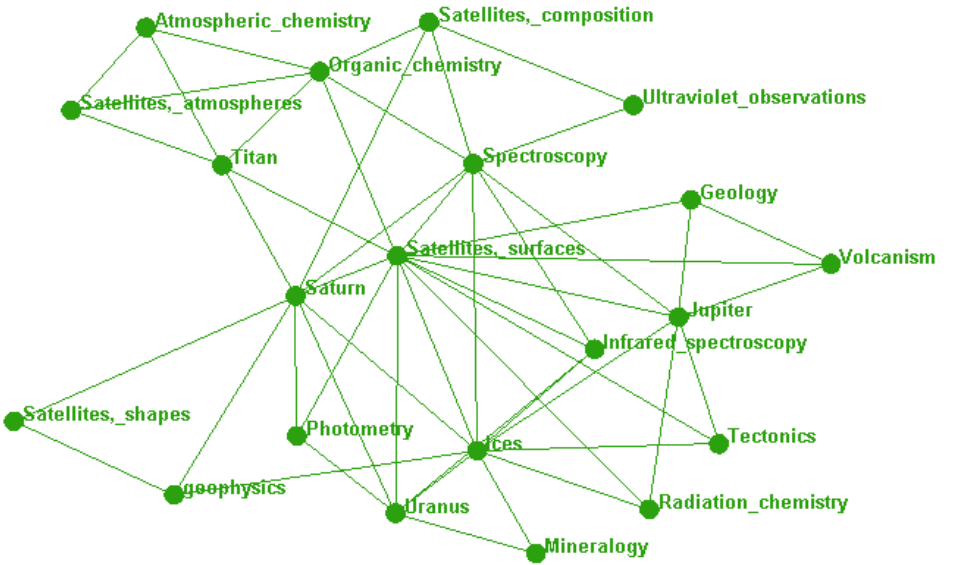
C26 - Oceanography



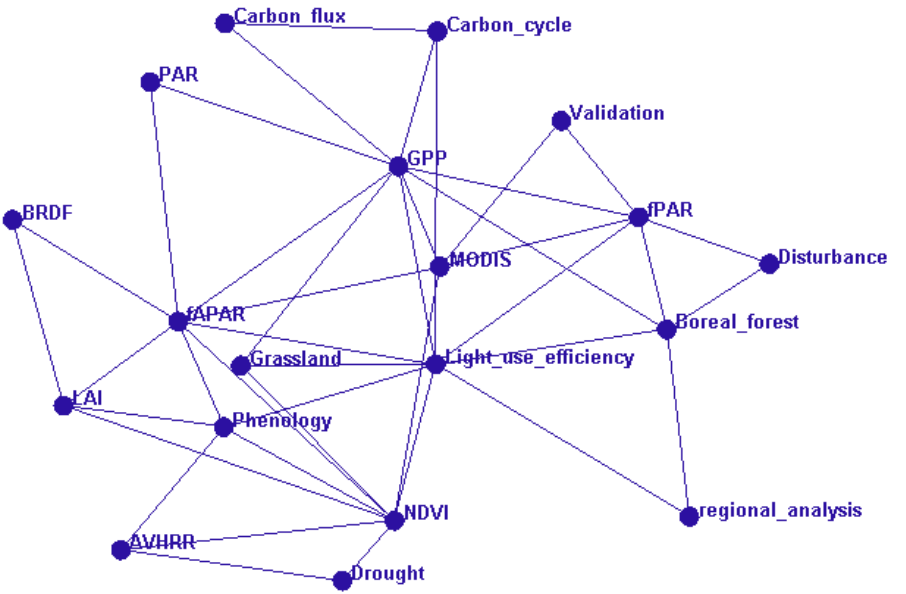
C28 - Astronomy



C33 - Astronomy



C31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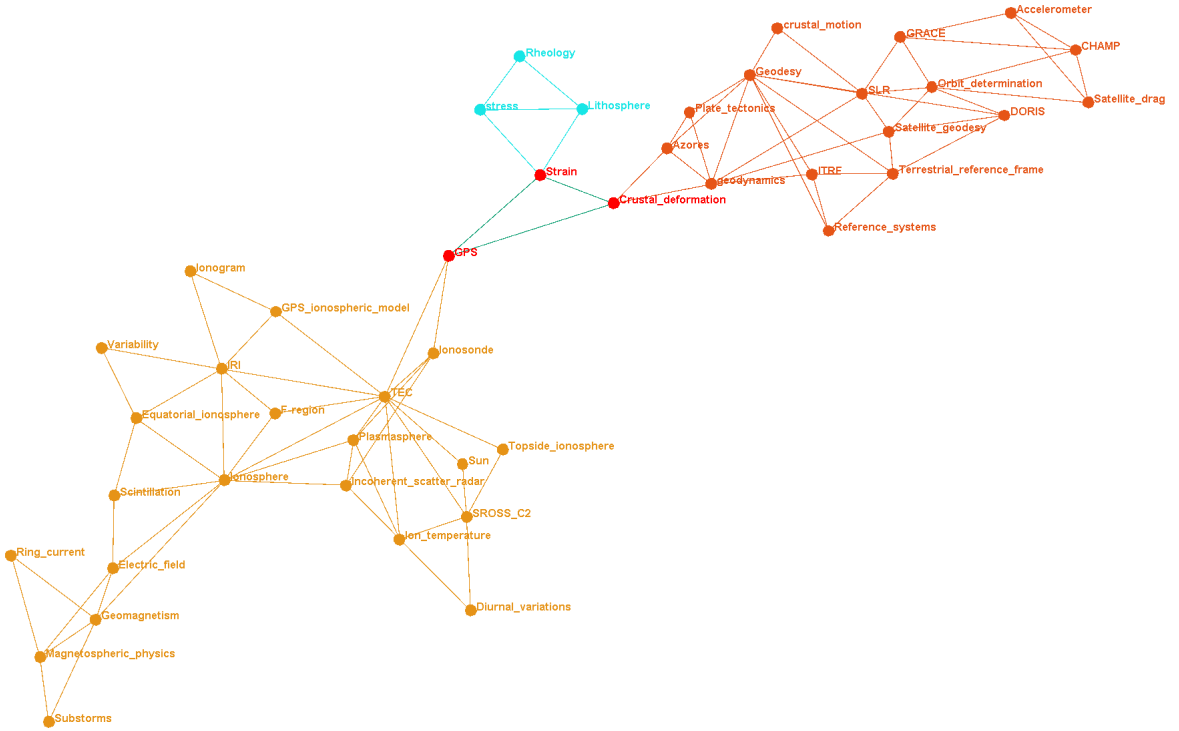
NDVI
regional_analysis
AVHRR
Drought

GPS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Accelerometer
GRACE
CHAMP
Geodesy
SLR
Orbit_determination
Satellite_drag
Plate_tectonics
DORIS
Satellite_geodesy
Azores
geodynamics
ITRF
Terrestrial_reference_frame
Reference_systems
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Ionogram
GPS_ionospheric_model
Variability
IRI
Ionosonde
TEC
Equatorial_ionosphere
F-region
Plasmasphere
Topside_ionosphere
Sun
Ionosphere
Incoherent_scatter_radar
Scintillation
SROSS_C2
Ion_temperature
Ring_current
Electric_field
Diurnal_variations
Geomagnetism
Magnetospheric_physics
Substorms

Conclusion

- It is possible recontruct how scientific fields are articulated arround gnss applications

Perspectives

- Early detection of emergent scientific fields
- Prediction of terms dynamics
- Localization of scientific themes to make a development policy

References

[1] Chavalarias D. & Cointet J-P. (2008) Scientometrics Vol. 75 No. 1

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Thank you

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