Correction of Jumps

the exoplanet point of view

the CoRoT Detection Team

17.10.2013

DLR

filtering of jumps

motivation

- program for the CoRoT extension 2013-2016 included the project *detection of solar-like oscilations in G-K giants as a tool to study the Galaxy*
- CoRoT Red Giants group (F. Baudin, J. Montalbán. . .) expressed interest in using exo pipeline to filter light curves of red giants
  1. the idea is good
  2. the devil is in the details

filtering of jumps

methodology

- filtering consists in two steps:
  1. detecting the signature of interest
     - in our case, discontinuities caused by hot pixels
     - random, sudden, increases of flux, affecting only limited amount of pixels
  2. building a model of the signal to substract it from the data
     - the model must preserve the information in the light curve

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1. detection: advantages

- detection is relatively straighforward

1. current pipeline includes a classification of hot pixels
   - status = 128 - new hot pixel
2. exo teams have different methods to identify hot pixels
   - by studying the derivative of the light curve
     Cabrera et al. (2012) A&A, 548
   - by using sliding windows
     Bonomo et al. (2010) A&A, 547
   - by using wavelets
     see review in Erikson et al. (2012) A&A, 539

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1. detection: disadvantages

- detection is relatively straighforward

1. current pipeline includes a classification of hot pixels
   - but it does not detect all hot pixels
   - and it has numerous false detections
2. exo teams have different methods to identify hot pixels
   - but their methods for removing hot pixels remove also the frequencies of interest for Red Giant studies

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what has been done so far

- J. Montalbán send a set of light curves to the Detection Team for analysis (LRc07 and LRc08)
- only DLR team analyzed the light curves
- conclusion: current tools unsuitable
  - they remove discontinuities as well as frequencies of interest

- J. Montalbán proposed re-analysis of LRc01 with new pipeline (v 3.2)
- only DLR team is analyzing the light curves
  - work in progress

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which is the situation now

- limited resources in Detection Team
  - as today, only DLR and Köln Teams active in transit search (Oxford and IAS teams active in candidate validation)
  - situation is not bright in the near future (i.e., limited funding in Germany)
- risks:
  - re-analysis of new pipeline data not done inside CoRoT community
  - tools for removal of discontinuities not done inside CoRoT community

filtering of jumps

what will happen next

- detection is not the issue, the issue is correction
- exo and sismo experts need to sit down and discuss to define the tools needed, satisfying that:
  - hot pixels are removed
  - frequencies of interest are preserved
- F. Baudin and M. Deleuil are organizing a joint workshop in Paris end 2013
  - these issues will be addressed
- these tools could be useful for the CoRoT Legacy