Welcome & Overview of the Meeting

Felix J. Herrmann

SLIM
University of British Columbia

PGS

Hosts of the 2016 SINBAD Consortium Meeting

SINBAD

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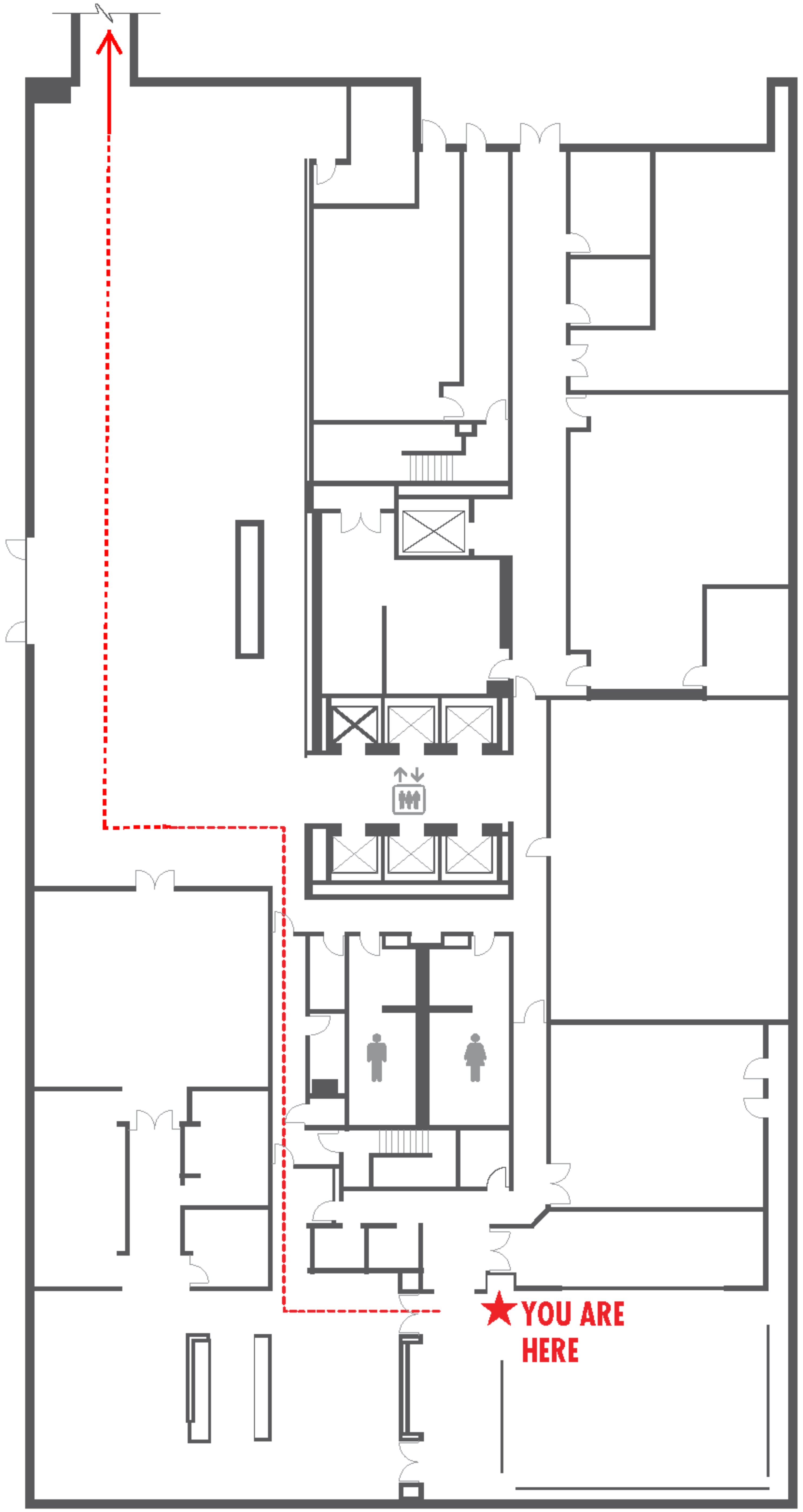

LEVEL 1

WIFI

PGS Guest

Password: dinosaur

Our mission

Fast & agile development of the next-generation of seismic data acquisition, processing, imaging, & inversion technology

Dissemination of research findings to spark innovations

Training of the next-generation of seismologists at

- undergraduate
- graduate, and
- post-graduate level


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Matrix square root-based wavefield extrapolation
CARP-CG
Modeling
Preconditioning of the Helmholtz equation via row-projections
A parallel matrix-free framework for frequency-domain seismic modeling in Matlab
Interferometric FWI
UQ for FWI with source subsampling
Uncertainty quantification (UQ)
Invert elastic data with the acoustic wave equation
Mitigating local minima in FWI by expanding the search space
3D frequency-domain waveform inversion using a row-projected helmholtz solver
model-space approach
data-space approach
Non-Uniqueness of the Student's t-formulation for Linear Inverse Problems
Full-Waveform Inversion (FWI)
Modified, sparsity promoting, Gauss-Newton algorithm for seismic waveform inversion
Robust FWI with misfit measured in the wavenumber domain
Robust FWI using Student's t-distribution
Estimation of Nuisance Parameters in inverse problems
Elastic waveform inversion
Robust Source Estimation
Degrees of freedom parameter estimation
Variance Estimation in the Gaussian model
Source estimation
Wavefield Reconstruction Inversion (Penalty method for FWI)
Multiparameter inversion
TV-regularized WRI
Interferometric imaging
Wave-equation based multi-parameter linearized inversion with joint-sparsity promotion
Preconditioned Imaging by random matrix probing
Limitations of the deconvolutional imaging condition for two-way propagators
HSS-based depth stepping migration
Imaging
Migration with extended image volumes
Sparsity-promoting migration with surface-related multiples
Efficient Least-Squares migration with sparsity promotion
Fast least-squares migration with multiples and source estimation
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Processing
randomized SVD and hierarchical matrices
EPSI (Estimation of Primaries via Sparse Inversion)
Multilevel acceleration of REPSI
Robust EPSI via one-norm minimization
REPSI w/ primary wavefield autoconvolution
Up/down wavefield decomposition by sparse inversion
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Exploiting the structure of the signal
Dimensionality Reduction
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Rank Minimization
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Weighted L1-minimization
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Generalized SPGL1
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WSPGL1
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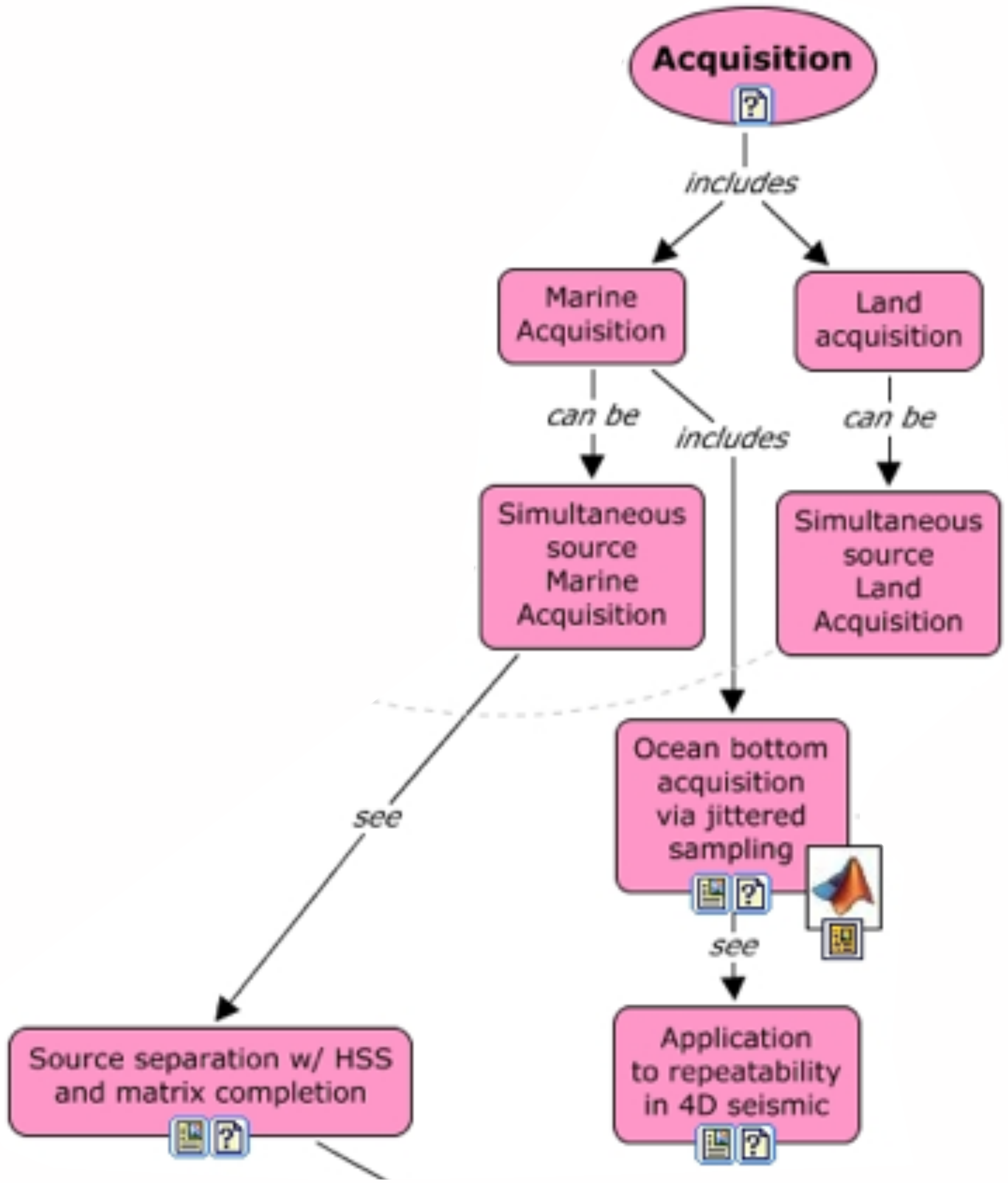
SLIM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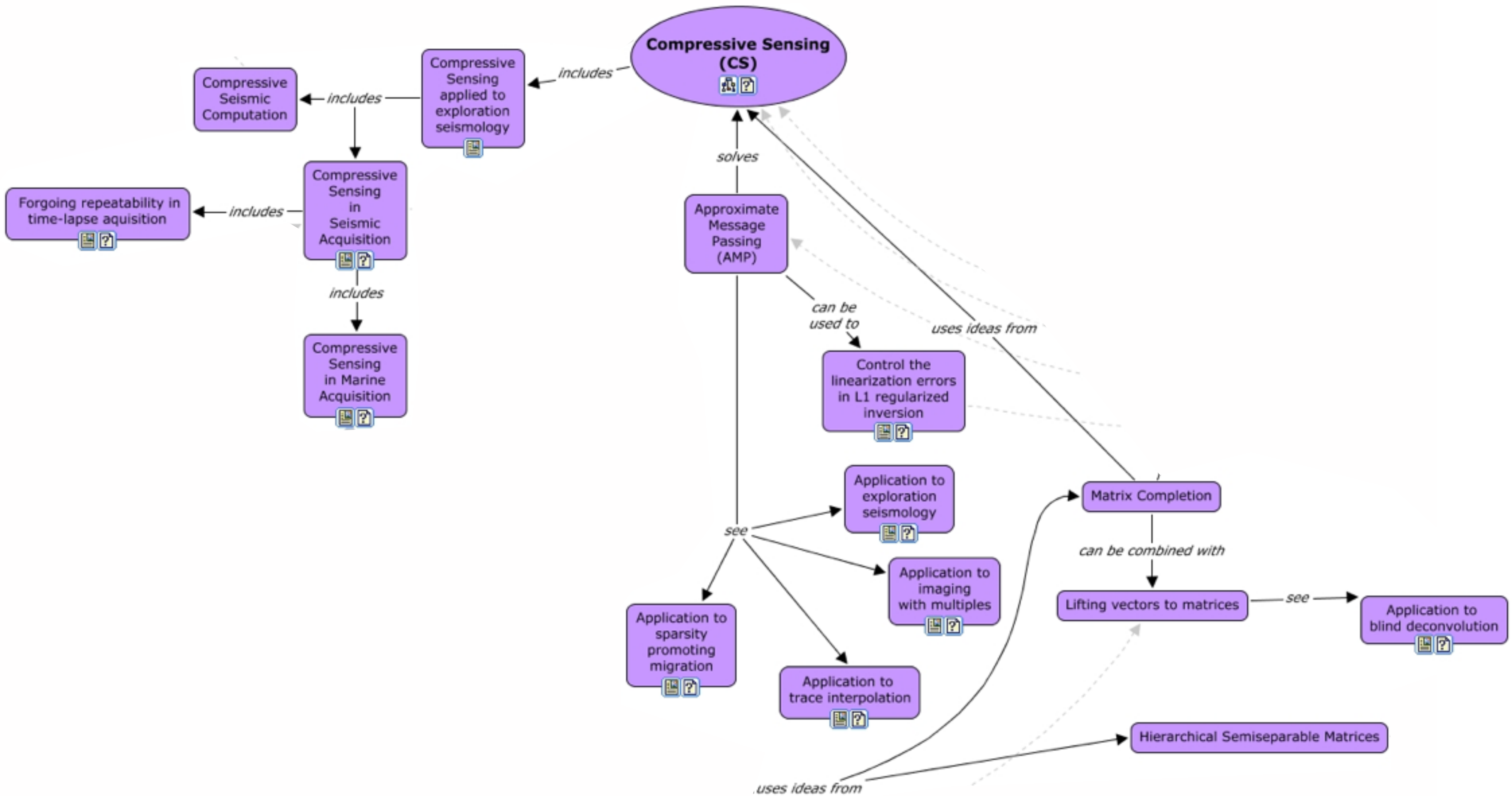
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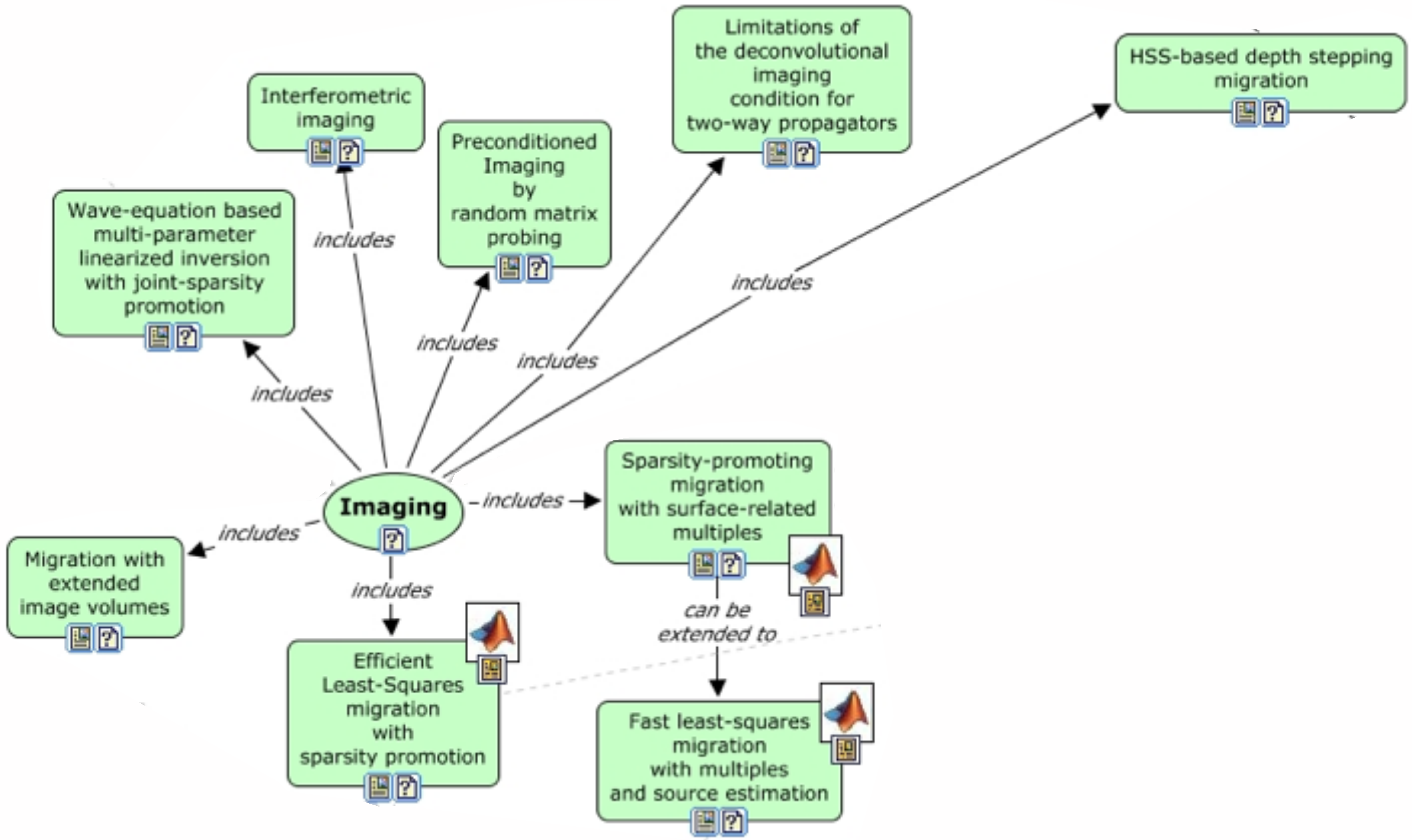

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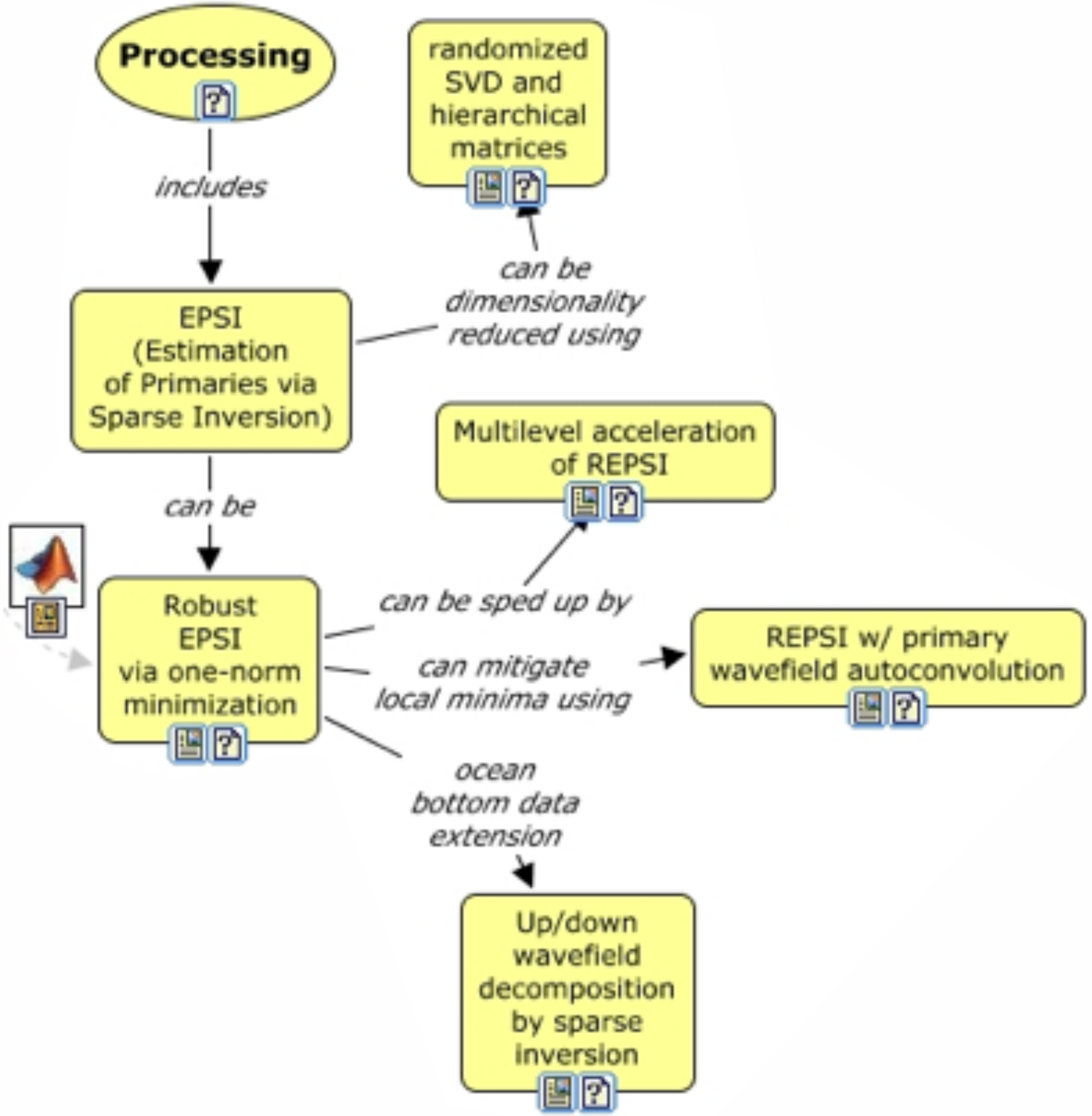

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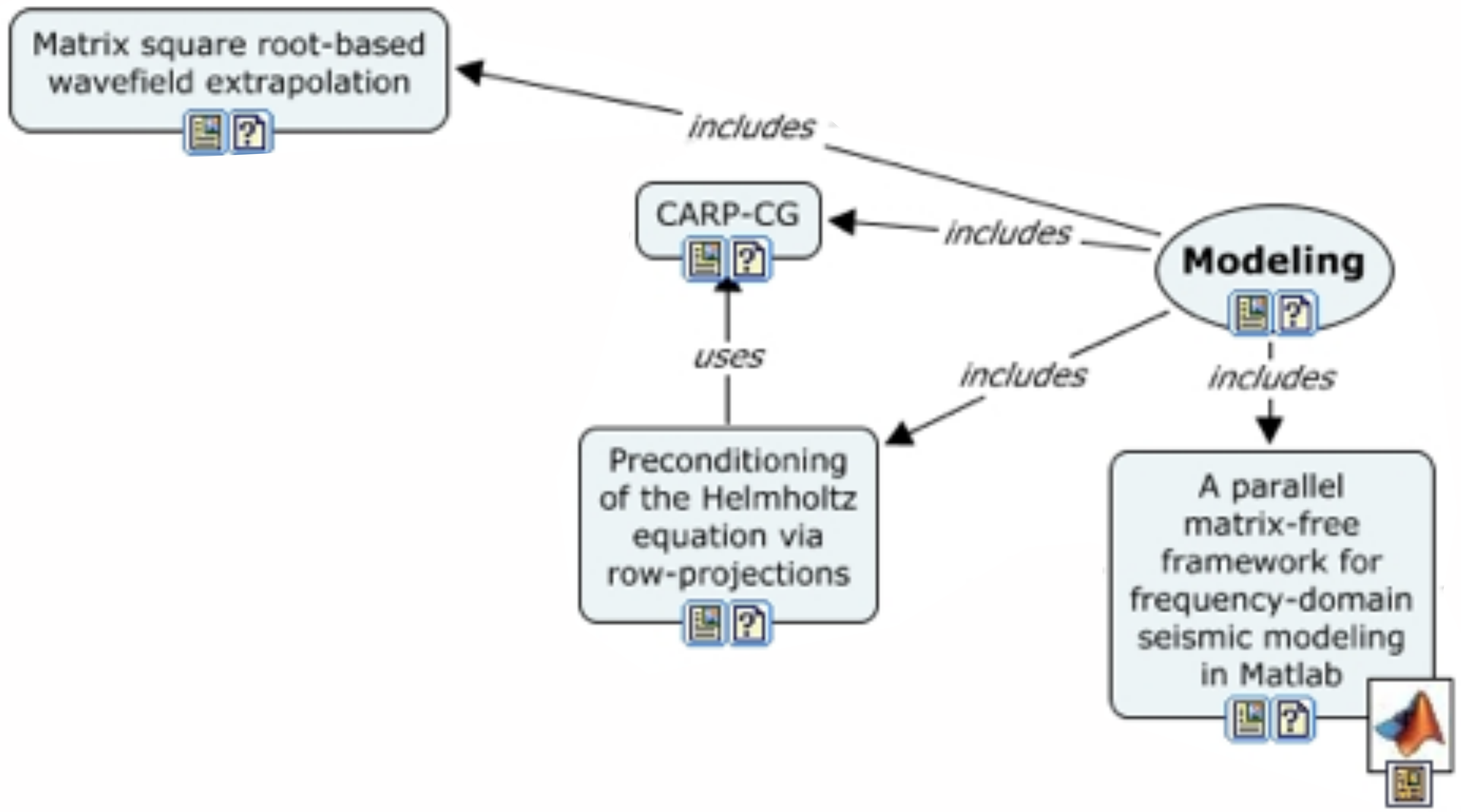
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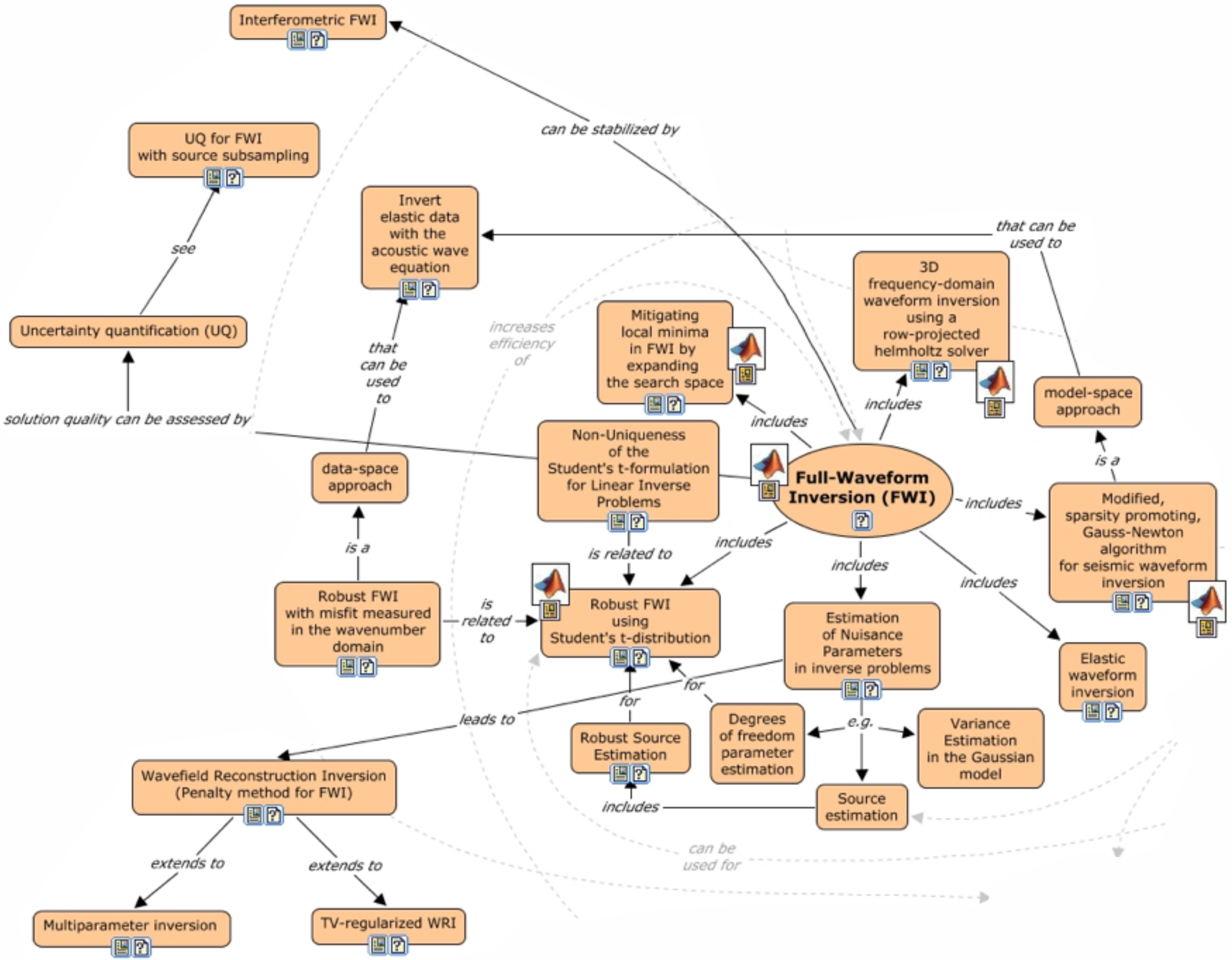
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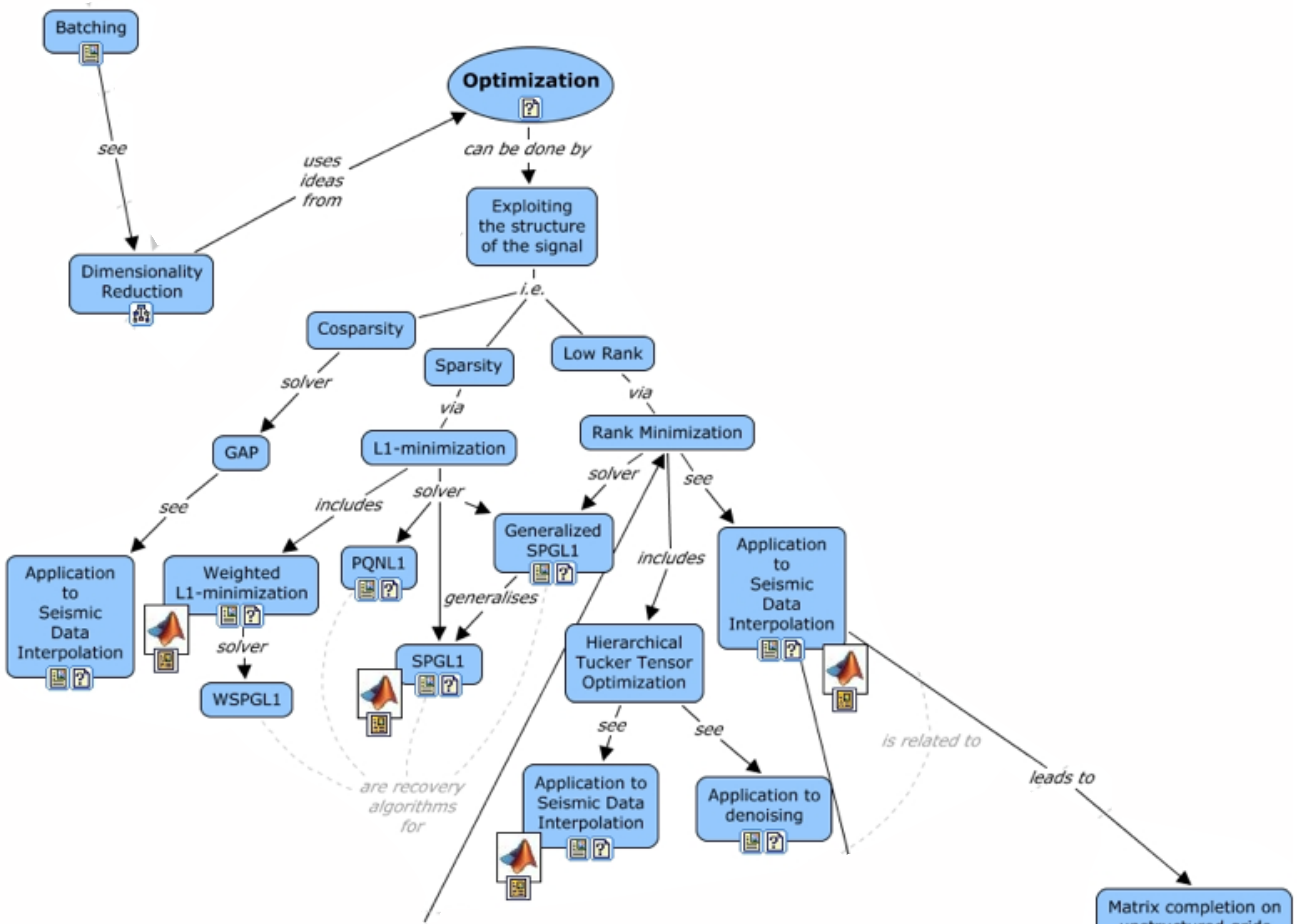
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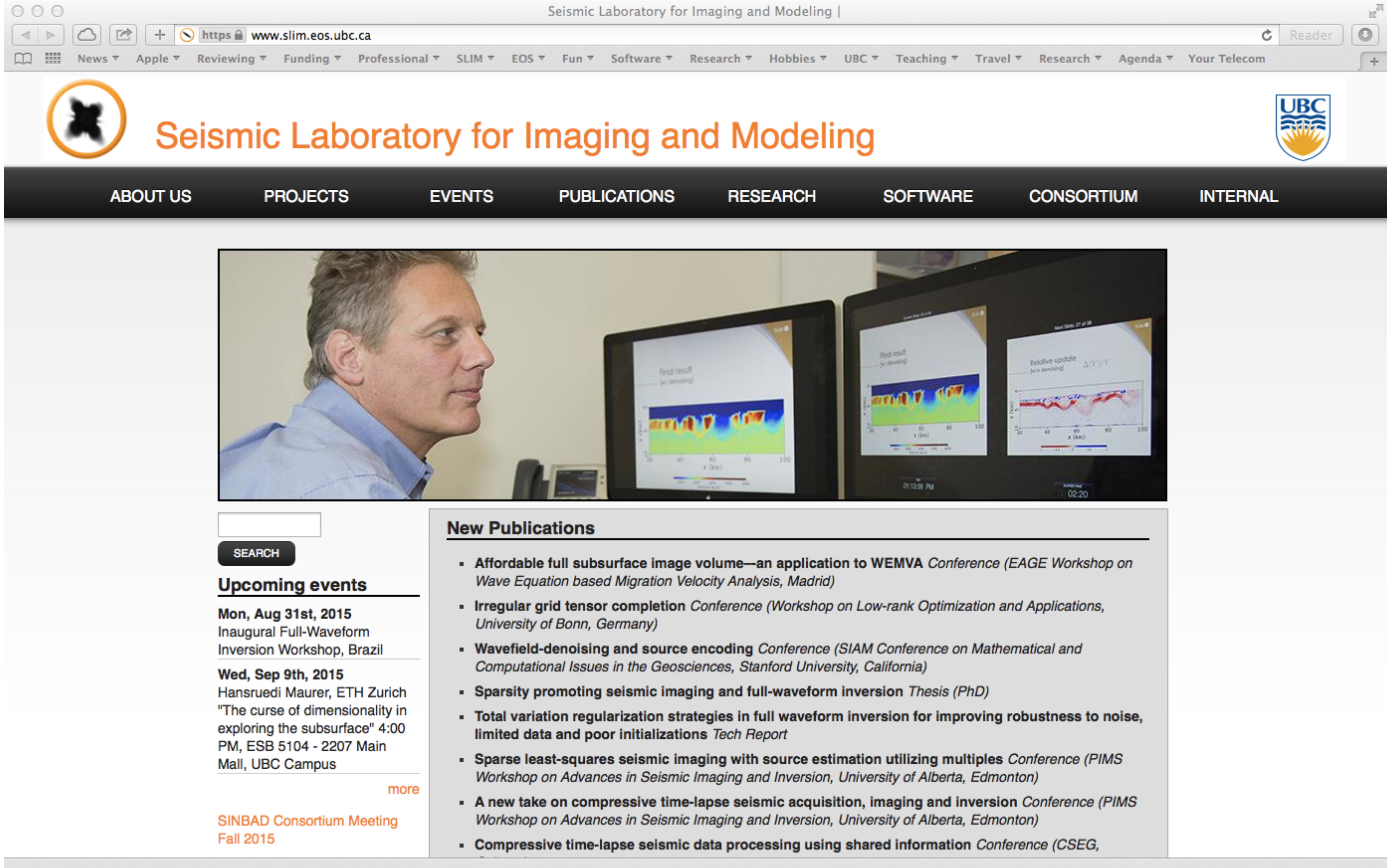
can be used for
used for
uses ideas from
can be done by
i.e.
solver
via
generalises
are recovery algorithms for
can be
can be sped up by
can mitigate local minima using
ocean bottom data extension
can be dimensionality reduced using
can be accelerated using ideas from
can be extended to
increases efficiency of
part of
solves
involves
can be combined with
Last Update: July 18, 2014 by Curt Da Silva

The team...

Total of 20 (under)graduate students, PDFs, visitors, faculty, & staff...


Seismic Laboratory for Imaging and Modeling |
https www.slim.eos.ubc.ca
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Seismic Laboratory for Imaging and Modeling
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RESEARCH
SOFTWARE
CONSORTIUM
INTERNAL
SEARCH
Upcoming events
Mon, Aug 31st, 2015
Inaugural Full-Waveform Inversion Workshop, Brazil
Wed, Sep 9th, 2015
Hansruedi Maurer, ETH Zurich "The curse of dimensionality in exploring the subsurface" 4:00 PM, ESB 5104 - 2207 Main Mall, UBC Campus
more
SINBAD Consortium Meeting Fall 2015
New Publications
Affordable full subsurface image volume—an application to WEMVA Conference (EAGE Workshop on Wave Equation based Migration Velocity Analysis, Madrid)
Irregular grid tensor completion Conference (Workshop on Low-rank Optimization and Applications, University of Bonn, Germany)
Wavefield-denoising and source encoding Conference (SIAM Conference on Mathematical and Computational Issues in the Geosciences, Stanford University, California)
Sparsity promoting seismic imaging and full-waveform inversion Thesis (PhD)
Total variation regularization strategies in full waveform inversion for improving robustness to noise, limited data and poor initializations Tech Report
Sparse least-squares seismic imaging with source estimation utilizing multiples Conference (PIMS Workshop on Advances in Seismic Imaging and Inversion, University of Alberta, Edmonton)
A new take on compressive time-lapse seismic acquisition, imaging and inversion Conference (PIMS Workshop on Advances in Seismic Imaging and Inversion, University of Alberta, Edmonton)
Compressive time-lapse seismic data processing using shared information Conference (CSEG,

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Guests

- Raymond Abma (BP)
- Francois Audebert (Total)
- Leonardo Borges (Intel)
- Joe Dellinger (BP)
- Mingqiu Luo (SINOPEC)
- Rami Nammour (Total)
- Paul Williamson (Total)
- Zhou Yu (BP)

Highlights '16

Disseminated research findings via

- **8** journal papers + **6** in review
- **12** presentations at the 2016 SEG
- **19** SINBAD presentations
- other presentations at IEEE, SEG Workshops, CSEG, others
- **17** software releases (Jan, April, Aug)

Recent software releases

August 2016

1. **Source separation for towed-streamer marine data via sparsity promotion. (beta in master branch)** This package contains a MATLAB implementation of a 2-D over/under blended marine acquisition scheme, and a deblending (or source separation) algorithm based on sparsity-promoting inversion in the curvelet domain using ℓ_1-norm minimization. For questions contact Haneet Wason. [Read more][GitHub]
2. **Source separation via SVD-free rank minimization in the Hierarchical Semi-Separable (HSS) representation. (update in master branch)** A parallel version of the code was added. For questions contact Haneet Wason. [Read more][GitHub]
3. **Several updated frequency-domain modeling and FWI/WRI tools. (in master branch)** We have improved the computational efficiency and flexibility of our modeling and inversion toolboxes. Specifically, we have
   i. Unified the interfaces for 2D and 3D, to allow for prototyping algorithms on 2D examples before applying them immediately to 3D examples.
   i. Merged WRI in to the FWI codebase, to allow for easy comparisons between the two methods.
   i. Added automatic source estimation, as well as other features such as arbitrary source/receiver locations.
   i. Added 2.5D modeling/inversion functions, to enable algorithmic prototyping on examples with the correct physical behaviour (spherical wave spreading, correct source behaviour, etc.) at a reasonable computational cost before moving to fully fledged 3D examples.
   For questions, contact Curt Da Silva. See 2D Frequency-domain acoustic modeling, 3D Frequency-domain acoustic modeling, Common Frequency-domain acoustic modeling.

Recent software releases

April 2016

1. **Time-domain least-squares reverse-time migration (LS-RTM) with sparsity promotion. (beta in master branch)** This software contains our version of sparsity-promoting least-squares RTM in the time domain. We use the linearized Bregman method, as the solver for the sparsity-promoting optimization problem. The use of linearized Bregman allows us, while maintaining convergence, to subsample the sources during each iteration, thus limiting the usual high cost of LS-RTM. We thereby reduce the overall number of PDE solves by a factor of `10` or more. For questions contact Philipp Witte. [Read more][GitHub]
2. **MATLAB interface to running iWAVE. (beta in master branch)** MATLAB toolbox for iWAVE++. With this toolbox, users may simulate the time-domain acoustic wave data, Born linearized data and its adjoint. This application also provides simple examples to do time-domain RTM, least-squares migration and FWI. For questions contact Zhilong Fang. [GitHub]
3. **Examples for using iWAVE interface for different applications. (beta in master branch)** This application provides a set of examples of using MATLAB toolbox for iWAVE++. With this application, users are able to simulate the time-domain acoustic wave data, Born linearized data and its adjoint. This application also provides simple examples to do time-domain RTM, least-squared migration and FWI. For questions contact Zhilong Fang. [Read more][GitHub]
4. **Code-efficiency/stability updates. (in master branch)** Numerous changes aiming at increasing code efficiency and stability, notably in modeling toolboxes: [2D Frequency-domain acoustic modeling], [3D Frequency-domain acoustic modeling], and [Time-domain modeling].
5. **RunApplication helper function. (beta in master branch)** A provided MATLAB function `RunApplication` [GitHub] helps running applications in our software release, in both interactive and batch mode. It ensures that: 1) appropriate toolboxes are added before application is being used, and 2) that the application is executed in proper location.
6. **Examples of constrained FWI in time-domain frequency-domain and time-domain. (beta in master branch)** This application contains one frequency-domain and one time-domain example of the constrained FWI toolbox on the same simple 2D model. Each of the example highlights how to setup the available constraints and how to include it in FWI. For questions contact Bas Peters or Mathias Louboutin. [Read more] [GitHub]
7. **Case study for Chevron 2012 blend test data set.** This release contains setup scripts and the starting model obtained by first-break travel-time inversion for the 2012 Chevron data set. For questions contact Zhilong Fang. [GitHub]

Recent software releases

Software Release — Jan 2016 Master branche

1. **Fast imaging with surface-related multiples by sparse inversion. (update in master branch)** This package includes 1) the algorithm 2) synthetic examples to produce the main results shown in paper "N. Tu and F. J. Herrmann, Fast imaging with surface-related multiples by sparse inversion, Geophysical Journal international, 2015, 201, 304–317". For questions contact Ning Tu. [Read more] [GitHub]
2. **Fast least-squares imaging with source estimation using multiples. (update in master branch)** This package includes 1) the algorithm 2) synthetic examples to produce the main results shown in the manuscript "N. Tu et al., Source estimation with surface-related multiples—fast ambiguity-resolved seismic imaging, submitted to Geophysical Journal international, 2015". For questions contact Ning Tu. [Read more] [GitHub]
3. **2D/3D Time-domain modeling kernel for inversion. (update in master branch)** This package contains a MATLAB implementation of a 2D time-domain acoustic modeling operator and its Jacobian. You can use up to 8th-order finite difference in space and 2nd-order in time. We also use PML boundary layer. This code is also implemented with domain-decomposition. Multiple matlab works are highly recommended for the simulations of large model. Hard or mirrored free-surface boundary condition is also included (optional). For questions contact Mathias Louboutin. [GitHub]

Recent software releases

Jan 2016 Beta in master branche

1 **Sparsity-promoting denoising of seismic data. (beta in master branch)** This package contains a MATLAB implementation of sparsity-promoting denoising of seismic data in the curvelet domain using L1 minimization. For questions contact Haneet Wason. [Read more] [GitHub]

2 **Time-domain 2D/3D modelling and linearized modelling. (beta in master branch)** This package contains basic examples of time-domain modelling. The 2D version allows acoustic and TTI acoustic anisotropic modelling and linearized modelling. The 3D modelling and linearized modelling has domain decomposition (parallel matlab necessary) and is acoustic only. For questions contact Mathias Louboutin. [Read more] [GitHub]

3 **Time-domain 2D FWI with TTI anisotropy. (beta in master branch)** This package contains basic examples of time-domain FWI. The data is modelled and inverted with an TTI anisotropic kernel. We only invert for velocity. This simple example shows the result after 5 gradient step and also compare it with a purely acoustic kernel inversion. For questions contact Mathias Louboutin. [Read more] [GitHub]

4 **Constrained FWI. (beta in master branch)** This package contains a set of routines that imposes multiple constraints onto “black-box” implementations of nonlinear inverse problems—such as full-waveform inversion—that aim to minimize an objective using local derivative (gradient) information. This package can work with any black box code that provides an objective function value and a gradient. Constraints include box constraints, TV-norm constraint, transform-domain sparsity constraints, various nonconvex constraints, several implementations of minimum smoothness constraints and several others. When provided a function value and gradient, this package sets up the constraints and solves the constrained optimization problem. For questions contact Bas Peters. [Read more] [GitHub]

New hires

Ali Siahkoohi — PhD
MSc in Geophysics, Univ Tehran
BSc in Electrical Engineering

Emmanouil Daskalakis — PDF
PhD Applied Mathematics, University of Crete
Thesis: Velocity estimation from ambient noise recordings using cross-correlations.

coming Jan 2016 — Marie Kray, PDF

Graduating this year…..

Haneet Wason —

"*queen marine*" acquisition, time-lapse

Rajiv Kumar —

rank minimization, matrix completion, WEMVA

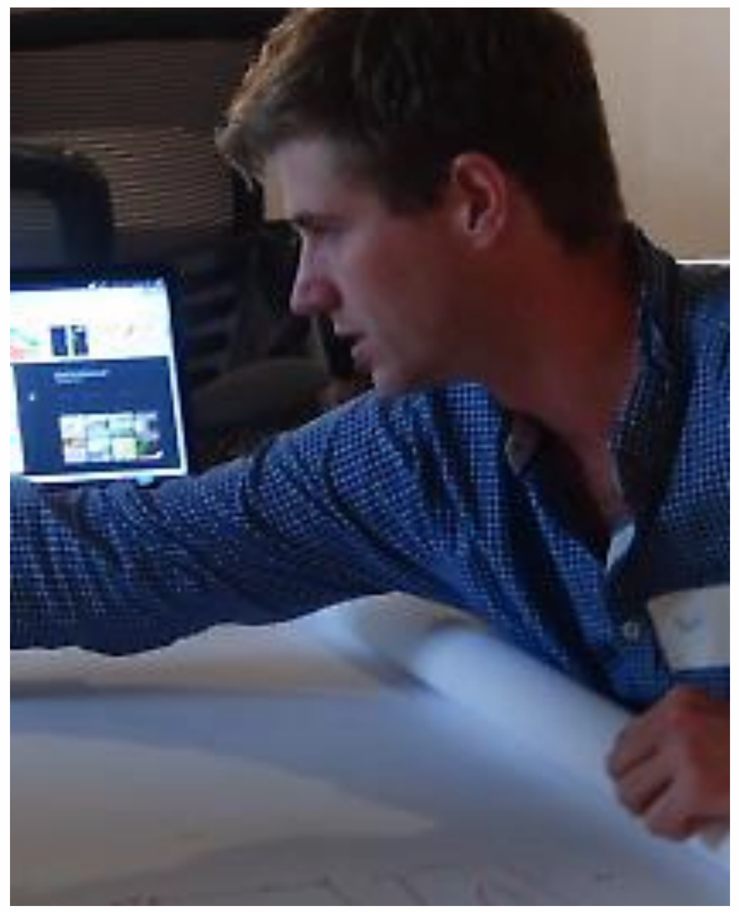
Felix Oghenekohwo — acquisition, time-lapse

Curt Da Silva —

matrix completion, optimization, FWI

Moving on .....

Ben Bougher, MSc.



Thesis: Machine learning applications to geophysical data analysis
AVA classification as an unsupervised machine-learning problem

defended Aug 15, joined Agile Geoscience

Ben's journal publications/submissions:

Ben B. Bougher and Felix J. Herrmann, "Using the scattering transform to predict stratigraphic units from well logs", CSEG Recorder, vol. 41, p. 22-25, 2016.

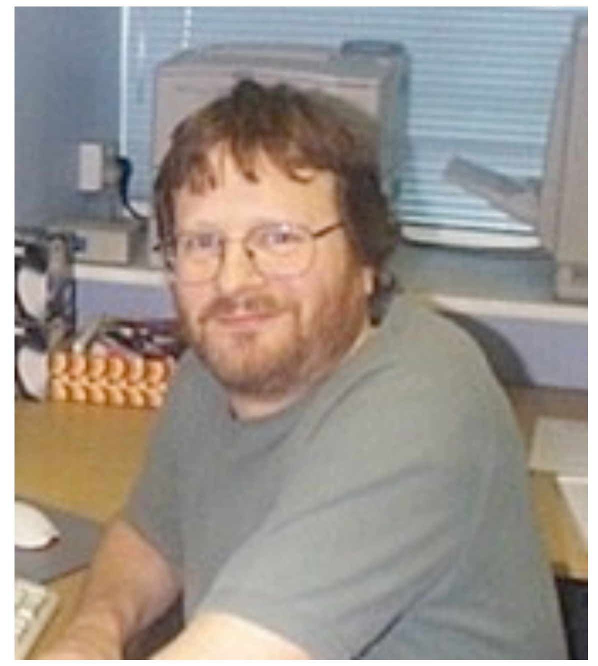
Conference expanded abstracts:

Ben B. Bougher and Felix J. Herrmann, "AVA classification as an unsupervised machine-learning problem", in SEG Technical Program Expanded Abstracts, 2016.

Ben B. Bougher and Felix J. Herrmann, "Prediction of stratigraphic units from spectral co-occurance coefficients of well logs", in CSEG Annual Conference Proceedings, 2015.

Collaborators

Mike Warner & Gerard Gorman
(Imperial College London)



Ben Recht on large-scale matrix completion
(Berkeley)

Tristan van Leeuwen
(Utrecht University)

Sasha Aravkin
(UoW)

Impact

Curvelet-based processing:

- noise removal, multiple elimination, sparse inversions, e.g. SRME & EPSI
- incorporated by Chevron & others leading to major improvements

Randomized (timelapse) acquisition / Compressive Sensing:

- validated & practiced by ConocoPhilips & SLB
- major (**5–10 X**) improvements in production & environmental imprint

Structure-promoting inversion by (convex) optimization:

- enabler of high-quality recovery from severe undersamplings
- Shell validated EPSI & time-lapse surveys will be shot

Impact

Randomized sampling in FWI:

- (**4 – 8 X**) reduction in computational costs
- makes WEI's computationally & economically feasible
- allowed Schlumberger to develop FWI into a viable service

FWI with extensions & convex constraints:

- removal of sensitivity to starting models
- EAGE distinguished lecture series
- automatic salt flooding developed in collaboration w/ Sub Salt Solutions

What's next

Leverage our

- experience in compressive sensing to low-cost time-lapse seismic acquisition
- work on wave-equation based inversion w/ constraints
- collaboration w/ OPESCI on fast near-peak HPC time stepping
- agility & ability to manage complex algorithms w/ abstractions

towards

- dramatically reduced costs by eliminating need to replicate surveys
- enhanced recovery w/ new low-cost reservoir seismic monitoring
- improved seismic reservoir characterization

CAI– Compressive time-lapse Acquisition & Imaging

Grant proposal submitted:

- to ITF’s call IMPROVED RESERVOIR IMAGING 2016 in the UK in collaboration w/ Gerard Gorman
- budget: 2,524,000 GPB
- duration: 36 months

Personnel:

- 6 FTEs for post-doctoral fellows
- 3 FTEs research faculty/associate
- 1.5 FTEs of a software support person
- 3 FTEs of student research time

CAI

Objectives:

- Form & analyze high-amplitude fidelity full-subsurface pre-stack image volumes for target-oriented reservoir delineation, characterization, & monitoring
- Create artifact-free highly repeatable high-resolution time-lapse images from data with multiples in (shallow) marine settings
- Create an agile development framework that will enable rapid translation of research to the field
- Minimize cost of acquiring time-lapse seismic data without impacting 4D repeatability
- Make developed technology available in the cloud

Time domain extended sources

Mathias Louboutin

SLIM

University of British Columbia

Matrix-free least-squares solves

Extension of Symes's work in time domain

(Matched Source Waveform Inversion: Space-time Extension, Guanghui Huang, William W. Symes & Rami Nammour, '16)

Least-squares solve instead of matlab's "\"

Agility

Example of our agility.

Research output of <24 h...

Formulation

Adjoint-state derivation

The PDE-constrained problem:

$$\underset{\mathbf{m},\mathbf{u}}{\text{minimize}} \; \frac{1}{2}\left\|\mathbf{P}_r\mathbf{u}-\mathbf{d}\right\|_2^2$$

$$\text{subject to } A(\mathbf{m})\mathbf{u}=\mathbf{q}_s$$

Eliminate the PDE & sum all sources:

$$\underset{\mathbf{m}}{\text{minimize}}\,\Phi(\mathbf{m})=\frac{1}{2}\sum_{i=1}^{n_s}\left\|\mathbf{d}_i-\mathbf{P_r}\mathbf{A}(\mathbf{m})^{-\mathbf{1}}\mathbf{q}_i\right\|_2^2$$

Extended source formulation

Replace PDE constraint by quadratic penalty (WRI – analysis form):

$$\underset{\mathbf{m},\mathbf{u}}{\text{minimize}} \; \frac{1}{2}\|\mathbf{P}_r\mathbf{u}-\mathbf{d}\|_2^2 + \frac{1}{2\alpha}\|A(\mathbf{m})\mathbf{u}-\mathbf{q}\|_2^2$$

Change of variables $A\mathbf{u} = \mathbf{q}_i, \; \mathbf{q} = 0$ **(WRI – synthesis form) & add focussing:**

$$\underset{\mathbf{m},\mathbf{q}_i}{\text{minimize}} \, \Phi(\mathbf{m},\mathbf{q}_i) = \frac{1}{2}\sum_{i=1}^{n_s}\|\mathbf{d}_i - \mathbf{P_r}\mathbf{A}(\mathbf{m})^{-\mathbf{1}}\mathbf{q}_i\|_2^2 + \frac{1}{2\alpha}\|\mathbf{W}\mathbf{q}_i\|_2^2$$

$\mathbf{W}$: Focusing operator, equivalent to a weighted L2 norm

Methodology: Cosparse regularization

They solve both for the source location & signature from

$$\underset{\mathbf{u}}{\text{minimize}} \;\; \lambda\|\mathbf{A}\mathbf{u}\|_{1,2} + \|\mathbf{P}\mathbf{u} - \mathbf{d}\|_F^2$$

Presented last year (2015)

Alternating variable-projection

Solve for the source (needs to be exact in theory):

WRI synthesis form w/ focussing

$$\begin{pmatrix} \mathbf{P}\mathbf{A}^{-1} \\ \frac{1}{\alpha}\mathbf{W} \end{pmatrix} \mathbf{q} = \begin{pmatrix} \mathbf{d}_{\text{obs}} \\ 0 \end{pmatrix}$$

Frequency domain : Backslash
Time domain : lsqr

WRI synthesis form

$$\begin{pmatrix} \lambda\mathbf{P}\mathbf{A}^{-1} \\ \mathbf{I} \end{pmatrix} \bar{\mathbf{q}} = \begin{pmatrix} \lambda\mathbf{d}_{\text{obs}} \\ \mathbf{q} \end{pmatrix}$$

then solve for velocity (adjoint state):

$$\underset{\mathbf{m},\mathbf{q}_i}{\text{minimize}}\, \Phi(\mathbf{m}, \mathbf{q}_i) = \frac{1}{2}\sum_{i=1}^{n_s} \left\|\mathbf{d}_i - \mathbf{P}_\mathbf{r}\mathbf{A}(\mathbf{m})^{-\mathbf{1}}\mathbf{q}_i\right\|_2^2 + \boxed{\frac{1}{2\alpha}\left\|\mathbf{W}\mathbf{q}_i\right\|_2^2}$$

Constant for fixed velocity

Gradient, analysis form

$$\underset{\mathbf{m},\mathbf{q}_i}{\text{minimize}}\,\Phi(\mathbf{m},\mathbf{q}_i) = \frac{1}{2}\sum_{i=1}^{n_s} \left\|\mathbf{d}_i - \mathbf{P_r}\mathbf{A}(\mathbf{m})^{-\mathbf{1}}\mathbf{q}_i\right\|_2^2 + \frac{1}{2\alpha}\left\|\mathbf{W}\mathbf{q}_i\right\|_2^2$$

Independent of the velocity for a fixed (solved) source

Adjoint state problem => adjoint state gradient

Gradient, synthesis form

Go back to

Independent of the velocity for fixed source

$$\underset{\mathbf{m},\bar{\mathbf{u}}}{\text{minimize}} \boxed{\frac{1}{2}\|\mathbf{P}_r\bar{\mathbf{u}} - \mathbf{d}\|_2^2} + \frac{1}{2\alpha}\|A(\mathbf{m})\bar{\mathbf{u}}\|_2^2$$

$$\text{with } \bar{\mathbf{u}} = \mathbf{A}^{-1}\bar{\mathbf{q}}$$

$\bar{\mathbf{q}}$ solution of the least-square problem

then

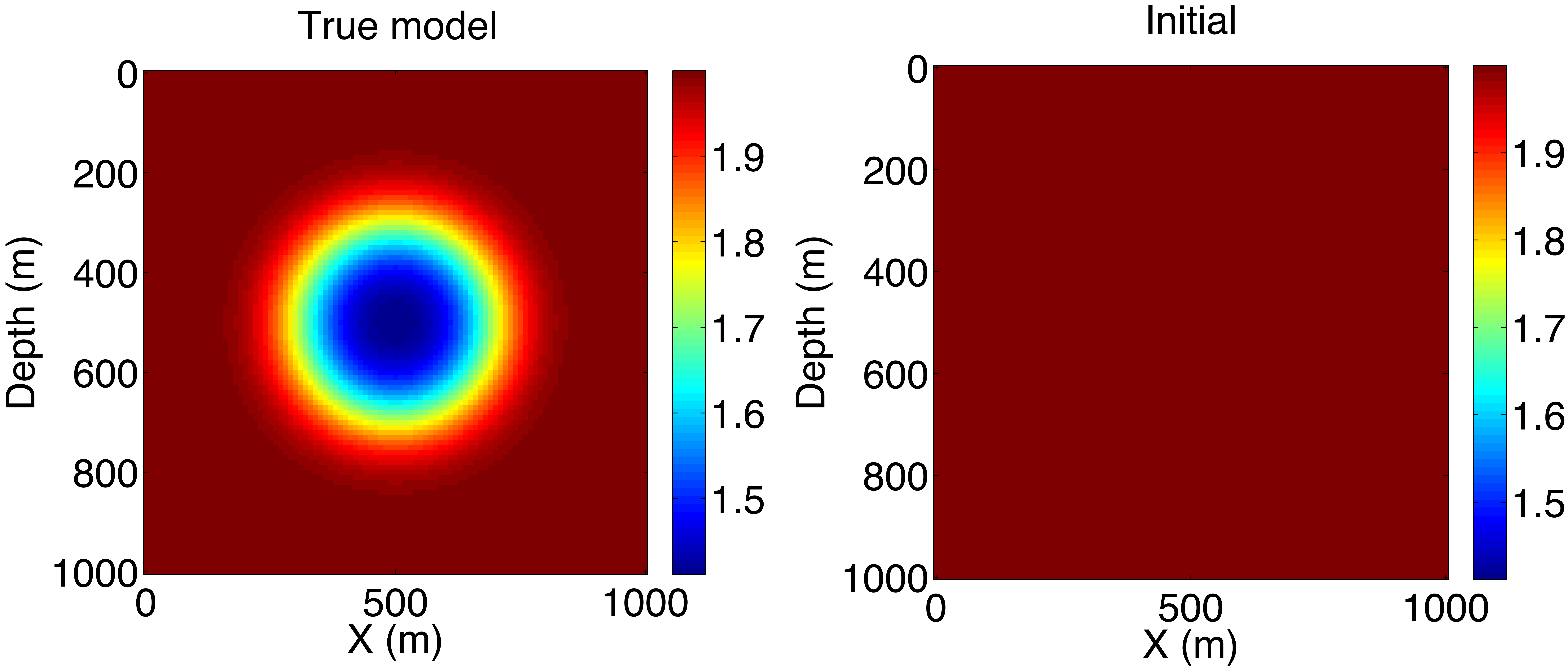
$$\mathbf{g} = \sum_{t=1}^{n_t}\left(\frac{d^2\bar{\mathbf{u}}}{dt^2}[t]\mathbf{W}^T\mathbf{W}\bar{\mathbf{q}}[t]\right)$$

WRI formulation gradient

2D example

Transmission camembert example

Models



True model
Initial
Depth (m)
X (m)
0
200
400
600
800
1000
0
500
1000
1.9
1.8
1.7
1.6
1.5

Transmission experiment Setup

11 sources on the left

101 receiver on the right

101x101 domain with 10m grid

10Hz Ricker wavelet, 1sec recording

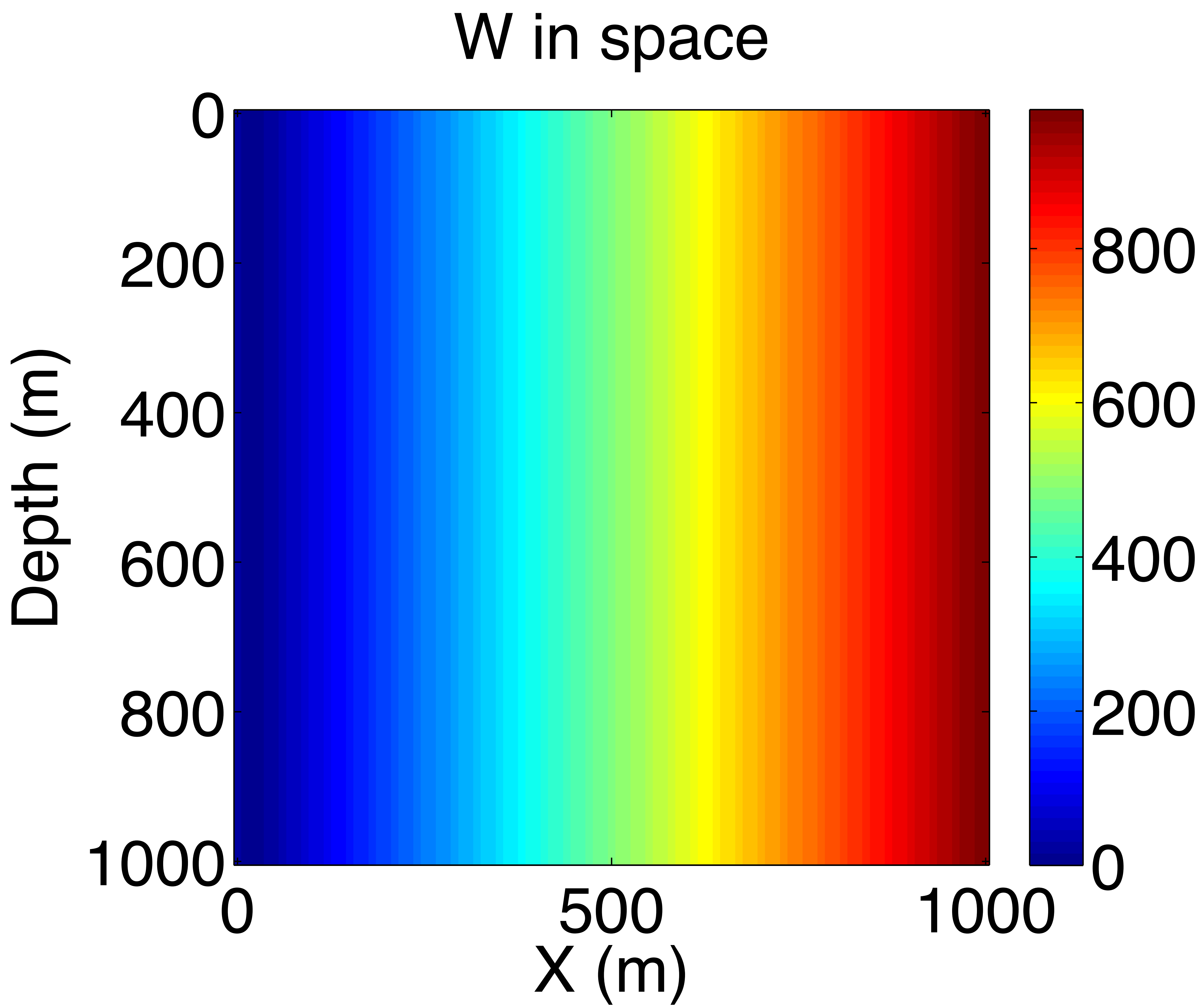
Constant initial model

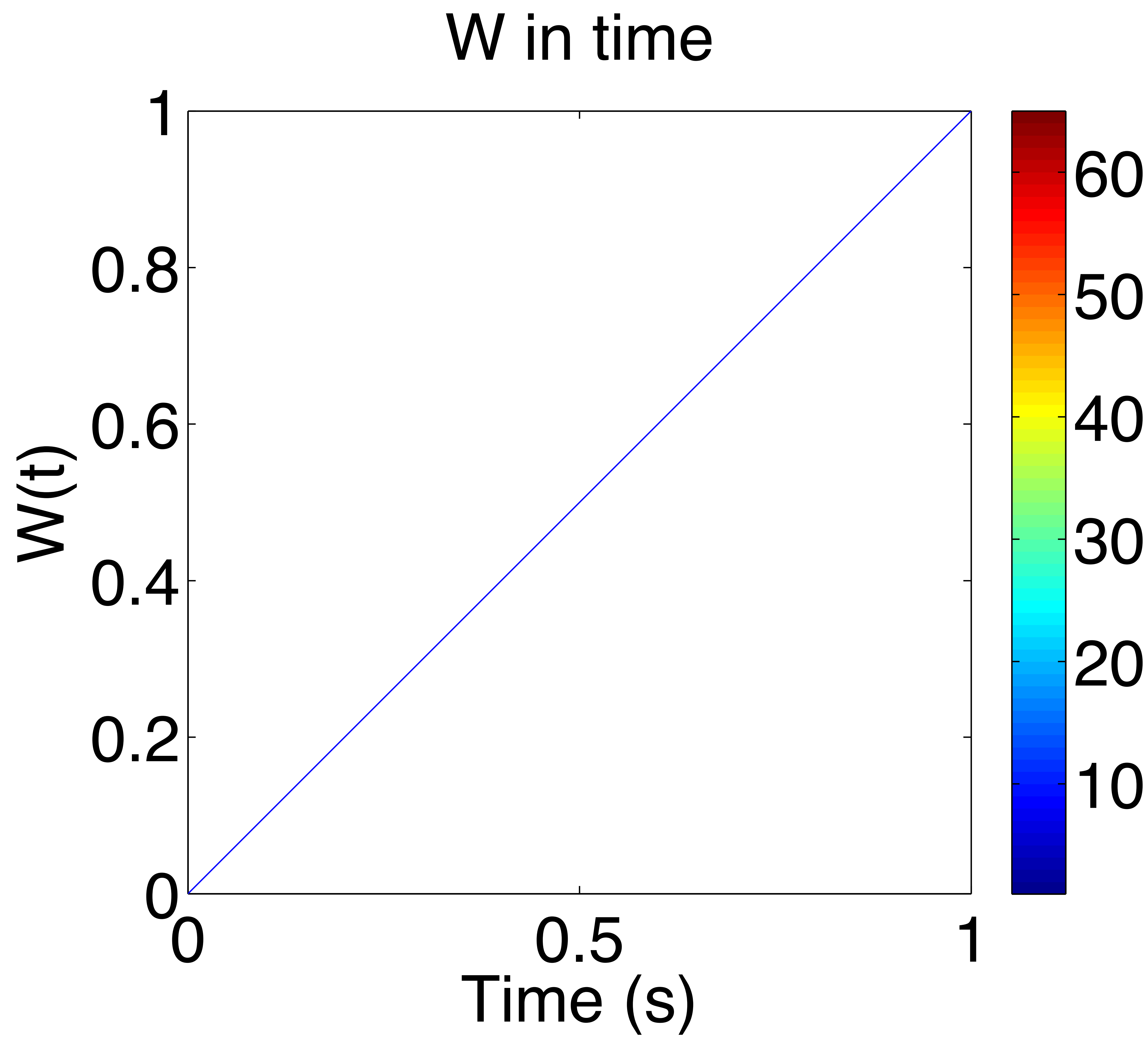
50 LSQR iterations for the source , $\alpha = 0.01$

Compare FWI and extended source

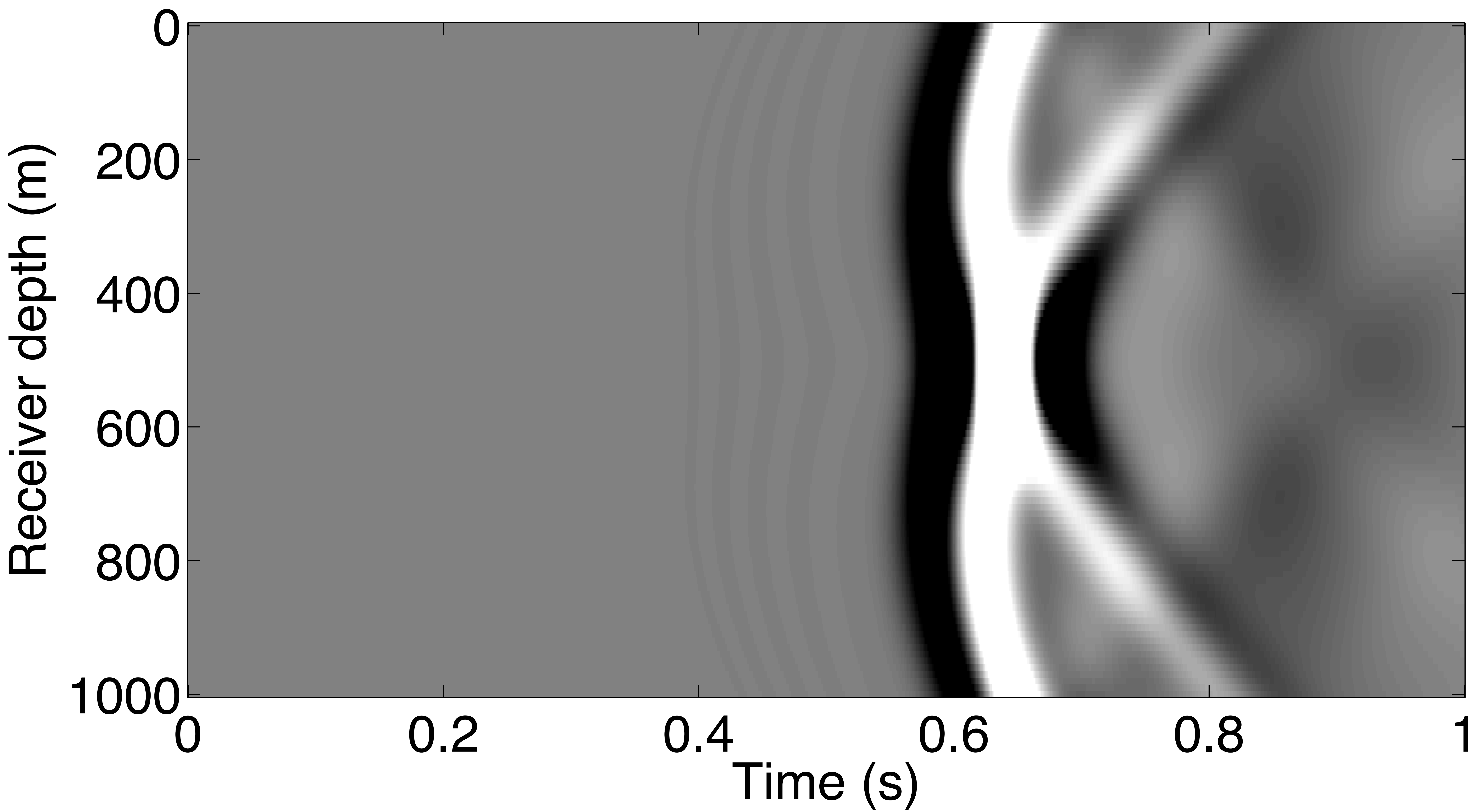
1. Data
2. first gradient

Focusing operator

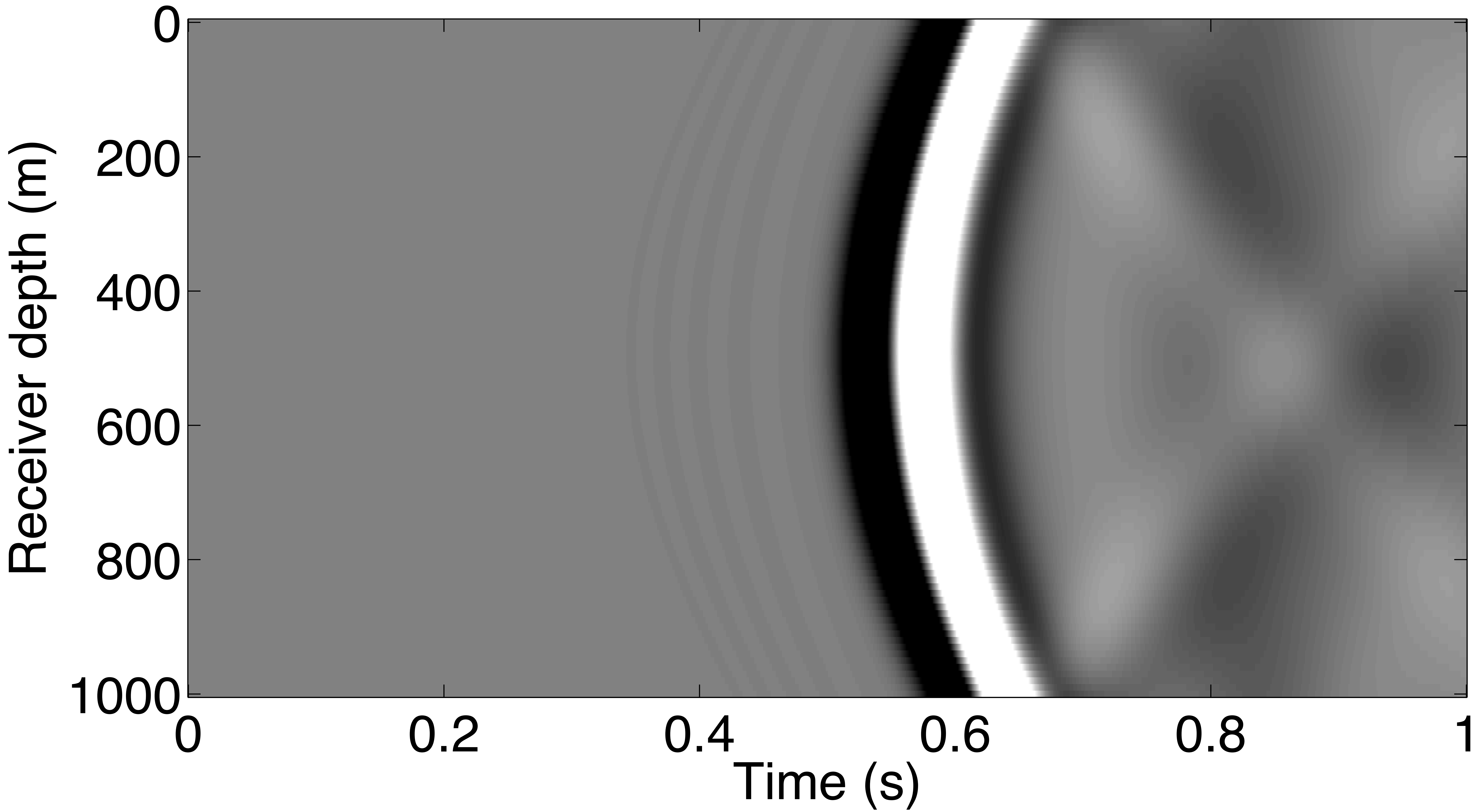




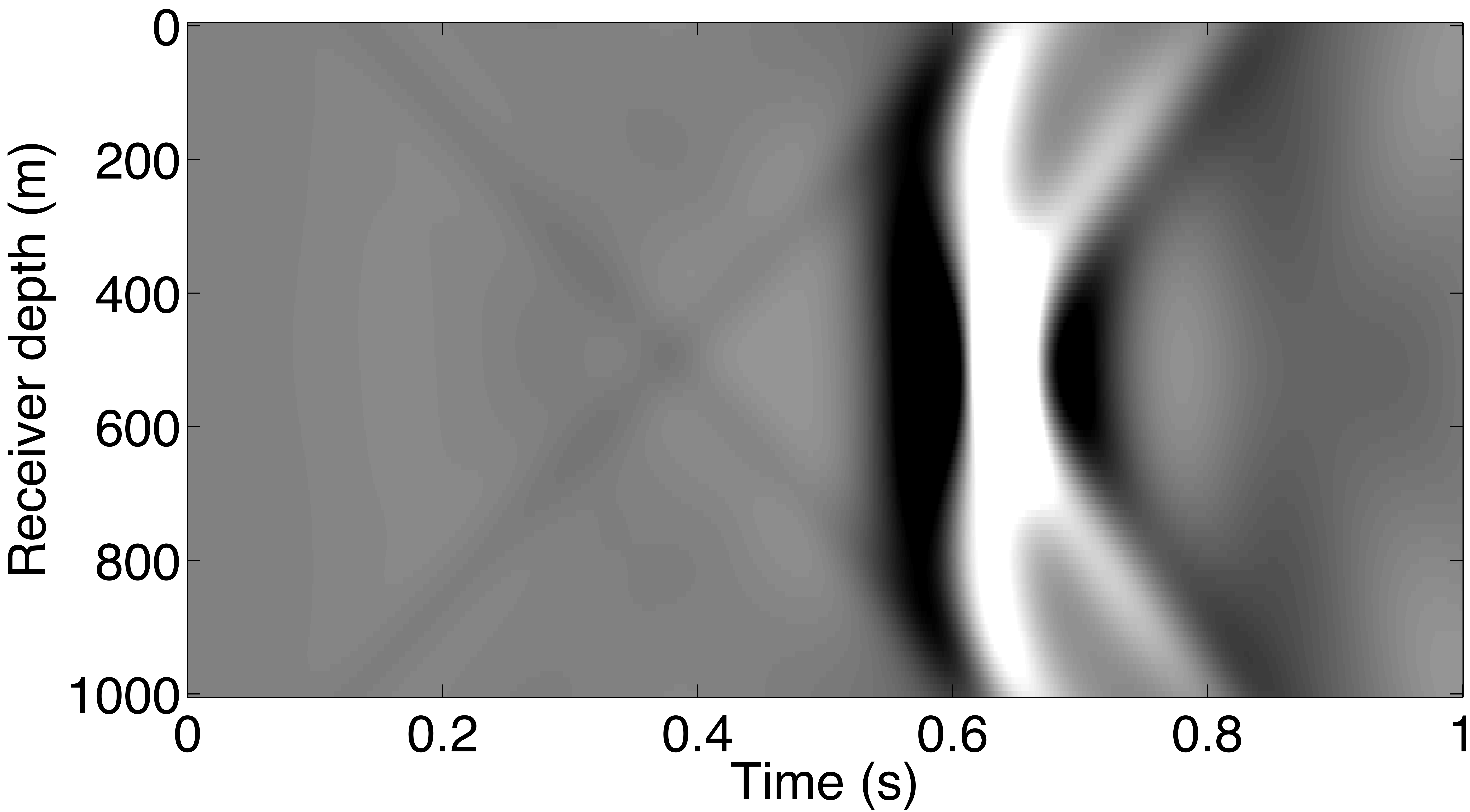
True data



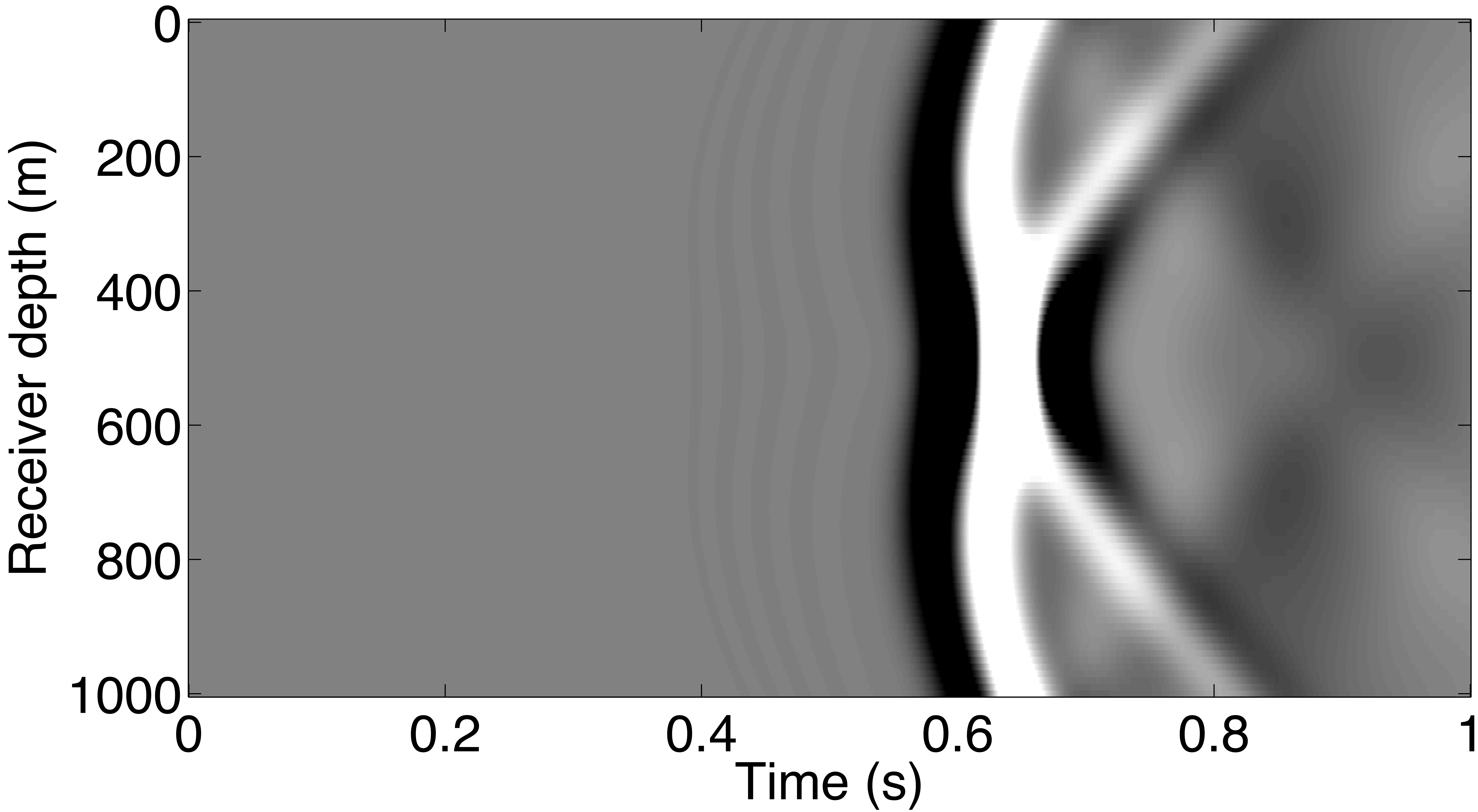
Data starting model



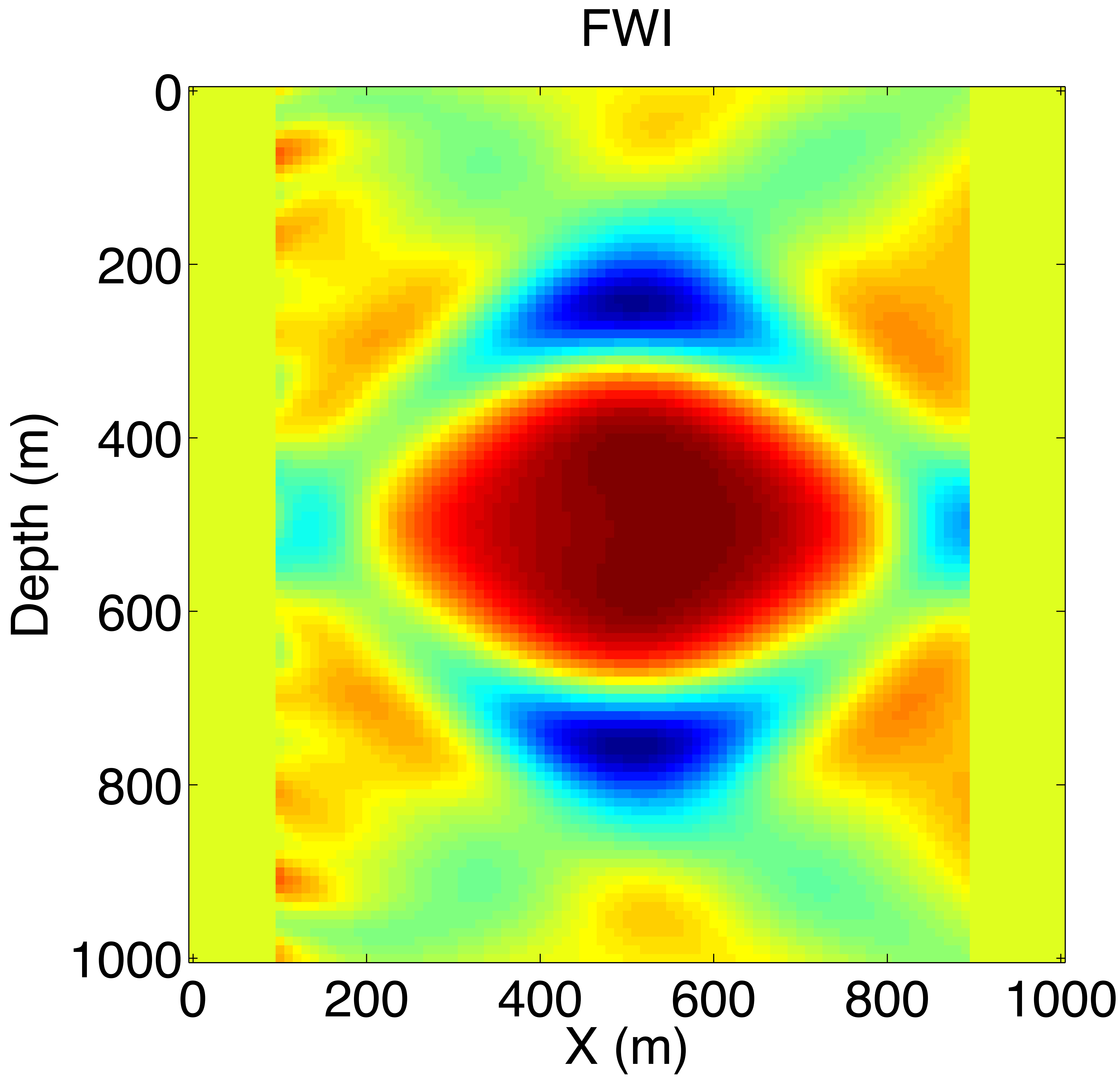
Data w/ extended source for starting model



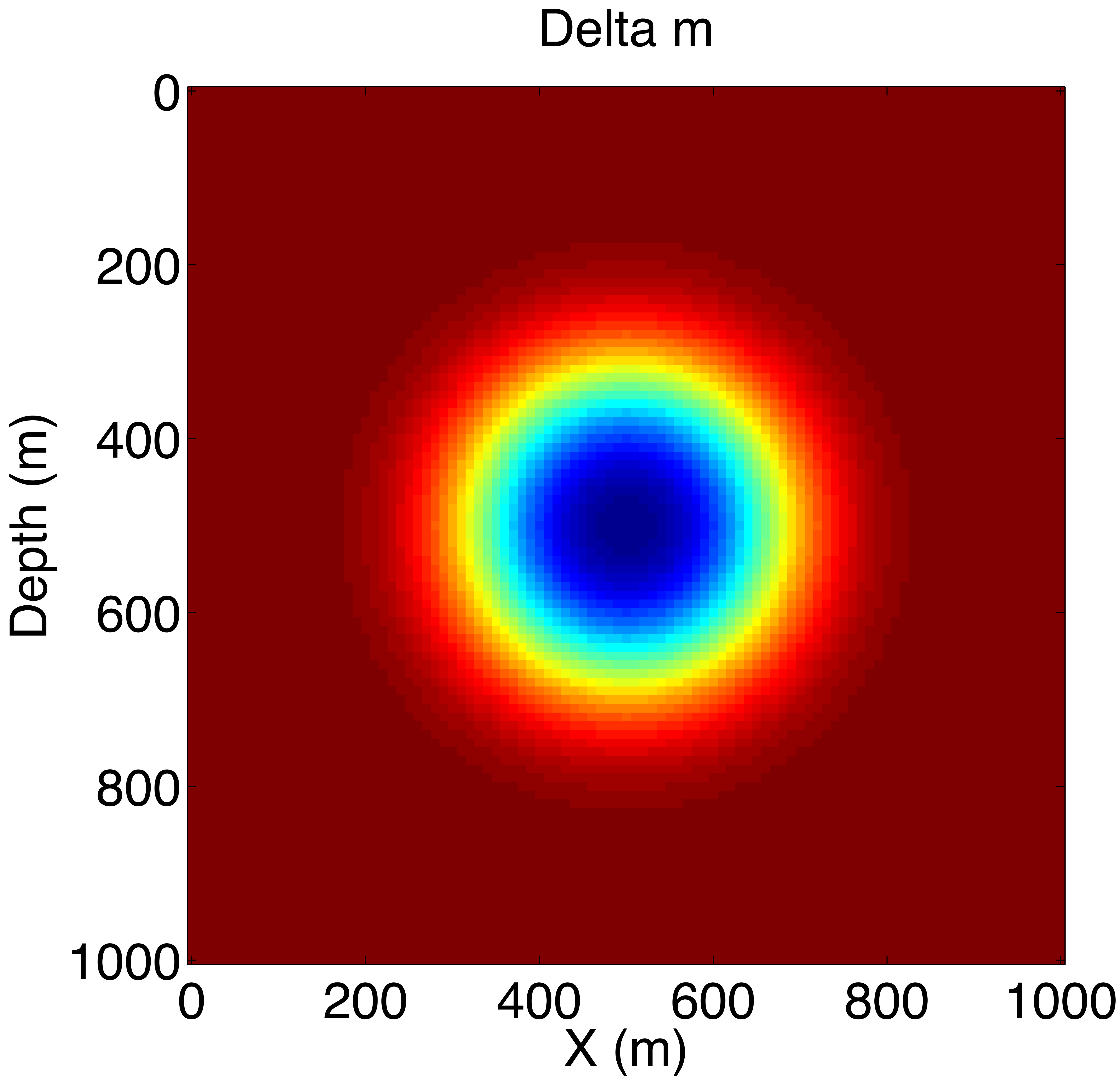
True data



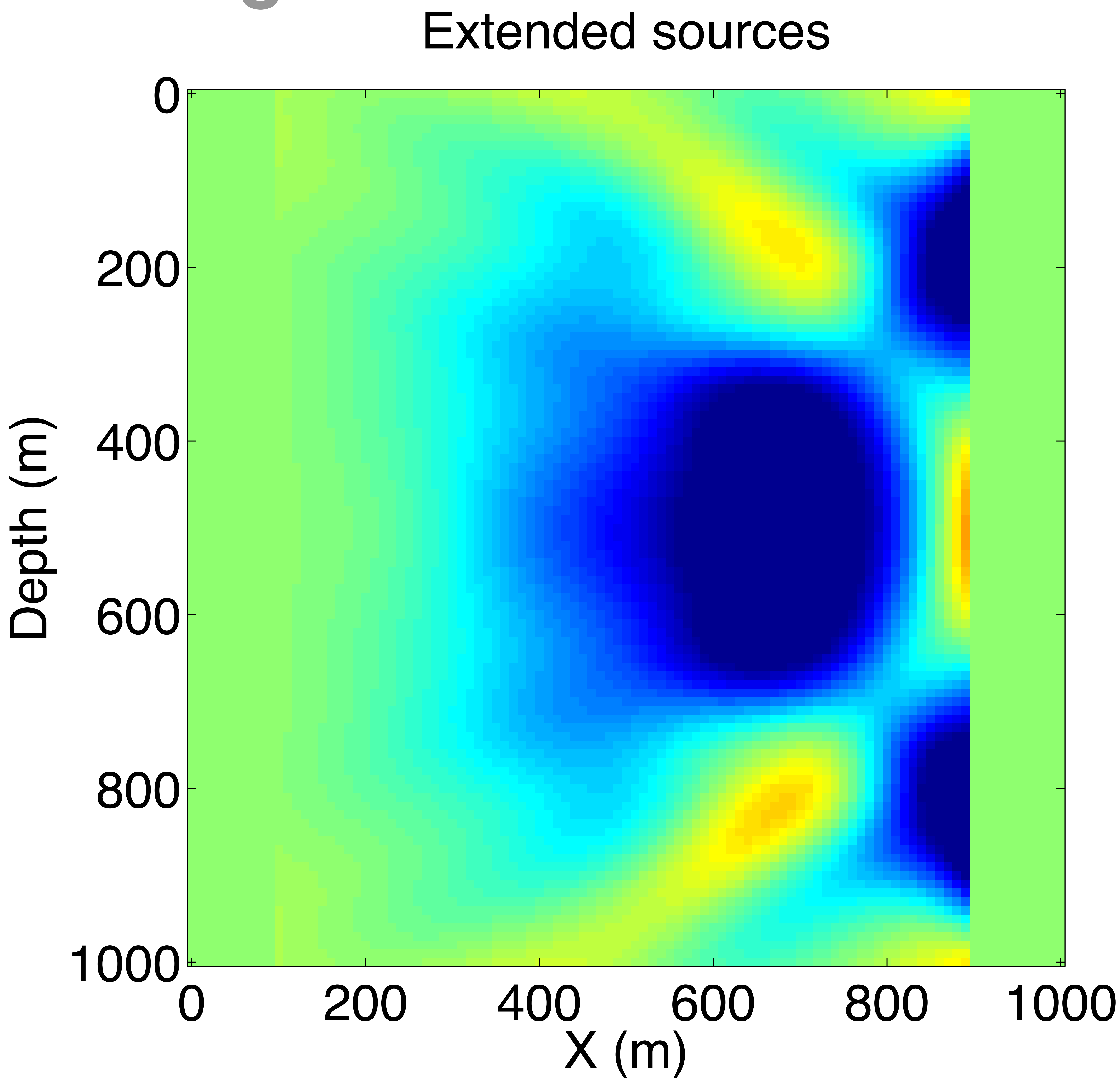
FWI gradient



True perturbation



Extended source gradient



III – International Inversion Initiative

Yemoja compute system:

- #1 in Latin America
- 17k cores, 405 Teraflop, 132k GB RAM, 2Petabyte storage, 18GBs IO
- largest (4k workers) parallel matlab installation in the world
- very strict access control

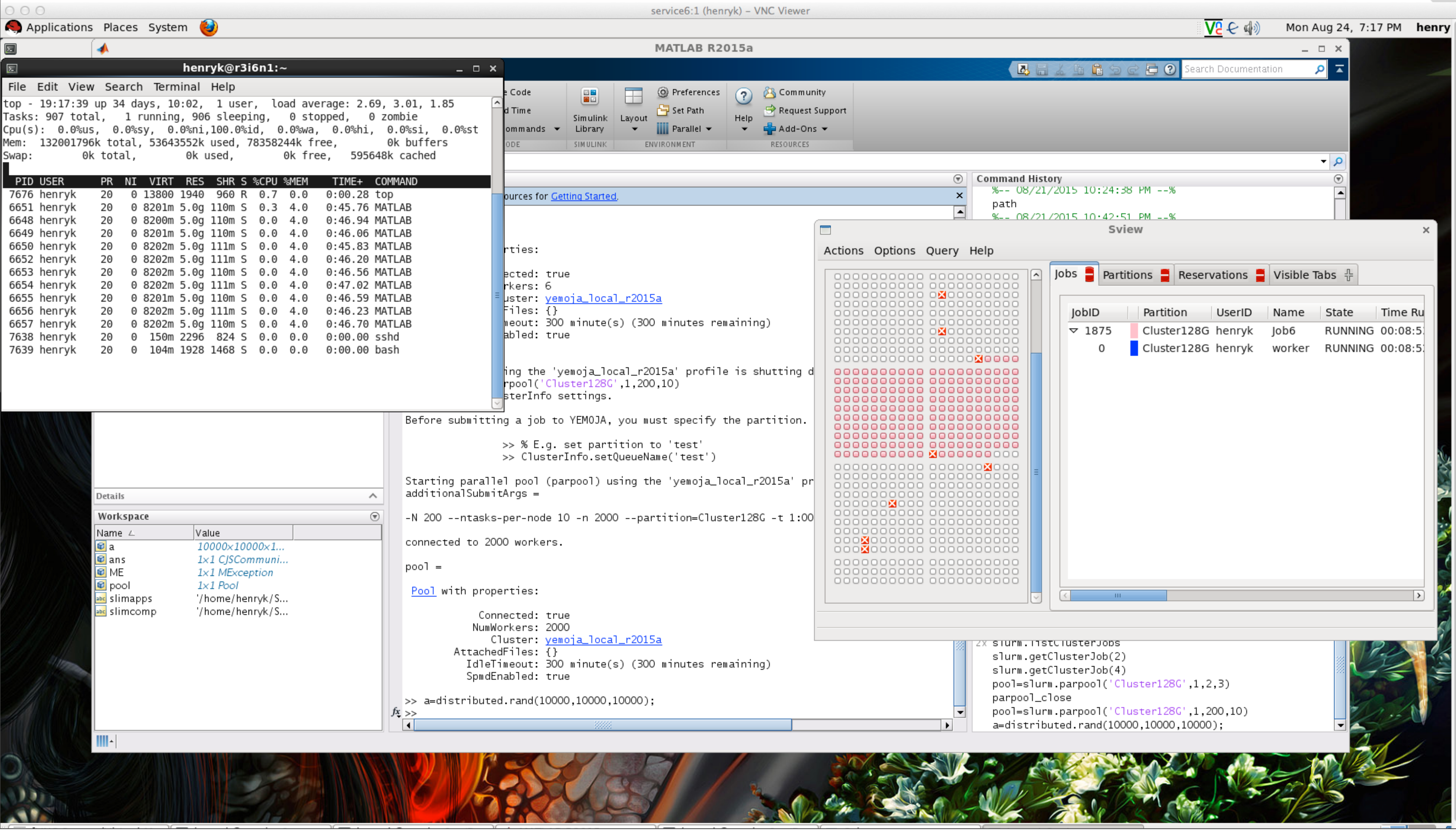
Designed for

- technology validation for wave-equation based inversions
- development of practical workflows on 3D field data sets
- training


CIMATEC
yemoja
anp
BG BRASIL
FIEB SENAI


CIMATEC
yemoja

SLIM


service6:1 (henryk) - VNC Viewer
Applications Places System
Mon Aug 24, 7:17 PM henry
MATLAB R2015a
henryk@r3i6n1:~
File Edit View Search Terminal Help
top - 19:17:39 up 34 days, 10:02, 1 user, load average: 2.69, 3.01, 1.85
Tasks: 907 total, 1 running, 906 sleeping, 0 stopped, 0 zombie
Cpu(s): 0.0%us, 0.0%sy, 0.0%ni,100.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 132001796k total, 53643552k used, 78358244k free, 0k buffers
Swap: 0k total, 0k used, 0k free, 595648k cached
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
7676 henryk 20 0 13800 1940 960 R 0.7 0.0 0:00.28 top
6651 henryk 20 0 8201m 5.0g 110m S 0.3 4.0 0:45.76 MATLAB
6648 henryk 20 0 8200m 5.0g 110m S 0.0 4.0 0:46.94 MATLAB
6649 henryk 20 0 8201m 5.0g 110m S 0.0 4.0 0:46.06 MATLAB
6650 henryk 20 0 8202m 5.0g 110m S 0.0 4.0 0:45.83 MATLAB
6652 henryk 20 0 8202m 5.0g 111m S 0.0 4.0 0:46.20 MATLAB
6653 henryk 20 0 8202m 5.0g 110m S 0.0 4.0 0:46.56 MATLAB
6654 henryk 20 0 8202m 5.0g 111m S 0.0 4.0 0:47.02 MATLAB
6655 henryk 20 0 8201m 5.0g 110m S 0.0 4.0 0:46.59 MATLAB
6656 henryk 20 0 8202m 5.0g 111m S 0.0 4.0 0:46.23 MATLAB
6657 henryk 20 0 8202m 5.0g 110m S 0.0 4.0 0:46.70 MATLAB
7638 henryk 20 0 150m 2296 824 S 0.0 0.0 0:00.00 sshd
7639 henryk 20 0 104m 1928 1468 S 0.0 0.0 0:00.00 bash
Before submitting a job to YEMOJA, you must specify the partition.
>> % E.g. set partition to 'test'
>> ClusterInfo.setQueueName('test')
Starting parallel pool (parpool) using the 'yemoja_local_r2015a' pr
additionalSubmitArgs =
-N 200 --ntasks-per-node 10 -n 2000 --partition=Cluster128G -t 1:00
connected to 2000 workers.
pool =
Pool with properties:
Connected: true
NumWorkers: 2000
Cluster: yemoja_local_r2015a
AttachedFiles: {}
IdleTimeout: 300 minute(s) (300 minutes remaining)
SpmdEnabled: true
>> a=distributed.rand(10000,10000,10000);
Workspace
Name Value
a 10000x10000x1...
ans 1x1 CJSCommuni...
ME 1x1 MException
pool 1x1 Pool
slimapps '/home/henryk/S...
slimcomp '/home/henryk/S...
Sview
Actions Options Query Help
Jobs Partitions Reservations Visible Tabs
JobID Partition UserID Name State Time Ru
1875 Cluster128G henryk Job6 RUNNING 00:08:5
0 Cluster128G henryk worker RUNNING 00:08:5
Command History
slurm.getClusterJob(2)
slurm.getClusterJob(4)
pool=slurm.parpool('Cluster128G',1,2,3)
parpool_close
pool=slurm.parpool('Cluster128G',1,200,10)
a=distributed.rand(10000,10000,10000);

Online program

https://www.slim.eos.ubc.ca/SINBAD2016

Program

Tuesday:

- Extreme-scale optimization w/ constraints
- Computational aspects of wave-equation based inversions

Wednesday:

- Novel wave-equation based inversion technologies
- Cost-effective (time-lapse) seismic data acquisition & recovery

John "Ernie" Esser (May 19, 1980 – March 8, 2015)

In memory of Ernie Esser, the UW Math Department, with additional generous funding from Ernie's family and friends and Sub Salt Solution, has created the **Ernie Esser Undergraduate Support Fund**. Gifts to the fund will support undergraduate students who are engaged in research with faculty. The UW Math Department plans to increase the fund with further contributions from Ernie's friends and others who share Ernie's passion for enlarging the mathematical research community. For more information about supporting the Ernie Esser Undergraduate Support Fund, contact Alexandra Haslam, Associate Director of Advancement, Natural Sciences, at alexeck3@uw.edu • (206) 616-1989, Or, to make your gift online, please visit www.washington.edu/giving and search for "Ernie Esser Undergraduate Award."