



Desktop SIFT: An Operational Tsunami Forecast Tool

Presented by Donald Denbo
John Osborne, Clint Pells & Mike Traum

University of Washington/JISAO – NOAA/PMEL



Introduction

- SIFT (Short-term Inundation Forecasting for Tsunamis) is designed to create an operational system from research tools developed at the NOAA Center for Tsunami Research.
- The development of SIFT is being done in collaboration with the National Weather Service Tsunami Warning Centers.



Design Goals

To provide the Tsunami Warning Centers with an operational system that meets the centers needs, we have chosen a design that:

- Provides a robust cross-platform architecture.
- Uses proven technologies to increase scalability.
- Uses a modular design for maximum flexibility and reusable components.



Technology Used

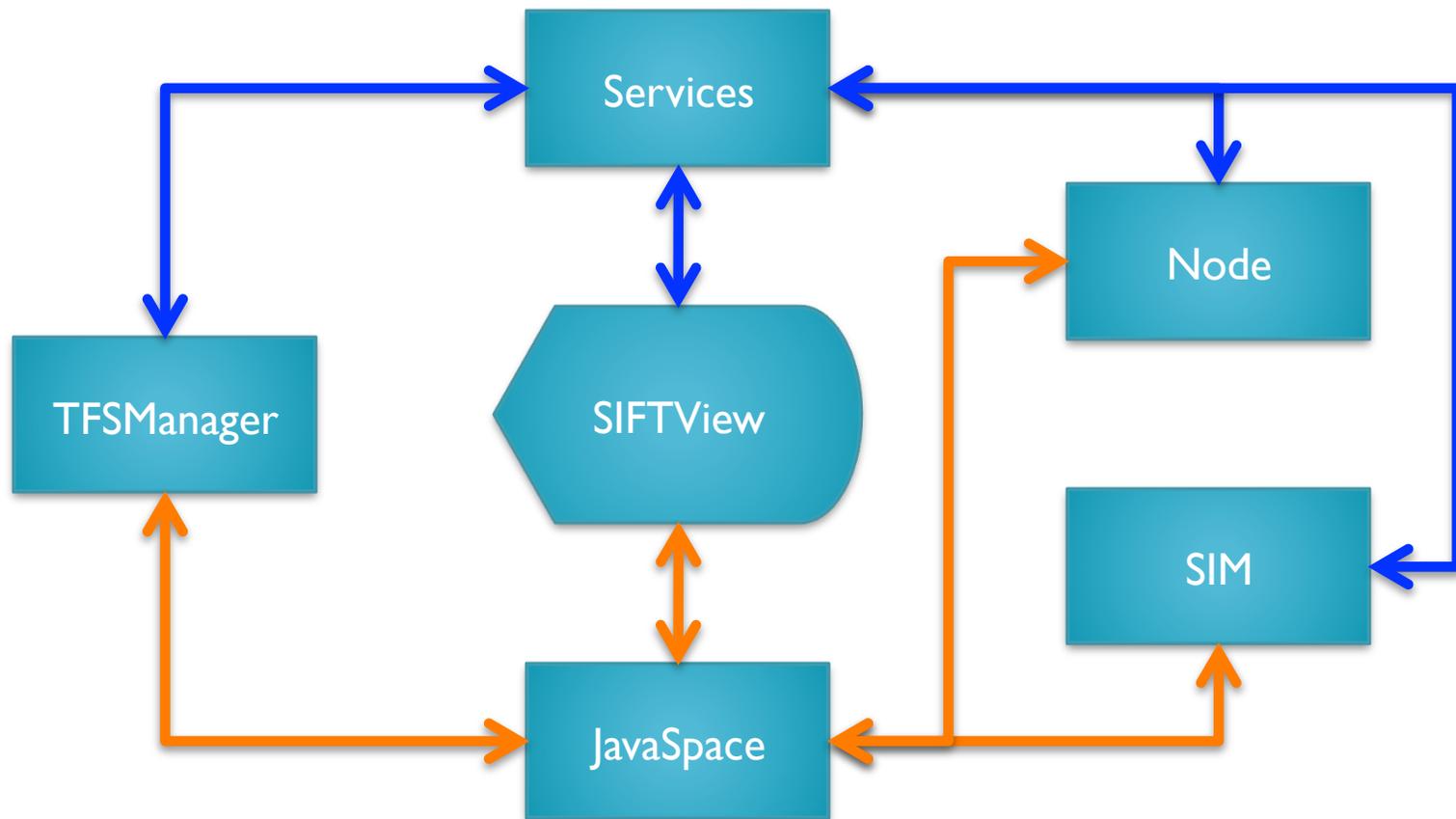
- Java 6.0 as the primary programming language.
- Java Swing for the user interface.
- Jini/JavaSpaces 2.1 to provide the Service Oriented Architecture.
- PostgreSQL 8.x with PostGIS for spatially-enabled relational databases.
- Java Persistence API for Java object to database mapping.



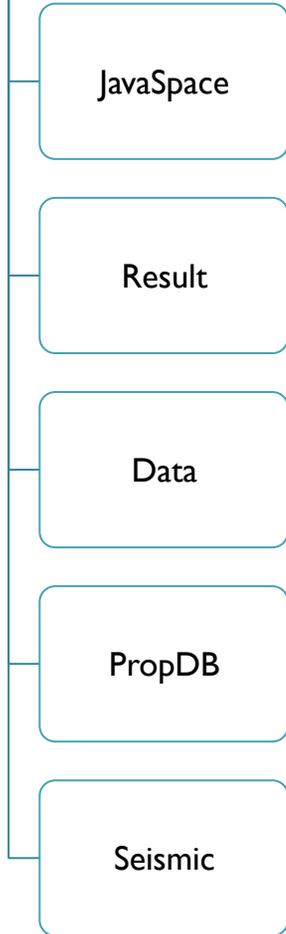
Desktop SIFT Features

- Compute initial estimates of tsunami wave height and travel time from earthquake parameters.
- Remove tidal signal from water level data in real-time.
- Use real-time data from DART® (Deep-ocean Assessment and Reporting of Tsunamis) buoys with model results to compute an improved estimate using constrained least-squares fit.
- Run the inundation forecast model using the improved estimate of tsunami wave height.

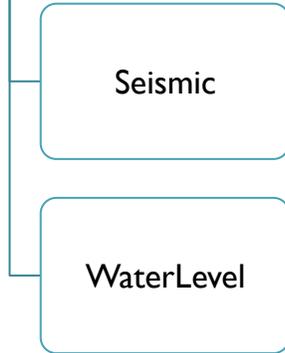
Architecture



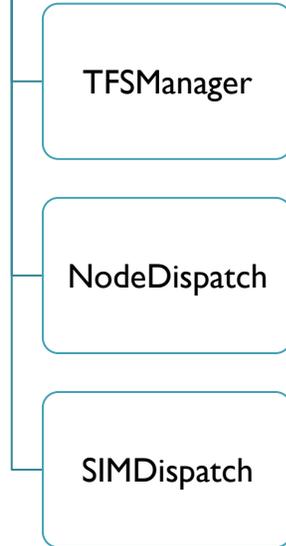
Jini Services



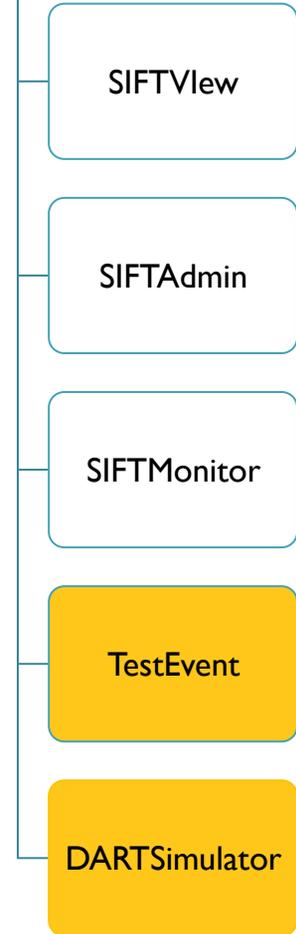
Monitors



SIFT Core



Tools

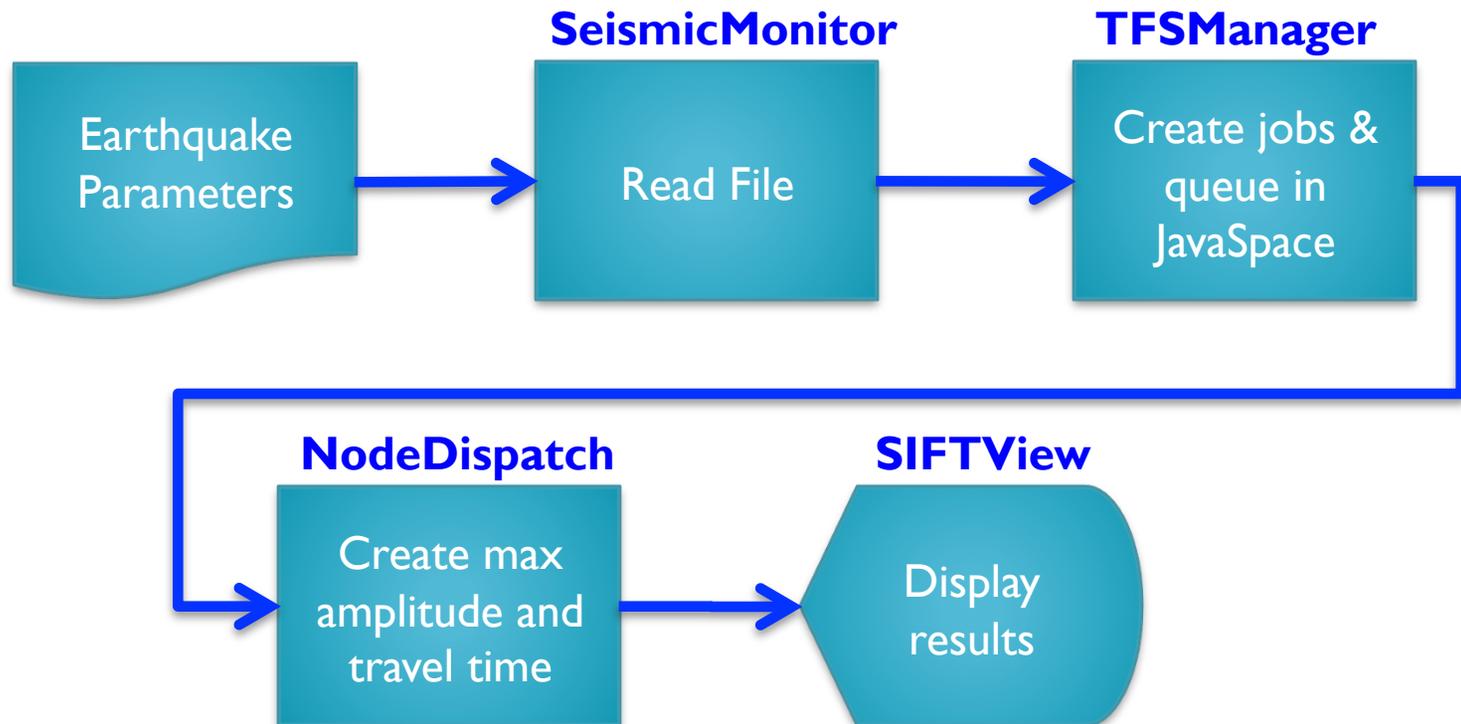




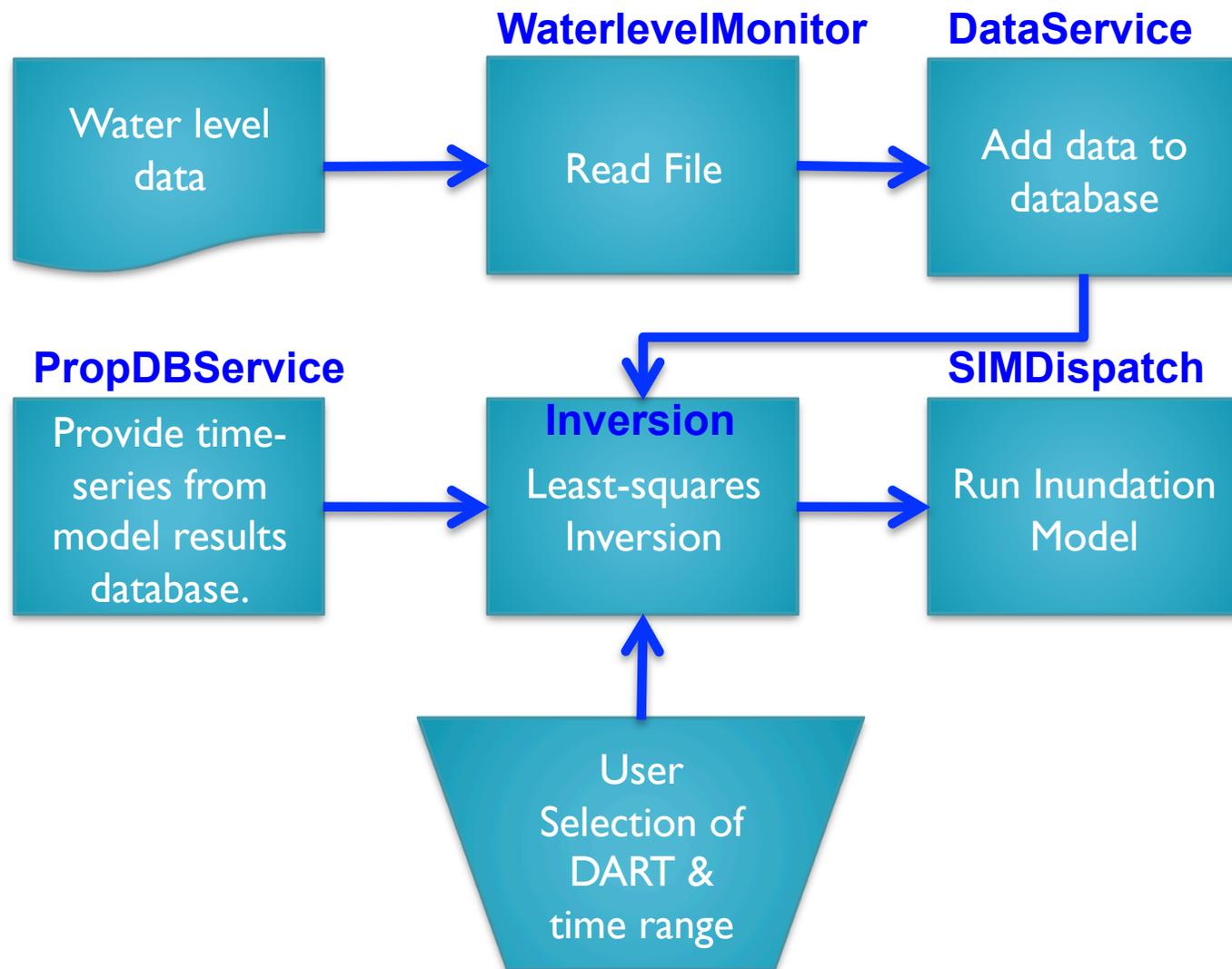
Operations

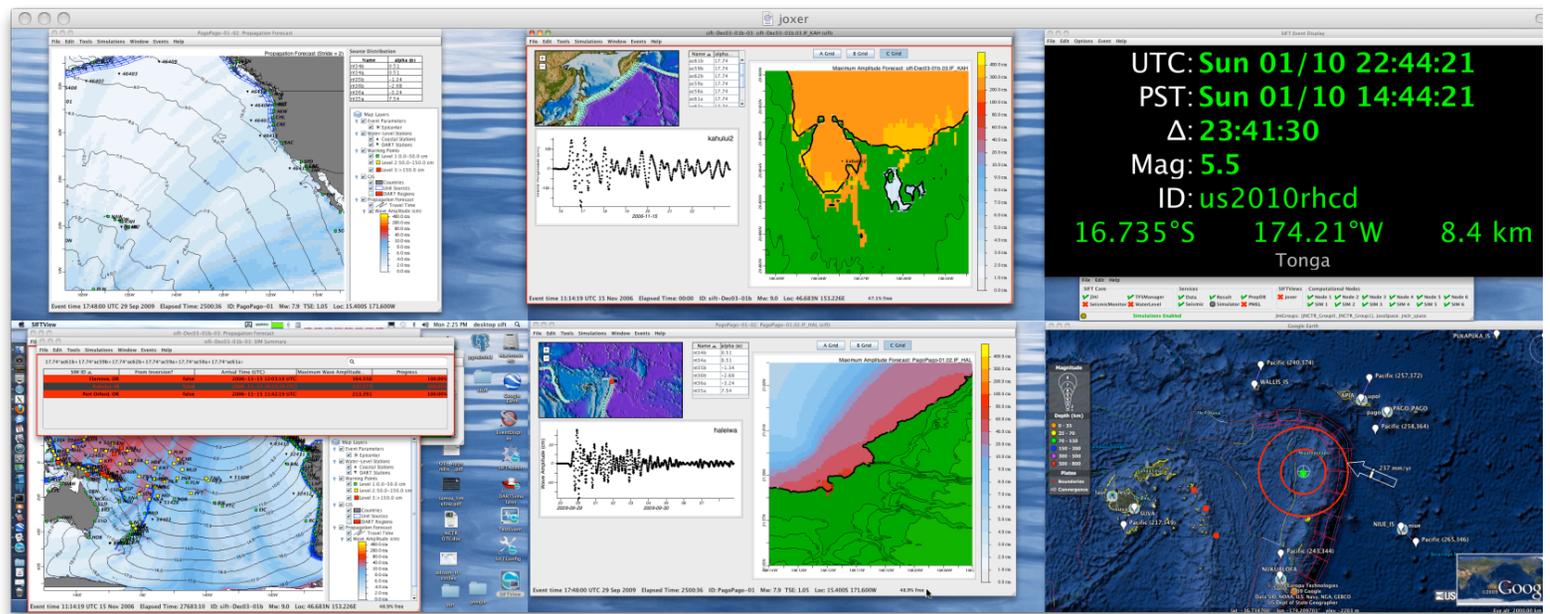
- SIFT must be as automated as possible for use in operations.
 - SIFT creates the first estimate of wave height and travel time when it detects a new earthquake parameter file.
 - Data from DART® buoys is automatically stored in a database to be immediately available for display or inversion.
 - Inundation model can be run from either initial estimate or improved estimate based on DART® data.

Operational Flow – Part I

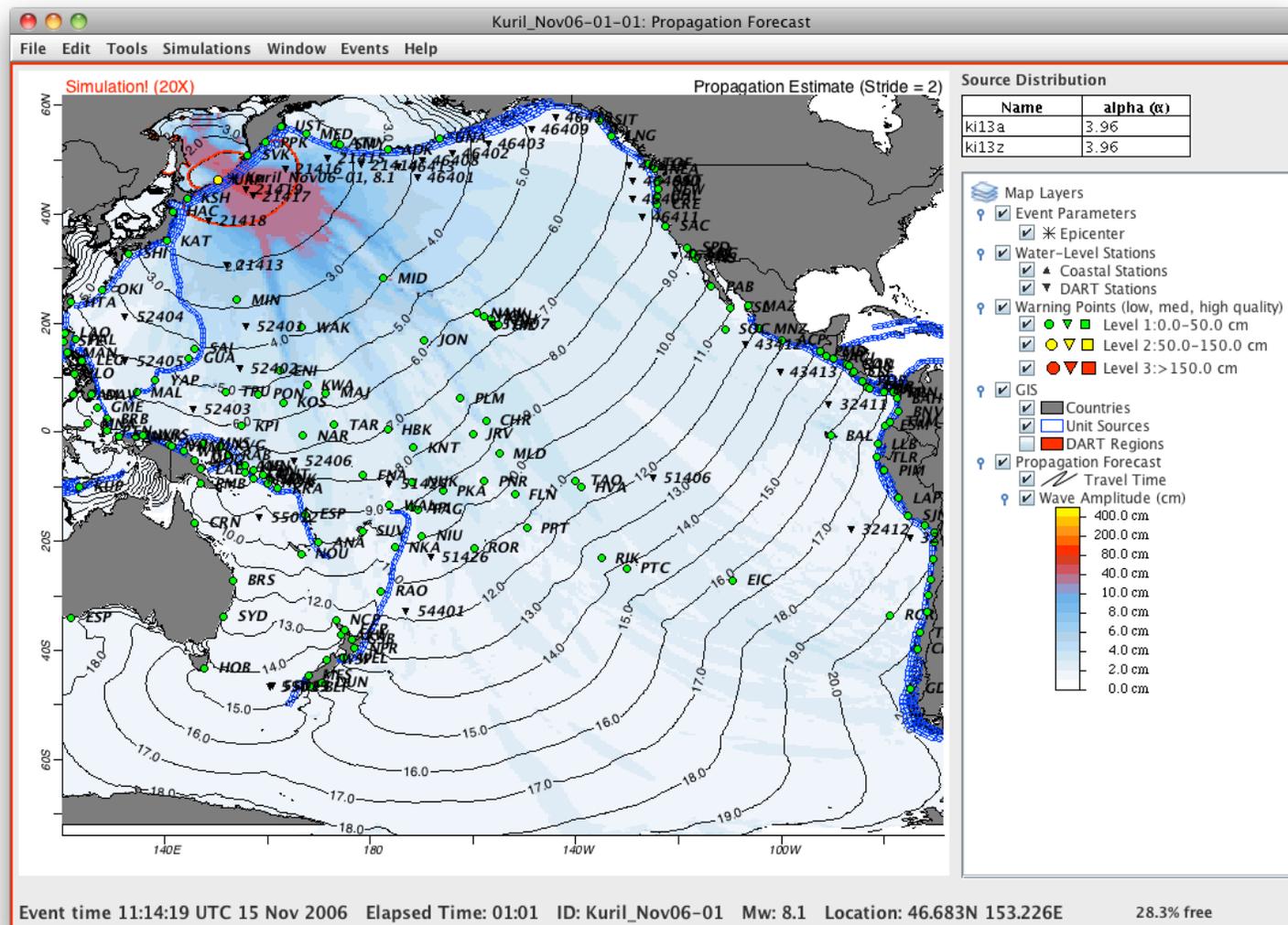


Operational Flow – Part 2





Initial Forecast



DART Workbench

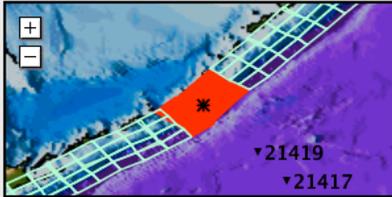
Kuril_Nov06-01-01: DART Workbench

File Edit Tools Simulations Window Events Help

DART Trigger Status

Code	Name	ETA	Status	Countdown	Data Received
21419	DART_Kuril_21419	11:30:19 UTC 15 Nov 2006	Standby		0.0 mins
21417	DART_Kuril_Is_21417	11:43:19 UTC 15 Nov 2006	Sufficient		284.0 mins
21416	DART_Kamchatka21416	12:02:19 UTC 15 Nov 2006	Sufficient		284.0 mins
21418	DART_Sendai_JP21418	12:13:19 UTC 15 Nov 2006	Sufficient		284.0 mins
21415	DART_Att_u_Is_21415	12:49:19 UTC 15 Nov 2006	Sufficient		284.0 mins
21413	DART_Tokyo_21413	13:13:19 UTC 15 Nov 2006	Sufficient		284.0 mins
21414	DART_NW_PAC_21414	13:22:19 UTC 15 Nov 2006	Sufficient		284.0 mins
46413	DART_E_ADAK_46413	14:00:19 UTC 15 Nov 2006	Sufficient		284.0 mins
46401	DART_Adak_46401	14:21:19 UTC 15 Nov 2006	Standby		0.0 mins
46408	DART_Amukta46408	14:25:19 UTC 15 Nov 2006	Standby		0.0 mins

Unit Source and DART Selection

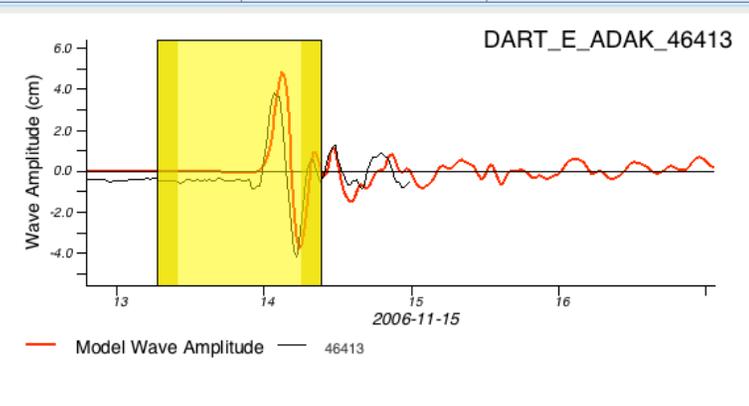


Name
ki13a
ki13z
ki13b
ki13y
ki12b
ki12a
ki12z
ki12y

Time Range Selection

DART_NW_PAC_21414 DART_Tokyo_21413
 DART_Att_u_Is_21415 DART_E_ADAK_46413
 DART_Sendai_JP21418 DART_Kuril_Is_21417 DART_Kamchatka21416

DART_E_ADAK_46413



Wave Amplitude (cm)

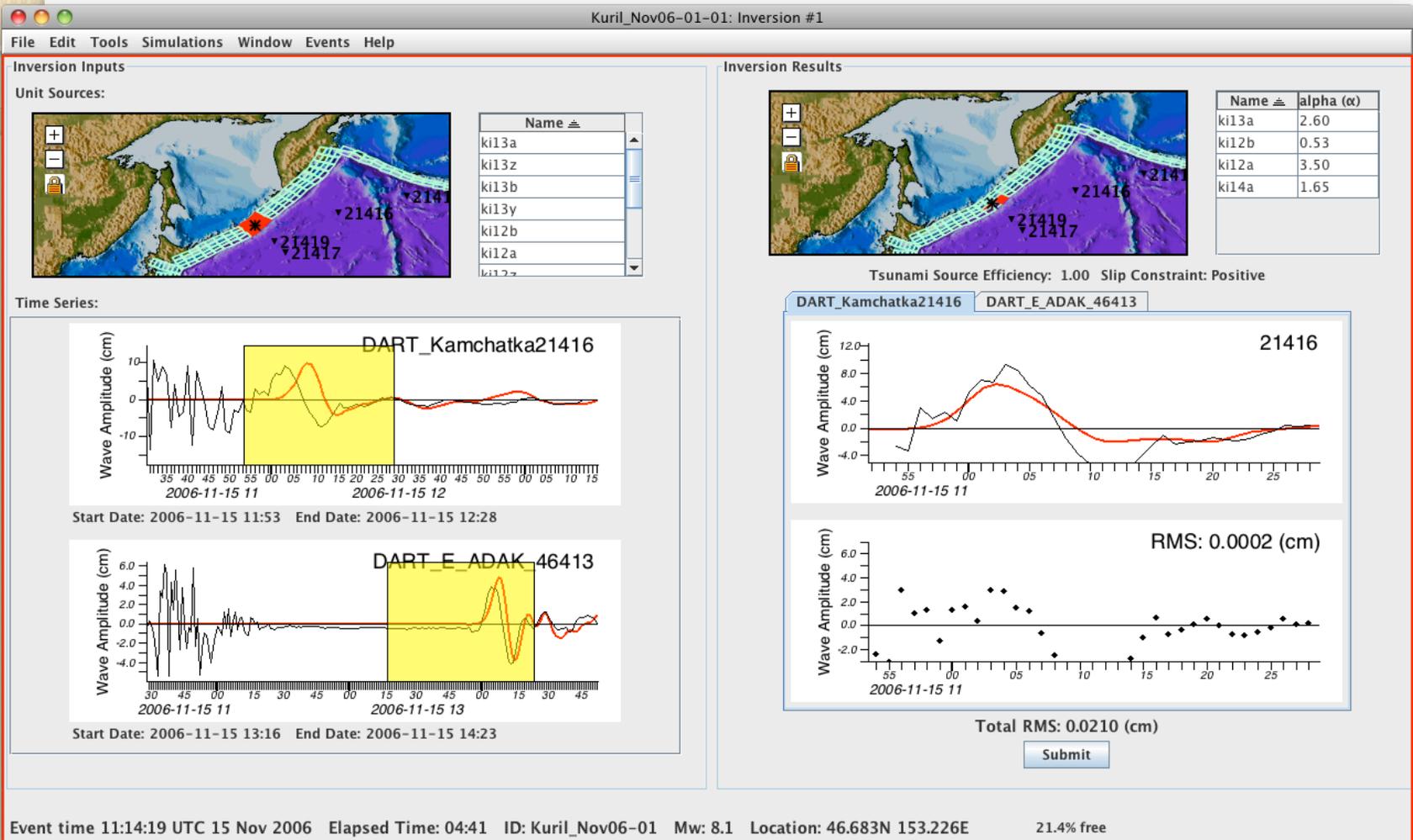
Model Wave Amplitude 46413

Start Date: 2006-11-15 13:16 End Date: 2006-11-15 14:23

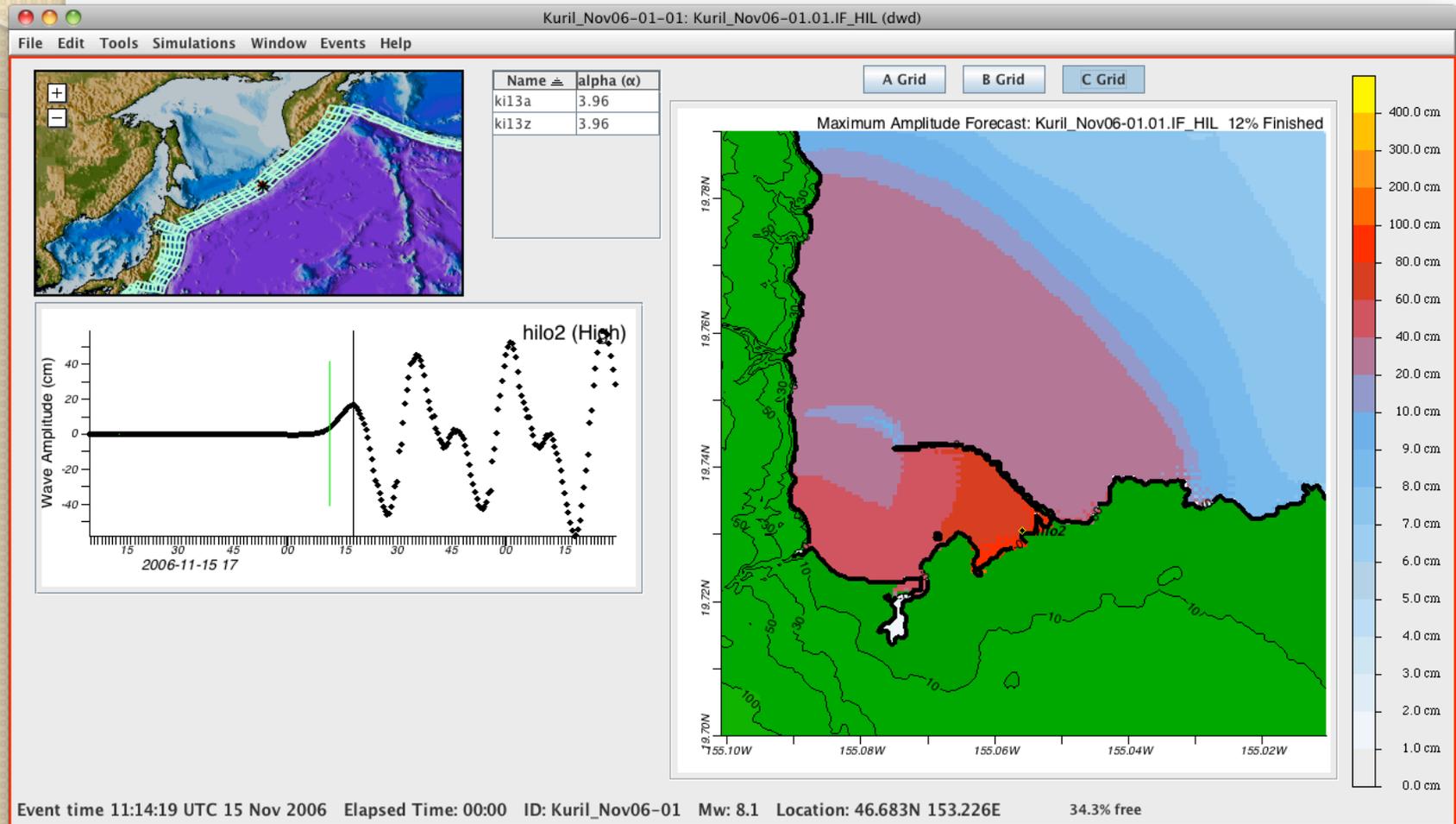
Alpha (α) constraint: Positive Negative None

Event time 11:14:19 UTC 15 Nov 2006 Elapsed Time: 04:01 ID: Kuril_Nov06-01 Mw: 8.1 Location: 46.683N 153.226E 30.5% free

Inversion result



SIM Results





What next?

- Improve SIFT system robustness to individual component failures.
- Compute Inundation forecasts remotely using NCEP (National Centers for Environmental Prediction).
- Improve watchstander usability.
- Add additional time-series filtering techniques.



Links

- NOAA Center for Tsunami Research
<http://nctr.pmel.noaa.gov/>
- NOAA Tsunami Website
<http://www.tsunami.noaa.gov/>