HLWYM HEmails

From: Stuart Stothoff
Sent: Monday, January 28, 2008 12:01 PM
To: Randall Fedors
Subject: RE: FYI: identified DTNs

Randy

Sorry about the delay in responding. I noticed late Friday that the most recent email in my box was wednesday afternoon... This morning's reboot gave me a whole set of items to go through.

The boreholes considered by the LBNL report include
A-5 disregarded
A-6 disregarded
A-7
G-1
G-2
G-3
G-4
H-1
H-3
H-4
H-5
H-6
NRG-6 disregarded
NRG-7 disregarded
SD-12
UZ-1
UZ-4 disregarded
UZ-5 disregarded
UZ-7A disregarded
WT-1
WT-2
WT-4
WT-6 disregarded
WT-7
WT-10 disregarded
WT-16 disregarded
WT-17
WT-18

The ones labeled "disregarded" refer to boreholes that did not have a "corrected percolation flux" value in Table 11.4 of the LBNL report (this is the table with the results of the analytical study of temperature). Boreholes that were shallow and/or had high root-mean-square errors were not given corrected values (i.e., were disregarded). The report claims that boreholes in proximity to faults tended to have high RMS errors.

The LBNL report uses the Sass report for temperature profiles of UZ-1 and the A, G, H, and WT series. The SD-12, NRG series, and the UZ series (other than UZ-1) were obtained from Rousseau measurements (DTN GS960308312232.001).

I've discretized the UZ portion of the Sass profiles so we have some comparison capability until the requested data values appear. Most of the UZ profiles have data points marked, facilitating discretization, but the SZ portions do not.

I've also started looking into the source of thermal conductivity and thermal capacity data. Sass reports 204 thermal conductivity measurements on core samples from G-1 (53 samples, all but 2 CH and below), G-2 (61 samples, 15 above CH), G-3 (50 samples, 13 above CH), G-4 (27 samples, 10 or 11 above CH), and p1 (13 samples, 12 Lone Mountain Dolomite and 1 Roberts Mountains Formation). These are not Q, as far as I can tell. The cores were sealed after removal to preserve their moisture content, thus have moisture contents that are presumably fairly close to in situ values.

Most of the thermal properties used for evaluating mountain-scale properties come from the SAND95-1955 report by Brodsky et al., which reports thermal conductivity values for 57 TCw, PTn, and TSw samples taken from NRG-4, NRG-5, NRG-6, and NRG-7, as well as thermal capacity values for 10 TSw samples taken from NRG-4 and NRG-5. I think that some additional samples were analyzed from the ECRB to augment the thermal property data set near the repository horizon, but I haven't tracked these down yet.

The SAND95-1955 samples have some counter-intuitive measurements. There is a distinct difference in thermal K above and below boiling for several of the samples; some jump higher (one sample doubles K above boiling), some jump lower (a drop of perhaps 20 percent in some cases), some remain fairly similar. These changes are for oven-dried samples (dried at 110 C). A different apparatus was used above and below 100 C.

Also, thermal capacitance has a distinct nearly linear (or perhaps slightly concave) increasing trend to approximately 160 C, where it levels off; individual samples have different shallow trends above the level point and may increase, decrease, or both. Thermal capacitance typically increases by approximately 40 percent from 25 to 160 C. The SAND95-1955 report acknowledges the trends, but does not claim to fully explain them. The report points to an earlier, more theoretical, report by Nimick and Connolly (1991; SAND88-3050) that suggests phase changes for tridymite and crystobalite occur at approximately 163 and 225 C, respectively. The Nimick and Connolly report describes thermal capacity of individual minerals as having a smooth concave downward rise with temperature.

Jack Gwo called Wednesday and asked if I needed him to extract information from the 16 3D UZ flow fields that came as part of the SEIS package. I wasn't aware until that time that we had them. I've put together some Matlab routines to read the grids and plot the results - so far I've plotted values at cell centroids including matrix and fracture saturations, matrix and fracture gas pressures, source fluxes (infiltration) and sink fluxes (recharge), and fracture-to-matrix fluxes. The fluxes are all in kg/s. I've been able to estimate the polygons for interior cells so far using the Voronoi triangulation package in Matlab, which will allow me to estimate cell area and height to convert volumetric fluxes to something more related to MAI. The polygons from the bottom of the grid appear to visually match the grid plotted in some AMRs (the grid has different shapes at different elevations near slanted faults). Hopefully by COB I'll have geometric components for all cells taken care of, and have some vertical flux profiles. I aim to be able to plot difference in vertical flux across individual units (e.g., the PTn) as a spatial distribution by today or tomorrow.

The mesh is organized as a series of 2042 columns, with each column stored as a continuous node sequence from top to bottom. There are between 23 and 92 layers per column. Most of the columns are vertical, but some of the faults are represented by slanted columns. All faults are represented by a matrix/fault/matrix triplet; if the fault column is slanted, so are the matrix columns. All horizontal coordinates are clamped to a 10-m grid, so slanted faults are represented by a stair-step pattern.

stu

-----Original Message-----
From: Randall Fedors [mailto:rwf@nrc.gov]
Sent: Friday, January 25, 2008 9:09 AM
To: stuart.stothoff@swri.org
Cc: chandrika.manepally@swri.org
Subject: Fwd: FYI: identified DTNs

Stu,

What are the 18 wells listed/mentioned in the 1997 LBNL UZ Report? I can't find my copy now.

I see that in the 2007 UZ Models and Submodels AMR, 9 boreholes for temperature are mentioned. Four are thrown out (3 because they are non-qualified data, and 1 because there is another borehole in the same UZ model grid). Hence, they are left with NRG-6, NRG-7A, SD-12, UZ#5, and UZ-7A. The non-Q boreholes are H-4, H-5, and WT-18. Are these included in the Sass data sets you listed for a data request? As for the last borehole, UZ#4, said to be in the same UZ model grid cell as UZ#5, it seems to me that we should look at both.

Thus, when we request the data sets (thermocouple, pychrometer, and saturation (cores or neutron probe??), I'd like to get all 18. In the old IRSR, we were not inclined to throw out as many boreholes as DOE did. It's not that we would do modeling of all the boreholes, but a quick glance at the data might be fruitful.

For the spatial bias part, it might suffice to use the old LBNL modeling (maybe compare it to updated modeling; i.e., compare hydro and thermal parameter inputs). Then look more closely at the spatial bias. I believe the old IRSR just looked at statistics of the results from the borehole modeling (e.g., arithmetic average versus geometric mean).

Rubenstone hadn't gotten through to DOE on the infiltration data request yet. Now that he is temporarily taking Melanie Wong's place, Jack Sulima is suppose to follow up. As of yesterday, Jack had not talked with DOE about the data yet. As you know, I'd like to request all the data at the same time.

--Randy

Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 1255

Mail Envelope Properties (1FA53ADF29758448974A8AC1118E627EA23FB6F99B)

Subject: RE: FYI: identified DTNs
Sent Date: 1/28/2008 12:00:51 PM
Received Date: 1/28/2008 12:00:00 PM
From: Stuart Stothoff

Created By: sstothoff@cnwra.swri.edu

Recipients:
"Randall Fedors" <Randall.Fedors@nrc.gov>
Tracking Status: None

Post Office: HQCLSTR01.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	7312	1/28/2008 12:00:00 PM

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received: