This is a README file orienting you to additional files of the network-based, bed-material sediment code adapted to gravel-bedded river networks developed by Jon Czuba (Virginia Tech; as of March 19, 2019).

This code extends the present model as described in the following publications:

Czuba, J.A. (2018), A Lagrangian framework for exploring complexities of mixed-size sediment transport in gravel-bedded river networks, *Geomorphology*, 321, 146-152, doi:10.1016/j.geomorph.2018.08.031.

Murphy, B.P., J.A. Czuba, and P. Belmont (2019), Post-wildfire sediment cascades: a modeling framework linking debris flow generation and network-scale sediment routing, *Earth Surface Processes and Landforms*, in review.

I typically run the code in cell mode and progress cell by cell as I have developed this research code. Due to this, if you just try to run one entire .m file then it may not work or produce unanticipated results. To use this code effectively you will have to sit down and try to understand what it is doing in order to make sure it is working the way you expect it to. The code presented here has evolved over a number of years with some changes to variable names/functions through time. I commented out some legacy code that may prove useful to some but it may need the end user to update some variable names/functions in order to work properly. I have provided some data to run the code on for you to see how the model functions. With this data, the model should run without much trouble, you will likely get hung up as the program looks for certain files and you will just have to update the file location in the .m file. You will have to adapt the input data and some of the code for your own study basin. This code is intended to be used by researchers with an understanding of river morphodynamics/fluvial geomorphology or equivalent and be experienced in the use of Matlab.

This code is written in Matlab and takes advantage of the Statistics Toolbox (necessary) and the Mapping Toolbox (convenient but not critical).

DISCLAIMER: The code provided here is offered as-is, with no guarantees or technical support. It is meant to provide an entry for the interested user to begin to produce results described in the above publications. You will need to adapt the input data and some of the code for your study basin at your own risk. Jon Czuba, Virginia Tech, and any coauthors of the above publications are not responsible for the misuse or misinterpretation of the results generated by this code.

The files include:

***CODE:***

**BMS\_MasterT.m**

**BMS\_FlowT**

**BMS\_Inputs.m**

**BMS\_CapacitySlopeT.m**

These files are the most important files for running the simulation model and tracking parcels through the network. The first file initializes the model based on network variables created in preprocessing. The second file assigns the flow. The third file assigns the temporal and spatial distribution of inputs. The fourth file is used to identify links at capacity and then adjust slopes; this is only useful if you are adding enough parcels to accurately simulate the supply. The essence of the model is to add inputs to the network and track them through time as they move on the network.

***DATA:***

**TusharBaseData.mat**

This data file contains the Tushar network properties for use in the code as described by Murphy et al. [2019]. This is the river network data that corresponds to the shapefile Tushar\_Network.shp.

**TusharPreProcData.mat**

This data file contains the Tushar network properties and preprocessed variables for use in the code as described by Murphy et al. [2019]. These are the main data used in the model.

**TusharQ2.mat**

This contains flow data used for scaling to all links of the Tushar network.

**TusharDFvols2.mat**

This contains information on debris flow sediment inputs to the Tushar network.

***GIS SHAPEFILES:***

**Tushar\_Network.shp**

Network described by Murphy et al. [2019] corresponding to TusharPreProcData.mat

**ClearCreekWatershedBndy.shp**

Catchment shapefile for the Clear Creek Watershed for use with the network.

**Twitchell\_Fire\_Boundary.shp**

Polygon of burned area.