Delta Channel Depletion

(DCD v1.0)

Preliminary User's Manual

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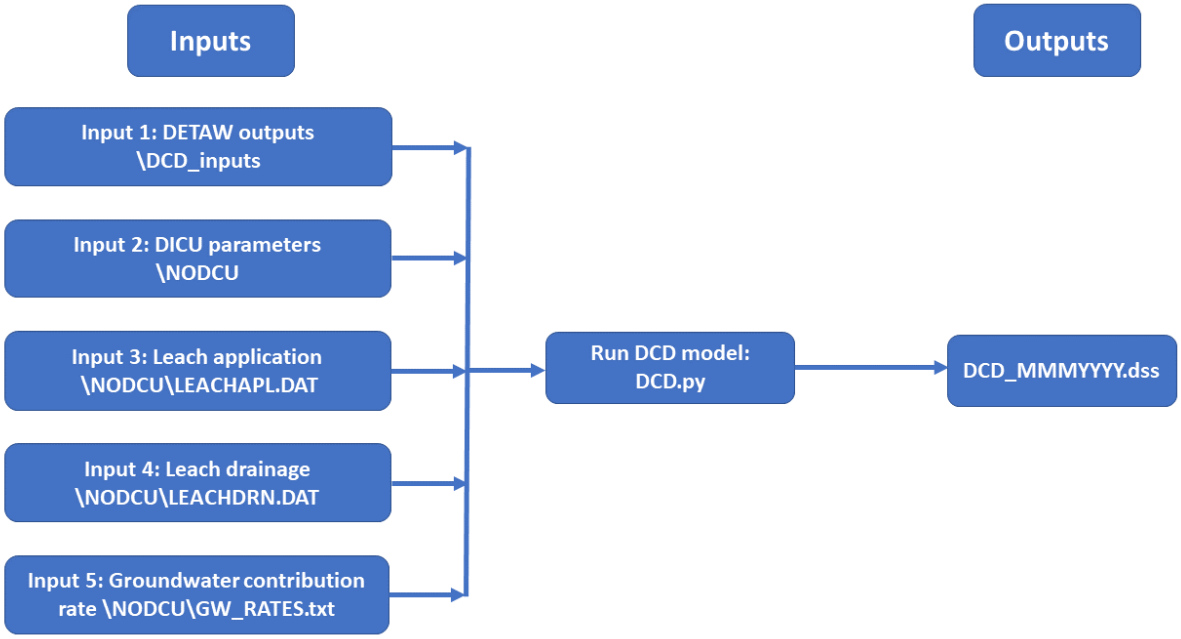
1. Introduction

DCD v1.0, an extension of Delta Evapotranspiration of Applied Water (DETAW v2.0), simulates channel depletions in the Sacramento-San Joaquin River Delta. Based on the Delta island ground surface water balance estimated by DETAW, DCD v1.0 inherits the algorithms and parameters from the Delta Island Consumptive Use (DICU) model to take into account farming practices, irrigation efficiencies, and allocation factors to distribute island values to Delta Simulation Model II (DSM2) nodes. DCD v1.0 also considers the contributions of regional groundwater in Delta uplands and subsurface water in Delta lowlands to meet Delta ground surface water demands. The three components of channel depletion produced by DCD v1.0, namely diversions to islands, drainage from islands, and seepage on DSM2 nodes, feed into DSM2 and other Delta hydrodynamics models to estimate Delta channel flows, stages, velocities and mass transport processes of salinity, temperature, dissolved organic carbon, sediment, and so on.

The major technical algorithms and parameters of DCD v1.0 are described in four documents under the folder \Documents in this model package. One document, the DICU report, describes the basic algorithm to calculate Delta channel depletion and the parameters related to farming practices, irrigation efficiencies, and allocation factors. Another document is Chapter2 of 2018 Delta Modeling annual report which describes the technical improvements in DCD v1.0 compared to DETAW and DICU. Since DCD v1.0 involves the ground surface water balance related terms produced by DETAW v2.0, DETAW v1.0 report and Chapter 3 of 2017 Delta Modeling annual report are also included.

This document is an overview of preparing all the input files of DCD v1.0 and running the model after the inputs of DETAW v2.0 have been prepared. A schematic representation of DCD v1.0 file structure is provided in Figure 1. All the required inputs for running DCD v1.0 from October 1921 through September 2016 have been included in the package. This DCD v1.0 package must be located on the same level as the DETAW v2.0 package in order to automatically load the DETAW outputs into DCD. A general description of the input files for DCD v1.0 is provided below. Finally, how to run the model is described.

Figure 1. A schematic representation of DCD v1.0 file structure



2. Model Inputs

2.1 Input 1: DETAW Outputs

The major output of DCD are: DETAW outputs, the daily evapotranspiration (ETc), total precipitation (Pcp), effective seepage (Espg), the daily drop of soil water content (Dsw), ET of applied water (ETaw), and effective rainfall (Er) of 168 sub-areas and 15 crop categories in the Delta. DETAW inputs must be prepared in the DETAW package before DCD runs. Setting up the DETAW inputs is described in the DETAW Preliminary Users Manual. Once DETAW and DCD inputs are ready, DCD runs DETAW and automatically loads DETAW outputs into the folder \DCD_inputs.

2.2 Input 2: DICU parameters

DCD v1.0 retains the same irrigation efficiencies and allocation factors of 142 Delta sub-areas as DICU. The details of these parameters can be found in the DICU report.

2.3 Inputs 3 and 4: Leach application and drainage

The DICU report describes how leach application and drainage were determined. Chapter 2 of 2018 Delta Modeling Section Annual Report describes how to modify them should a better understanding of Delta leaching justify an updating.

2.4 Input 5: Groundwater contribution rate

The definition of groundwater contribution rate can be found in Chapter 2 of 2018 Delta Modeling Section Annual Report.

These packages include the files needed for a historical simulation of DETAW and DCD from WY1922 through WY2016. If users want to update the historical simulation of both models for the years after WY2016, DCD only requires updating DETAW inputs and the groundwater contribution rate. When this annual groundwater contribution rate is updated for recent several years, a value of 0.4 is recommended, based on the current calibration.

3. Run DCD v1.0

3.1 Prerequisites

Four software programs should be installed before running DCD v1.0.

3.1.1 Window command prompt

Double click on two files in the folder /tools/window_command to install the prompt. This will then allow you to open a command window by clicking the current folder in Windows File explorer. Python scripts run in the command window.

3.1.2 Python

Download Python 2.7 from the websites of Python or Anaconda or find it in the folder /tools/python, and double click on the executable file to install.

3.1.3 Vtools

Download from the websites of Vtools or find two executable files in the folder /tools/vtools/. Vtools_pydss~/. Double click on these two executable files and install them under the Python library. Vtools' functions are called by the DCD python scripts to process the timeseries.

3.1.4 HEC-DSSVue

Download and install HEC-DSSVue. DCD v1.0 outputs are in DSS files. HEC_DSSVue is convenient to visualize, examine, and process the model outputs.

3.2 Launching DCD v1.0

Once all the required software and the model inputs are prepared, the model can be run. Below are the steps to run the model:

a) Open Windows File Explorer, right click the folder where the DETAW package is located, and select “Windows Command Prompt Here”;
b) In the command window, type:
   python DCD.py

The released package includes all the inputs of the historical scenario from October 1922 through September 2016. The parameters have been calibrated and validated, and the historical simulation results can be produced by running the model directly without any change of the released input files. As stated above, running DCD will automatically produce both DETAW and DCD results. There is no need to transfer DETAW results into DCD package manually. Once the DCD output file DCD_MMMYYYY.dss is generated, copy it into the DSM2 folder \timeseries for running the DCD-based DSM2 historical simulation.