**Dalhousie University**

**Mechanical Engineering**

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**ESP-r Handnotes**

**cygwin version**

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**INTRODUCTION**

ESP-r (Environmental Systems Performance, r for “research”) is an integrated energy modelling tool for the simulation of the momentary thermal energy and fluid flows within combined building and plant systems when constrained to conform to control action. It is a detailed dynamic thermal simulation program which attempts to simulate the real world as thoroughly as possible, combining building, plant and mass flow simulation.

**INSTALLATION**

For installing ESP-r via cygwin, first cygwin should be installed. You can find cygwin in the following link:

<http://cygwin.com/>

Then you can download and install it. Please select following packages:

* Subversion
* G77
* Xterm
* Xwindows
* Make
* Whole package of X11

After that start the cygwin and write:

svn checkout http://esp-r.net/espr/esp-r/trunk/

Then you can go to cygwin directory and start X:

C:\cygwin\usr\X11R6\bin\startxwin.bat

Or write **start x** on the screen of cygwin.

In the X window write:

cd trunk⮠ ls ⮠ cd src ⮠ ls ⮠ ./Install

accept all defaults. Installing will start. It may take around 1 hour.

Copy **esru** in

C:\cygwin\home\sara\

$echo $PATH

$PATH=$PATH:/usr/esru/esp-r/bin

$export $PATH

Esp-r

**START WORKING**

Create a directory for your models like:

**mkdir** NAME of directory(exp. Models)

This is the only time that you need to make a directory for your models. Then go to directory that you have made by writing:

**cd** (means change directory) NAME of directory (exp. Models)

Now by writing “**esp-r**” or “**prj**” you can start esp-r window.

**CREATING NEW PROJECT**

**Step 1:**

In left hand side of ESP-r project manager page under Model Selection section select “**e create new**”. It asks:

**Model root name?**

Write the name you prefer for your project, it is better something that explains your project clearly. Here we can call it Model1. The next question is:

**Create Model folders? Yes**

**Model description? First Model for learning how to use ESP-r**

Accept all default for questions till latitude:

**Latitude = 45.3**

**Longitude = 75.6 (site longitude difference = -0.6)**

**Assessment year = 2007**

**Step 2:**

*NOTE: SAVE YOUR WORK EACH STEP.*

Now we have the file which represents our model. Next step is defining the climate file. For this purpose go to:

**project manager -> b database maintenance -> a annual climate -> b select another**

You can select whatever you need (of course if it doesn’t include the weather data that you need you can add that one. We describe it later)

For this exercise select **f Birmingham IWEC,** then accept all default answers for followed questions.

**Step 3:**

In this step we want to define our construction materials:

**project manager -> f database maintenance -> e constructions -> a browse or edit -> 1 add/delete/copy/invert -> add at the end of list**

1. **Construction name: Exterior-wall**

**Add/delete layer -> append @ inside face -> yes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No. of layer (from ext. to int.)** | **Name of material** | **The place** | **db No.** | **Thickness (mm)** |
| 1 | Paviour Brick | a brick -> a | 1 | 100 |
| 2 | EPS | k insulation material 1 -> o | 214 | 25 |
| 3 | Glass Fiber Quilt | o insulation materials 2 -> a | 281 | 89 |
| 4 | Gypsum Plaster | f plaster -> e | 104 | 13 |

1. **Construction name: Floor-cons**

**Add/delete layer -> append @ inside face -> yes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No. of layer (from ext. to int.)** | **Name of material** | **The place** | **db No.** | **Thickness (mm)** |
| 1 | Synthetic Carpet | l carpet -> f | 225 | 10 |
| 2 | Light Mix Concrete | b concrete -> b | 21 | 100 |
| 3 | EPS | k insulation material 1 -> o | 214 | 38 |

1. **Construction name: Ceiling-cons**

**Add/delete layer -> append @ inside face -> yes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No. of layer (from ext. to int.)** | **Name of material** | **The place** | **db No.** | **Thickness (mm)** |
| 1 | Glass Fiber Quilt | o insulation materials 2 -> a | 281 | 200 |
| 2 | Gypsum Plaster | f plaster -> e | 104 | 13 |

1. **Construction name: Window-cons**

**Add/delete layer -> append @ inside face -> yes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No. of layer (from ext. to int.)** | **Name of material** | **The place** | **db No.** | **Thickness (mm)** |
| 1 | 4 mm Clear Float | m glass -> d | 243 | 4 |
| 2 | air | R value: 0.17 0.17 0.17 | 0 | 12.7 |
| 3 | 4 mm Clear Float | m glass -> d | 243 | 4 |

**Step 4:**

Now it is the time to define the geometry. The main floor geometry is a simple one storey L-shape place.

To define the main floor select:

**project manager -> m browse/edit/simulate -> c compositions -> a geometry & attributions**

**input dimensions**

**Name: Main**

**Description: Main describes a simple plan**

**Polygon plan** (what is the difference between polygon plans and extruded rectangular????)

**Z base: 0, Z top: 2.5**

**No. of walls: 7**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **V. No.** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** |
| **X** | 5 | 10 | 10 | 10 | 0 | 0 | 5 | 5 | 10 | 10 | 10 | 0 | 0 | 5 |
| **Y** | 0 | 0 | 5 | 10 | 10 | 5 | 5 | 0 | 0 | 5 | 10 | 10 | 5 | 5 |
| **Z** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |

**Step 5:**

The next step is defining the windows on each wall.

*Note: the offset is from the lower left corner of the existing surface (looking from the outside).*

For this goal go to:

**project manager -> m browse/edit/simulate -> c compositions -> a geometry & attributions**

Now you can select your plan name which is here Main. Then select:

**e surface list & edges -> + add/insert/copy/extrude from -> c inserted into a surface**

Then we should select the surface which we want to add window. Let’s start with W4 which is on wall1. Then we should select “**within surface**” and its offset is:

**x = 1.5, z = 0.5, width = 2, height = 1.5**

In this point you can define the composition of window or skip it let’s select from the list Window-cons which we defined it in third step. Then we can add all windows in geometry with this process.

Here we don’t have door but if we had door, we would select “**at base**” instead of “**within surface**”.

**Step 6:**

The last task in attribution is, defining the composition of material used for surfaces. For this purpose we should select:

**project manager -> m browse/edit/simulate -> c compositions -> a geometry & attributions**

Now you can select your plan name which is here Main. Then select:

**f surface attributes -> \* attribute many -> composition (such as External-wall)**

And then select the surfaces you want to attribute (such as wall 1 – 7)

For ceiling and floor you have to define their construction one by one. First click on the surface you want to change its construction then click on construction which is defined as unknown now and then select the composition you want. Finally exit the menu and the construction of that surface has been changed.

**Step 7:**

In this stage we should define boundary conditions. Go to:

**project manager -> m browse/edit/simulate -> c compositions -> d surface connections & boundary -> r check via vertex contiguity**

**Select the file name** (here it is Main)

Select the boundary condition you wish here:

**Connect windows, walls and ceiling to exterior.**

**Connect floor to BASESIMP, and use configuration 42.**

At this point the geometry of plan is finished. The next step is defining loads and air conditioning stuffs.

**Step 8:**

In this part do as follows:

**project manager -> m browse/edit/simulate -> c compositions -> c operational details -> sketch -> define casual gain and airflow**

**Infiltration**

0h00 – 7h00: 0.5 ach

7h00 – 20h00: 0.1 ach

20h00 – 24h00: 0.5 ach

**Internal loads**

Sensible load = 600 W

Latent Load = 150 W

Radiative 0.7, Convective 0.3

Copy the loads and airflows for Saturday and Sunday.

**Step 9:**

In this step we want to define the Thermostat control strategies. Do as follows:

**project manager -> m browse/edit/simulate -> j zones -> click on control -> period data -> select law -> basic control -> define first controls with following strategies:**

Heating capacity set to 500 kW.

Heat set point is 21 ˚C, Cooling off (cooling capacity = 0)

Then define the period of validity which is for entire a year here.

Then define next control with 3 periods of working:

Heating capacity set to 500 kW.

From 0h00 – 6h00

Heat set point is 16 ˚C, Cooling off (cooling capacity = 0)

From 6h00 – 22h00

Heat set point is 21 ˚C, Cooling off (cooling capacity = 0)

From 22h00 – 24h00

Heat set point is 16 ˚C, Cooling off (cooling capacity = 0)

**Step 10:**

Define the construction for each zone.

**project manager -> m browse/edit/simulate -> c compositions -> b construction**

**Step 11:**

The last step is simulation. Go to:

**project manager -> m browse/edit/simulate -> p simulation -> integrated simulation -> invoke simulation**

**project manager -> m browse/edit/simulate -> q results analysis -> graphs -> climate -> ambient temperature -> draw graph**

**Notes:**

* **All dimensions in ESP-r are internal.**
* **All construction materials are defined from outside to inside surface.**

**WEATHER DATA:**

**If you want to work with the weather data from HOT3000 site don’t do it??? It has some problem which should be fixed. And the other problem is when using the weather data we should shift it by half an hour to back. I.e. 12:30 data is actually the data for 12:00.**

**For adding Basesimp follow the instructions:**

1. In the cfg file add filename.bsm (copy the filename.cnn and delete the content and add from file trunk/tester/test-suite/basesimp/bsn-basic)
2. Change filename.cfg with writing the bsm file and then simulate immediately.

**SOME NOTES ON MENUE OF ESP-r**

First menu on the right hand side of the ESP-r is **Model Management (fig. 1):**

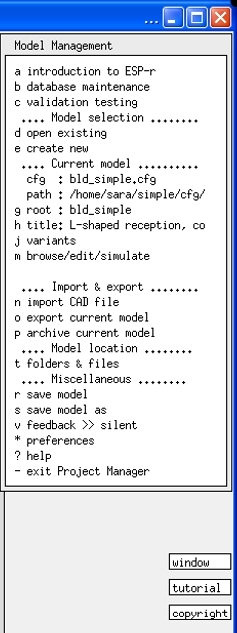
***a: introduction to ESP-r:*** This option gives information about the ESP-r and how to start.

Figure : Model Management

***b: database maintenance:*** by clicking on this option another menu will appear like fig. 2.

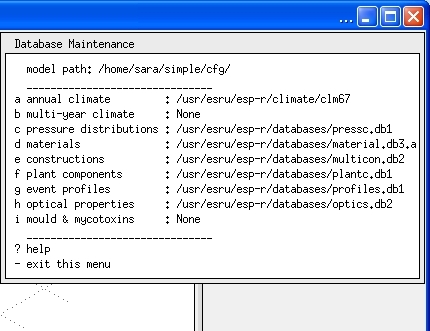


Figure : Database Maintenance

In database maintenance menu there are other options that user can choose them to define weather data, materials and components which will be used in simulation later.

1. Annual climate:

Climate database contain hourly parameters over the period 1h00 to 24h00 on 31 December (i.e. no leap year). Where data is supplied for only one or more parts of this period, the remaining data will be set to zero. The parameters required for each hour are as follows:

* + 1. Diffuse horizontal solar intensity (W/m^2).
    2. Dry bulb temperature (tenth °C, i.e. 102=10.2 °C).
    3. Direct normal solar intensity (W/m^2). As an alternative, global horizontal intensity may be used in which case a corresponding db flag must be set.
    4. Wind speed (tenth m/s, i.e. 15=1.5 m/s).
    5. Wind direction (clockwise degrees from north).
    6. Relative humidity (%).

Also included is the site latitude, longitude difference from the local reference Meridian, the site altitude and a site name.

When using these climate parameters ESP-r will assume that the data represents the one hour period centered on the hour in question where sub-hour applied.

The database held in binary format to allow random access. Conversion to ASCII format is supported to allow transfer between different operating systems.

The following options can be selected:

1. If the file exists then you can browse the database and if you have permission to update the file you can edit the entities in the database.
2. Select another file: you will be asked for a file name and if it is found you can browse or edit it.
3. Make a new database: a new database will be created based on the file name you supply.
4. Copy default database: a project copy of the default database will be made and you will be offered a chance to rename it.
5. Convert binary file to an (ESP-r) ASCII file (typically for transport between machine types).
6. Convert ASCII (ESP-r) climate file to a binary suitable to the current computer.
7. Convert an EPW file (which has already been edited as per EPW-readme instructions) to an ESP-r binary climate file.
8. Multilayer climates: which is not available yet
9. Pressure distributions:

To enable the calculation of wind-induced surface pressures (as required the simulator), this database of angle dependent pressure coefficients is provided.

Wind pressure coefficients are pressure coefficients for surfaces in typical positions and within several different exposure categories.

The following options can be selected:

1. If the file exists then you can browse the database and if you have permission to update the file you can edit the entities in the database.
2. Select another file: you will be asked for a file name and if it is found you can browse or edit it.
3. Make a new database: a new database will be created based on the file name you supply.
4. Copy default database: a project copy of the default database will be made and you will be offered a chance to rename it.

1. Materials:

The definition and description of the thermo-physical properties within a problem are built up via the use of two databases: the Materials db and the Constructions db. A description of the former follows.

This holds the density, specific heat, conductivity, diffusion resistance, surface absorptivity and surface emissivity of materials such as brick, concrete, metal, wood, glass, etc. The database is held in a binary representation for rapid access although an ASCII version may be generated (and vice versa) to enable transfer between different operating systems. Database entities are accessed via an associated index. The standard version of this database resides is:

~esru/esp-r/database/constr.db1

In the case of a project where measured thermo-physical properties are available or bespoke materials are being used, the user may copy the standard Materials database to the project, rename it and modify it as required.

The following options are available:

1. If the db exists then it may be browsed and used. If you are the owner you may also edit the db entries.
2. Select another db: e.g. you might copy a standard db to your directory (option below) in order to own it. Selecting it here then gives you edit permission.
3. Create a new db: to which you can then make material entries as required.
4. Copy standard db: a copy of ESP-r’s standard db is made which you own and can therefore modify.
5. Export the binary representation of the db (which is platform dependant) to an ASCII representation.
6. Import an ASCII representation of the db and convert it to a binary representation.
7. Import an ASCII representation of the db into memory, view/modify it and then write out to an ASCII representation.
8. Constructions:

The construction db defines the composition of construction such as walls and glazing systems in terms of layers of materials of particular thickness in a particular order and, where appropriate, with a named set of optical properties. Item in this database named and are accessed by this name. It is therefore necessary that unique names are used (the first 15 characters are used).

In the case of an asymmetrical construction, i.e. one which has different layers depending on the direction of examination, it is necessary to provide a reversed version of the construction to define the partition between two zones. This is because constructions are associated with each zone independently.

The following options can be selected:

1. If the file exists then you can browse the database and if you have permission to update the file you can edit the entities in the database.
2. Select another file: you will be asked for a file name and if it is found you can browse or edit it.
3. Make a new database: a new database will be created based on the file name you supply.
4. Copy default database: a project copy of the default database will be made and you will be offered a chance to rename it.
5. Plant components:

The plant components database is a binary, random access file holding plant component description to enable the establishment of component state-space representations used by ESP-r. If there is no such file then a new one will be created to hold data for a new component.

The data categories included for each component are:

|  |  |
| --- | --- |
| Generic type | : to classify the component (<40 chars) |
| Description | : (<80 chars) |
| Entry number | : internal database index, also for user selection in simulator |
| Component type: | : 0 for single component  1 for meta component |
| Model type code: | : Pointer to corresponding simulator coefficient generator |
| Data | : of insertion into database |

For a single component:

|  |  |
| --- | --- |
| No. of nodes | : in comp. nodal scheme (<20) |
| No. coefficients | : only non-zero coeff. (<40) |
| Coeff. positions | : matrix locations for nodal coefficients where, for a 6 node scheme,  M(1,1)=1, M(1,2)=2,  M(2,1)=7, M(2,2)=8, etc. |
| Node conductivity | : number of allowed external connections |
| Node type | : defines energy state variable and number of phases requiring mass balance |

For a meta component:

|  |  |
| --- | --- |
| No. of components | : in meta component |
| Component codes | : define code number for each component |
| No. inter-conncns | : total number of components inter-connections |
| Conncn definitions | : 8 data items define each connection as follows: |
| C1 | : Sending component |
| N1 | : Sending node |
| CT | : Connection type |
| C2 | : Receiving component |
| N2 | : Receiving node |
| MDR | : Mass diversion ratio |
| MISC1 | : First miscellaneous data |
| MISC2 | : Second miscellaneous data |

The following options can be selected:

1. If the file exists then you can browse the database and if you have permission to update the file you can edit the entities in the database.
2. Select another file: you will be asked for a file name and if it is found you can browse or edit it.
3. Make a new database: a new database will be created based on the file name you supply.
4. Copy default database: a project copy of the default database will be made and you will be offered a chance to rename it.
5. Event profiles:

Databases located in /usr/esru/esp-r/databases

Profiles in this database are currently used to assist in the definition of zone operations. The standard is found in /usr/esru/esp-r/databases

The data requirements are summarized below:

For each profile – number of events.

For each event – start and finish hours

percentage of first magnitude

percentage of second magnitude

The following options can be selected:

1. If the file exists then you can browse the database and if you have permission to update the file you can edit the entities in the database.
2. Select from list (not available for event profiles database).
3. Make a new database: a new database will be created based on the file name you supply. It will contain a minimal number of items and you can then modify this as required.

Exercise care if you use a text editor to copy sets of data from another event profile database. (???)

1. Copy default database: a project copy of the default database will be made and you will be offered a chance to rename it.
2. Binary -> ascii conversion saves current database to a computer independent form.
3. Ascii -> binary useful when switching computers.
4. Select a file (X11 only): edit the file name.
5. Optical properties:

The optical properties of multilayer constructions are defined in an optical database. The data include angular (0, 40, 55, 70, 80 degrees from normal) solar transmission and absorption at each layer.

The following options can be selected:

1. If the file exists then you can browse the database and if you have permission to update the file you can edit the entities in the database.
2. Select from list (not available for optics database).
3. Make a new database: a new database will be created based on the file name you supply. It will contain a minimal number of items and you can then modify this as required.

Exercise care if you use a text editor to copy sets of data from another optical database.

1. Copy default database: a project copy of the default database will be made and you will be offered a chance to rename it.
2. Select a file (X11 only): edit the file name and if it is found you can browse or edit it.

Hint: if you eventually want to copy that other file into the model folder first select it and then ask for a copy.

1. Mould & mycotoxins: (it is not available yet)

***c: validation testing:***

***I have no idea what it is about*!!!!**

***d: open existing:*** this optiongive you the chance to open an example or your own file which already exists in the system.

The ESP-r system includes a number of example models that demonstrate different modeling capabilities. Alternatively, you can select another existing model, perhaps one you created earlier or have received from a colleague.

If ***exemplar*** option is chosen then a new menu will open which includes different examples in three categories:

* Models for beginner
  + Simple
  + Technical features
* More comprehensive models
  + Realistic scale
  + Real projects
* Models with a special focus
  + Network ventilation
  + Systems + control
  + Systems + network fluid flow
  + Construction related issues
  + Windows and daylighting
  + Acoustics
  + Air movement
  + Combined heat and power

Note to ESP-r Administrators: the ‘exemplars’ file located in directory ~esp-r/training should be kept up-to-date by appending new models using the key word syntax as explained in the exemplars file.

***e: create new:*** this optiongive you the chance to create a new project and work on it.

The model configuration file holds the definition of the building, plant and control systems to be simulated, including references to associated files. The name you supply will be used as the root name for the various files corresponding to the model you will later establish. Up to 24 characters allowed.

**SOME NOTES FROM HELP OF ESP-r**

**Site Exposure:**

The site exposure defines the relative view factors between a vertical surface and the sky (S), ground (G) and surrounding buildings (B). These data are used in the calculation of external longwave radiation exchange.

The following options are available:

|  |  |  |  |
| --- | --- | --- | --- |
| Context | View factor to: | | |
| S | G | B |
| Urban (normal) | 0.36 | 0.36 | 0.28 |
| Urban (low density) | 0.41 | 0.41 | 0.18 |
| Rural | 0.45 | 0.45 | 0.1 |
| Urban (equal weighting) | 0.33 | 0.33 | 0.34 |
| Urban (B emphasized) | 0.15 | 0.33 | 0.52 |
| Isolated rural | 0.50 | 0.50 | 0.00 |
| Totally enclosed | 0.00 | 0.00 | 1.00 |
| User defined | - | - | - |

This table from esp-r site exposure help has been derived and it is the same as the Table 7.15 of Energy Simulation in Building Design book page 255 which is:

Table 7.15: representative values of sky, ground and obstructions view factors.

|  |  |  |  |
| --- | --- | --- | --- |
| Location | fs | fg | fu |
| City center: surrounding buildings at same height, vertical surface | 0.36 | 0.36 | 0.28 |
| City center: surrounding buildings higher, vertical surface | 0.15 | 0.33 | 0.52 |
| Urban site: vertical surface | 0.41 | 0.41 | 0.18 |
| Rural site: vertical surface | 0.45 | 0.45 | 0.1 |
| City center: sloping roof | 0.50 | 0.20 | 0.30 |
| Urban site: sloping roof | 0.50 | 0.30 | 0.20 |
| Rural site: isolated | 0.50 | 0.50 | 0.00 |

Where fs, fg and fu are the view factors to the sky, ground and surroundings respectively.

**Ground Reflectivity:**

Ground shortwave reflectance can be determined from one of three methods:

Constant = time invariant value;

Simple = 12 monthly values, with user defined snow cover;

Advanced = 12 monthly values, with hourly snow depth from weather file.

**SOME NOTES FROM ESP-r TUTORIAL SITE**

The folder structure in ESP-r is as follows:

*Project\_name*

*‘-----cfg*

*‘-----ctl*

*‘-----doc*

*‘-----nets*

*‘-----temp*

*‘-----zones*

Some abbreviation:

|  |  |
| --- | --- |
| Abbreviation | Stand for |
| prj | Project Manager |
| bps | Simulator |
| res | Result analysis program |
| mfs | Stand-alone mass flow solver |
| plt | Stand-alone plant solver |
| pdb | Plant database manager |
| pdf | Plant network descriptions |
| isi | Shading and insolation program |
| mrt | Shape factor?? |
| prm | Materials database |
| mlc | Construction database |
| opt | Optical properties database |
| prs | Pressure distribution database |
| evn | Event profile database |
| clm | Climate database |
| ctl | Control analysis |
| TDF | Static attribute of tabular data temporal definitions database |
| TAB | Timestep data file |
| cfg | Topology tool |
| .opr | Schedules in zone folder |
| .geo | Geometry in zone folder |
| .con | Construction in zone folder |
| .obs | Obstruction in zone folder |
| .tmc | Transparent construction in zone folder |
| .con | Connection between zones folder |
| .shd | Shading in zone folder |

**References:**

***Masters in Architecture, Energy and Sustainability European Masters in the Integration of Renewable Energies into Buildings, Module AR52P, ESP-r,*** Luisa Brotas.

***The ESP-r: cookbook***, J.W. Hand, 2006

J.A. Clarke, Energy Simulation in Building Design, second edition, 200, Buterworth-Heinemann publisher.

ESP-r program help

* To update CSDDRD folder:

*cd CSDDRD*

*svn up*

* To update the new version of esp-r in Linux, use the following command:

*svn checkout* [*https://esp-r.net/espr/esp-r/trunk*](https://my6.dal.ca/webmail/services/go.php?url=https%3A%2F%2Fesp-r.net%2Fespr%2Fesp-r%2Ftrunk)

*or*

*svn checkout* [*http://esp-r.net/espr/esp-r/trunk*](http://esp-r.net/espr/esp-r/trunk)

If you have this update please type this one in your “trunk” directory:

*svn update*

The svn document which is very useful can be found in the following link:

<http://svnbook.red-bean.com/>

ESP-r subversion site is:

<http://subversion.tigris.org>

The Perl documents can be found in the following link:

<http://perldoc.perl.org>

Some useful commands for working with subversion:

|  |  |
| --- | --- |
| Command | Description |
| svn co | Check out (for directory not file) |
| svn info | Gives information about svn |
| svn status | Shows the changes that we made in the file |
| svn diff | Shows the difference between two subversions |
| svn revert -R . (\*) | Go back to the previous status |
| svn commit | Accept changes (ctrl+x) |
| svn up (or update) | Update files |
| svn log (or log –r o:Head) | Shows you broad information: log messages with date and author information attached to revisions and which paths changed in each revision |
| svn rm | Remove file |
| svn merge –r 50:45 URL@50 | Merge two revisions |
| nano | See the text of the file |
| svn add |  |
| cd |  |

From svn book:

The typical work cycle looks like this:

1. Update your working copy.

• **svn update**

2. Make changes.

• **svn add**

• **svn delete**

• **svn copy**

• **svn move**

3. Examine your changes.

• **svn status**

• **svn diff**

4. Possibly undo some changes.

• **svn revert**

5. Resolve conflicts (merge others' changes).

• **svn update**

• **svn resolve**

6. Commit your changes.

• **svn commit**

Following steps shows the updating subversion:

1. cd esp-r\_src
2. rm –r(remove directory) –f(force) Lukas-Swan /
3. checkout my branch:
   1. cd esp-r\_src/
   2. svn co <https://esp-r.net/espr/esp-r/branches/Sara-Nikoofard>
   3. cd Sara-Nikoofard
   4. svn log –stop –on –copy
   5. svn merge –r 3499:HEAD

<https://esp-r.net/espr/esp-r/branches/development_branches>

* 1. svn commit

help merge gives all information about merging.

For merging another version to my branch I should go to Sara\_Nikoofard branch and then merge.

Compiling esp-r:

esp-r\_src/Sara\_Nikoofard/src

./esp-r\_compile.pl

Installing g files:

sudo aptitude install gcc-4.1 g++ gfortran-4.1

sudo aptitude search can help find what you want to install.

cd esp-r\_src

svn co <https://esp-r.net/espr/esp-r/branches/Lukas_Swan>

Add Lukas’s version to mine.

To add climate options you should go to the Root:

/usr/esru/esp-r/climate1

You cannot add or remove directory

Use command window and write **sudo** before each command.

Some questions:

1. it seems that for