Appendix –Summary of HYDRA Commands

HYDRA main window
　　　Displays a world map and shows ***File, Load***, ***Tools, Settings***, and ***Start*** at top.

File offers
　　　　　New to open a new main HYDRA window
　　　　　Exit ends the entire HYDRA session

Load has the options
　　　　　Local Data allows you to search local directories to find MODIS, AIRS, GOES or
　　　　　　　　Meteosat data.
　　　　　Remote Data allows you to get data from a remote server
　　　　　　　　　(a) Terra or Aqua Direct Broadcast or (b) Goddard DAAC
　　　　　GOES/MSG allows you to get geostationary satellite data from an ADDE server
　　　　　Calipso allows you to display CALIPSO lidar data
　　　　　CloudSat allows you to display CLOUDSAT data
　　　　　AREA allows you to load data in McIDAS AREA file format

After a data granule is selected HYDRA displays the infrared window (at reduced resolution 4 km for MODIS) on a world map.

Tools offers
　　　　　Capture Display to save the image as a jpeg

Settings has
　　　　　Set Color Range where the histogram of brightness temperatures or radiances can
　　　　　　　　be adjusted to maximize contrast – the color range can be altered with a
　　　　　　　　right click plus drag at either end of the color scale
　　　　　Set Color Scale where ***Color***, ***Gray*** and ***Inverse Gray*** gives choice of color, grey,
　　　　　　　　or inverse grey (which produces white clouds for infrared channels)

The toolbar at the top enables reset, zoom in, zoom out, translate, box magnify, find location, and subset at full resolution functions
　　　　　Reset (left click on reset and then click on image to restore original image)
　　　　　Zoom in (left click on zoom in plus click on image enables enlargement)
　　　　　Zoom out (left click on zoom out plus click on image enables far view)
　　　　　Translate (left click on translate plus click on image enables moving the image
　　　　　　　　within the window)
　　　　　Box magnify (left click on box plus click and drag to create box for enlargement)
　　　　　Find location (left click on arrow plus click on image displays location of the
　　　　　　　　chosen pixel)
　　　　　Subset at full resolution (only after Multi-Channel Viewer is engaged, then left
　　　　　　　　click on subset plus click and drag on image creates a subset of image at full
　　　　　　　　resolution; this is automatically transferred from HYDRA into the Multi-Channel
　　　　　　　　Viewer when both are engaged – data is displayed at reduced resolution by default
　　　　　　　　unless subset function is used)

Start opens ***Multi-Chanenel Viewer***
>   wherein the measured spectra (wavelength on x-axis and radiance or brightness temperature on y-axis) is displayed along with a spectral band superimposed on a map. Left click on arrow icon in the bottom toolbar allows you to see the pixel value for a given lat-lon (using left click and drag).

Tools menu (appears in ***Multi-Channel Viewer*** window)
>   ***Linear Combinations*** opens the **Channel Combination Tool** display where you can specify linear combinations of spectral bands a,b,c and d
>   (a +-x / b) +-x / (c +-x / d).
>   ***rgb*** allows you to select a spectral channel for each color in the RGB display
>   ***Transect*** allows you to create a line on the image and see the temperatures or radiances along the transect marked by shift plus right click and drag.
>   ***Capture Display*** allows you to save the image as a jpeg
>   ***Statistics*** displays the min and max values in the image
>   ***Reference Spectrum*** allows you to compare spectral measurements from two selected pixels (controlled by the arrows in the bottom toolbar)

Settings (on the Viewer) has
>   ***Set Color Range*** where the histogram of brightness temperatures or radiances can be adjusted to maximize contrast – the color range can be altered with a right click plus drag at either end of the color scale
>   ***BT->radiance*** allowing you to toggle from brightness temperatures to radiances in the infrared spectral channels
>   ***Projection*** offers ***Lambert Equal Area, Polar Stereographic*** or ***Instrument*** projections of the data
>   ***Set Color Scale*** where ***Color***, ***Gray*** and ***Inverse Gray*** gives choice of color, grey, or inverse grey (which produces white clouds)
>   ***Lat/Lon Grid*** can be superimposed on the image by using the toggle
>   ***Image Label*** labels the image with the instrument and day/time of the data

The ***Channel Combination Tool*** offers the usual tool bar and
>   ***Compute*** to create an image of the selected linear combination (you can indicate at the bottom your preference for this linear combination to be on the x- or y-axis in the scatter plot) and displays a toolbar for image manipulations (five color boxes are available in the toolbar to select regions by boxes or curves in the image that will be displayed in the scatter plot; a left click drag in the image highlights the chosen points in the scatter plot).
>   ***Scatter*** creates a scatter plot of the chosen x- and y-axis linear combinations. Five color area boxes (or area curves) in the bottom toolbar of the scatter plot allow you to select points in the scatter plot that will be displayed in the x-axis and y-axis images; a left click drag in the scatter plot highlights the chosen points in the scatter plot and simultaneously in the x- and y-axis images. Conversely (as indicated before) left click drag in the x- or y- axis images shows the locations of the chosen pixels in the scatter plot. Each color area box (or area curve) can be erased with a left click when the color box is engaged; after erasure another area box (or area curve) can be selected for this color. The zoom capability in the scatter plot (on the

bottom right of the toolbar) allows you to enlarge special features in the scatter plot and investigated them in more detail.

Viewing Level 2 Products

When viewing level 2 products (staged in a separate file), HYDRA generates a display of that product. Current choices include the cloud mask (from MOD35), total column ozone and water vapor (from MOD07), cloud top properties (from MOD06), fires from (MOD14) and AIRS profile retrievals (generated using a statistical regression retrieval algorithm trained with AIRS spectra calculated from radiosonde observations).

When viewing MOD07 or AIRS profiles, ***Variables*** offers the choice to display
>   air temperature profiles
>   total ozone
>   precipitable water
>   surface temperature
>   water vapor profiles
>   surface pressure
>   ozone profiles

Levels offers 17 levels between 1100 and 50 hPa for the retrieval field display.

Settings offers a choice to ***Set Color Range***, ***Set Color Scale***, and ***Show Color Bar***. The last choice enables superposition of a color bar label that identifies the values of the product associated with each color.

Tools offers the option of ***Reference Profile*** that allows you to compare level 2 products from two selected pixels (controlled by the arrows in the bottom toolbar where the red dot indicates the location of the second profile) and ***Transect*** that allows you to construct a transect across the level 2 product image.