Cluster AAR Campaign Summary Plots User Guide and Caveats

These summary plots are intended for event selection only and contain data to which only preliminary calibrations have been applied. As such care should be taken in interpretation and the relevant instrument teams contacted for better quality data. The plots contain data from WBD (courtesy University of Iowa), FGM (courtesy Imperial College, London), EFW (courtesy KTH, Stockholm), PEACE (courtesy MSSL, UCL) and CIS (courtesy CESR, Toulouse) and were produced at MSSL. The plots are available at http://www.mssl.ucl.ac.uk/missions/cluster/AAR_SP_home.php.

The first panel is a frequency-time spectrogram created from the WBD instrument's electric field waveforms. It displays the spectral power density (in $V^2 m^{-2} Hz^{-1}$) as a function of frequency (in kHz). The data often include multiple frequency bands within a single plot, so some plots are very compressed--please note that many details are not visible in such cases. On a small number of dates, magnetic field data are also available, but these are not plotted here.

The second panel is a plot of magnetic field perturbations based on spin resolution FGM UP data from the CSDS. The data are plotted in a "model field aligned" coordinate system calculated such that the three components represent the direction of the T96 model field at the instantaneous Cluster spacecraft location, B_M (based where possible on accurate upstream parameters from OMNI), a pseudoazimuthal component, $R \times B_M$ (where R is the spacecraft GSE position vector) and a pseudoradial component, $B_M \times R \times B_M$). Note that many of these data are from the previously unused FGM Range 6 and Range 7, the calibrations of which have not at the time of writing been finalised.

The third panel plots spin resolution spin plane ISR2 components of electric field from EFW (black and red, LH axis) and the negative of the spacecraft potential (blue, RH axis). The electric field is computed in the same way as the CSDS data but includes also the sunward component E_x . The transformation to inertial frame (vxB subtraction) uses a model magnetic field. Note that DC offsets and magnitude calibrations have not been applied to these CSDS-quality data.

The fourth panel is an energy-time spectrogram of electron differential energy flux from PEACE, plotting particles with pitch angles of 0°. Data come from the HEEA sensor and are based on onboard calculated pitch angle distributions (SPINPAD), where pitch angle selection may be inaccurate during intervals of rapid magnetic field fluctuations. Calibrations are preliminary so care must be taken with interpretation.

The fifth panel is a pitch angle-time spectrogram of electron differential energy flux, summed over all PEACE energies. Data sources and caveats as above.

The sixth panel is an energy-time spectrogram of electron differential energy flux from PEACE, plotting particles with pitch angles of 180°. Data sources and caveats as above.

The seventh panel is an omnidirectional CIS energy-time spectrogram, taken from HIA for Spacecraft 1 & 3 and CODIF for Spacecraft 4. CODIF spectra are for protons. Again, only preliminary calibrations have been applied to these data. Caveats for specific intervals can be found on the CIS website (http://cluster.cesr.fr:8000).

The eighth panel is a CIS pitch angle-time spectrogram, summed over all measured energies. Data sources and caveats as above.

Note that spacecraft positions on the X axis include altitude rather than position vector. Radial latitude and MLT were calculated using AACGM code provided by Haje Korth, T96 footpoint Latitude and MLT were calculated using accurate upstream parameters from the NASA OMNIweb where possible.