

## GUISDAP Documentation

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### 1. Data file format

A datafile contains the parameter block, correlator status word and correlator dump from one integration period. They are stored in binary Matlab files as three variables:

<code>d_parbl</code>	parameter block, column vector
<code>d_status</code>	correlator status word
<code>d_data</code>	correlator dump, column vector

The name of the data file gives the dump time in seconds from the beginning of year. The name must always be 8 character long and is padded with zeroes from the left, when necessary. Thus a measurement on the New Years Day at 1 UT is written to a file with name `00003600.mat`. The name convention is chosen so that the same names are usable in various systems for which Matlab is available (MAC, UNIX, MS-DOS and Vax VMS). Of these the most restrictive is MS-DOS. For safety reasons the extension part is always assumed to be `.mat`.

## 2. Result file format

The analysis result file contains the parameters with errors and the necessary control information so that the post prosessing of results is possible. The file is a binary Matlab file and the names of the variables are started with the prefix **r\_**. In the following the parameters appear in the order  $N_e, T_i, T_e/T_i, \nu_{in}, v_i$  and are denoted by  $p_1 \dots p_5$ .

variable	size	contents
<b>r_ver</b>	(1,1)	version number of the GUISDAP program
<b>name_expr</b>	(1,1)	Name of the experiment
<b>name_site</b>	(1,1)	measurement site
<b>r_time</b>	(2,6)	start and end times of the integration period in order: year, month, day, hour, minutes, seconds
<b>r_az</b>	(1,1)	antenna azimuth (from parameter block)
<b>r_el</b>	(1,1)	antenna elevation (from parameter block)
<b>r_Pt</b>	(1,1)	power of the transmitter (from parameter block)
<b>r_m0</b>	(1,2)	masses of ions in the fit in atom mass units
<b>r_range</b>	(Ng,1)	range in km to the scattering volume
<b>r_h</b>	(Ng,1)	altitude in km of the scattering volume
<b>r_param</b>	(Ng,5)	result of the fit, $p_1 \dots p_5$
<b>r_error</b>	(Ng,15)	errors and correlations of the parameters, order: $\Delta p_1 \dots \Delta p_5, \text{Corr}(p_1, p_2), \text{Corr}(p_2, p_3), \text{Corr}(p_3, p_4), \text{Corr}(p_4, p_5), \text{Corr}(p_1, p_3) \dots \text{Corr}(p_4, p_5)$
<b>r_res</b>	(Ng,2)	residual of the fit with standard deviation
<b>r_status</b>	(Ng,1)	status of the fit, values: 0 = fit OK 1 = max number of iterations exceeded 2 = No fit done, because data too noisy
<b>r_dp</b>	(Ng,1)	ion composition $[\text{O}^+]/N_e$
<b>r_apriori</b>	(Ng,5)	<i>a priori</i> values for $p_1 \dots p_5$
<b>r_apriorierror</b>	(Ng,5)	<i>a priori</i> errors for $p_1 \dots p_5$
<b>r_pp</b>	(Npp,1)	Power profile with $T_e/T_i = 1$ and neglecting Debye term
<b>r_pprange</b>	(Npp,1)	Range to power profile points
<b>r_XMITloc</b>	(1,3)	transmitter location [latitude ( $^{\circ}$ N), longitude ( $^{\circ}$ E), altitude (km)]
<b>r_RECloc</b>	(1,3)	receiver location [latitude ( $^{\circ}$ N), longitude ( $^{\circ}$ E), altitude (km)]
<b>r_SCangle</b>	(1,1)	half of the scattering angle (radians)