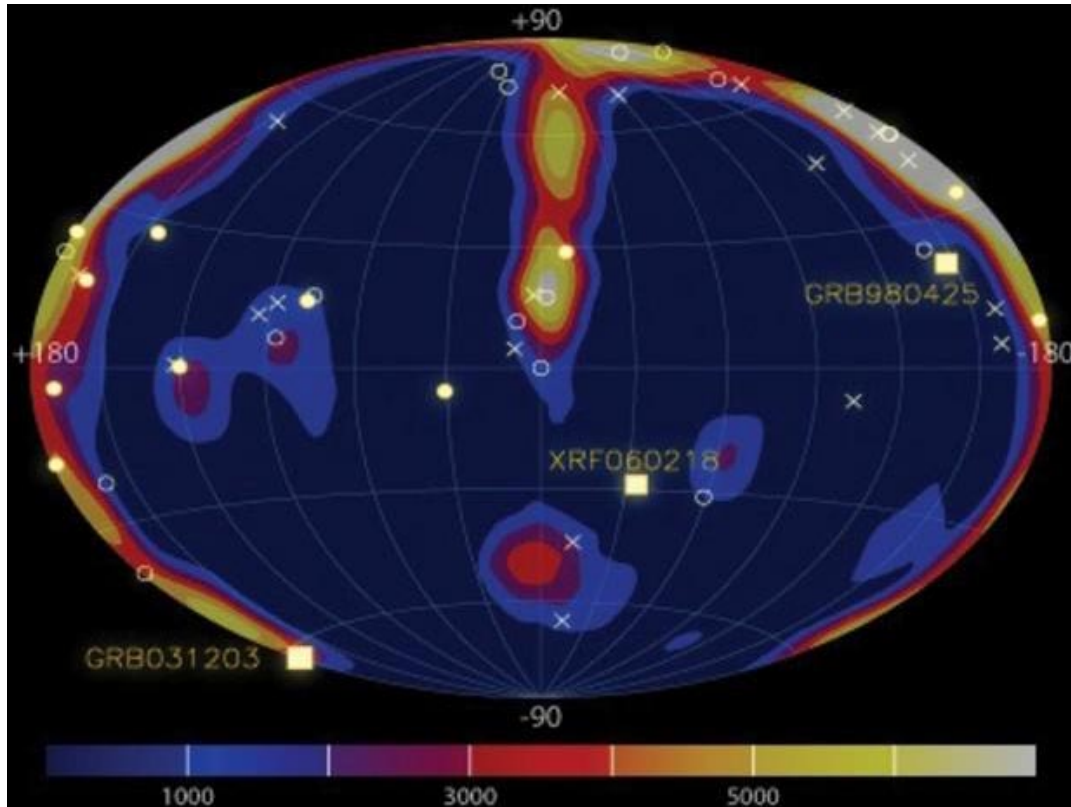


Picture of the Month

November 2008



INTEGRAL traces the low luminosity population of Gamma Ray Bursts

The imaging telescope IBIS, on board ESA's gamma ray observatory, INTEGRAL, is the most sensitive telescope ever launched into space when it comes to detecting gamma ray bursts (GRBs). INTEGRAL/IBIS detects about 10 GRBs per year in its FOV and has localised 47 GRBs in 4.5 years of operation.

The global properties of all INTEGRAL GRBs have been determined and the rate over the whole sky is about 1400 per year above the trigger threshold of IBIS. Many GRBs exhibit a "spectral lag", i.e. a time delay between the arrival of the high energy and low energy gamma ray photons. The spectral lag was measured for 28 INTEGRAL GRBs and two groups were identified in the lag distribution, one with short lags and the other with long lags. The long lag GRBs all have faint peak fluxes which are near the sensitivity limit of the IBIS telescope and have faint optical and x-ray afterglows. They are observed preferentially from the direction of the so-called "supergalactic" plane (Fig. 1) which traces nearby clusters of galaxies and the local large scale structure of the Universe. The rate of the low luminosity GRBs is estimated to be about 25% of all events related to core collapse supernovae of Type Ibc. Some of these GRBs may be produced by the collapse of a massive star without a characteristic supernova signal. Alternatively some may result from a different progenitor such as the merger of two white dwarfs or a white dwarf with a neutron star or black hole in a galaxy in the cluster of galaxies. INTEGRAL therefore detects a large proportion of faint long lag GRBs that are inferred to be local. The rate of such bursts may be far higher than that of classical GRBs, but only be detectable locally due to their lower luminosities. Clearly, more INTEGRAL observations over the coming years are needed to fully explore this new population of gamma-ray bursts.

On the picture above, the 47 INTEGRAL gamma-ray bursts are plotted in supergalactic coordinates. The locations of the long-lag, low-luminosity GRBs are indicated as filled-in circles. (Credit: ESA)

For more information: [S. Foley et al. "Global characteristics of GRBs observed with INTEGRAL and the inferred large population of low luminosity GRBs", A&A 484, 143, 2008.](#)