A selection of *AKARI* FIS BSC extragalactic objects

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Abstract. The point sources in the Bright Source Catalogue (BSC) of the *AKARI* Far–Infrared Surveyor (FIS) were classified based on their far–IR and mid–IR fluxes and colours using Quadratic Discriminant Analysis method (QDA) and Support Vector Machines (SVM). The reliability of our results show that we can successfully separate galactic and extragalactic *AKARI* point sources in the multidimensional space of fluxes and colours. However, differentiating among the extragalactic sub–types needs further information.

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The objects of the *AKARI* FIS (Kawada *et al.* 2007) BSC (Yamamura *et al.* 2010) were classified into 3 main types : YSO candidates, evolved stars and galaxies (Toth *et al.* 2014) using QDA. The class of extragalactic sources contain 5138 galaxy candidates. The goodness of our classification was tested by using associated object types from the SIMBAD database. 4456 (86.4%) of them are known SIMBAD galaxies. 238 of the sources were found to be *IR* (infra–red source) as catalogued by SIMBAD. Other 43 objects are *Radio* type sources. 168 sources remained unidentified. These we do not consider as a contaminating type. Only 233 (4.5%) of the QDA galaxies are from Galactic source types and therefore are considered as contamination.

We also aimed at discriminating our extragalactic objects into subtypes. We looked for counterparts in the Rowan–Robinson catalogue of galaxies (Wang *et al.* 2014) by using a 30″ search radius. Numerous classifications with different statistical approaches were tested, including QDA, and SVM. While cirrus dominated objects can be identified with high accuracy, the differentiation into the other subtypes was not successful, suggesting that further information is essential for accurate class separation. An example for a previously unclassified galaxy is the object 2MASX J05592768+0108245, which is unknown to the SIMBAD. We classified it as a "Cirrus dominated galaxy" based on the Rowan–Robinson classification scheme.

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References

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