

Evaluation of milling-surfacing performance

Introduction

- The assessment of pavement performance life is necessary in order to identify and define pavement maintenance and rehabilitation needs,
- Different maintenance strategies can be applied and performance life of rehabilitated pavement can change depending on the techniques,
- The performance models used for rehabilitated pavements are the same as those used for new pavements.

Objective

Evaluate the factors affecting performance life of milling-surfacing of flexible pavement and test of performance models used.

Some existents performance models

Fatigue cracking

$$D = \sum_{i=1}^n d_{r_i} = \sum_{i=1}^n \frac{n_i}{N_{f_i}} \text{ (Miner's law)}$$

$$N_f = k_1 \left(\frac{1}{\epsilon_t} \right)^{k_2} \left(\frac{1}{E} \right)^{k_3}$$

Where:

- D: damage;
- n_i : actual traffic for period i;
- n: total number of periods;
- N_{f_i} : allowed traffic under conditions prevailing period i;
- ϵ_i : tensile strain at the critical location;
- E: stiffness of the material;
- k_1, k_2, k_3 : regression coefficients.

Permanent Deformation

$$PD = \sum_{i=1}^n \epsilon_p^i h^i$$

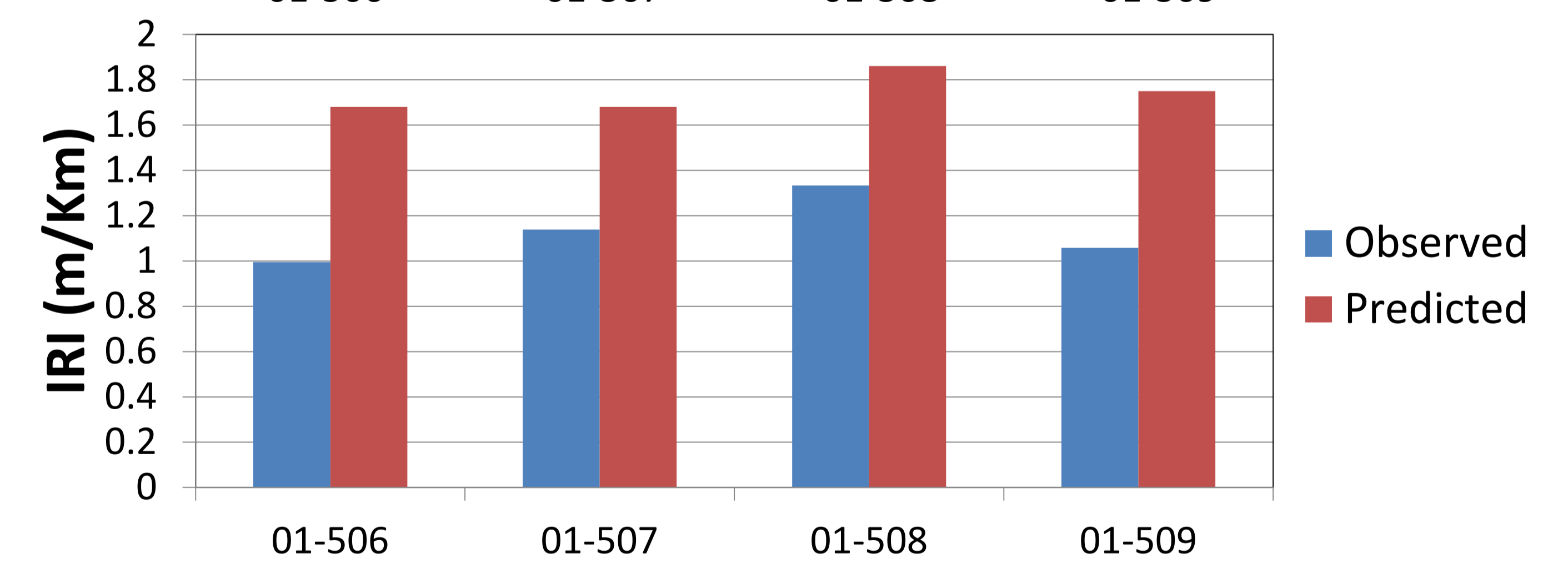
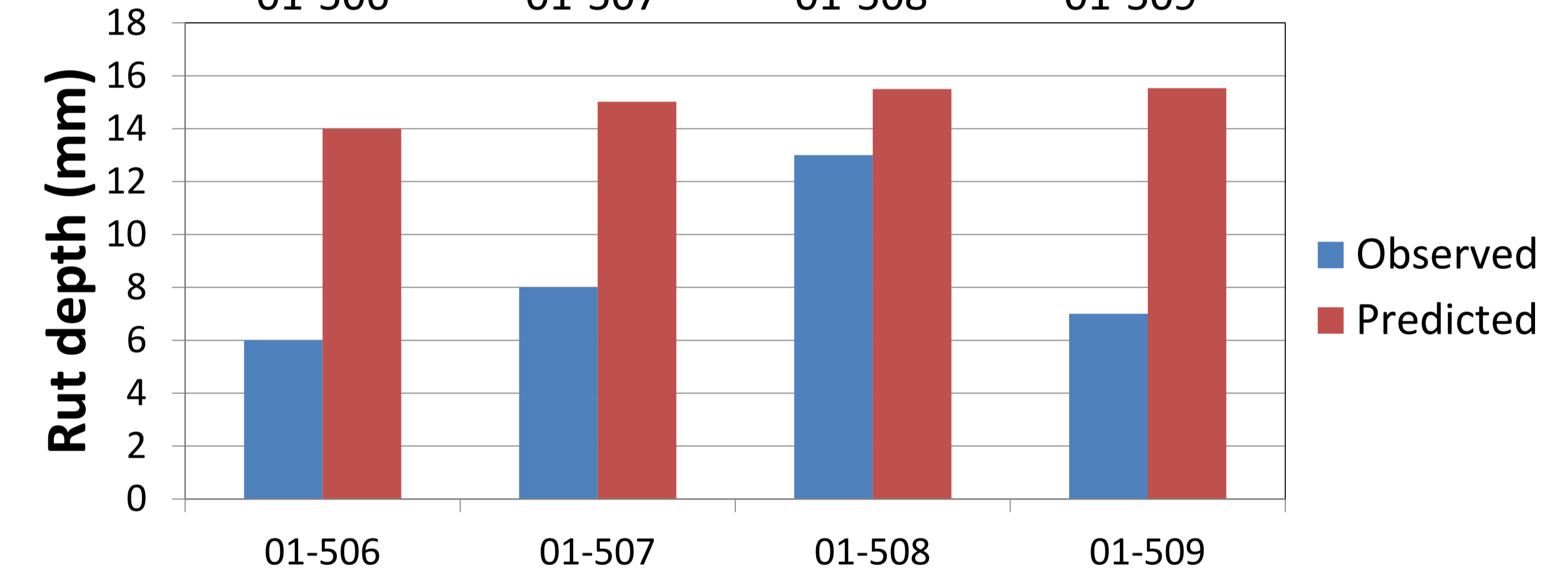
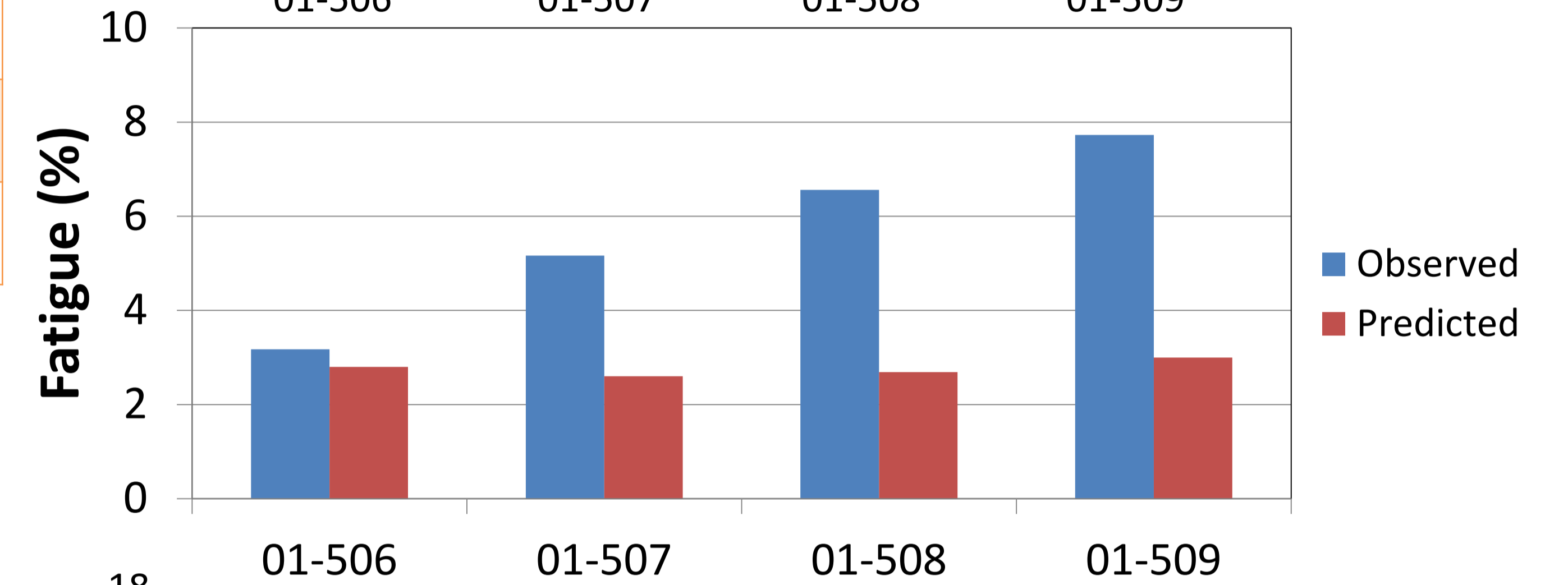
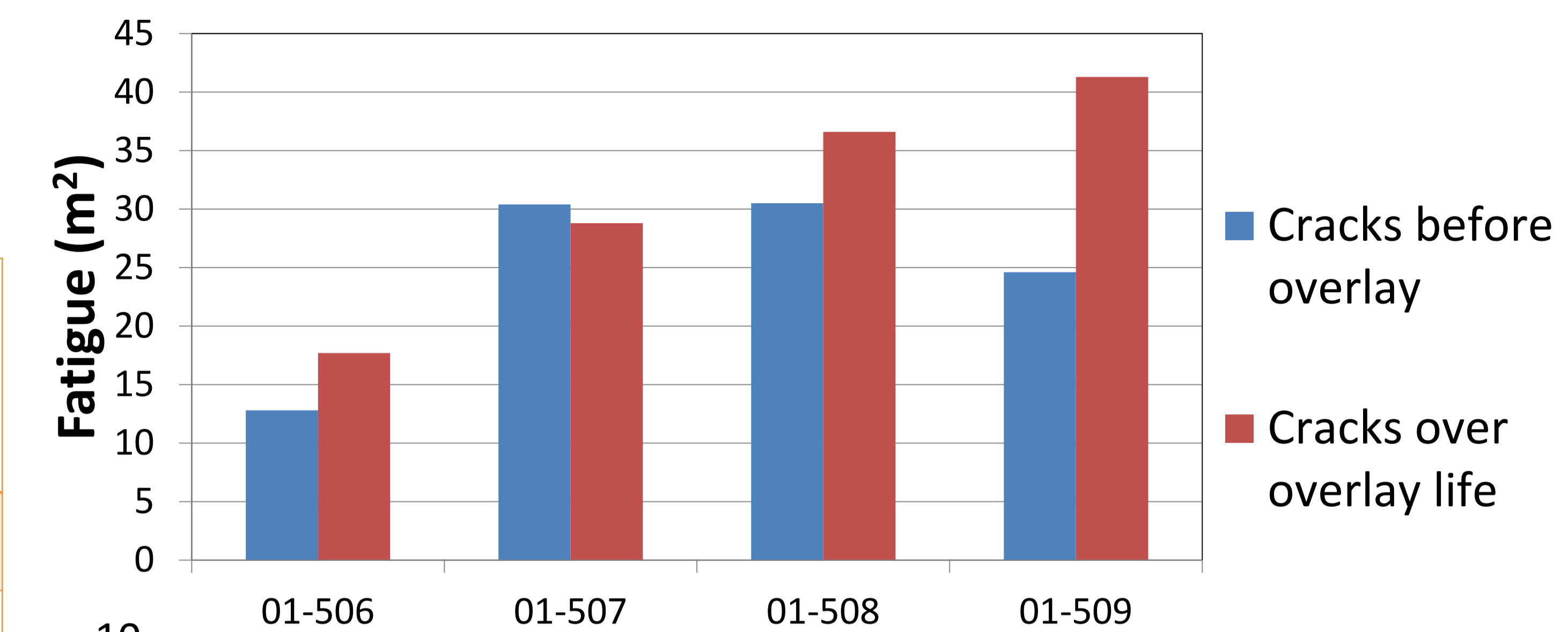
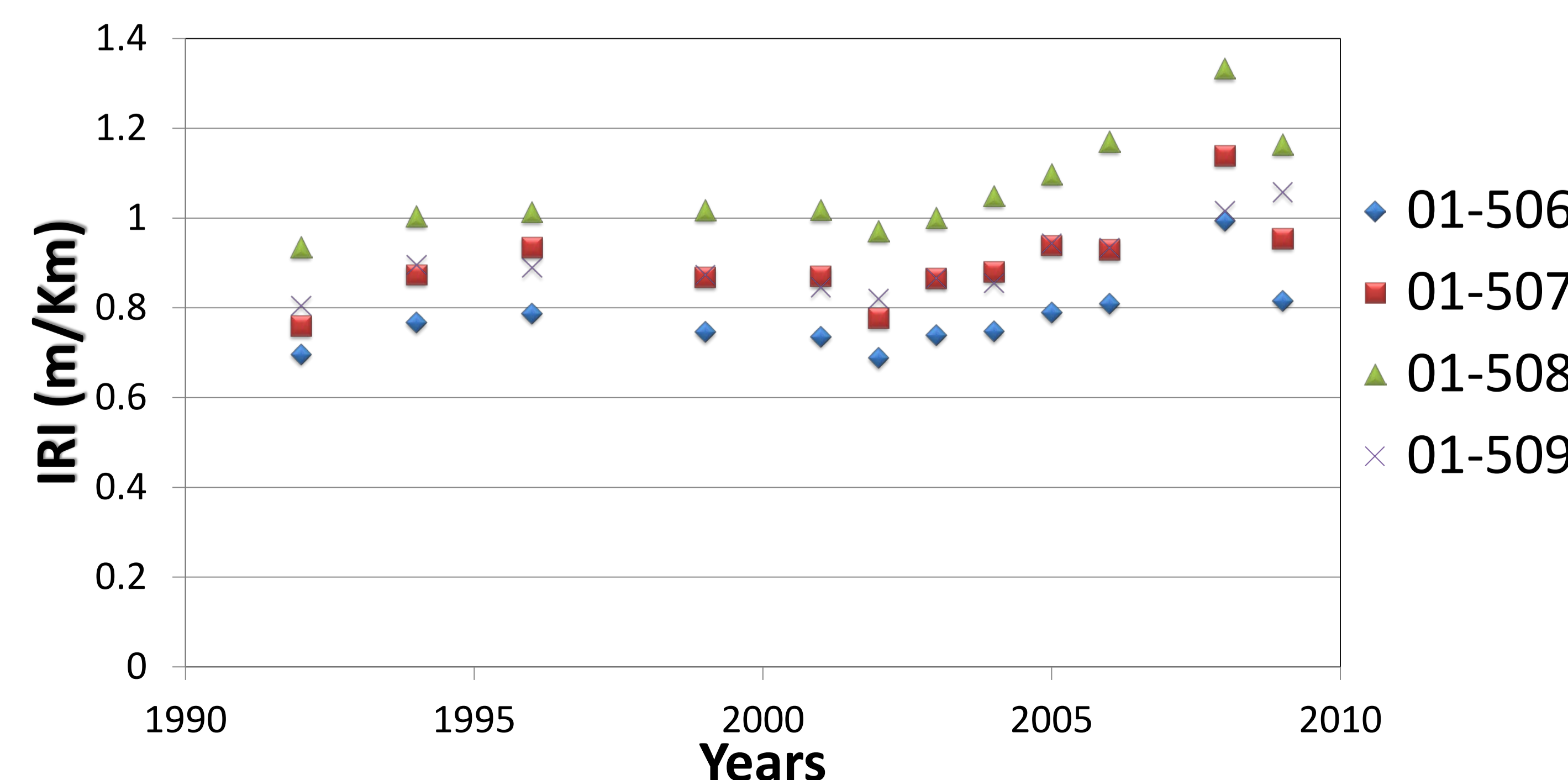
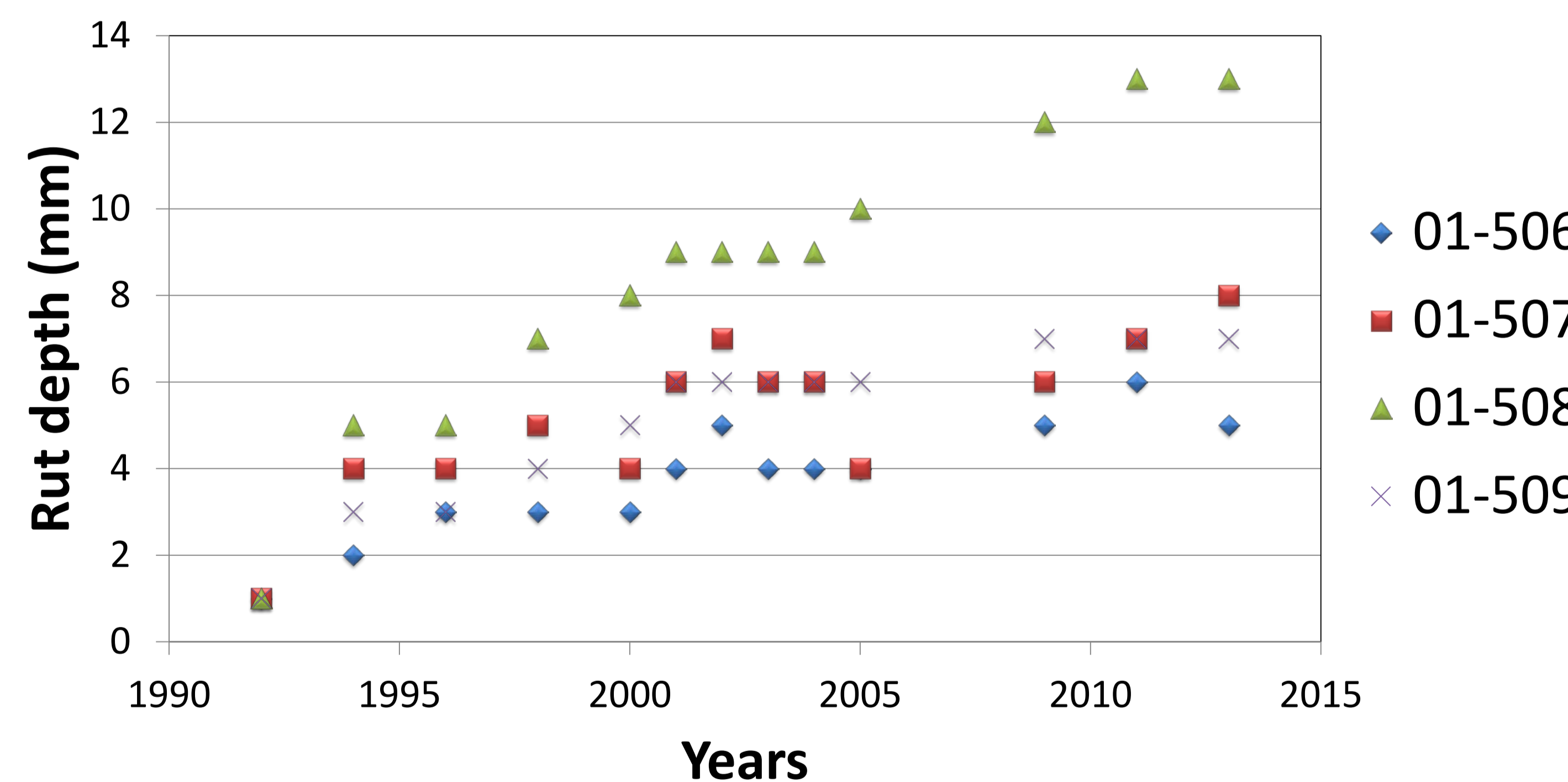
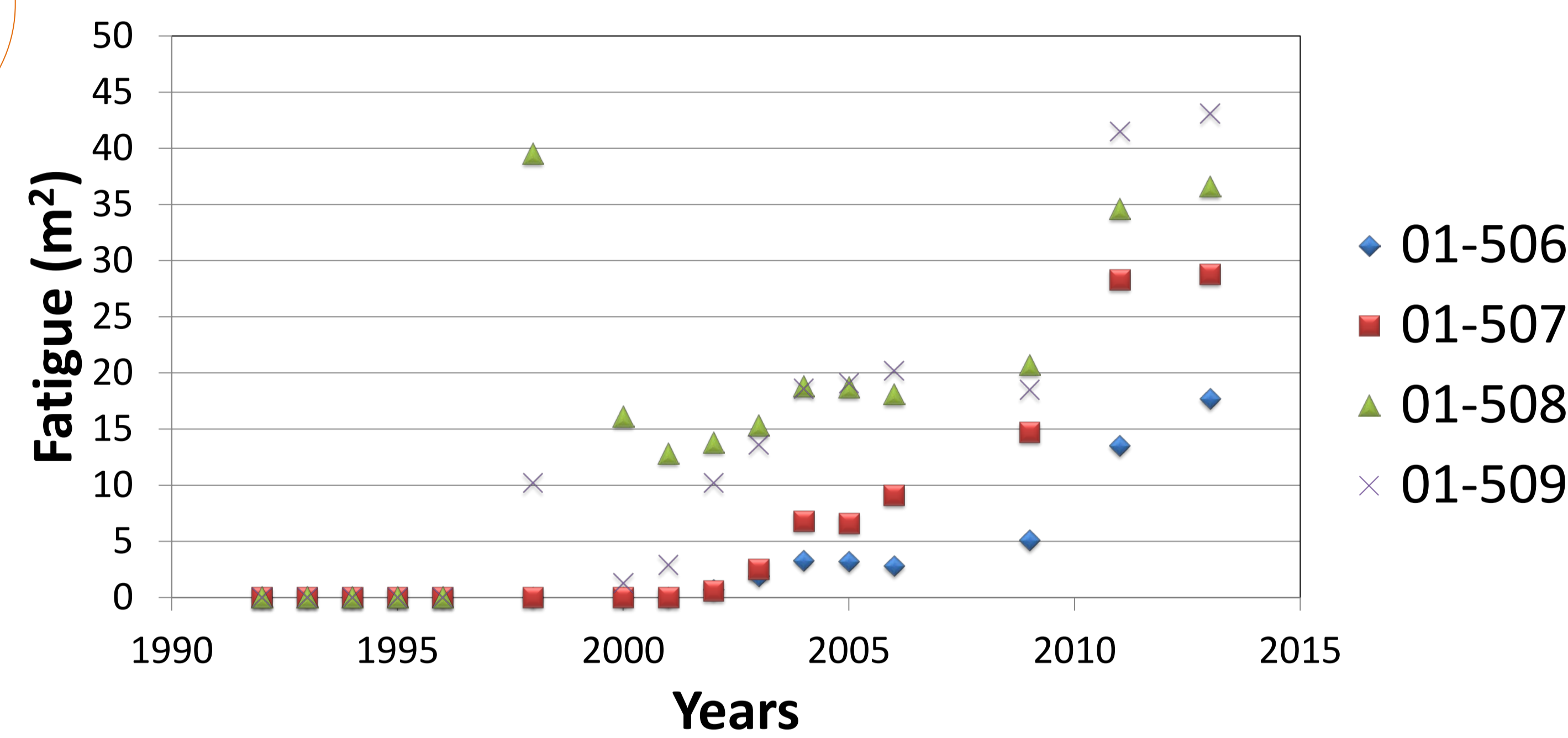
$$\frac{\epsilon_p}{\epsilon_r} = a_1 \times T^{a_2} N^{a_3}$$

Where:

- PD: pavement permanent deformation;
- n: number of sublayers;
- h_i : thickness of sublayers i;
- ϵ_p^i : total plastic strain in sublayer i;
- ϵ_p : accumulated plastic strain at N repetitions of load (in/in);
- ϵ_r : resilient strain of the asphalt material (in/in);
- N: number of load repetitions;
- T: temperature (degF);
- a_1, a_2, a_3 : regression coefficients.

Data Collection

State	Section	Overlay Type	Overlay Thickness (mm)	Maintenance
ALABAMA	01-506	NO RAP	51	WITH MILLIING
	01-507	NO RAP	127	WITH MILLIING
	01-508	WITH RAP	127	WITH MILLIING
	01-509	WITH RAP	51	WITH MILLIING



Conclusion

- Overlay thickness and mixture type (with RAP or not) have an effect on fatigue, rut and IRI performance trends.
- Results predicted with mechanistic-empirical software (AASHTOWare Pavement ME) are different for those observed.
- Mechanistic empirical models doesn't consider different factors having influence on performance life of rehabilitated pavements such as recycled mixture, overlay thickness, cracks before overlay...