

SOLAR FLARE EFFECTS ON GEOMAGNETIC ACTIVITY

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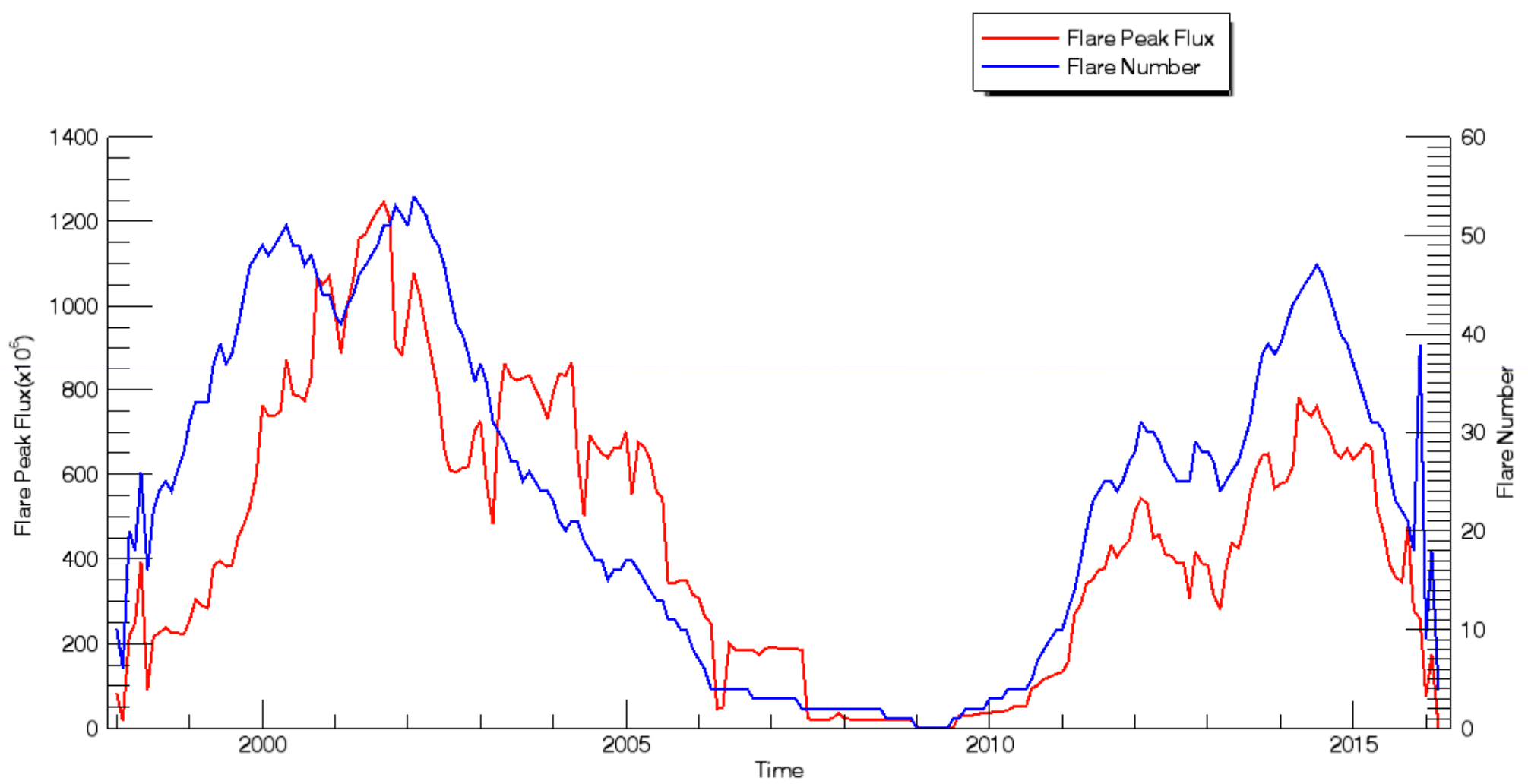
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- Solar Flare Datasets
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- CME Speed Index
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SOLAR FLARE DATASETS

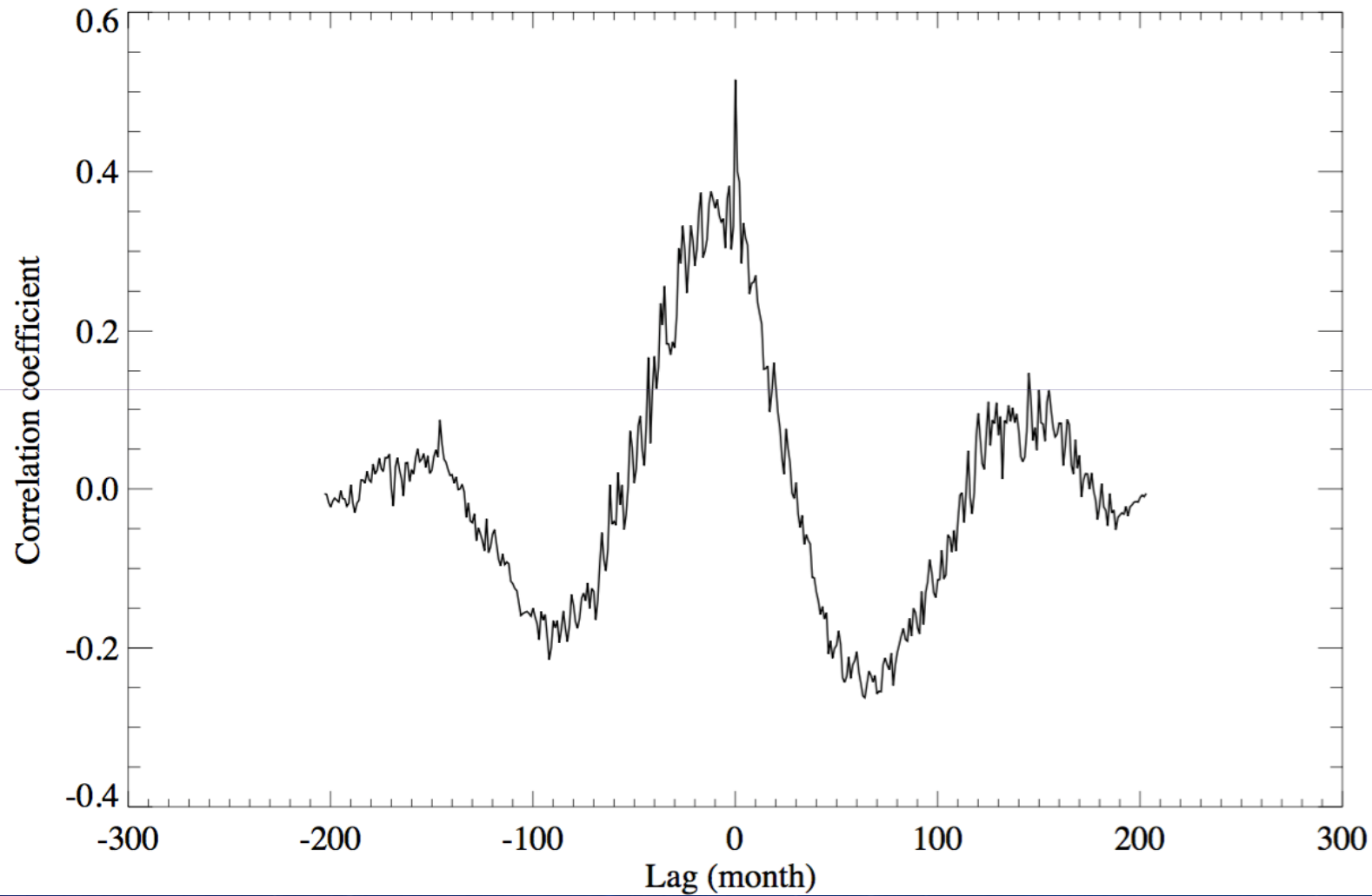
1. PEAK FLUX ($\times 10^6$ W/m²) - Monthly averaged solar flare peak fluxes
 2. NUMBER – Total solar flare numbers per month
- * NOAA / GOES X-Ray flux data

Time Variations of Flare Peak Flux and Flare Number



CROSS CORRELATION GRAPH

Flare Peak Flux - Flare Number

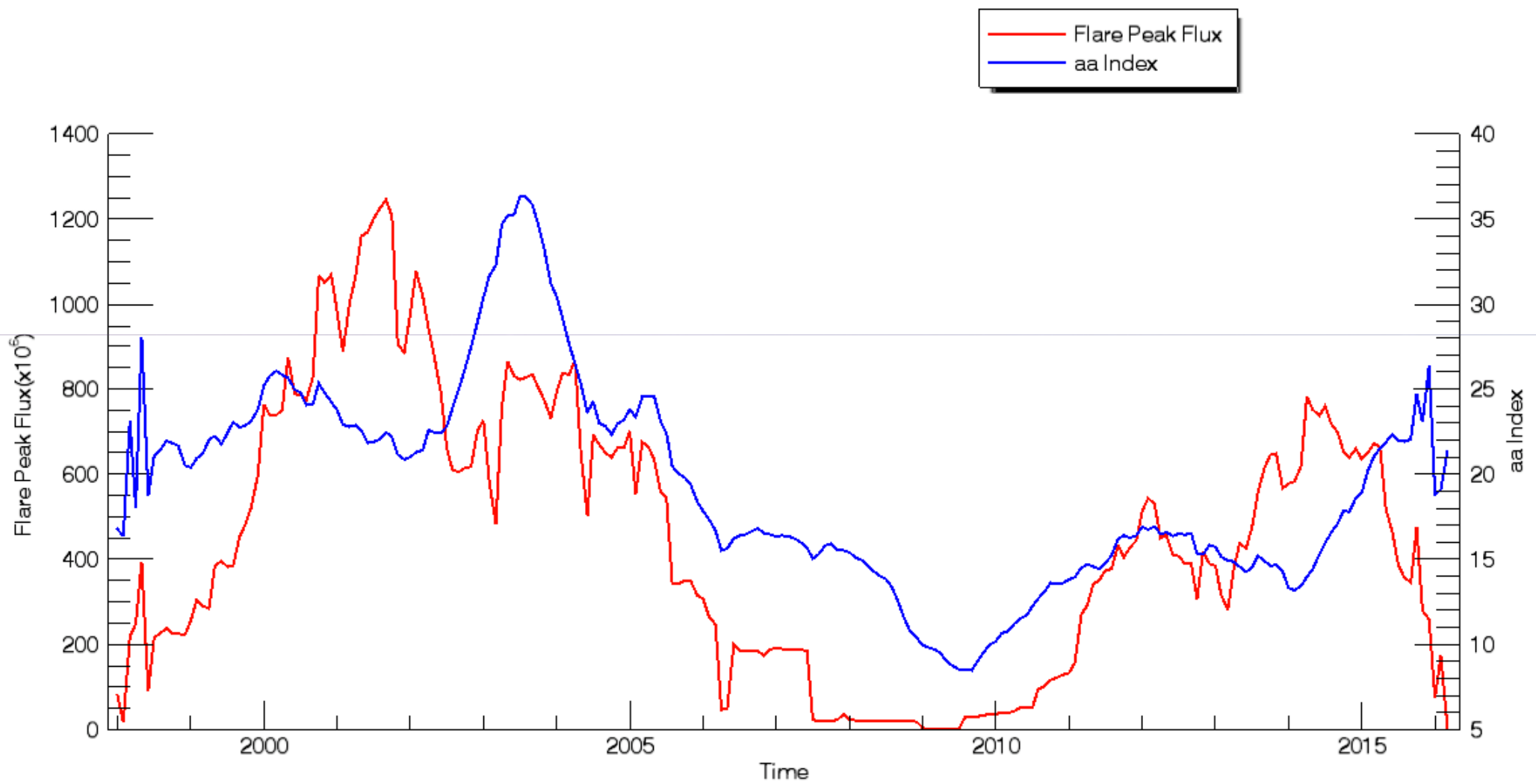


Max cc = 0.52
Lag = 0 months

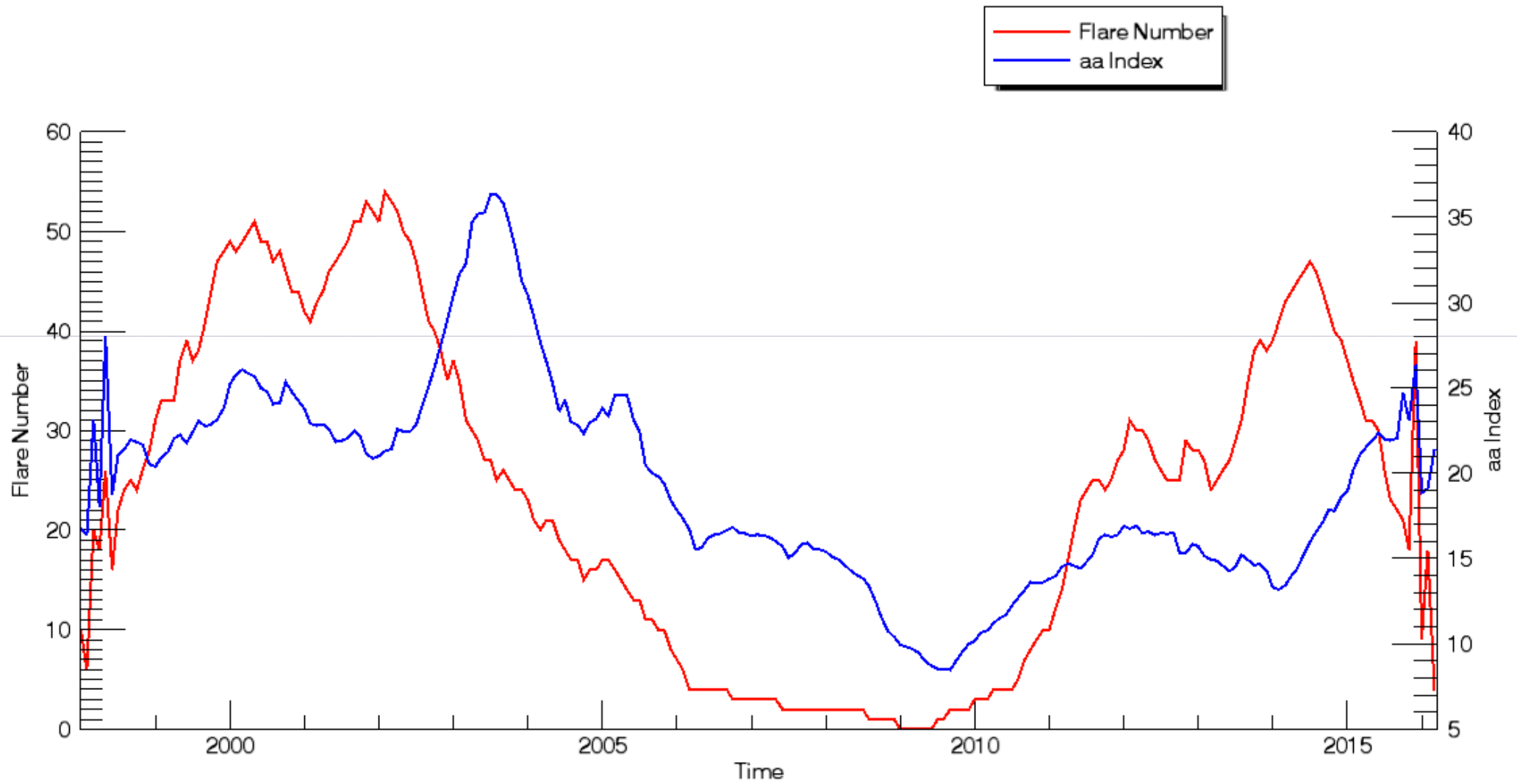
COMPARISON WITH GEOMAGNETIC INDICES

- aa Index : mid-latitude – global index from antipodal observatories
- Dst Index : low-latitude – ring current and geomagnetic storms
- AE Index : auroral zone – auroral electrojets

Time Variations of Flare Peak Flux and aa Index

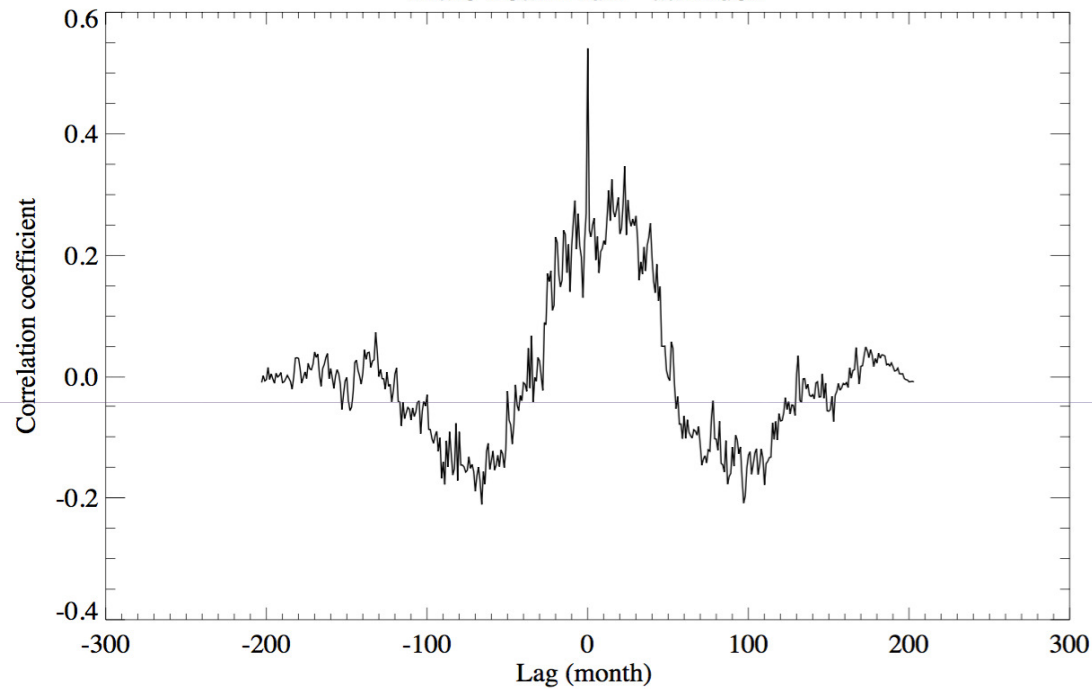


Time Variations of Flare Number and aa Index



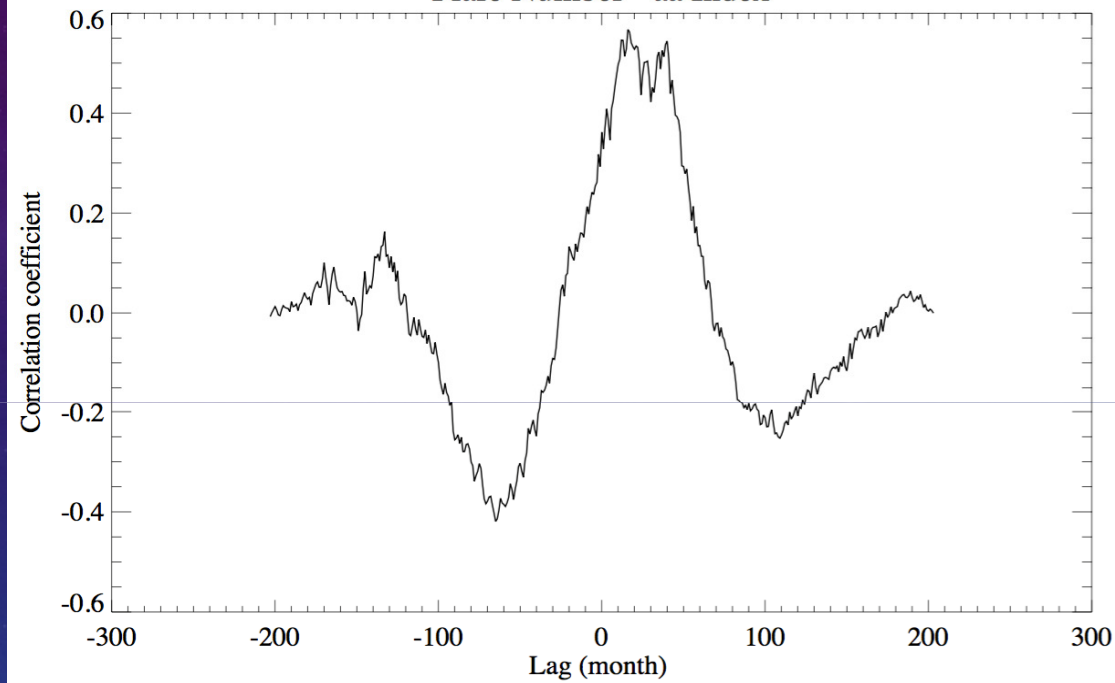
CROSS CORRELATION GRAPHS

Flare Peak Flux - aa Index



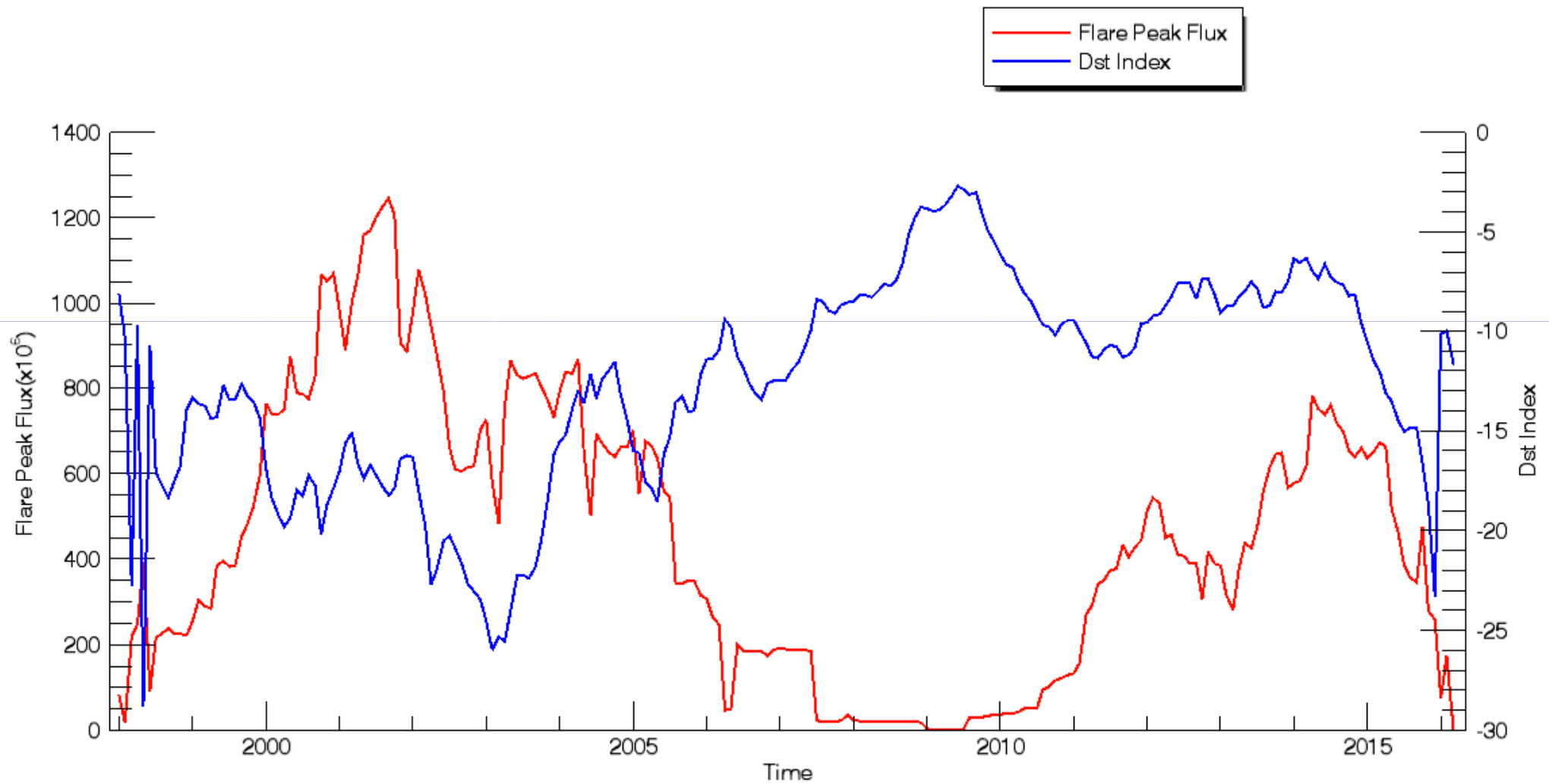
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Flare Number - aa Index

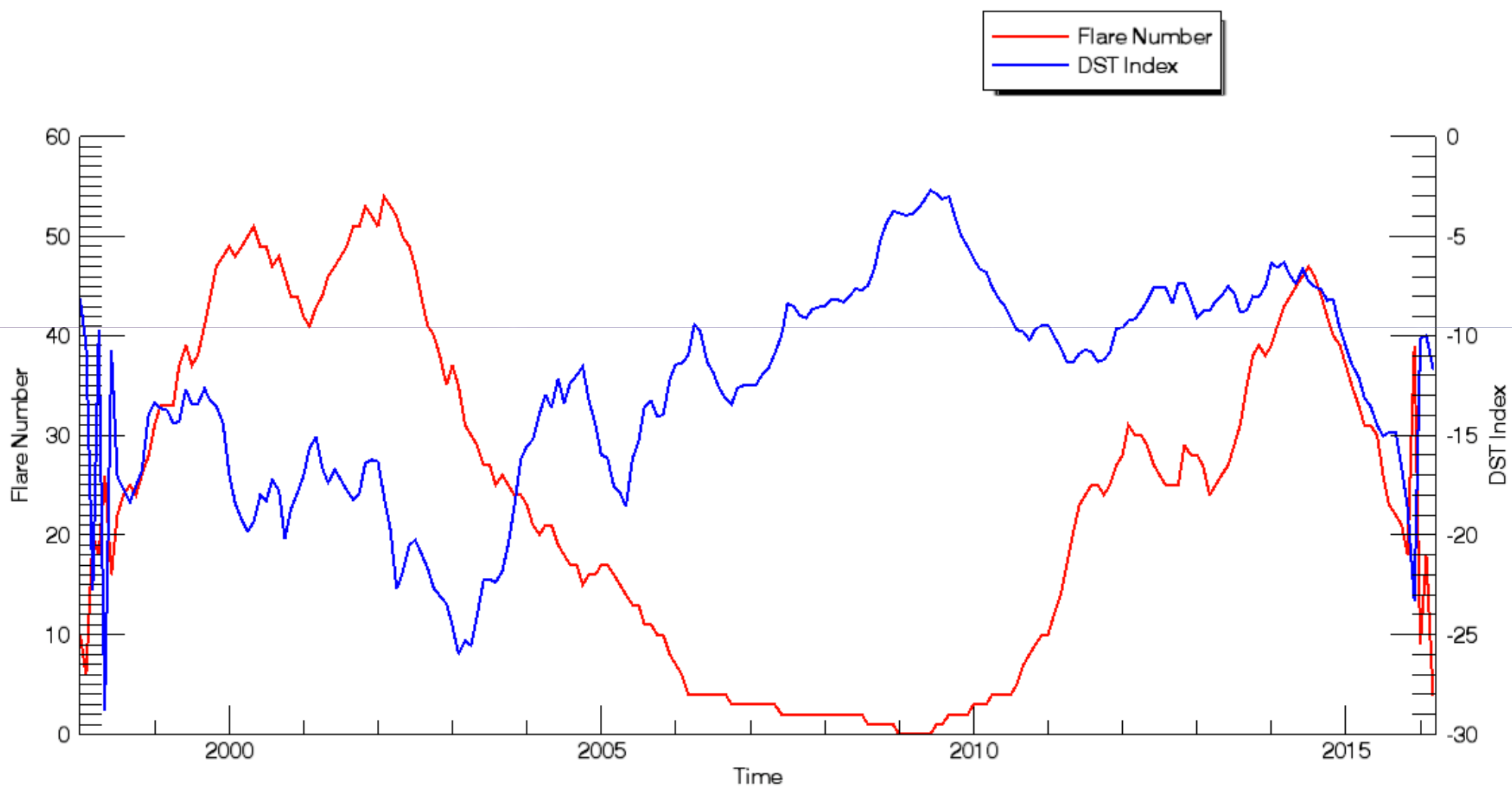


Max cc = 0,57
Lag = 16 months

Time Variations of Flare Peak Flux and Dst Index

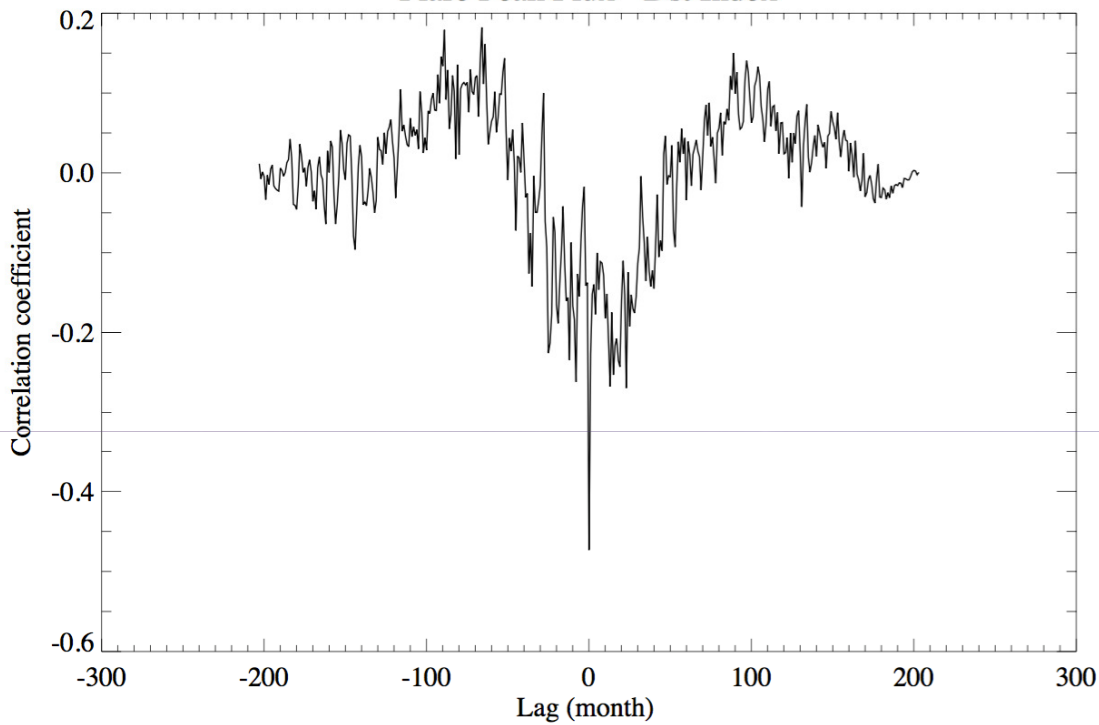


Time Variations of Flare Number and Dst Index



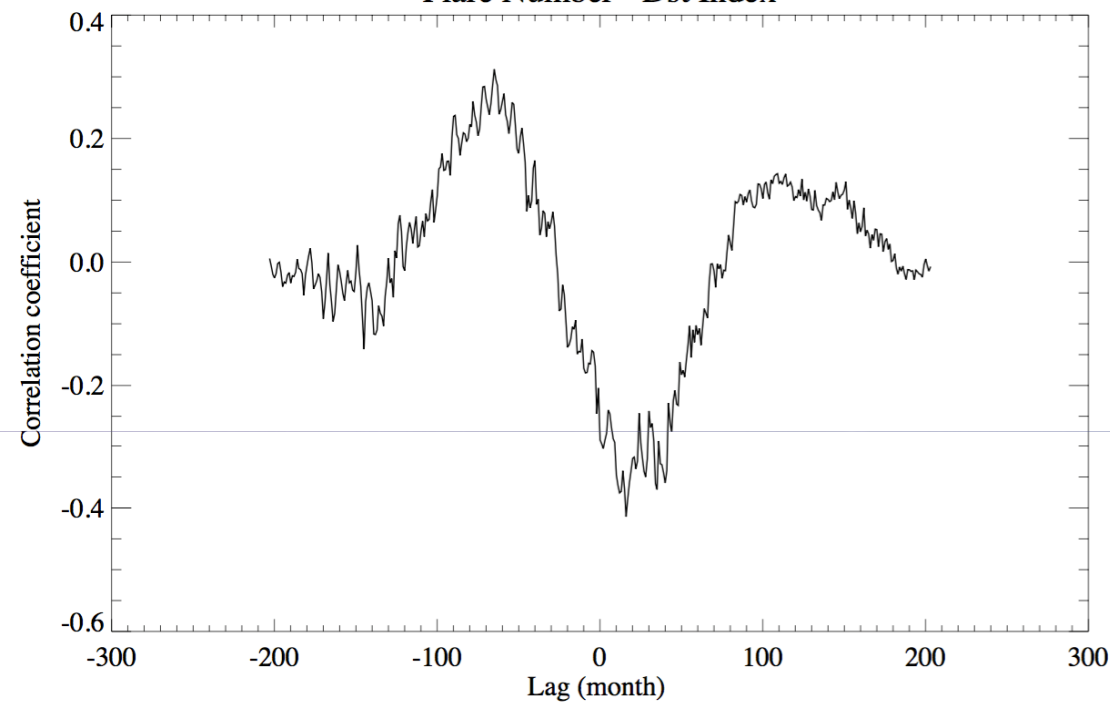
CROSS CORRELATION GRAPHS

Flare Peak Flux - Dst Index



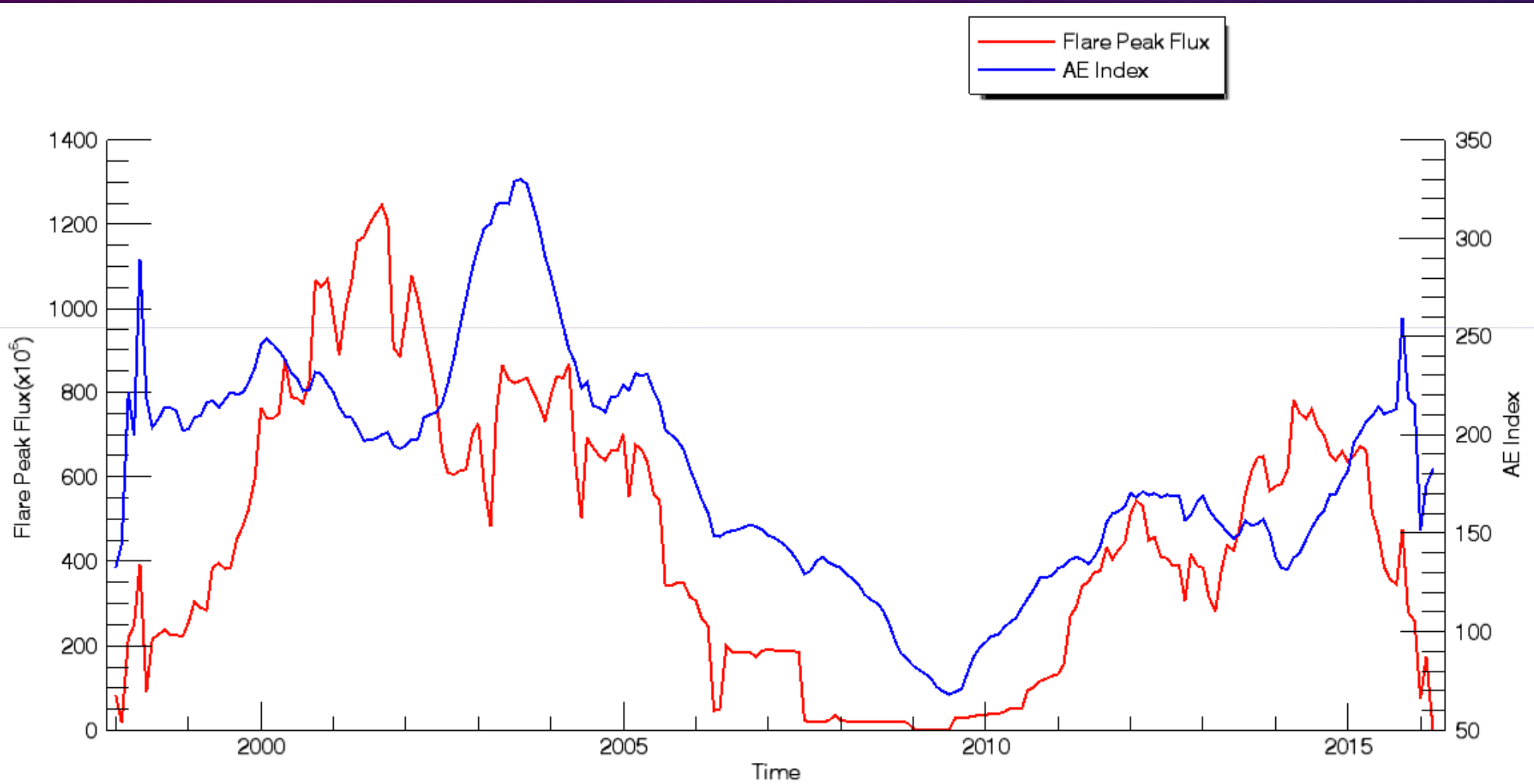
Max cc = -0,47
Lag = 0 months

Flare Number - Dst Index

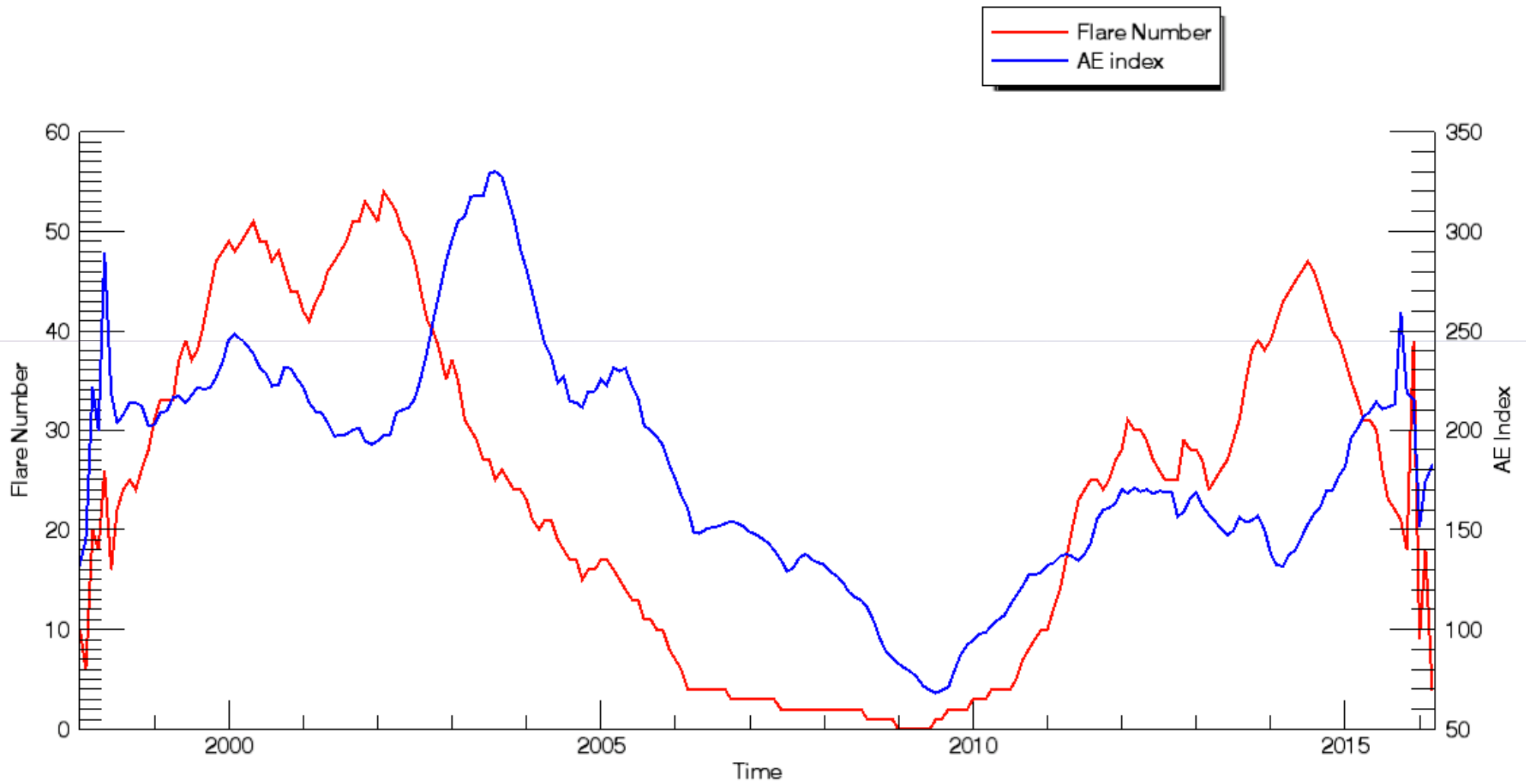


Max cc = -0.41
Lag = 16 months

Time Variations of Flare Peak Flux and AE Index

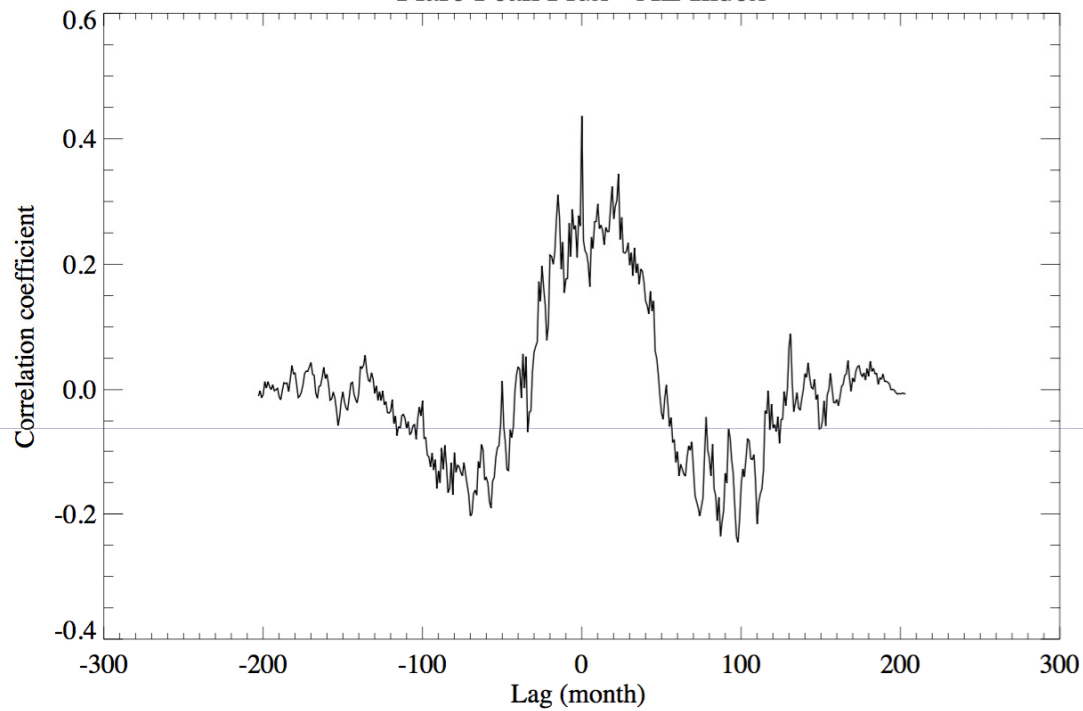


Time Variations of Flare Number and AE Index



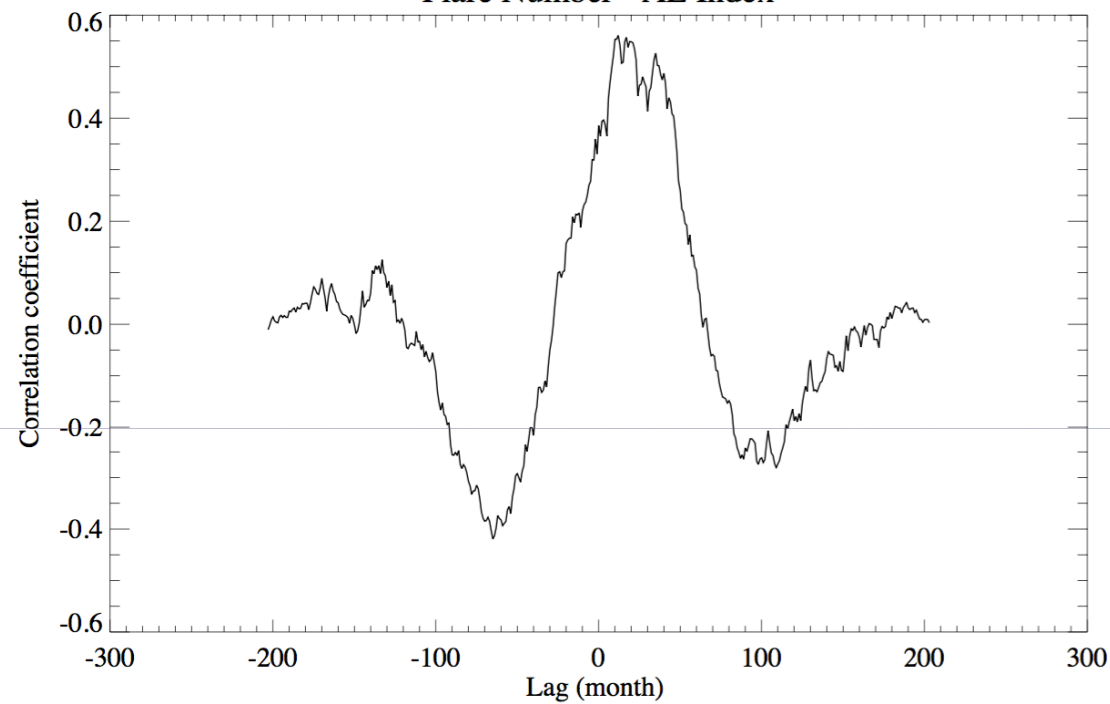
CROSS CORRELATION GRAPHS

Flare Peak Flux - AE Index



Max cc = 0,44
Lag = 0 months

Flare Number - AE Index



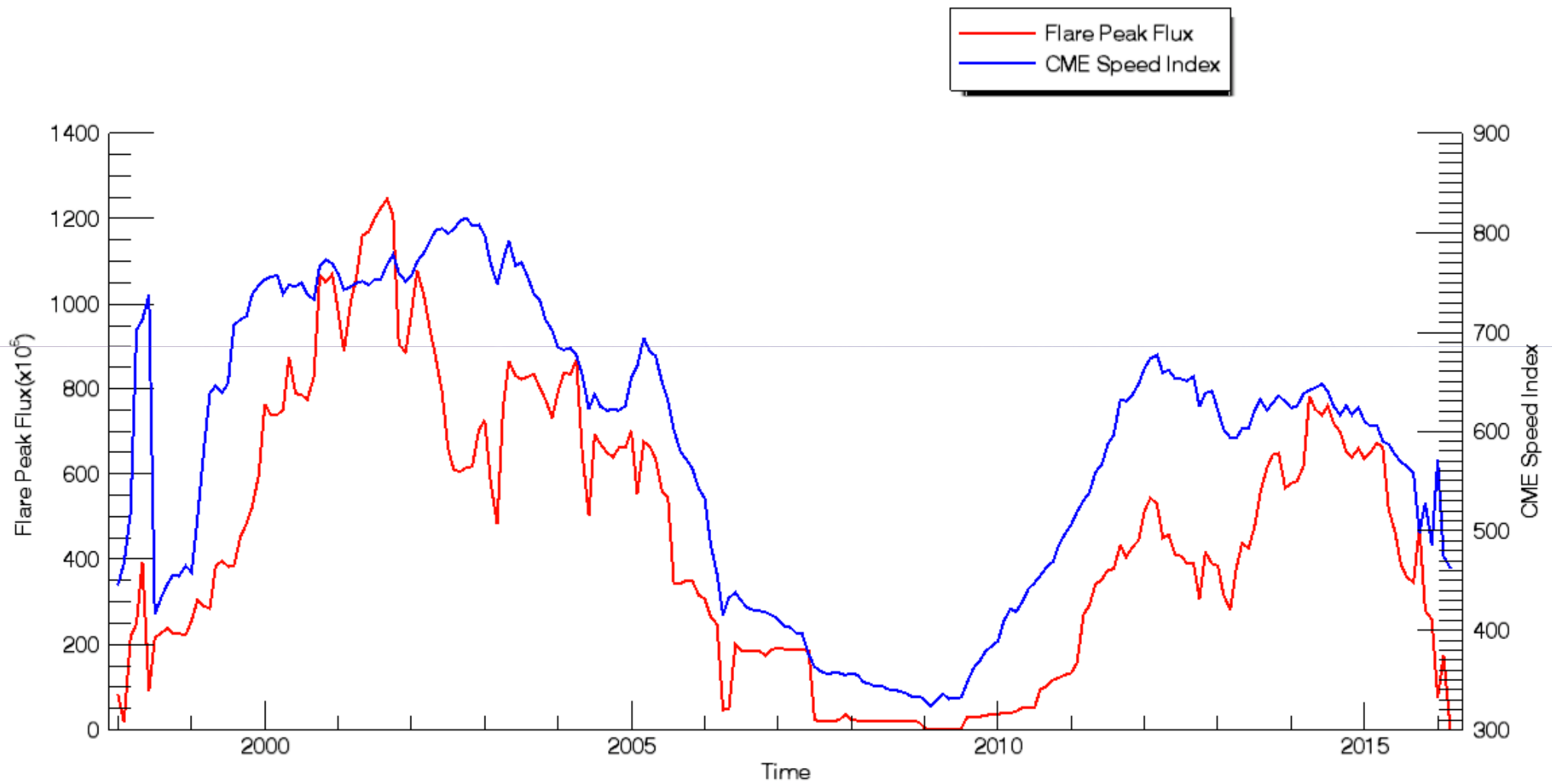
Max cc = 0,56
Lag = 12 months

COMPARISON WITH CME SPEED INDEX

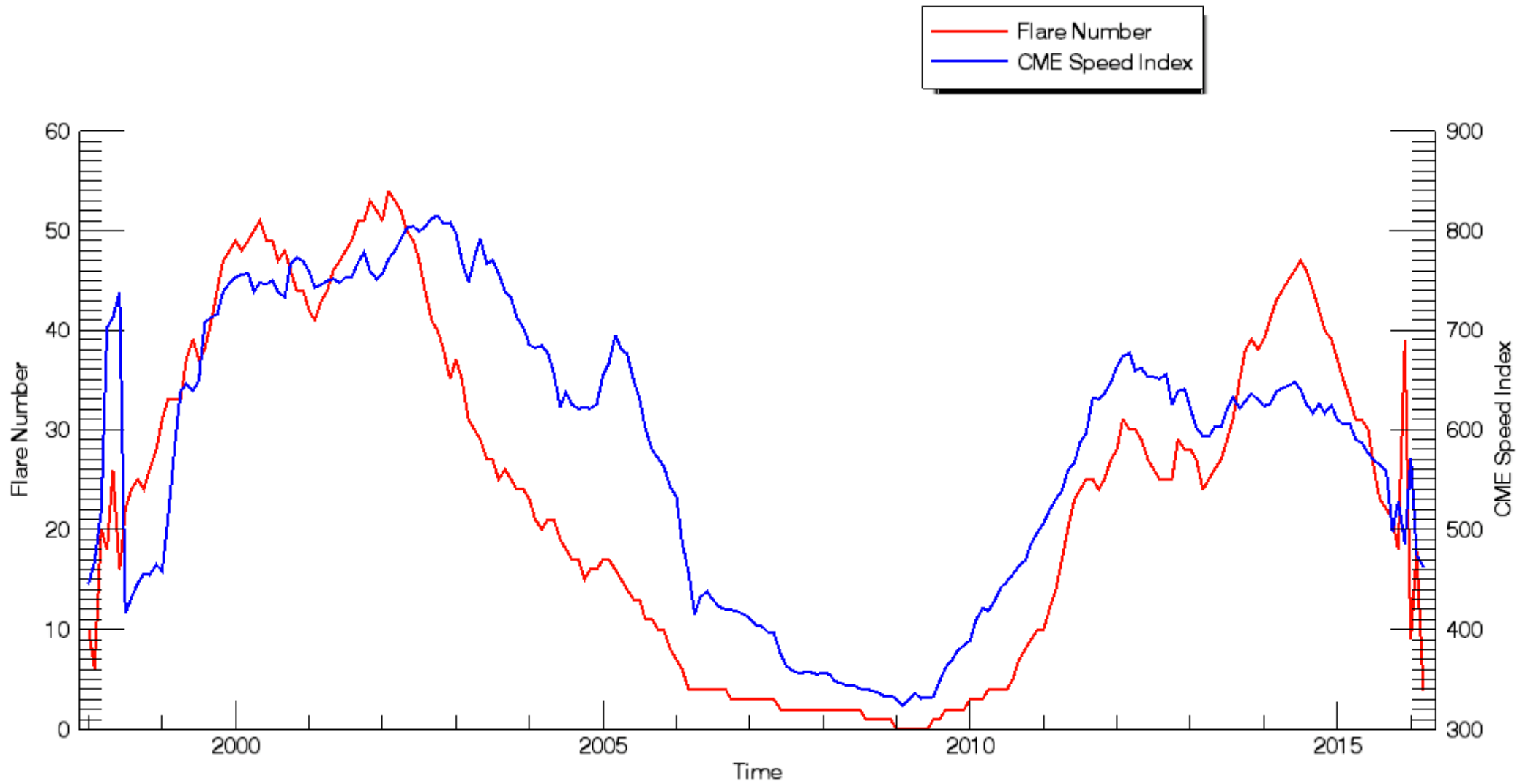
CME Speed Index is both a geomagnetic index and a solar index

It is derived as monthly average of daily maximum CME Speeds

Time Variations of Flare Peak Flux and CME Speed Index

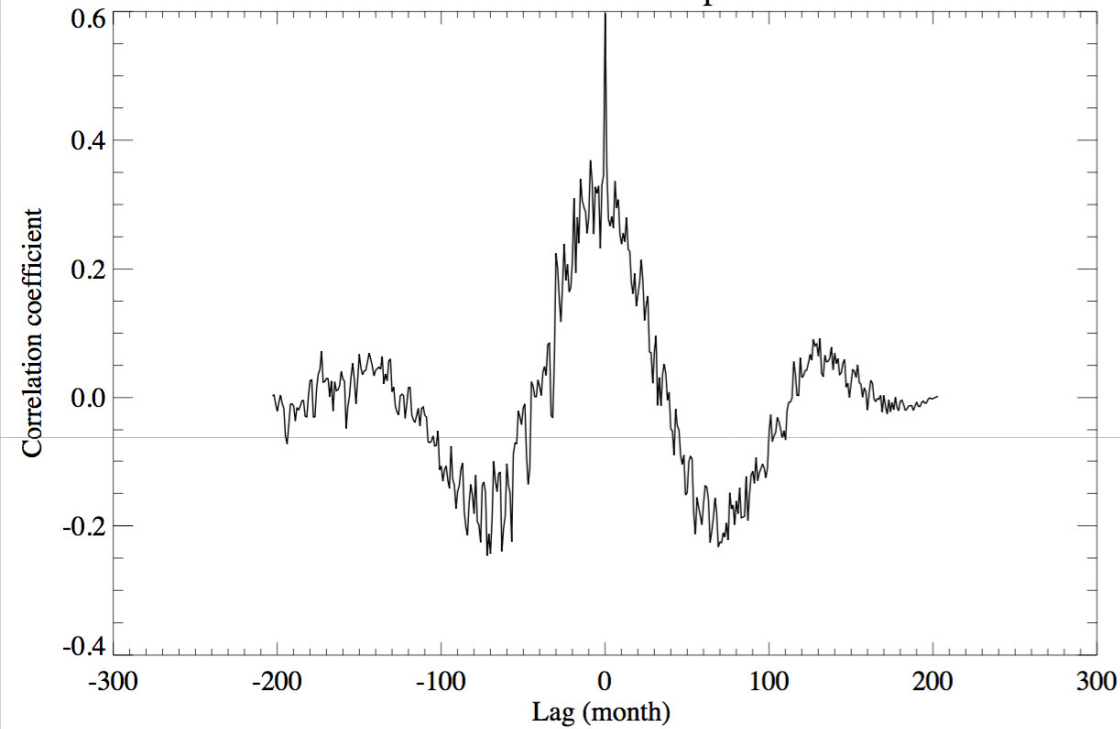


Time Variations of Flare Number and CME Speed Index



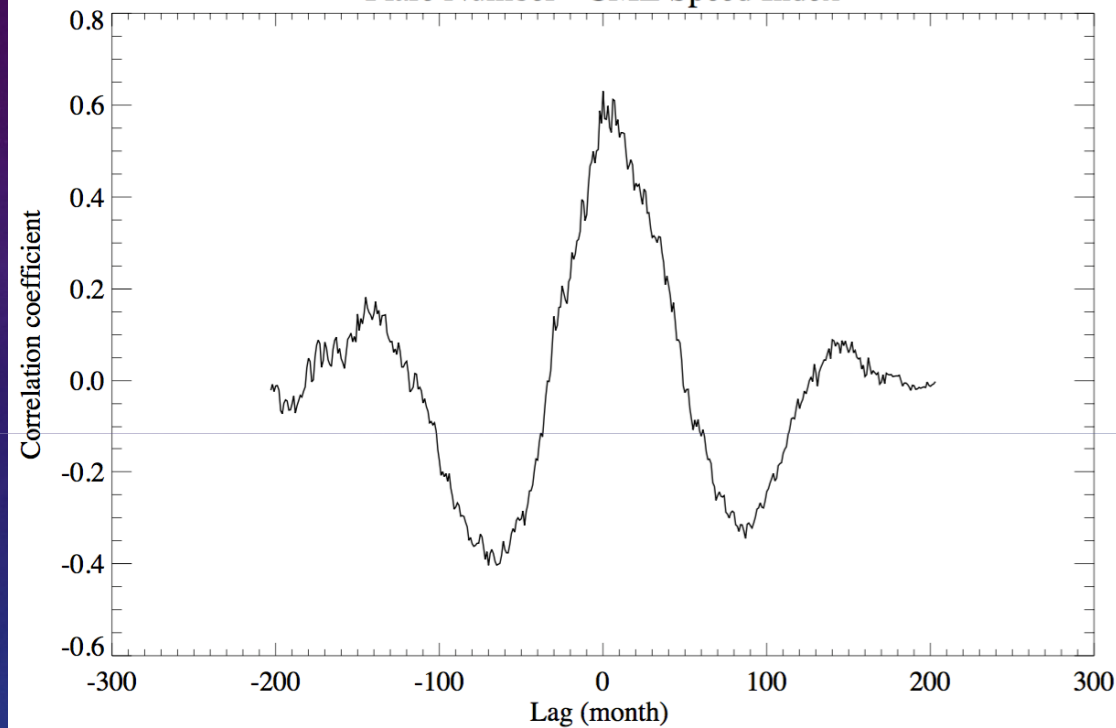
CROSS CORRELATION GRAPHS

Flare Peak Flux - CME Speed Index



Max cc = 0,60
Lag = 0 months

Flare Number - CME Speed Index



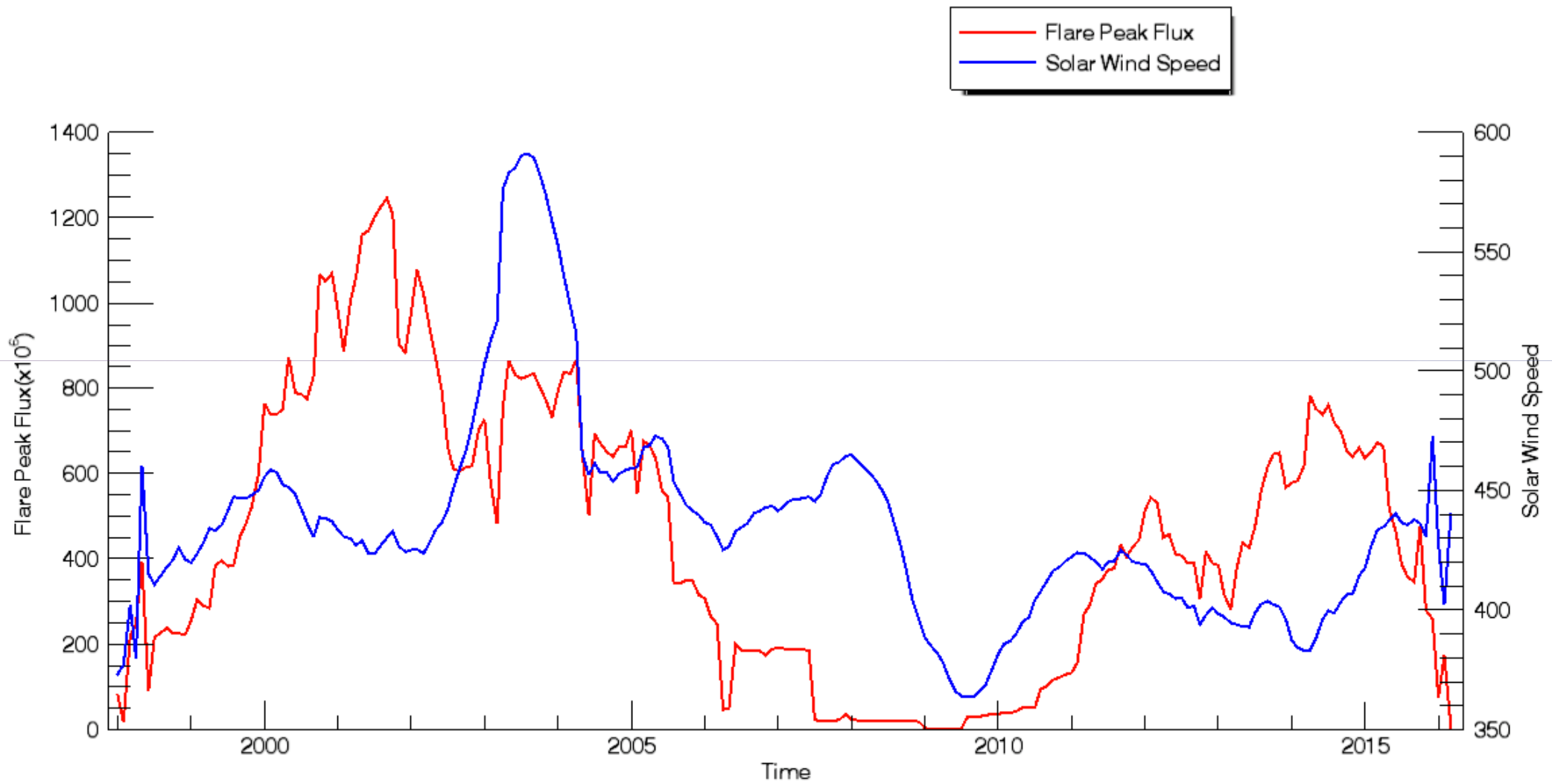
Max cc = 0,63
Lag = 0 months

RELATION WITH SOLAR WIND SPEED

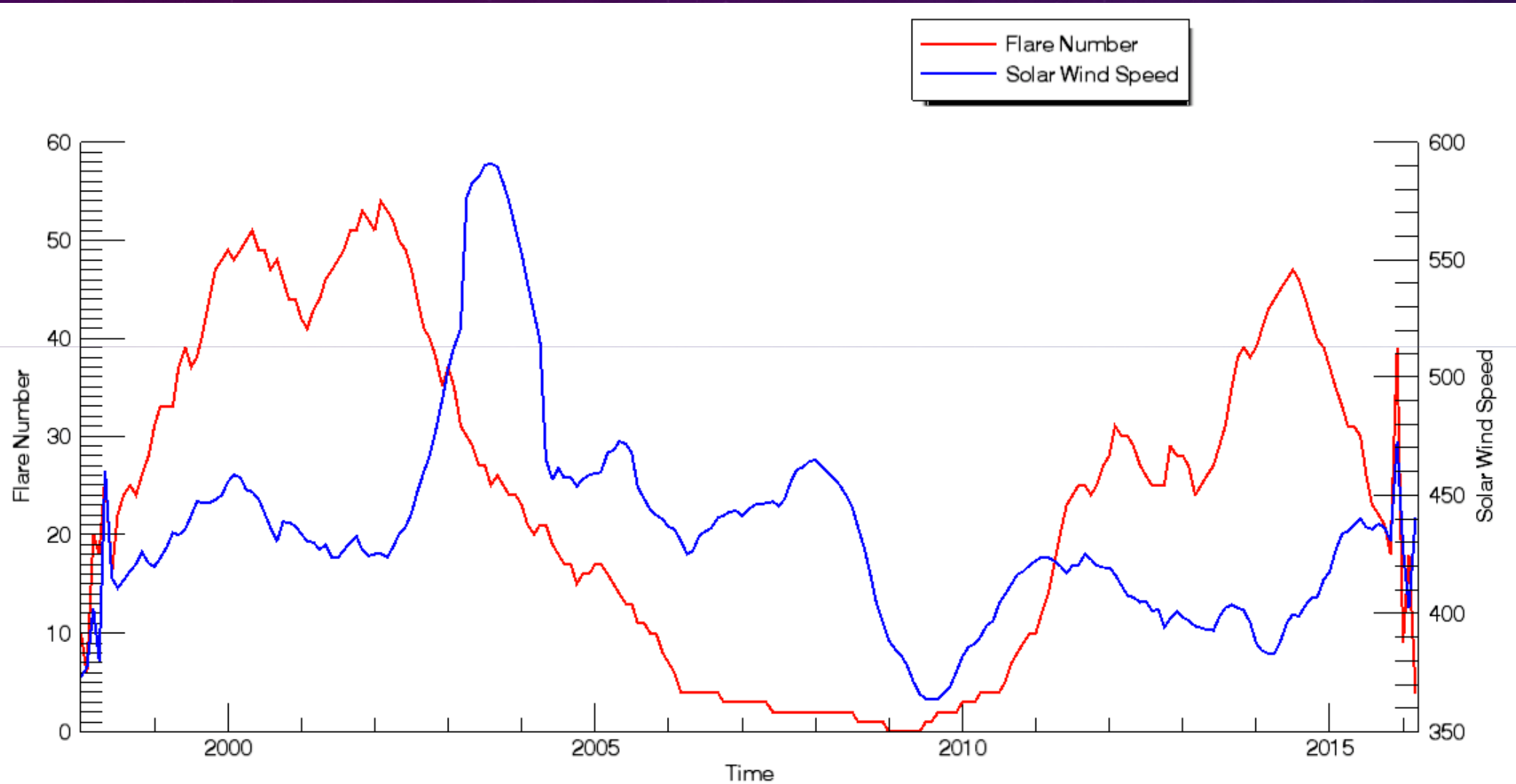
It is derived as monthly average of Solar Wind Speeds

It is the driving force of solar particles to reach Earth

Time Variations of Flare Peak Flux and Solar Wind Speed

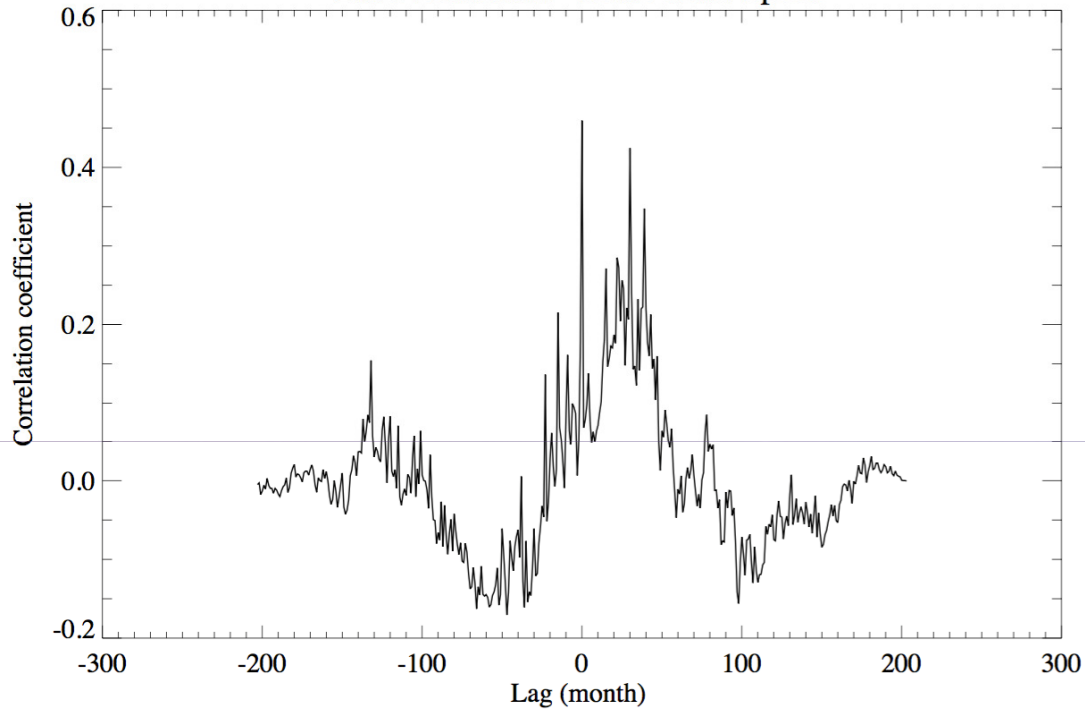


Time Variations of Flare Number and Solar Wind Speed



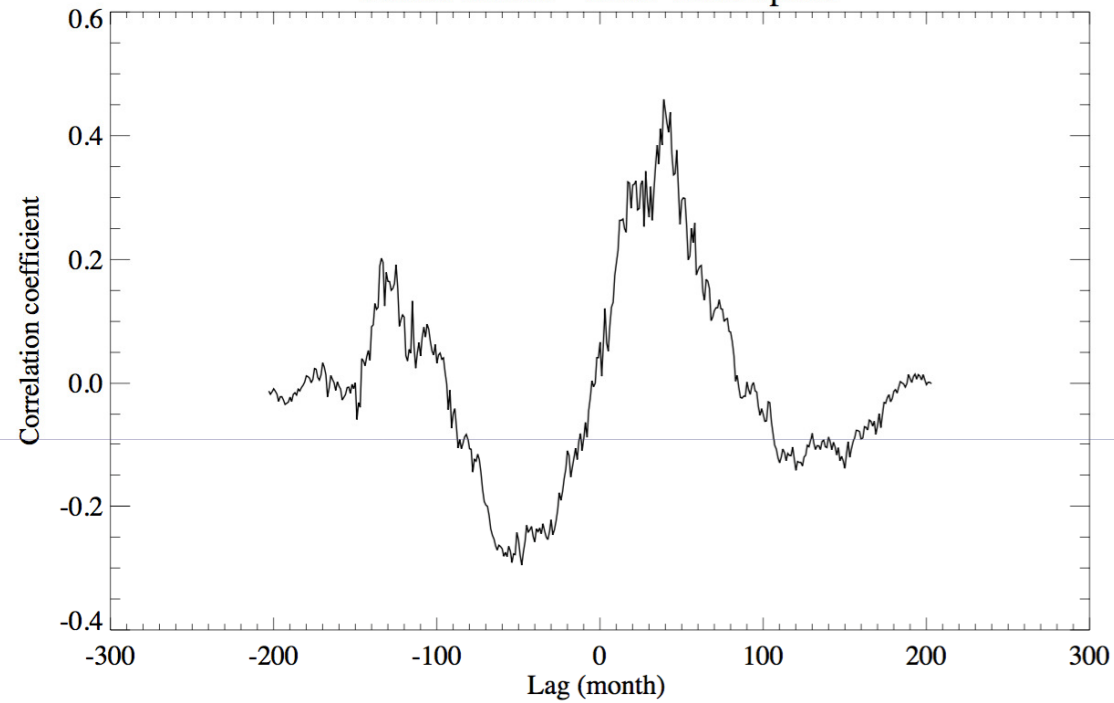
CROSS CORRELATION GRAPHS

Flare Peak Flux - Solar Wind Speed



Max cc = 0,46
Lag = 0 months

Flare Number - Solar Wind Speed



Max cc = 0,46
Lag = 39 months

	Flare Peak Flux					Flare Number			
	max cc	ro_plus	ro_minus	lag		max cc	ro_plus	ro_minus	lag
aa Index	0,54	0,63	0,44	0		0,57	0,65	0,47	16
Dst Index	-0,47	0,57	0,36	0		-0,41	0,52	0,30	16
AE Index	0,44	0,54	0,32	0		0,56	0,65	0,46	12
CME Speed Index	0,60	0,68	0,50	0		0,63	0,70	0,54	0
Solar Wind Speed	0,46	0,56	0,35	0		0,46	0,56	0,35	39
Flare Number	0,52	0,70	0,41	0		0,52	0,70	0,41	0

CONCLUSION

- Maximum correlation is found for CME Speed Index
- Flare peak flux could be used for geoeffectiveness
- Flare number effects has time delays