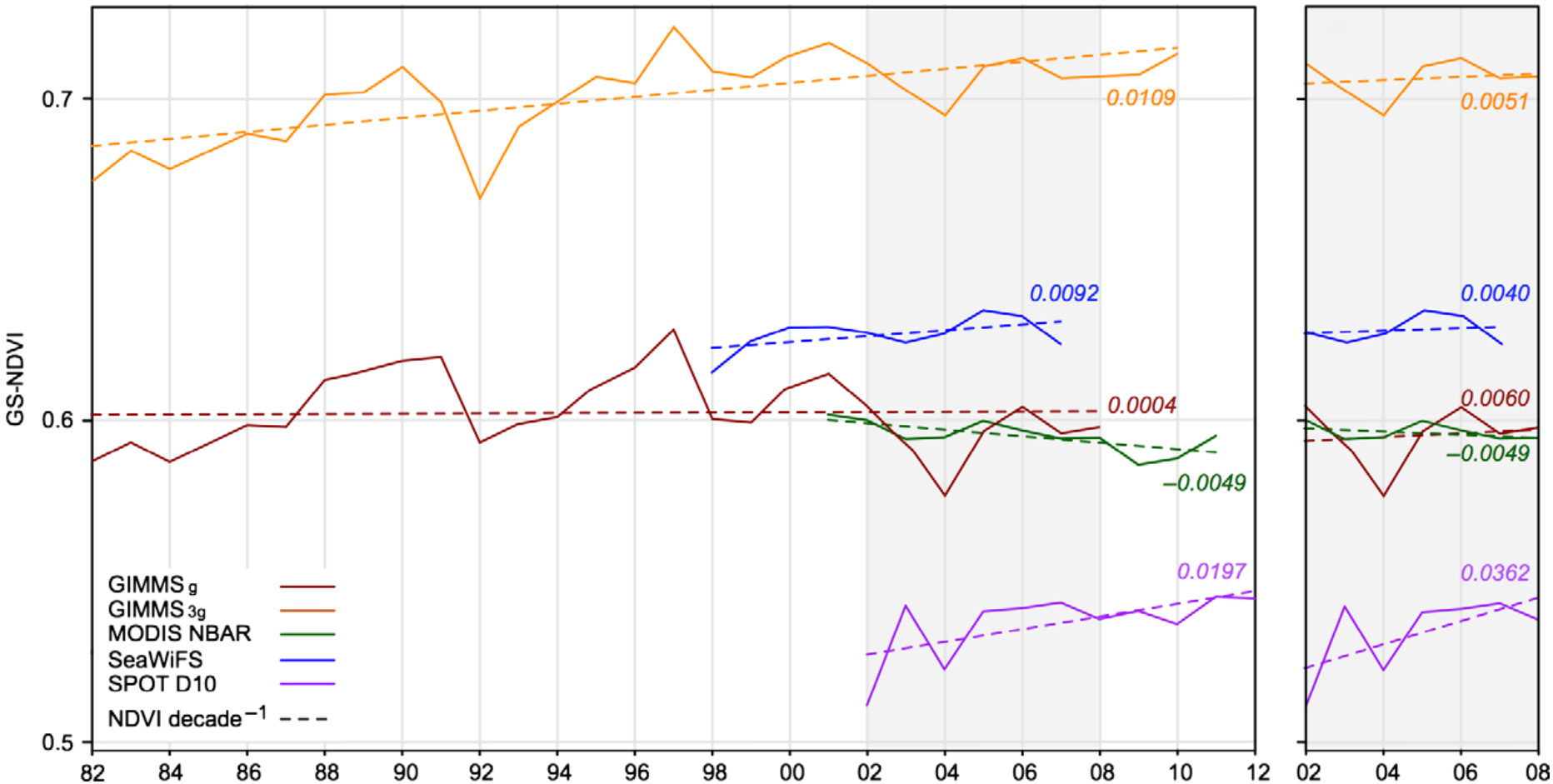
How to explain and reconcile the difference in plant productivity trends over a same tempo-spatial domain when different remote sensing datasets are used?

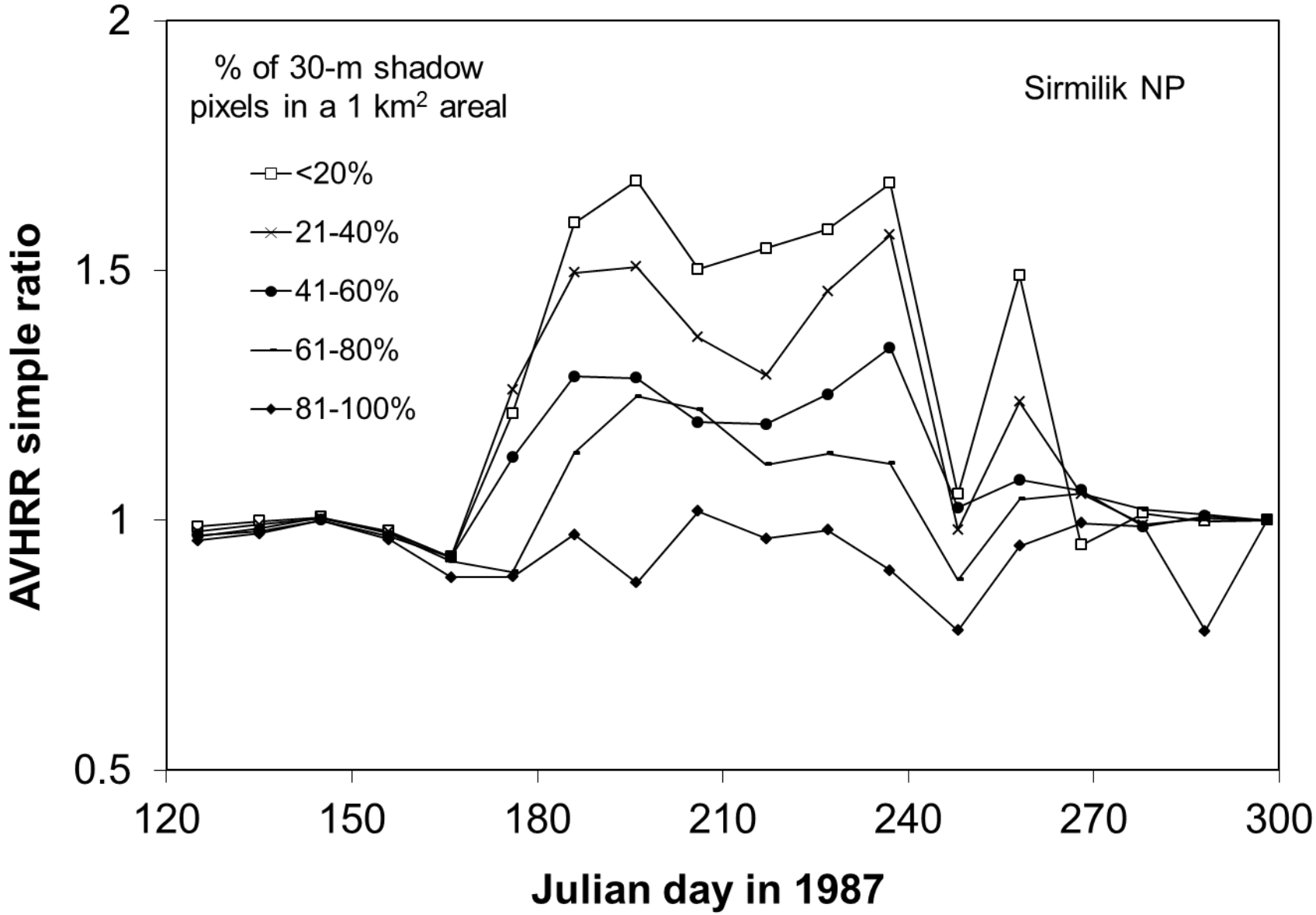
E.g., Guay et al. (2014, Global Change Biology), vegetated areas north of 50°N during 2002–2008

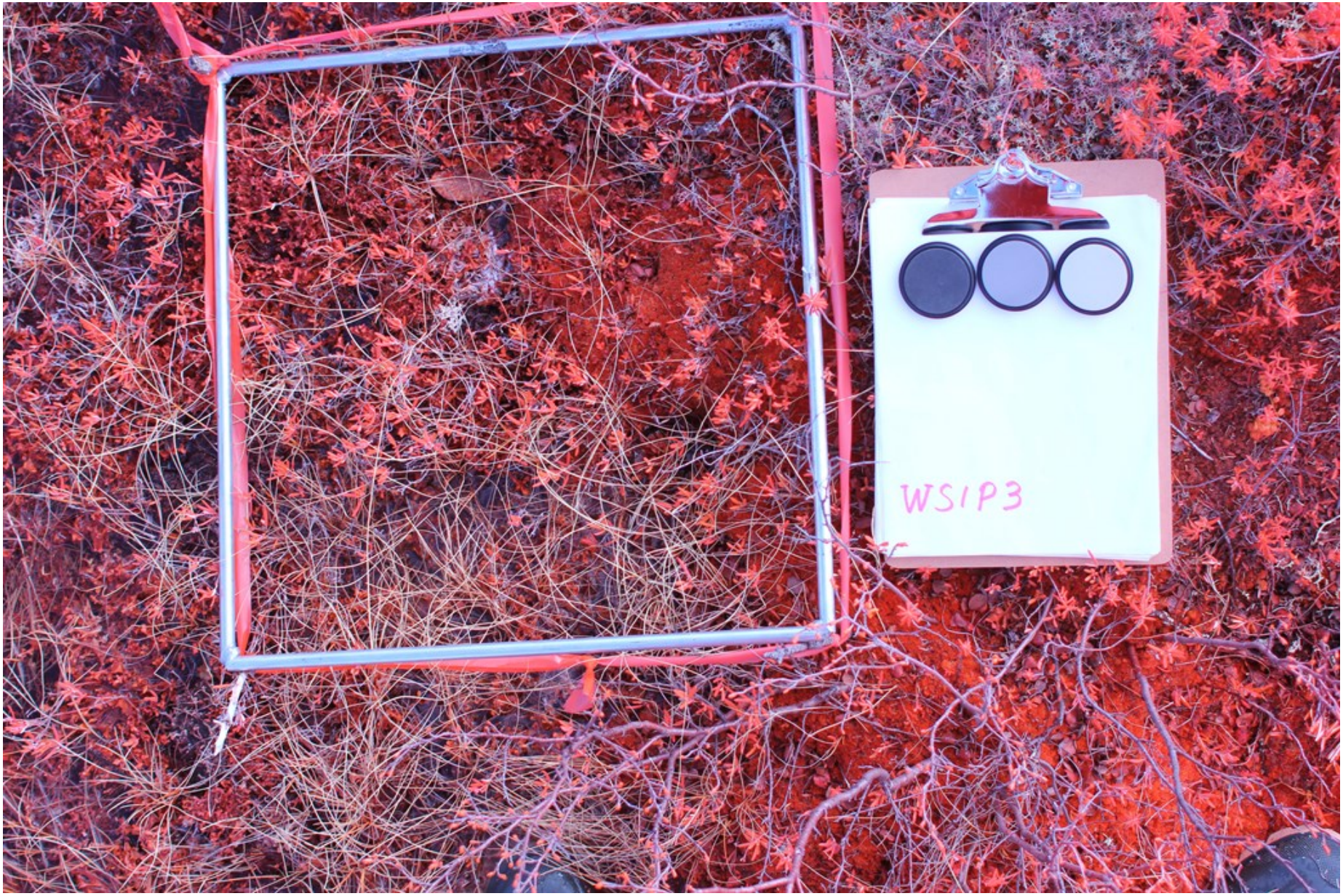


How to avoid the subjectivity in determining plant phenology using satellite remote sensing data?

Threshold definition (category, rationale)	Filtering/smoothing algorithms	Application area (reference)
AVHRR NDVI = 0.09 (1, citing Markon et al. 1995)	BISE filter + filling	Northern Alaska (Jia et al. 2004)
MODIS NDVI = 0.09 (1, citing Reed et al. 1994, Jia et al. 2004)	Double logistic	> 60ºN circumpolar (Zeng et al. 2011)
AVHRR NDVI = 0.2 (1, set at a value > 0.1, considering snow effect)	3-compsition moving max	Northern Asia (Suzuki et al. 2003)
AVHRR NDVI = 0.3 (1, not given)	No filtering /smoothing	North America (White et al. 2009)
SPOT-VGT NDVI = 0.4 (1, based on in-situ leaf appearance)	Filtering out data of NDSI < 0.4	Central Siberia (Delbart et al. 2005)
AVHRR $NDVI_{ratio}$ = 0.5 (2, time of max NDVI increase)	BISE filter	Continental USA (White et al. 1997)
Landsat $NDVI_{ratio}$ = 0.5 (2, most stable and well constrained point in the curve)	Double logistic	New England, USA (Fisher et al. 2006)
PAT50: 50% pixels in a phenoregion of $NDVI_{ratio}$ > 0.5 (2, citing White et al. 1997)	No filtering/ smoothing	Eastern Canada (White and Nemani 2006)
AVHRR $NDVI_{ratio}$ = 0.1 (2, not given)	Asymmetric Gaussian + upper enveloping	Africa (Jonsson and Eklundh 2002)
MODIS $NDVI_{ratio}$ = 0.1 (2, not given)	6 noise-reduction techniques	Alberta, Canada (Hird and McDermid 2009)
0.2 spring SPOT-VGT NDSI amplitude (2, in situ leaf appearance & estimated error)	Filtering out data of NDSI < 0.4	Central Siberia (Delbart et al. 2005)
Max curvature point of a logistic fit to MODIS EVI (3, Not given)	Piecewise logistic	New England (Zhang et al. 2003)
Moving average crossing smoothed AVHRR NDVI (3, a sudden increase signals the onset)	line-smoothing	Continental USA (Reed et al. 1994)

How to account for the influence of shadow and bare surface on remote sensing signals and vegetation indices when monitoring plant growth and phenology over the Arctic?




WS1P3

How to make remote sensing more relevant to decision making on key issues in the Arctic, e.g., resource development vs. protection of environment (including water, land, and wildlife)?

- **Different R/S trends over a same target**
- **Subjectivity in R/S threshold and seasonal profile**
- **Effects of shadow and background in arctic**
- **Relevancy to policy making**