	ERA-Interim	ERA5
Model version	**August 2006 (IFS Cy31r2)**	**September 2015 (IFS Cy41r2)**
Model boundary conditions	As in forecasting (inconsistent SST)	Appropriate for climate (CMIP5, HadISST.2)
Spatial resolution	79 km global 60 levels to 10 Pa	31 km global 137 levels to 1 Pa
Time period	1979 - present	1979 - present (extension to ~1950?)
Dissemination	Monthly	Monthly for ERA5; daily for ERA5T
Observations	Mostly ERA-40, GTS	Various reprocessed CDRs
Radiative transfer	RTTOV7	RTTOV11
Analysis method	4D-Var 1D+4DVar rain	10-member EDA All-sky radiance assimilation
Variational bias corrections	Satellite radiances	Radiances, ozone, aircraft, surface pressure, radiosondes

Satellite data assimilated in ERA-Interim (1979 – present)

Microwave radiances
- temperature sounding
- water vapor sounding

Infrared radiances
- temperature and water vapor sounding
- stratospheric temperature sounding

Imagery — visible, near infrared, water vapor

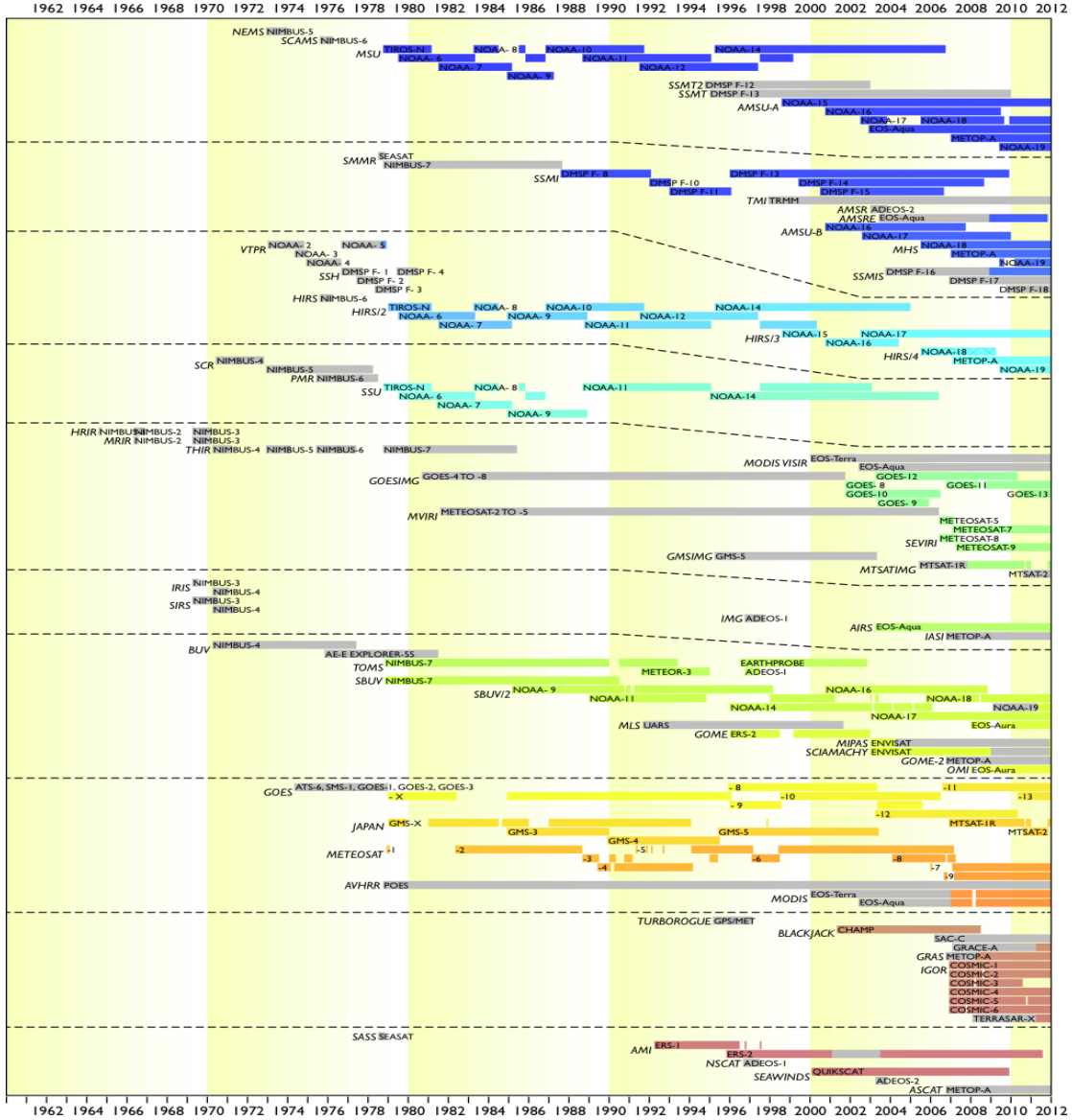
Hyper-spectral infrared

Ozone
- mostly ultra-violet, some limb-viewing infrared

Atmospheric motion vectors
- geostationary (GEO)
- low-earth orbit (LEO)

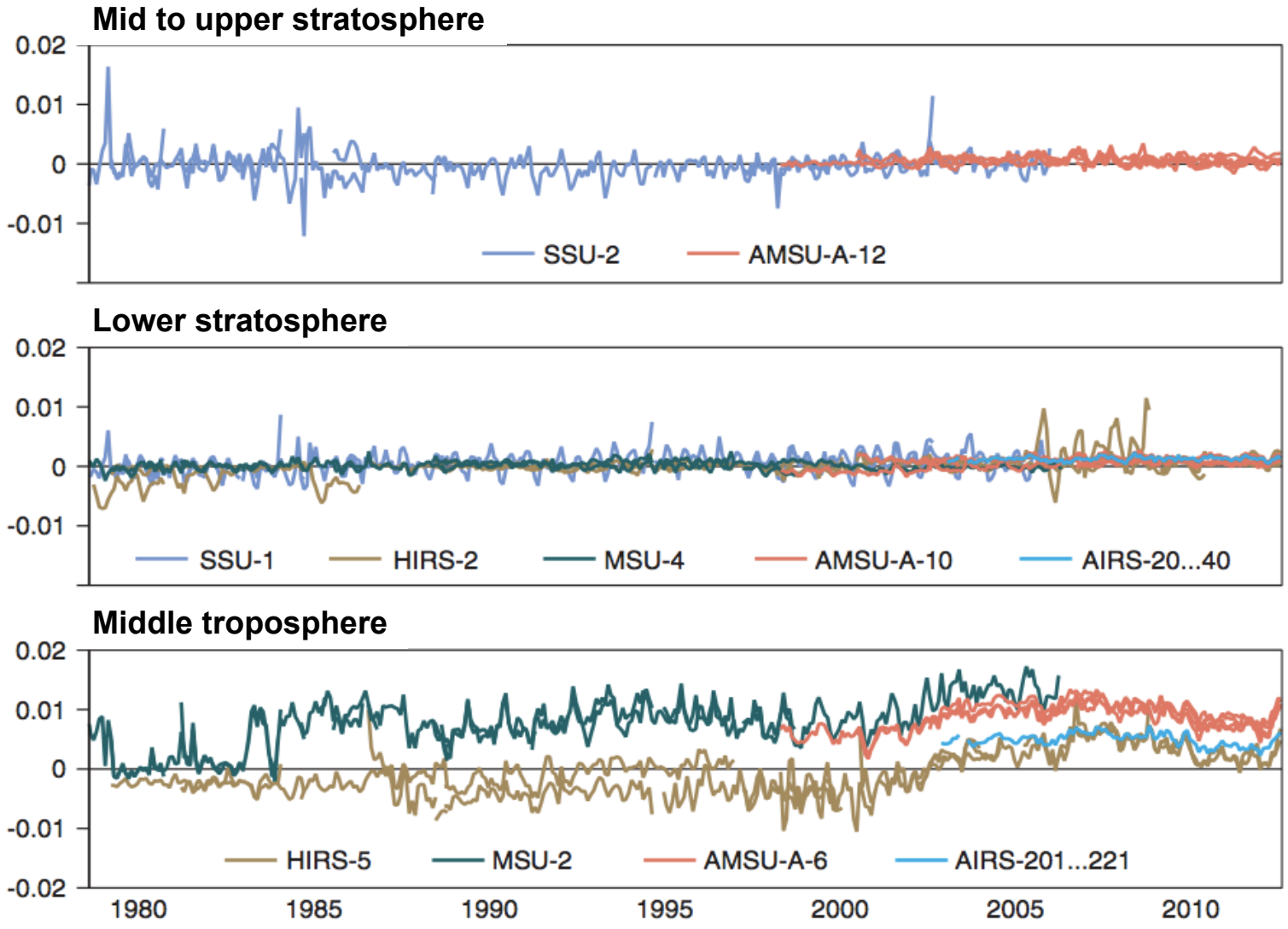
Bending angles from GPS radio occultation

Backscatter — near-surface wind above ocean



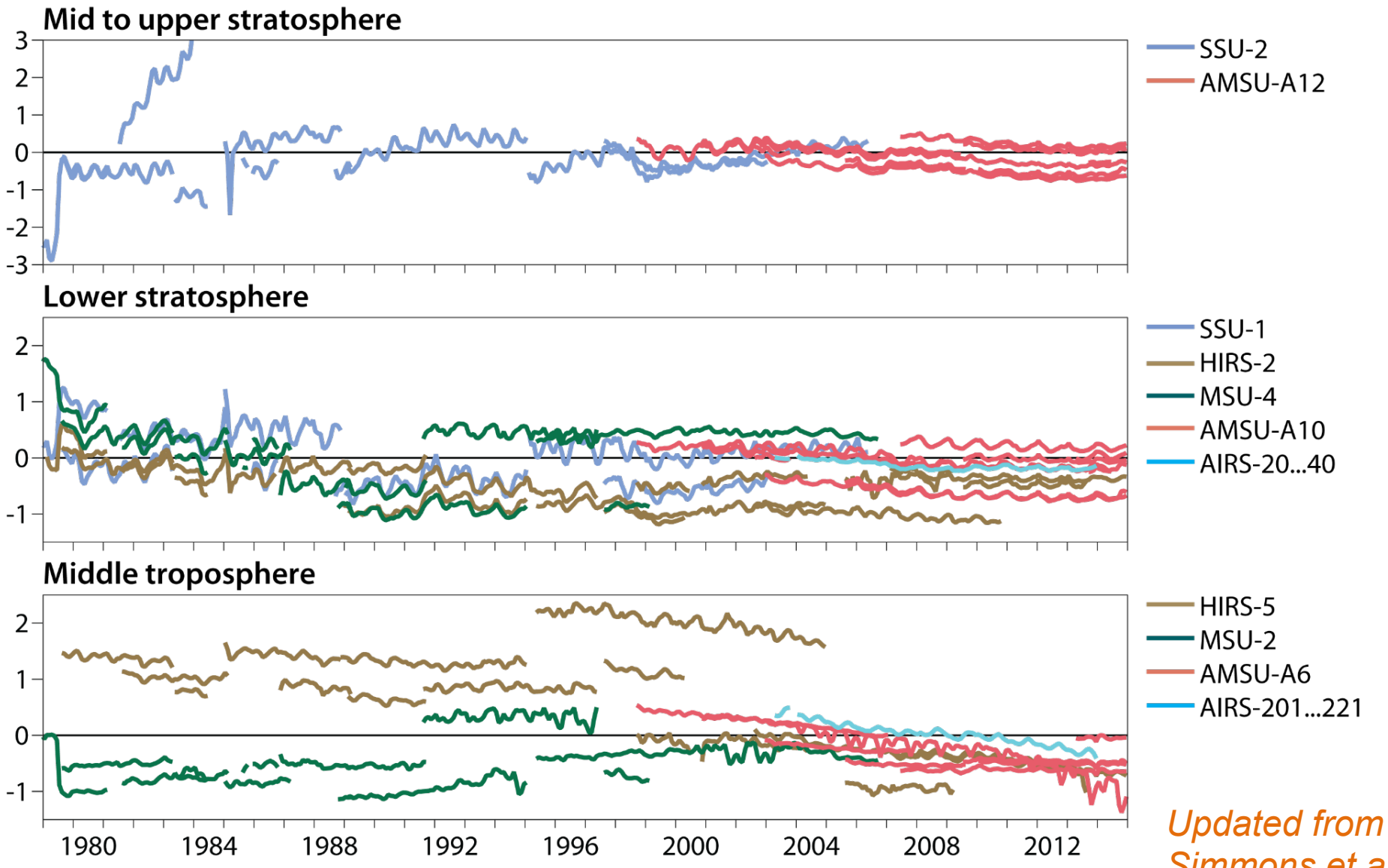
ECMWF

Global mean fit [K] to selected temperature sounding channels



Simmons et al, QJ 2014

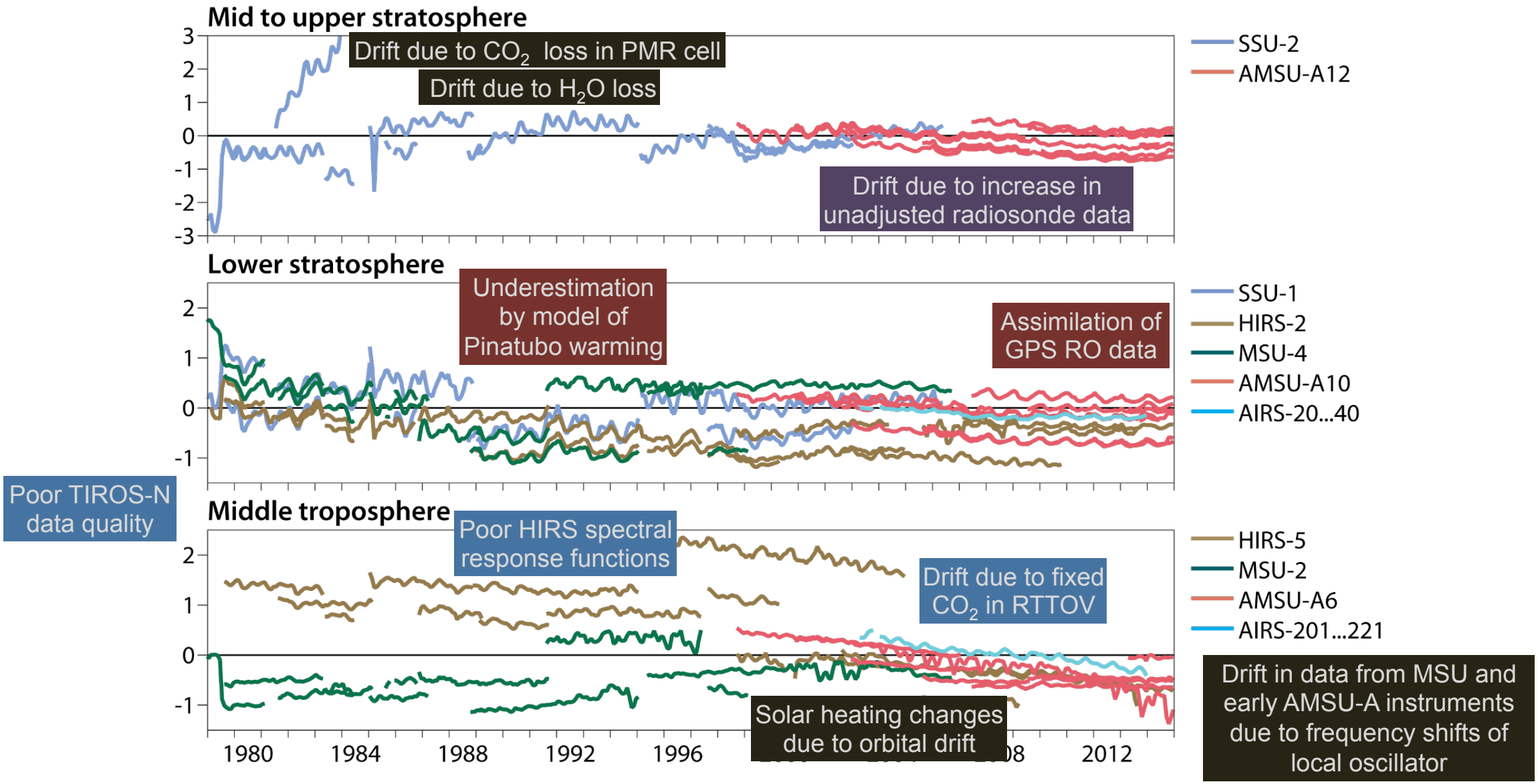
Quality feedback on Climate Data Records: Bias adjustments [K]



Updated from Simmons et al, QJ 2014

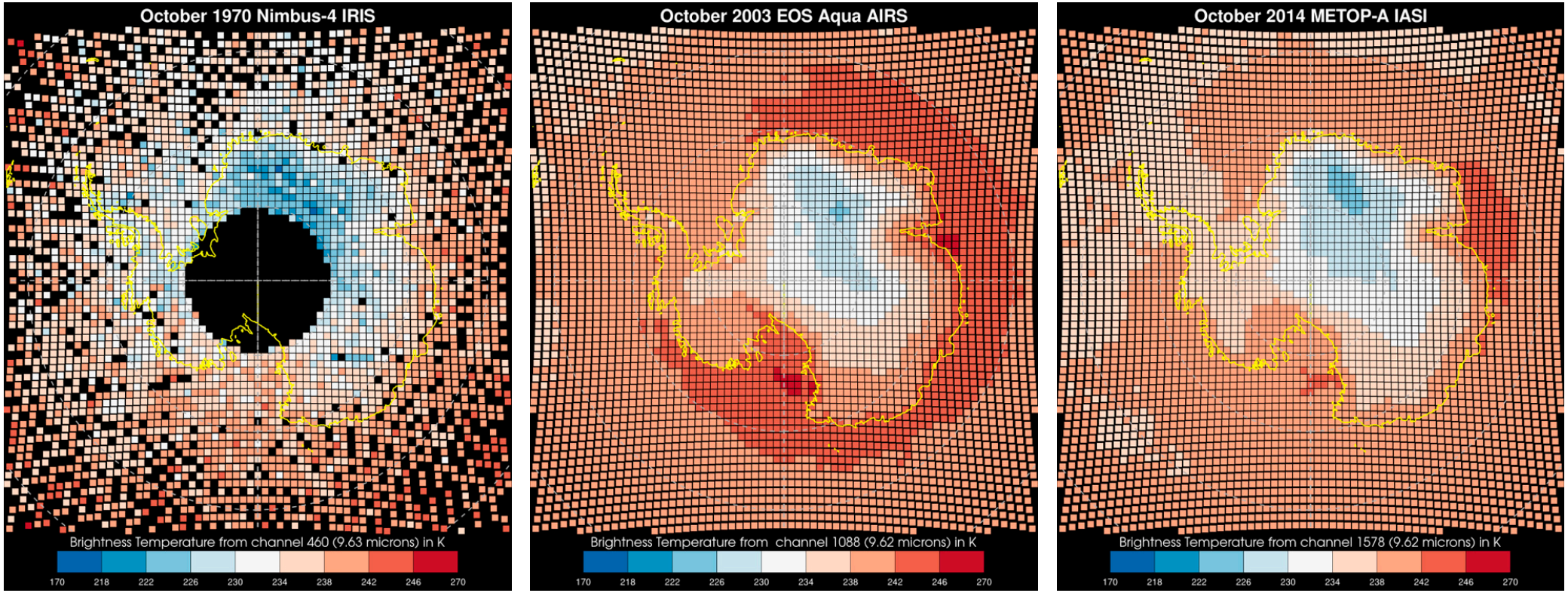
ECMWF

Quality feedback on Climate Data Records: Lessons learned



Cao et al. (2009), Dee and Uppala (2009), Kobayashi et al. (2009), Chung and Soden (2011), Nash and Saunders (2013), Saunders et al. (2013), Lu and Bell (2014), Simmons et al. (2014), …

NIMBUS-4 IRIS: Extending the usable satellite data record for ozone



http://www.ecmwf.int/en/about/media-centre/news/2015/climate-reanalysis-data-challenge

ECMWF master plan for reanalysis productions

Reanalysis productions	2014	2015	2016	2017	2018	2019
ERA-Interim **ERA-Interim/Land**	1979–NRT, 79km resolution					
ERA-20C **ERA-20CM** **ERA-20C/Land**	20th-century atmospheric reanalysis 1900–2010, 125km resolution					
ERA5 **ERA5/Land**	ERA-Interim successor 1979–NRT, 31km resolution					
CERA-20C **CERA-20C/Carbon**	20th-century atmos / ocean reanalysis 1900-2010, 125km/1x1					
ERA6 **ERA6/Carbon**	ERA5 successor coupled with ocean?					

Copernicus The European Earth Observation Programme Climate Change Service (C3S)

ECMWF

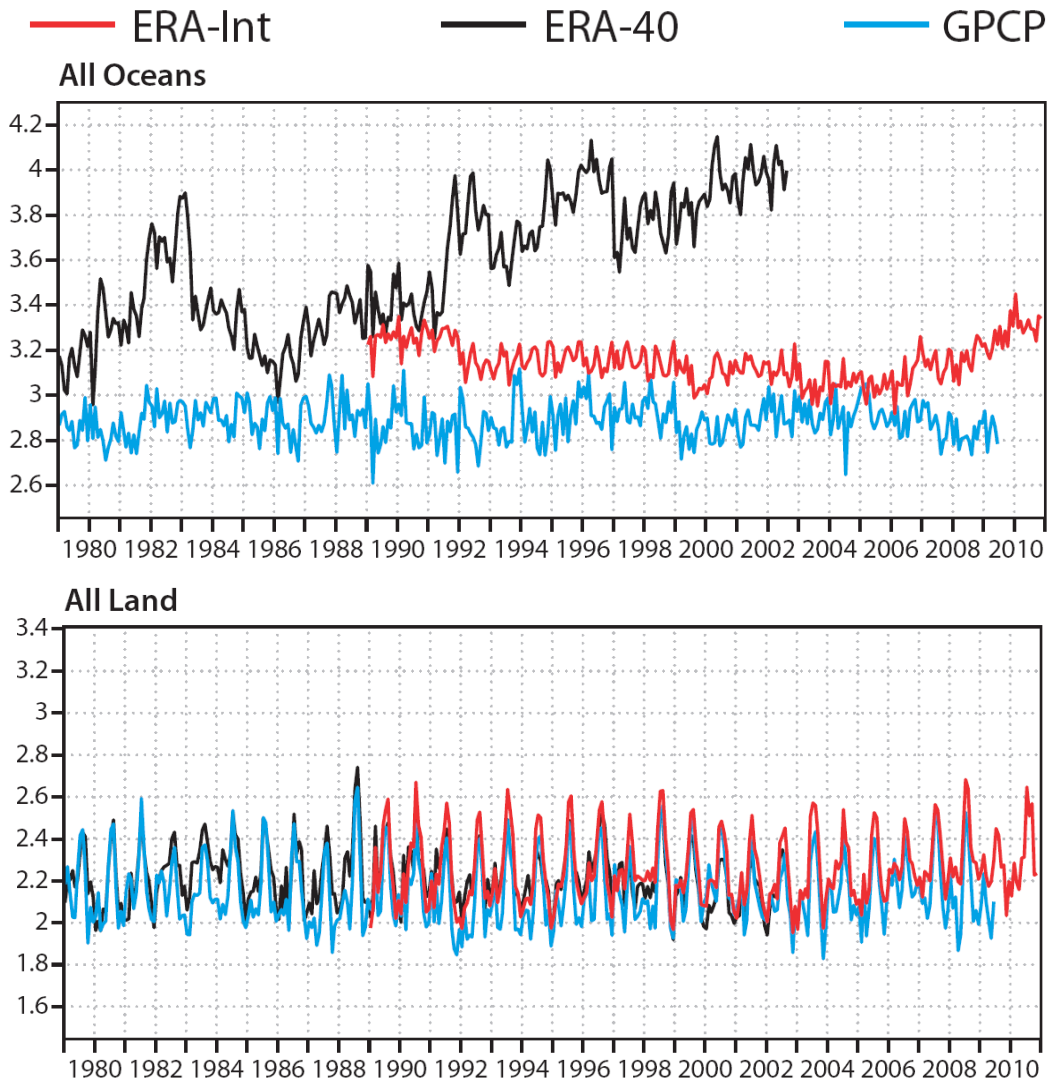
CRA CLIM → CRA CLIM2 →

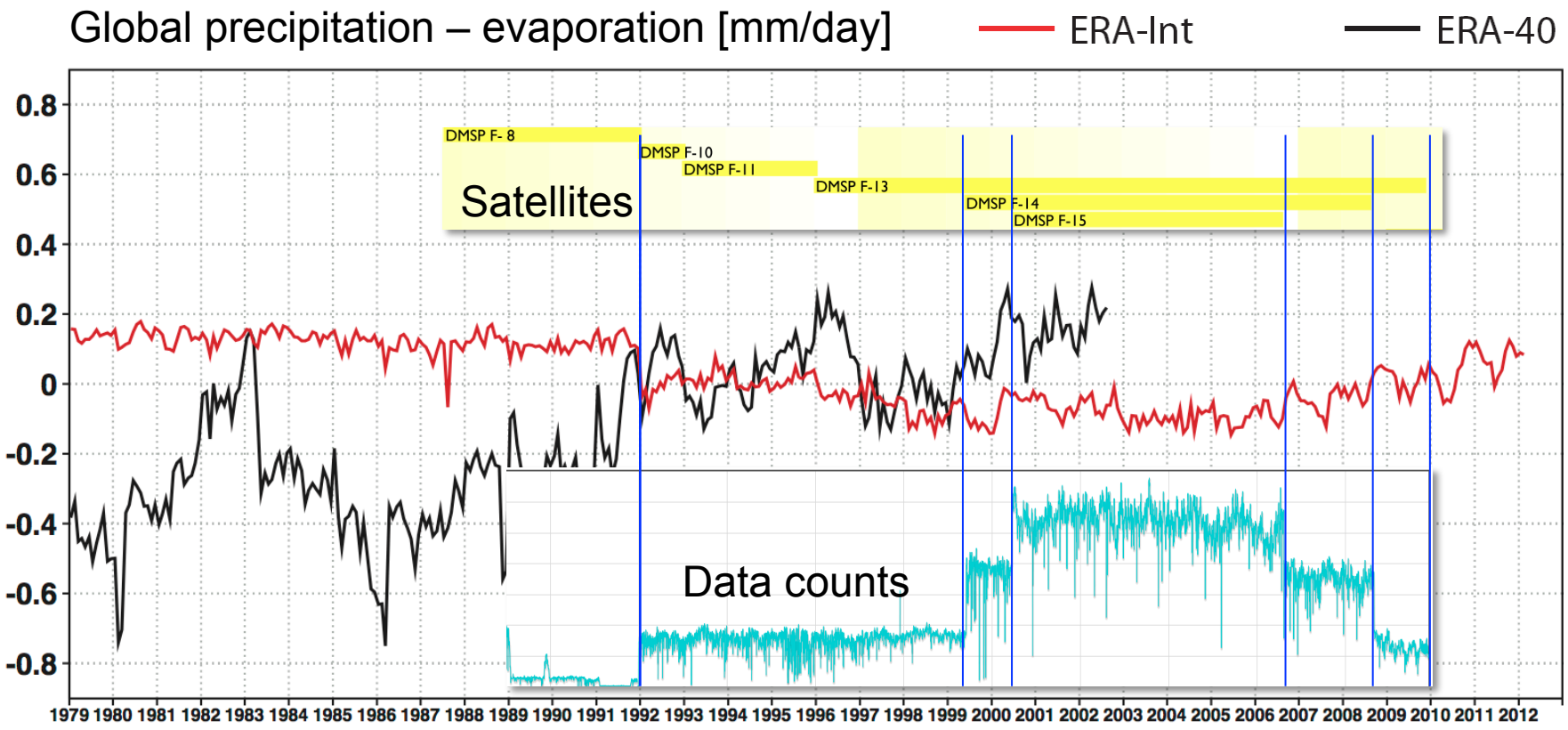
A difficult challenge: Reanalysis of the hydrological cycle

Comparison of monthly averaged rainfall with combined rain gauge and satellite products (GPCP)

The hydrological cycle in reanalysis is generated by the model based on observations of temperature and humidity

ERA-Interim estimates of rainfall over ocean still problematic



ECMWF

Unphysical shifts due to assimilation of rain-affected SSM/I radiances