

Supplementary Information

McSweeney *et al*, ‘Selecting CMIP5 GCMs for downscaling over multiple regions’

Table S1: Details of CMIP5 GCMs analysed (models with 6hrly instantaneous variables available for use in RCM experiments are highlighted in grey).

Modelling Group	Group Acronym	Model Designation
Commonwealth Scientific and Industrial Research Organization (CSIRO) and Bureau of Meteorology (BOM), Australia	CSIRO-BOM	ACCESS1-0
Commonwealth Scientific and Industrial Research Organization (CSIRO) and Bureau of Meteorology (BOM), Australia	CSIRO-BOM	ACCESS1-3
Beijing Climate Center, China Meteorological Administration	BCC	bcc-csm1-1
Beijing Climate Center, China Meteorological Administration	BCC	bcc-csm1-1-m
College of Global Change and Earth System Science, Beijing Normal University	GCESS	BNU-ESM
Canadian Centre for Climate Modelling and Analysis	CCCMA	CanESM2
National Center for Atmospheric Research	NCAR	CCSM4
Community Earth System Model Contributors	NSF-DOE-NCAR	CESM1-CAM5
Community Earth System Model Contributors	NSF-DOE-NCAR	CESM1-WACCM
Centro Euro-Mediterraneo per I Cambiamenti Climatici	CMCC	CMCC-CESM
Centro Euro-Mediterraneo per I Cambiamenti Climatici	CMCC	CMCC-CM
Centro Euro-Mediterraneo per I Cambiamenti Climatici	CMCC	CMCC-CMS
Centre National de Recherches Météorologiques / Centre Européen de Recherche et Formation Avancée en Calcul Scientifique	CNRM-CERFACS	CNRM-CM5
Commonwealth Scientific and Industrial Research Organization in collaboration with Queensland Climate Change Centre of Excellence	CSIRO-QCCCE	CSIRO-Mk3-6-0
EC-EARTH consortium	ICHEM	EC-EARTH
LASG, Institute of Atmospheric Physics, Chinese Academy of Sciences and CESS, Tsinghua University	LASG-CESS	FGOALS-g2
The First Institute of Oceanography, SOA, China	FIO	FIO-ESM
NOAA Geophysical Fluid Dynamics Laboratory	NOAA GFDL	GFDL-CM3
NOAA Geophysical Fluid Dynamics Laboratory	NOAA GFDL	GFDL-ESM2G
NOAA Geophysical Fluid Dynamics Laboratory	NOAA GFDL	GFDL-ESM2M
NASA Goddard Institute for Space Studies	NASA-GISS	GISS-E2-H
NASA Goddard Institute for Space Studies	NASA-GISS	GISS-E2-H-CC
NASA Goddard Institute for Space Studies	NASA-GISS	GISS-E2-R
NASA Goddard Institute for Space Studies	NASA-GISS	GISS-E2-R-CC
Met Office Hadley Centre	MOHC	HadCM3
Met Office Hadley Centre	MOHC	HadGEM2-CC
Met Office Hadley Centre	MOHC	HadGEM2-ES
National Institute of Meteorological Research/Korea Meteorological Administration	NIMR/KMA	HadGEM2-A0
Institute for Numerical Mathematics	INM	inmcm4
Institut Pierre-Simon Laplace	IPSL	IPSL-CM5A-LR
Institut Pierre-Simon Laplace	IPSL	IPSL-CM5A-MR
Institut Pierre-Simon Laplace	IPSL	IPSL-CM5B-LR
Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies	MIROC	MIROC-4h
Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies	MIROC	MIROC5
Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies	MIROC	MIROC-ESM
Japan Agency for Marine-Earth Science and Technology, Atmosphere and Ocean Research Institute (The University of Tokyo), and National Institute for Environmental Studies	MIROC	MIROC-ESM-CHEM
Max-Planck-Institut für Meteorologie (Max Planck Institute for Meteorology)	MPI-M	MPI-ESM-LR
Max-Planck-Institut für Meteorologie (Max Planck Institute for Meteorology)	MPI-M	MPI-ESM-MR
Max-Planck-Institut für Meteorologie (Max Planck Institute for Meteorology)	MPI-M	MPI-ESM-P
Meteorological Research Institute	MRI	MRI-CGCM3
Norwegian Climate Centre	NCC	Nor-ESM1-M
Norwegian Climate Centre	NCC	Nor-ESM1-ME

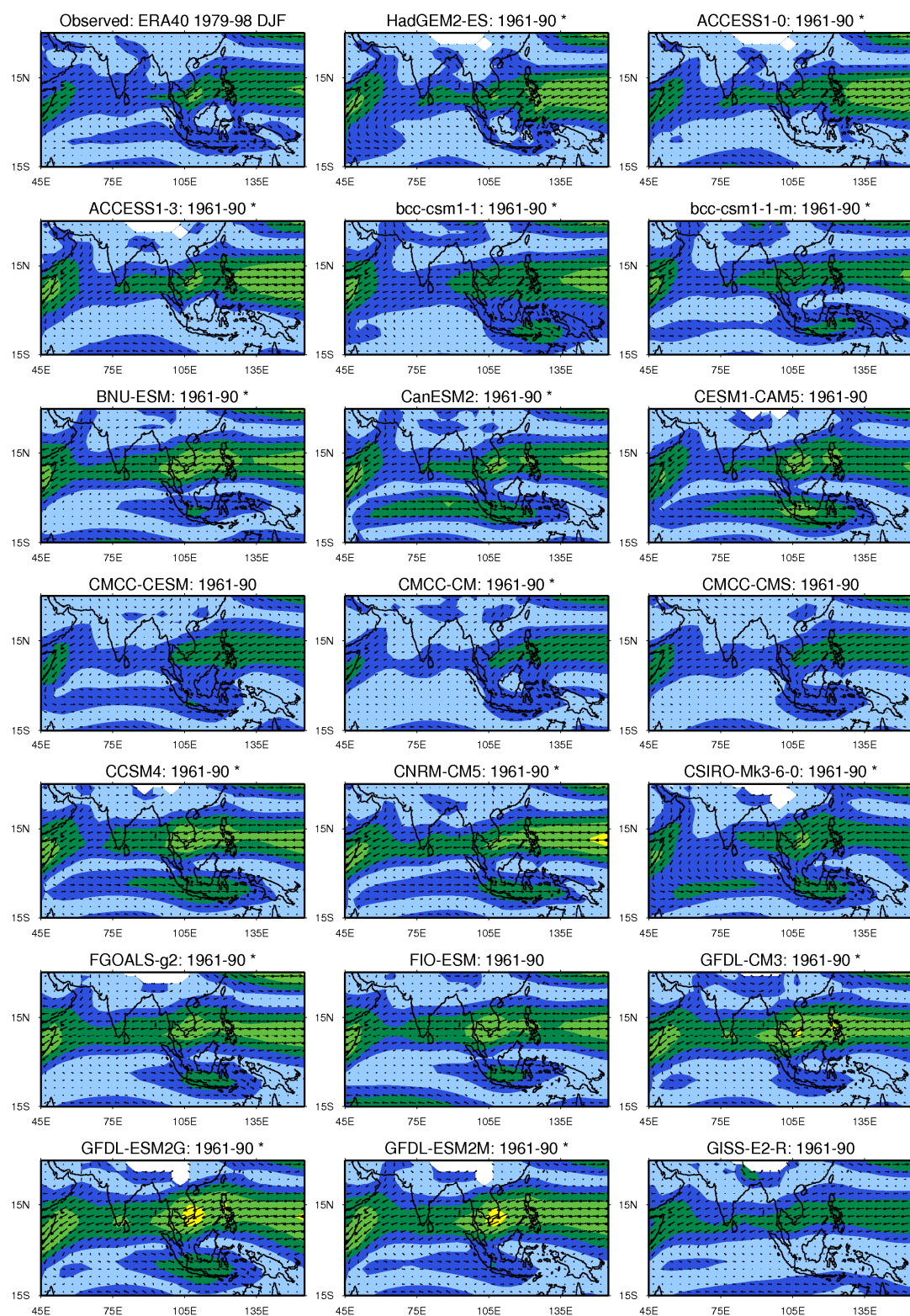


Figure S1(a): The North-East (Winter) Asian Monsoon circulation in 850hpa flow for ERA40 reanalyses (Uppala *et al*, 2001) and CMIP5 models (see Figure SA1(b) for colour scale).

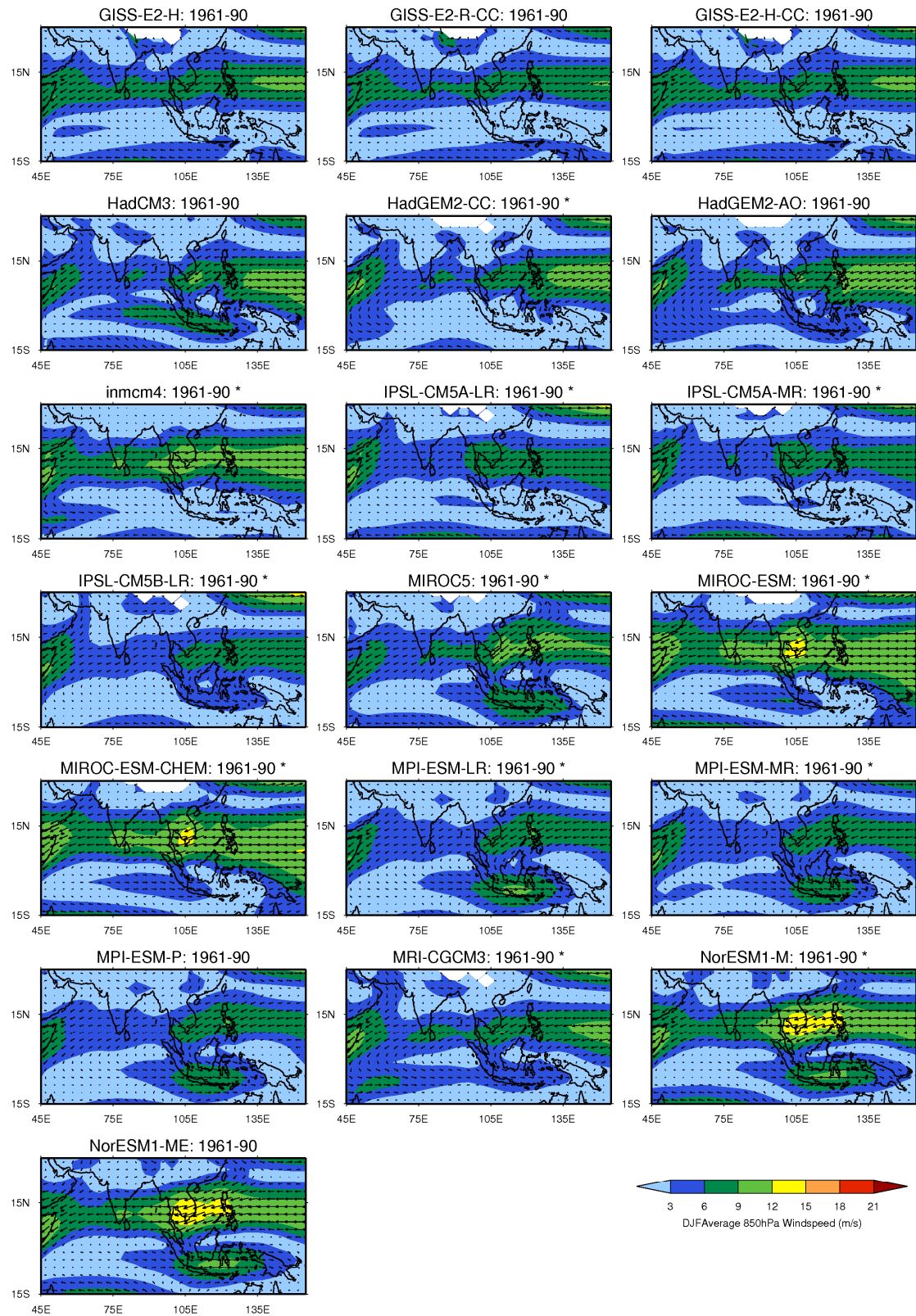


Figure S1(b): The North-East (winter) Asian Monsoon circulation in 850hpa flow for ERA40 reanalyses and CMIP5 models.

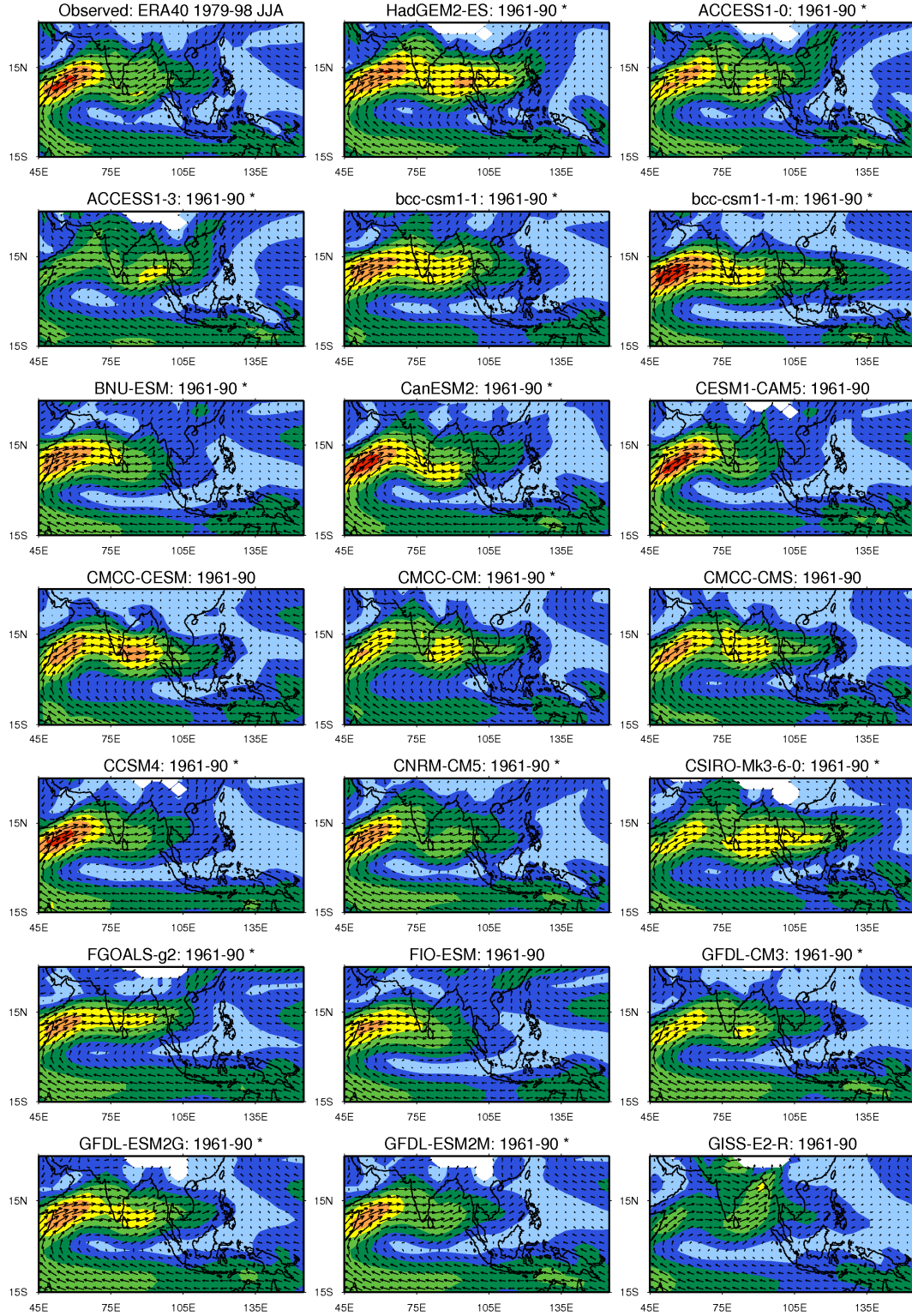


Figure S2(a): The South West (Summer) Asian Monsoon circulation in 850hpa flow for ERA40 reanalyses and CMIP5 models (See fig S2(b) for colour scale).

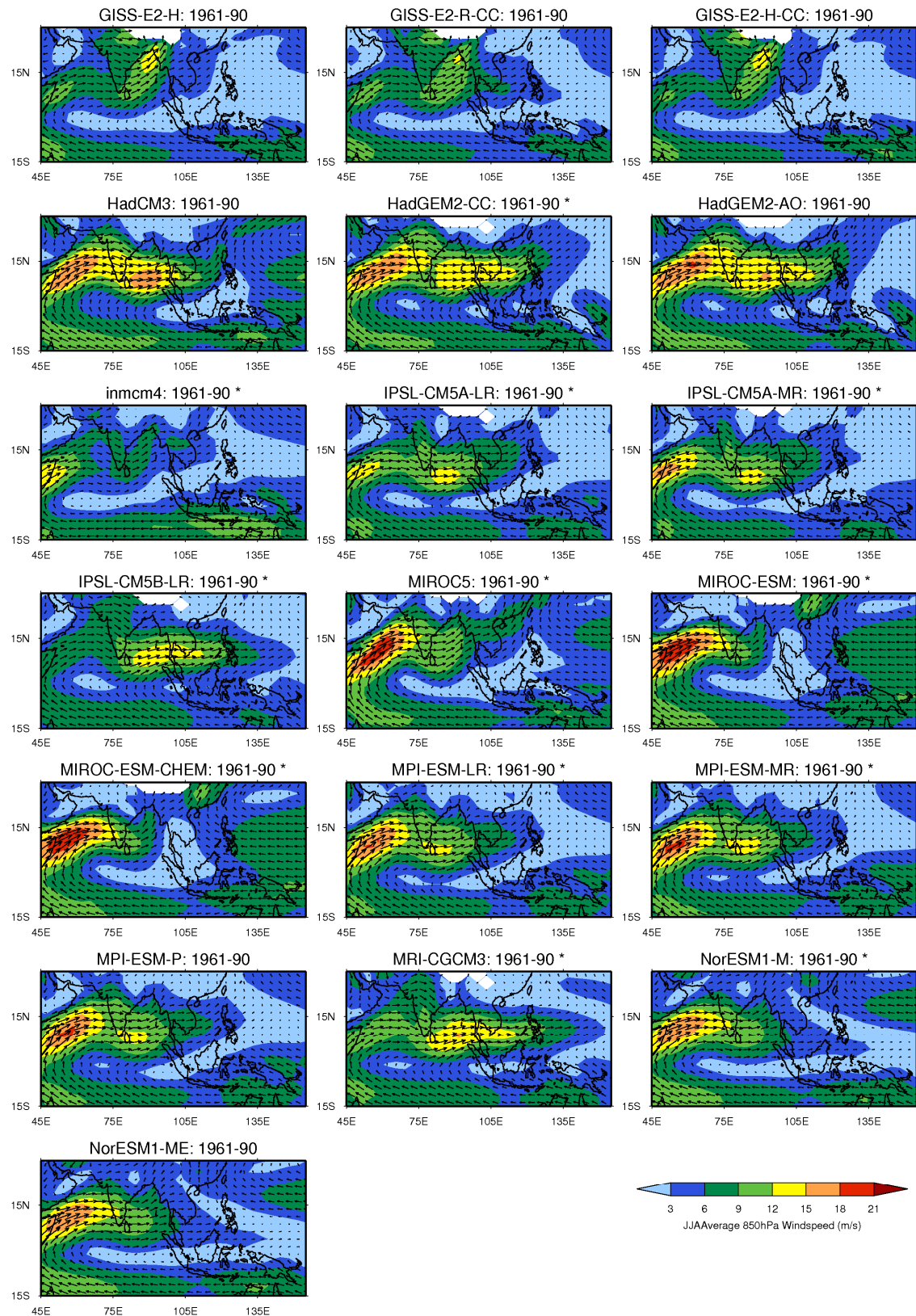


Figure S2(b): The South West (Summer) Asian Monsoon circulation in 850hpa flow for ERA40 reanalyses and CMIP5 models.

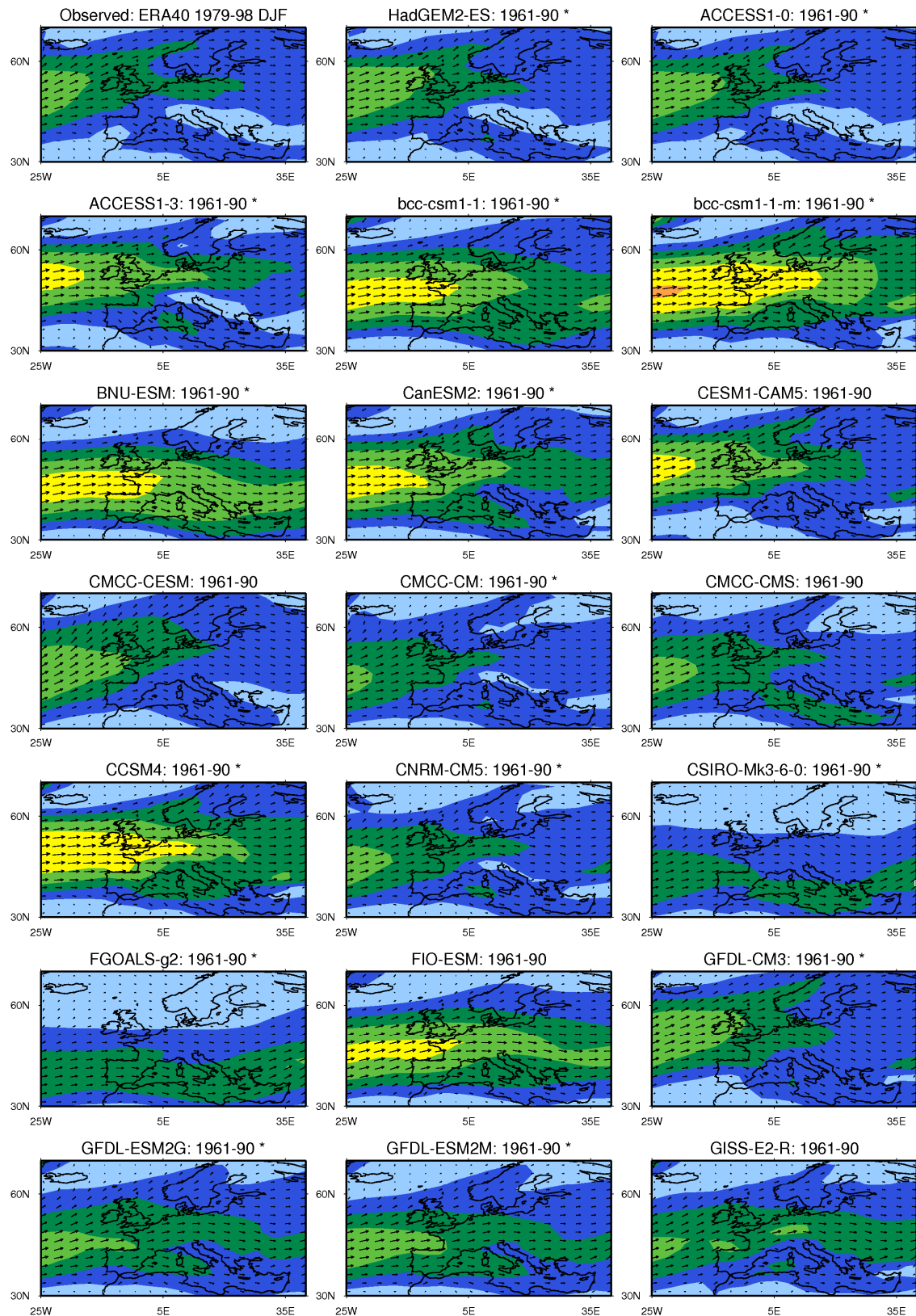


Figure S3(a): Winter 850hpa flow for ERA40 reanalyses and CMIP5 models for Europe (see Fig S3 (b). for colour scale).

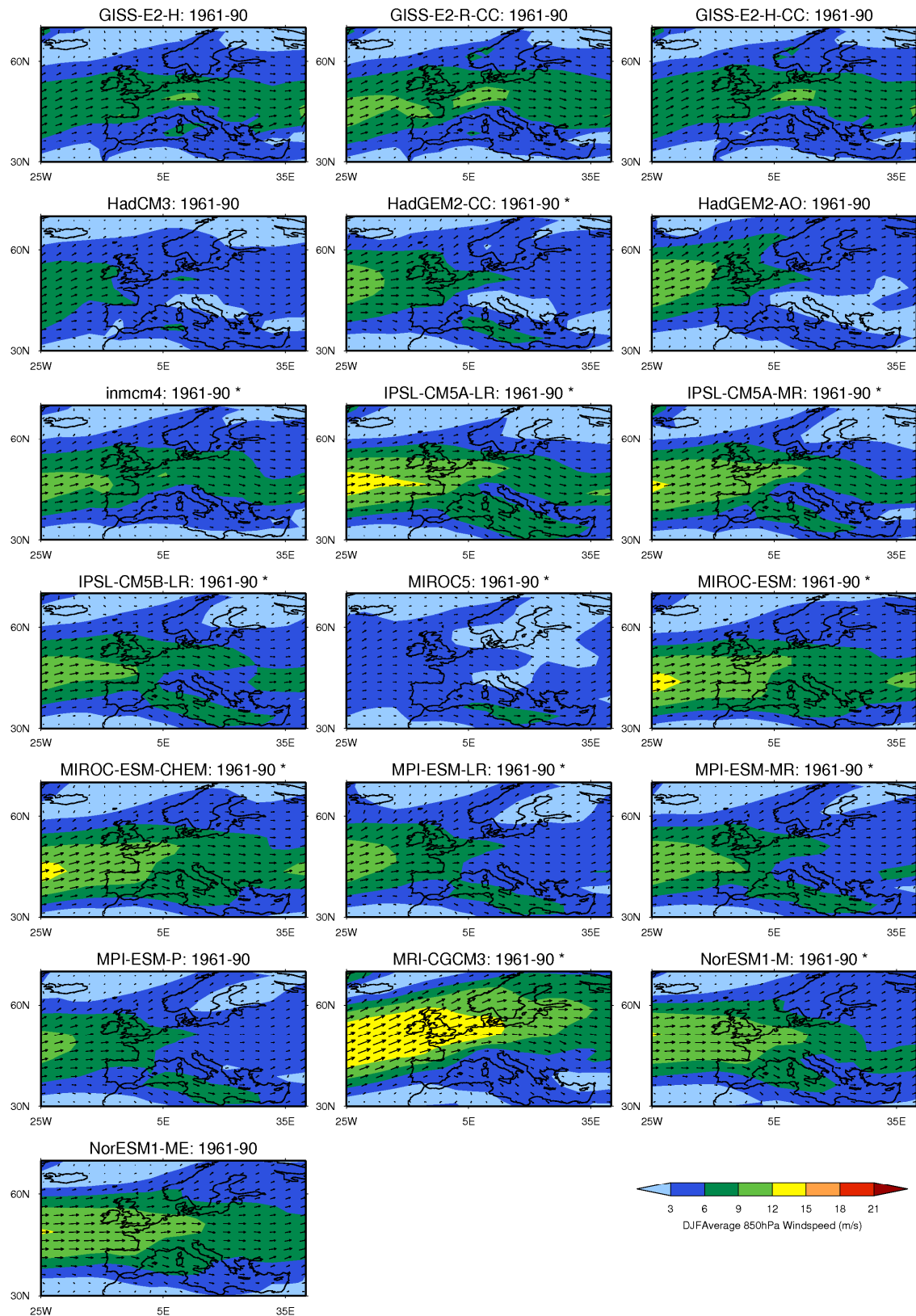


Figure S3(b): Winter 850hpa flow for ERA40 reanalyses and CMIP5 models for Europe.

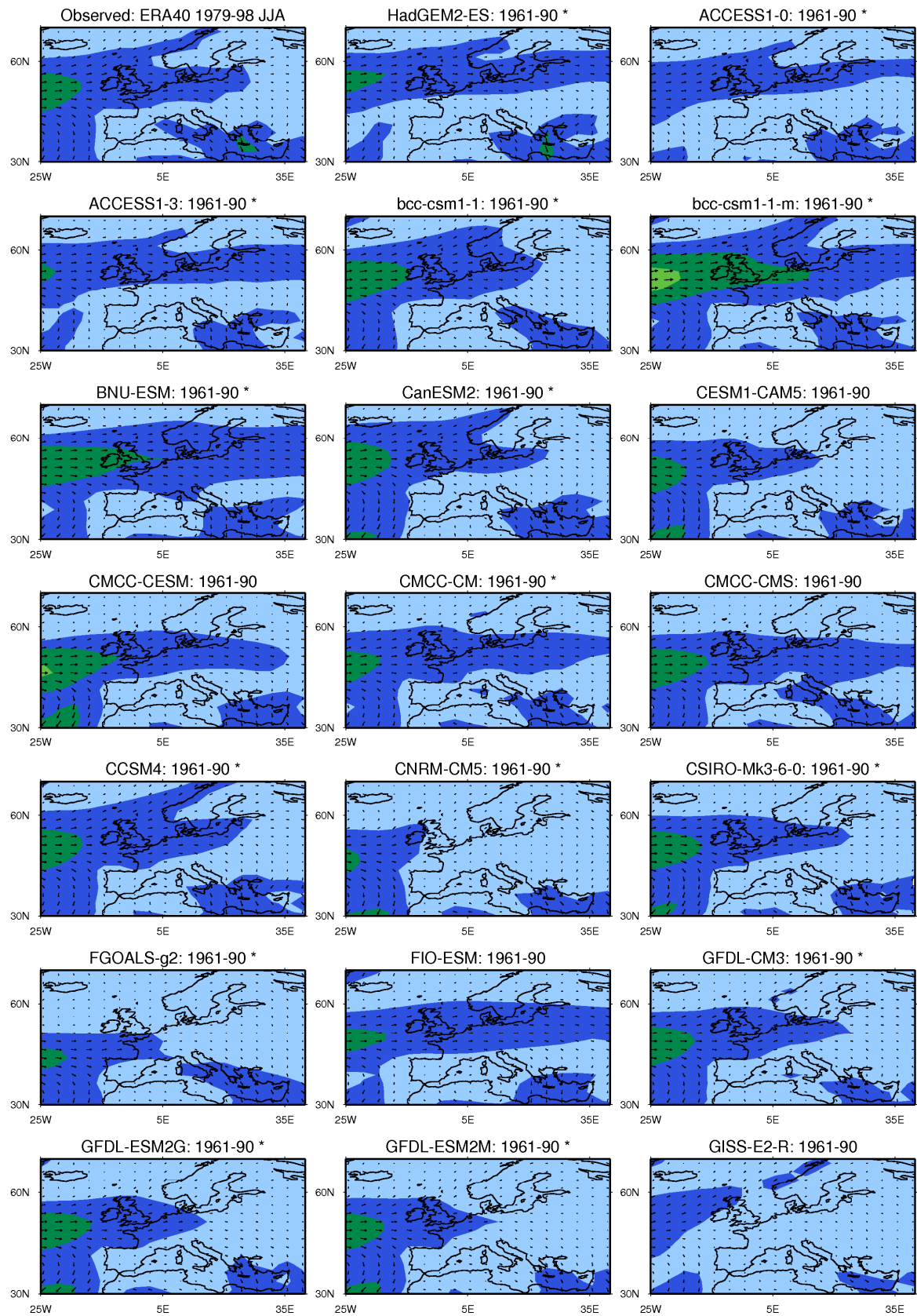


Figure S4(a): Summer 850hpa flow for ERA40 reanalyses and CMIP5 models for Europe (see Fig S4(b). for colour scale).

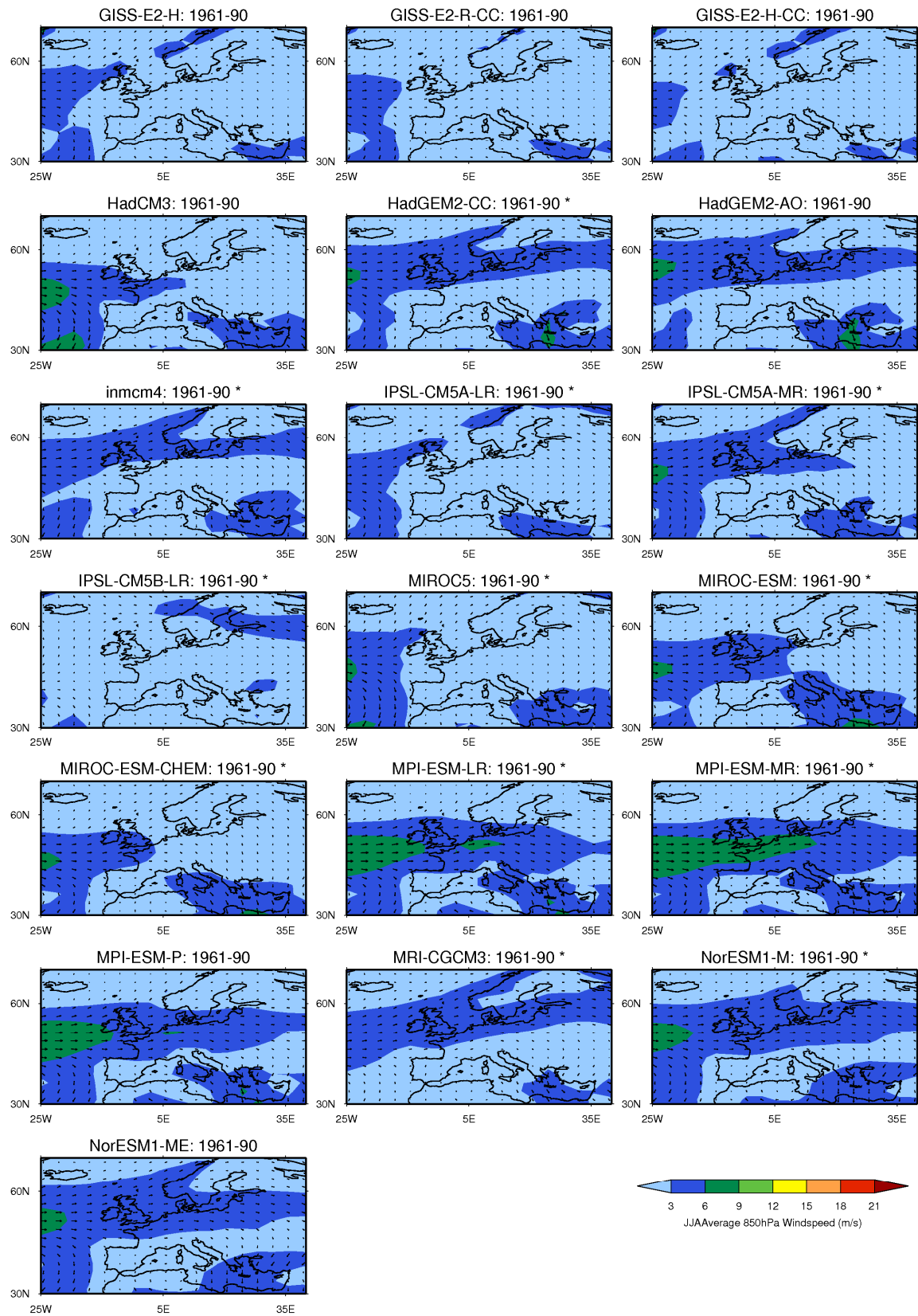


Figure S4(b): Summer 850hpa flow for ERA40 reanalyses and CMIP5 models for Europe.

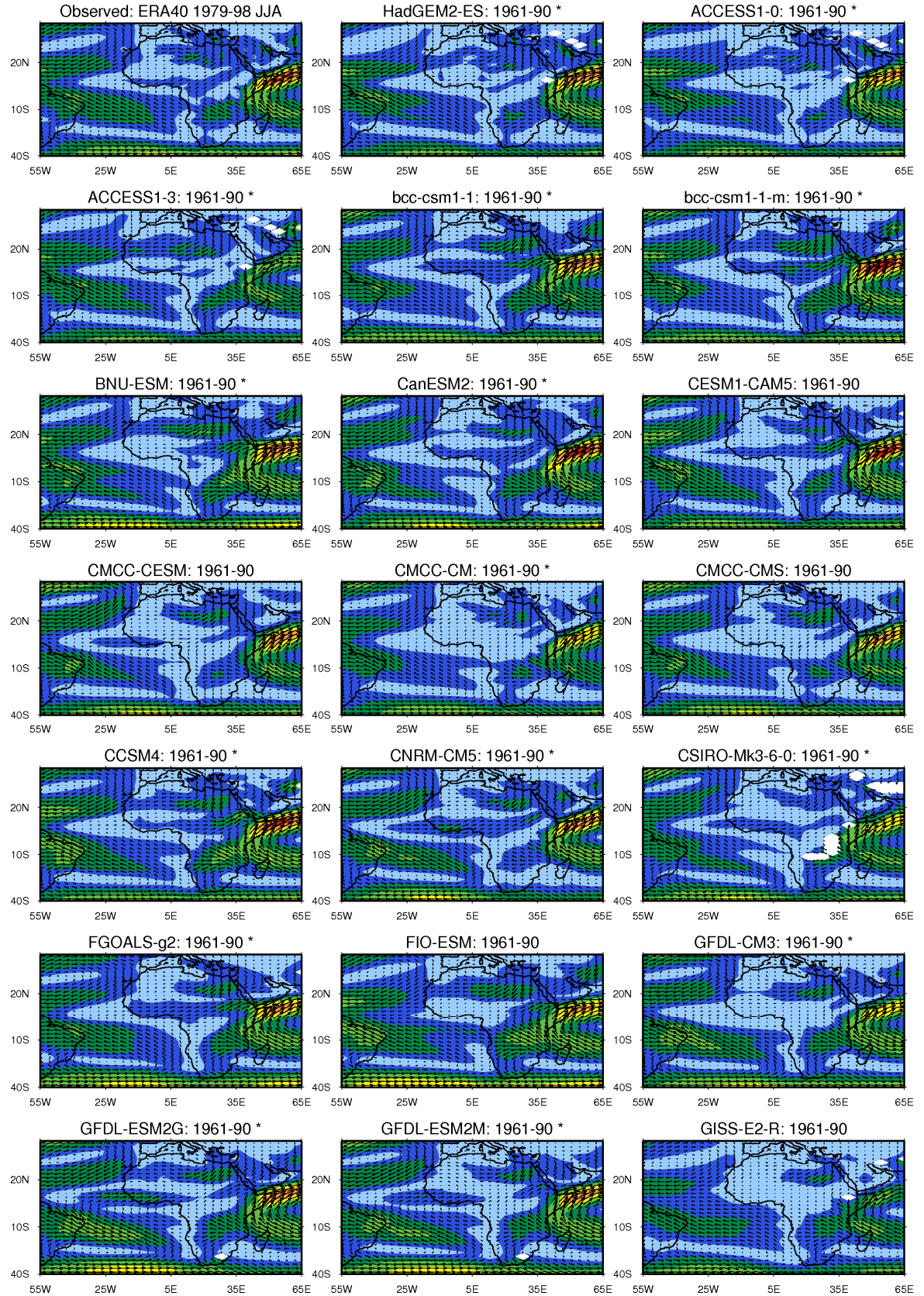


Figure S5(a): Summer 850hpa flow for ERA40 reanalyses and CMIP5 models for Africa (See fig S5(b) for colour scale).

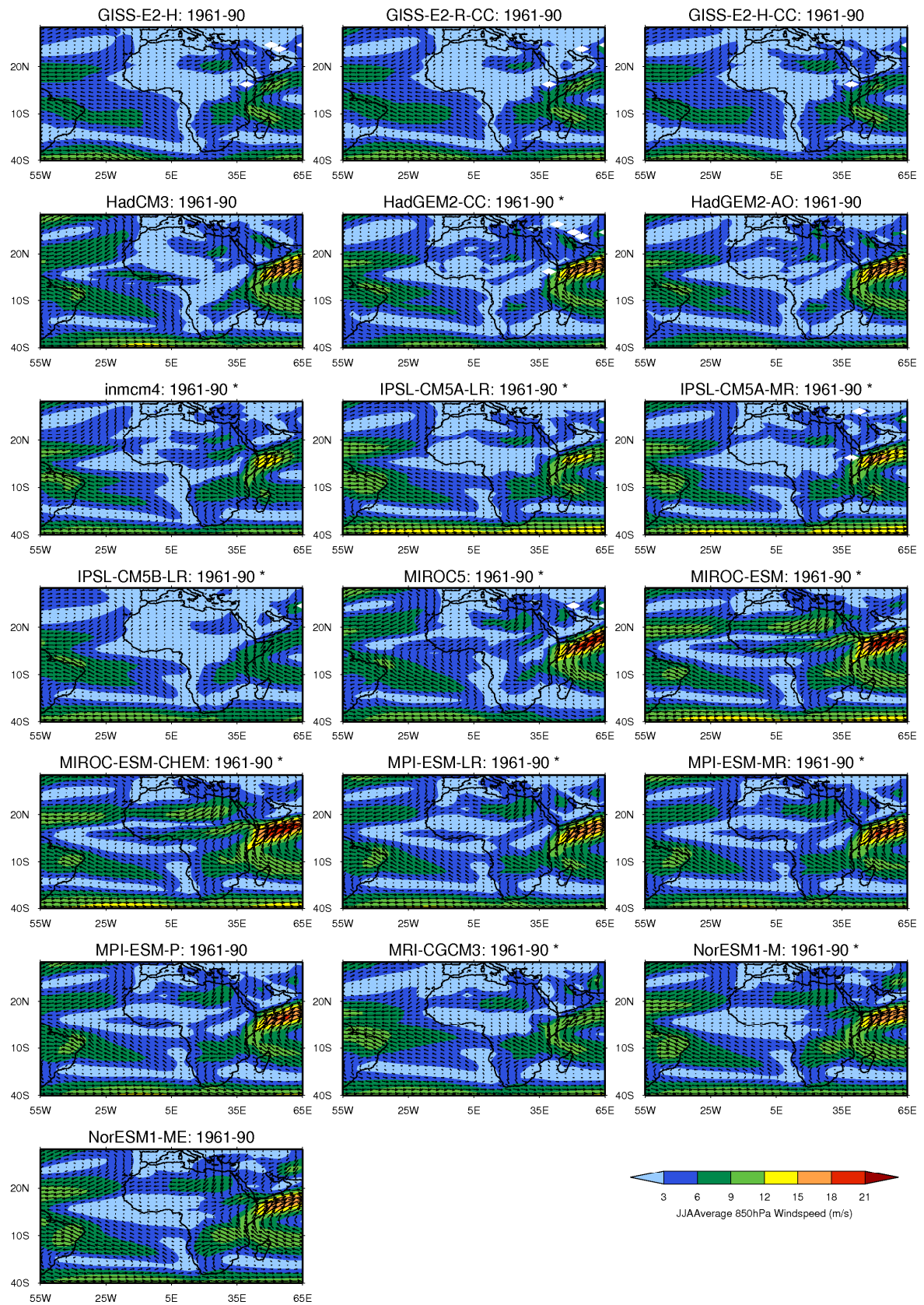


Figure S5(b): Summer 850hpa flow for ERA40 reanalyses and CMIP5 models for Africa.

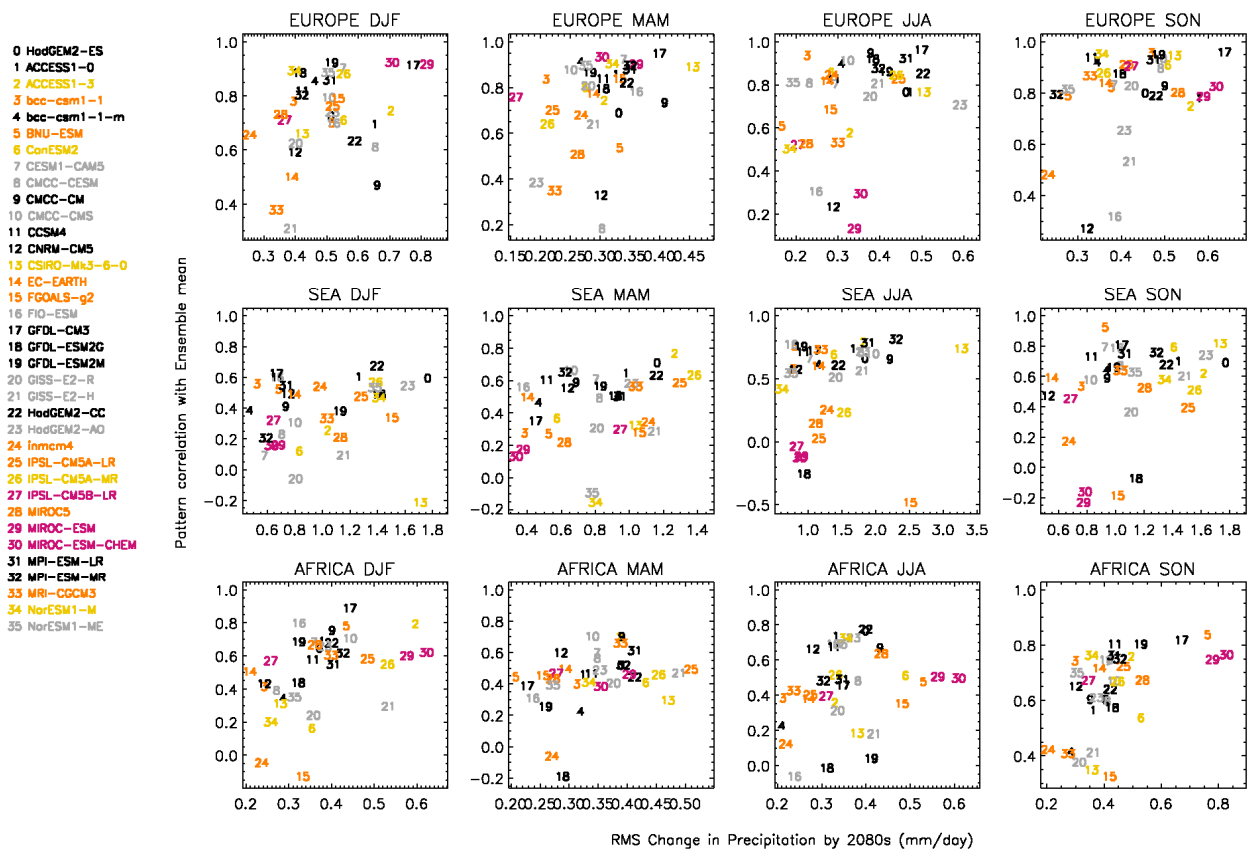


Figure S6: Scatter plots indicating regional average RMS change in mean precipitation vs the pattern correlation with the ensemble mean change for all 3 major regions. Models shown are those for which monthly temperature and precipitation data were available for historical and RCP8.5 simulations up to 2100. Colours indicate the overall outcome from model validation, whereby pink=Implausible, Orange=Very Poor and Yellow= Poor. Grey models are not LBC-avail, remaining models are shown in black.