

10 YEARS OF CALIPSO

Some of the science discussed (in France and elsewhere) at the time of the mission development

Hervé Le Treut

The first list of French PIs

3 Lidar scientists : Jacques Pelon Gérard Mégie,
Pierre Flamant

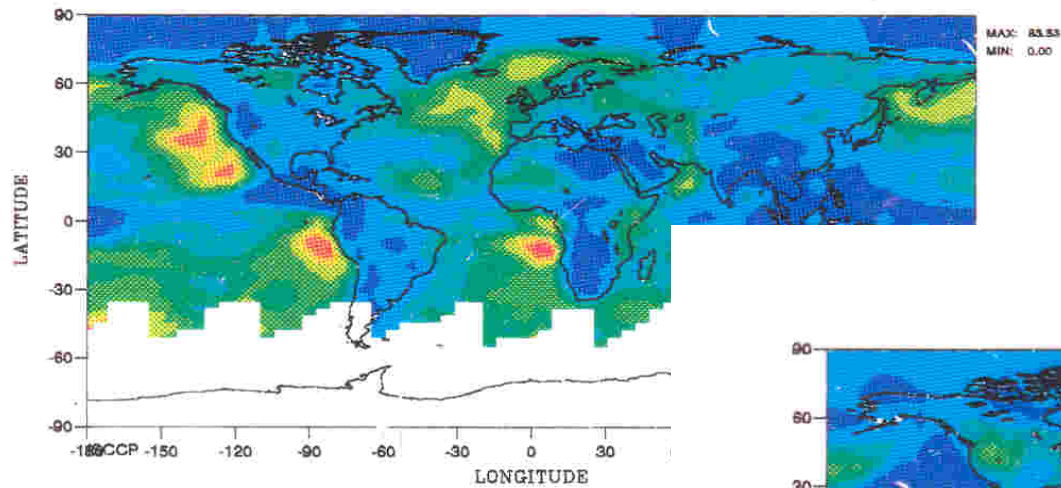


1 climate modeler : Hervé Le Treut

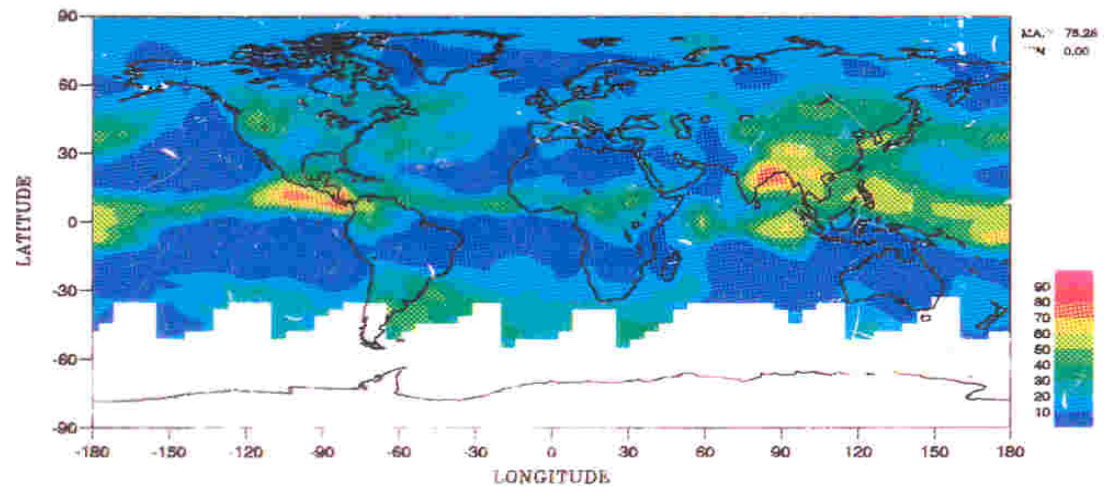
+ The outstanding role of Pierre Morel (NASA), and the CNES
team

The 80's: from cloud parameterizations based on ISCCP data to the revision of the
« Charney range of uncertainty » for climate sensitivity

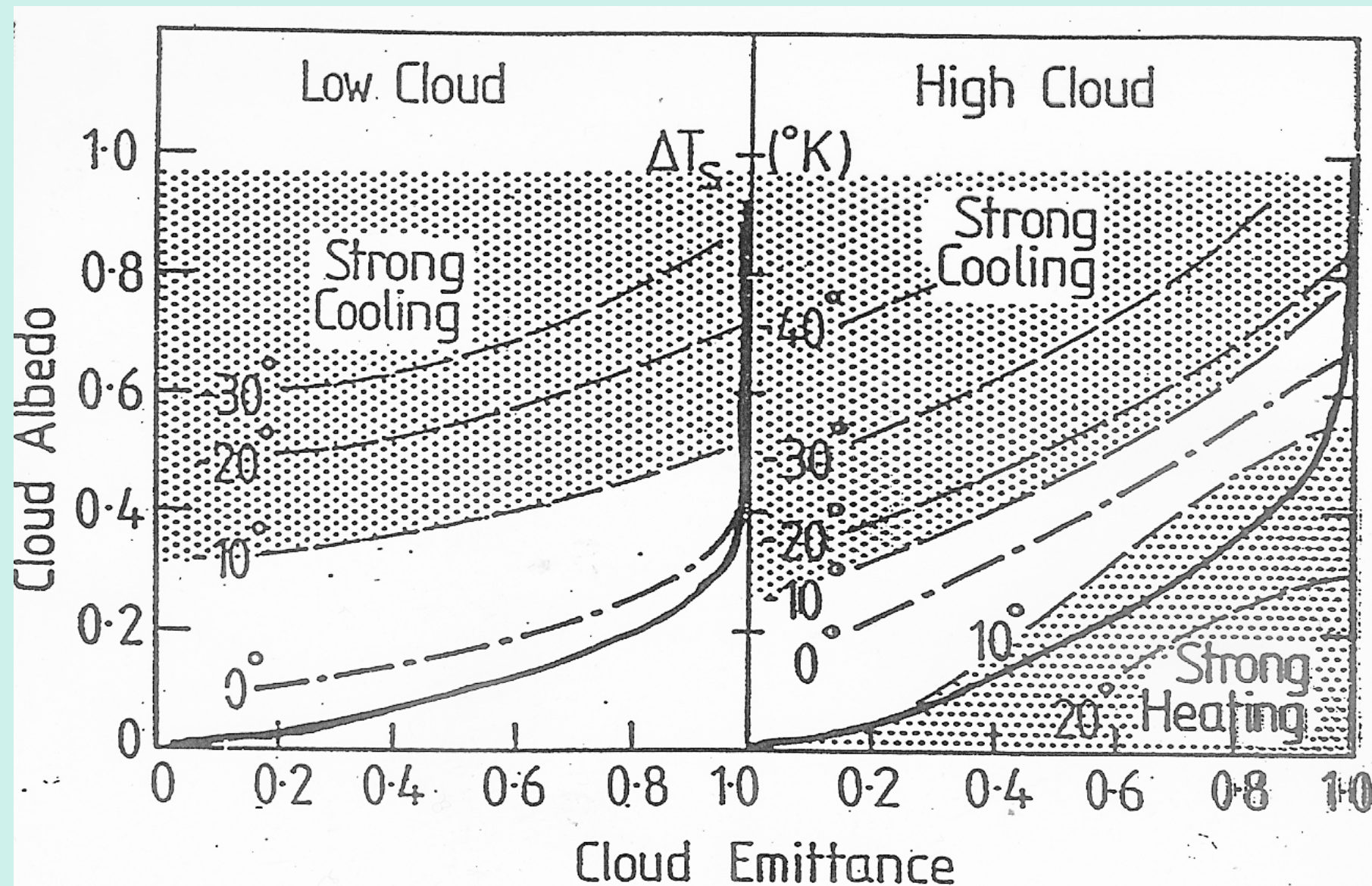
nuages bas [%], (juillet- 1987)



nuages hauts [%], (juillet- 1987)



NASA GISS Workshop, 1980, Webster



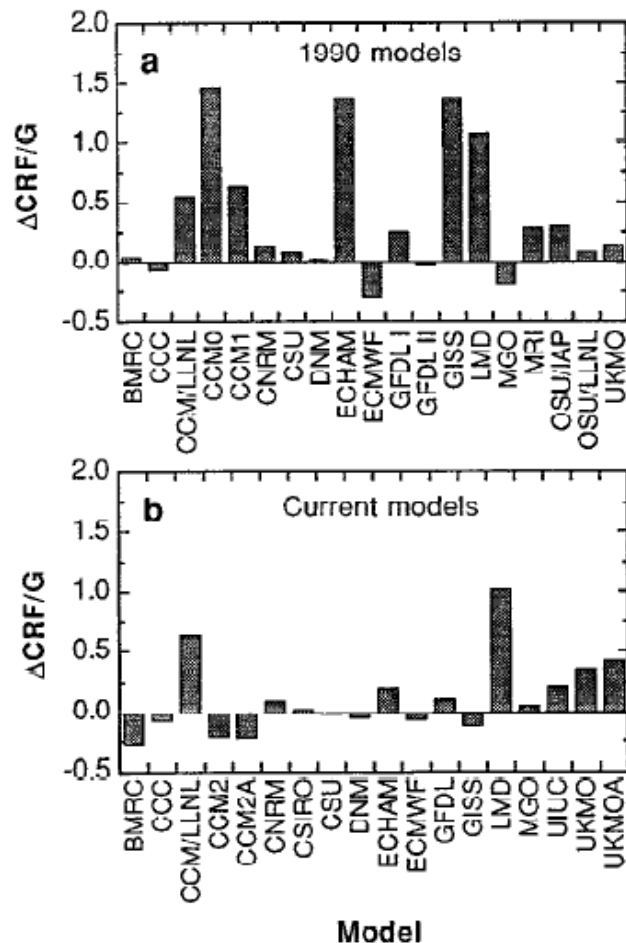


Figure 2. (a) The cloud feedback parameter, $\Delta\text{CRF}/G$, as produced by the 19 atmospheric general circulation models (GCMs) used in the 1990 study (Figure 3). The model acronyms are those used in Figure 3. (b) The same as Figure 2a but for the current models. Several of the 1990 models are no longer in use (CCM0, CCM1, OSU/IAP, and OSU/LLNL). Of the current models, one (CCC) has undergone no revision, another (CCM/LLNL) only modest revision, two (CSIRO and UIUC) were not part of the 1990 comparison, and the rest have undergone either extensive or total revision. The MRI GCM is not a current participant.

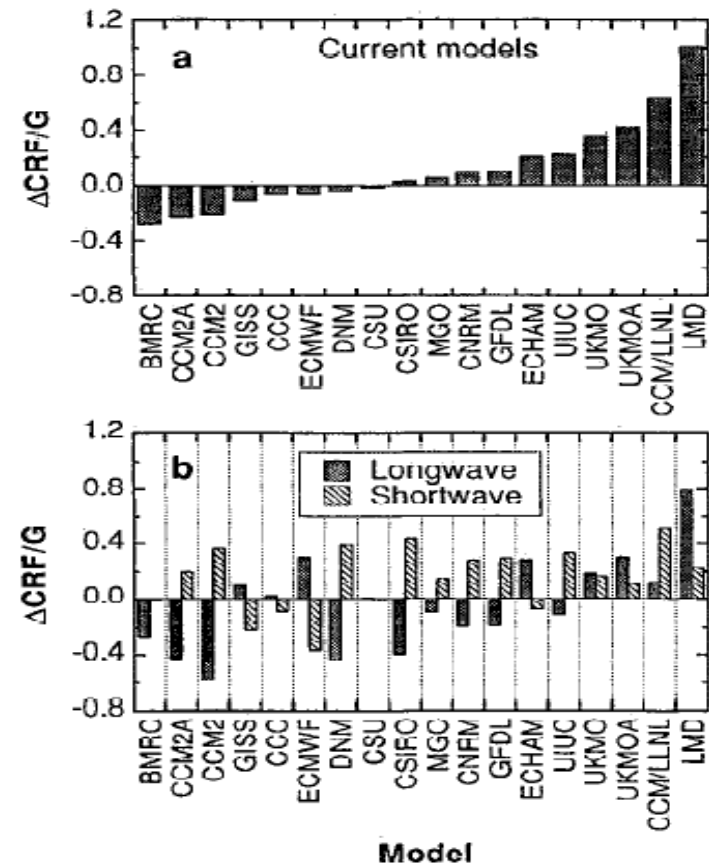


Figure 3. (a) The same as Figure 2b but ordered in ascending values of the cloud feedback parameter $\Delta\text{CRF}/G$. (b) The same as Figure 3a but for the longwave and shortwave components of $\Delta\text{CRF}/G$.

Cess et al, 90, 96

The importance of model intercomparisons ... and the risks of associated peer pressure?

Carbon Dioxide and Climate: The Impact of Cloud Parameterization

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(Manuscript received 10 June 1991, in final form 3 April 1992)

Cloud-radiation feedbacks in a general circulation model and their dependence on cloud modelling assumptions

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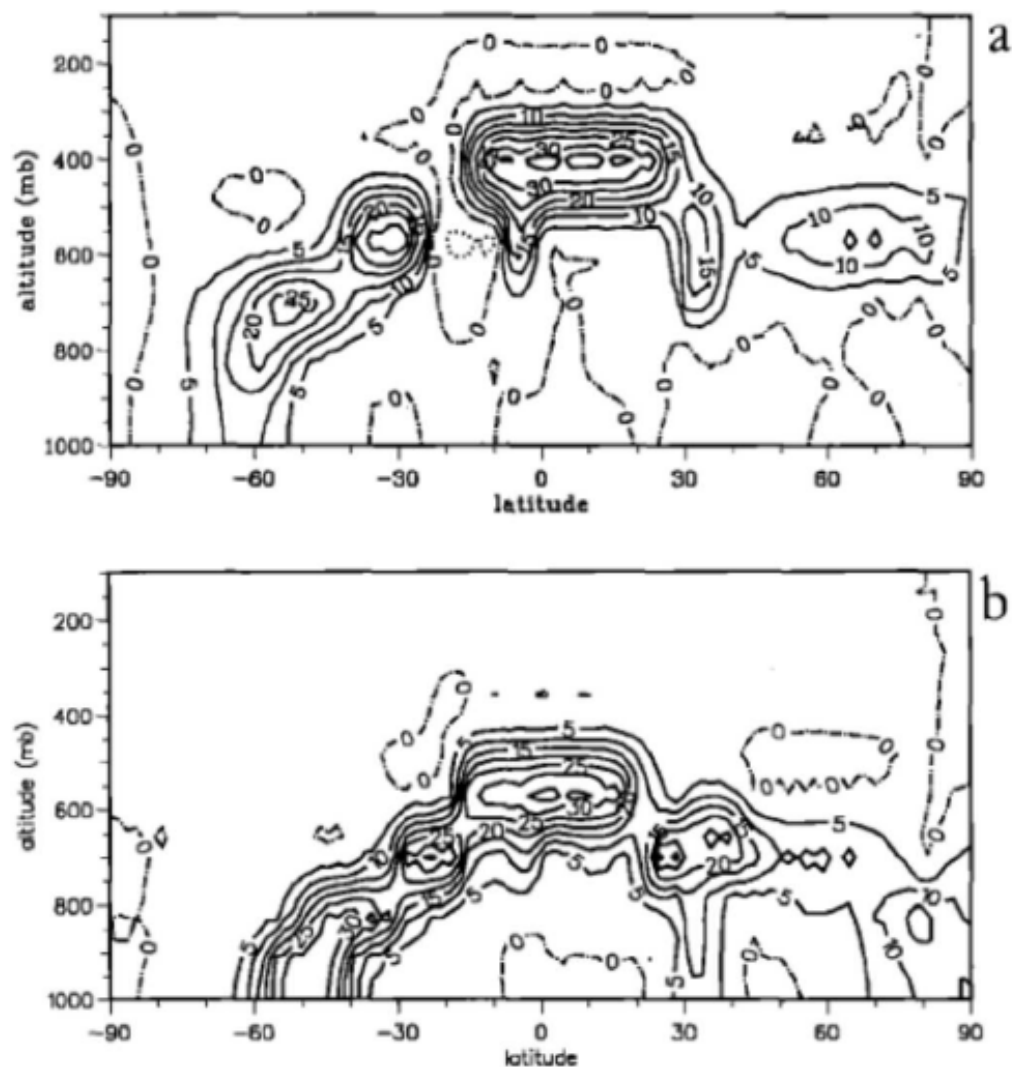


Fig. 5a, b. As Fig. 4 but for the cloud liquid (or ice) water content (in 1×10^{-6} kg/kg): **a** experiment A; **b** experiment B

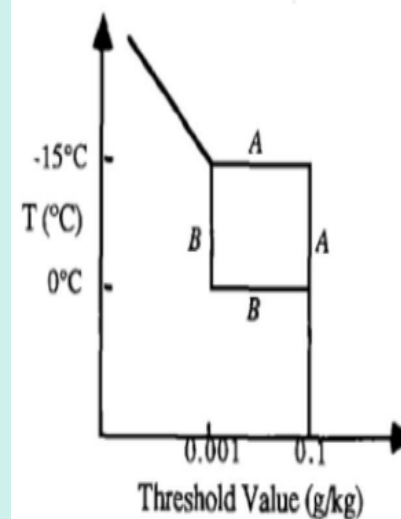
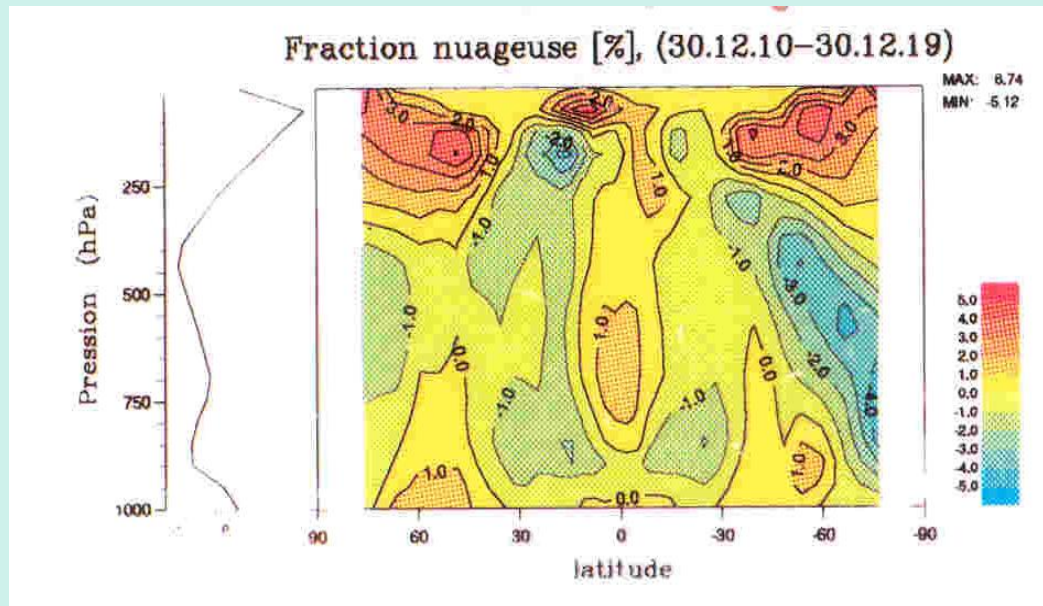


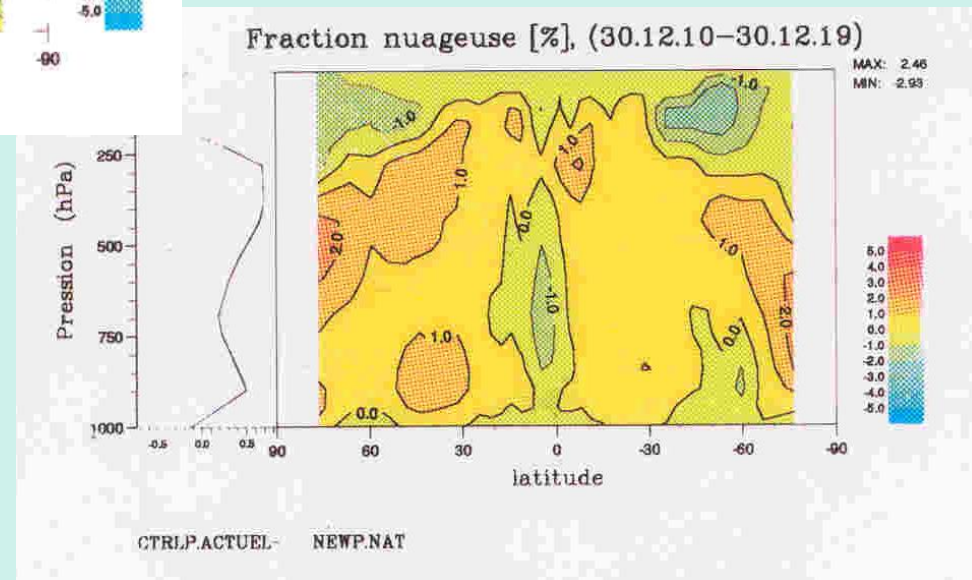
Fig. 1. Schematic figure showing the variations of the precipitation threshold value with temperatures for experiments A and B

Cloud feedbacks: qualitative understanding, quantitative uncertainties



CO₂
impact

Aerosol
impacts



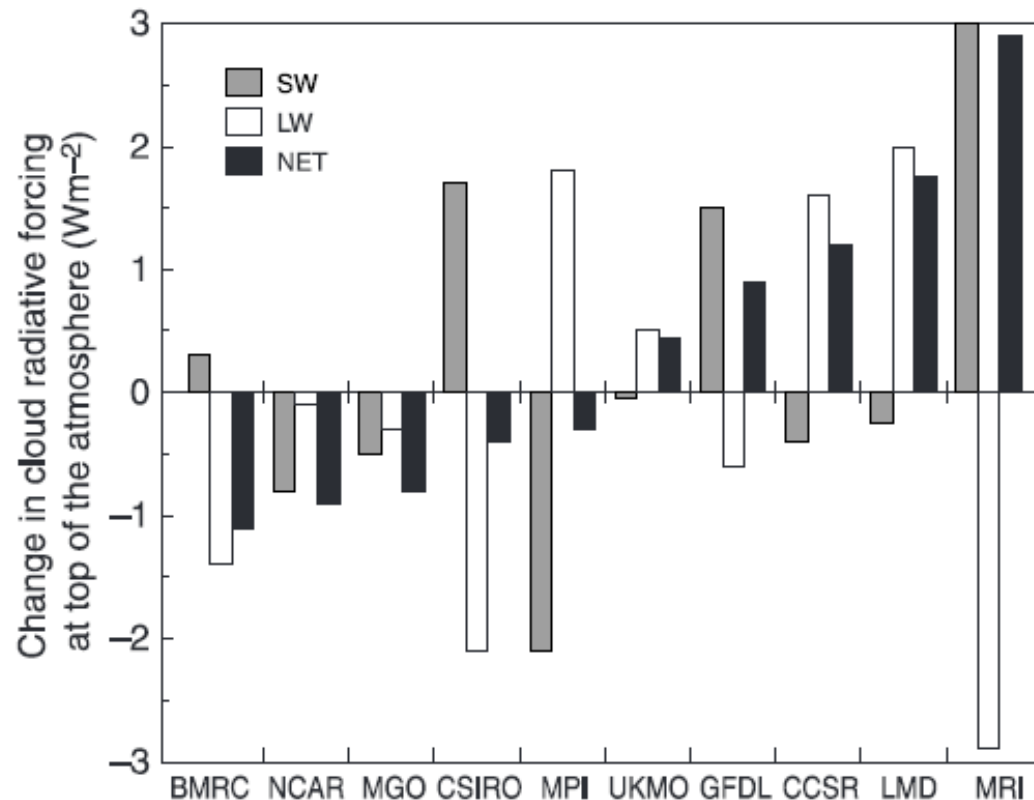
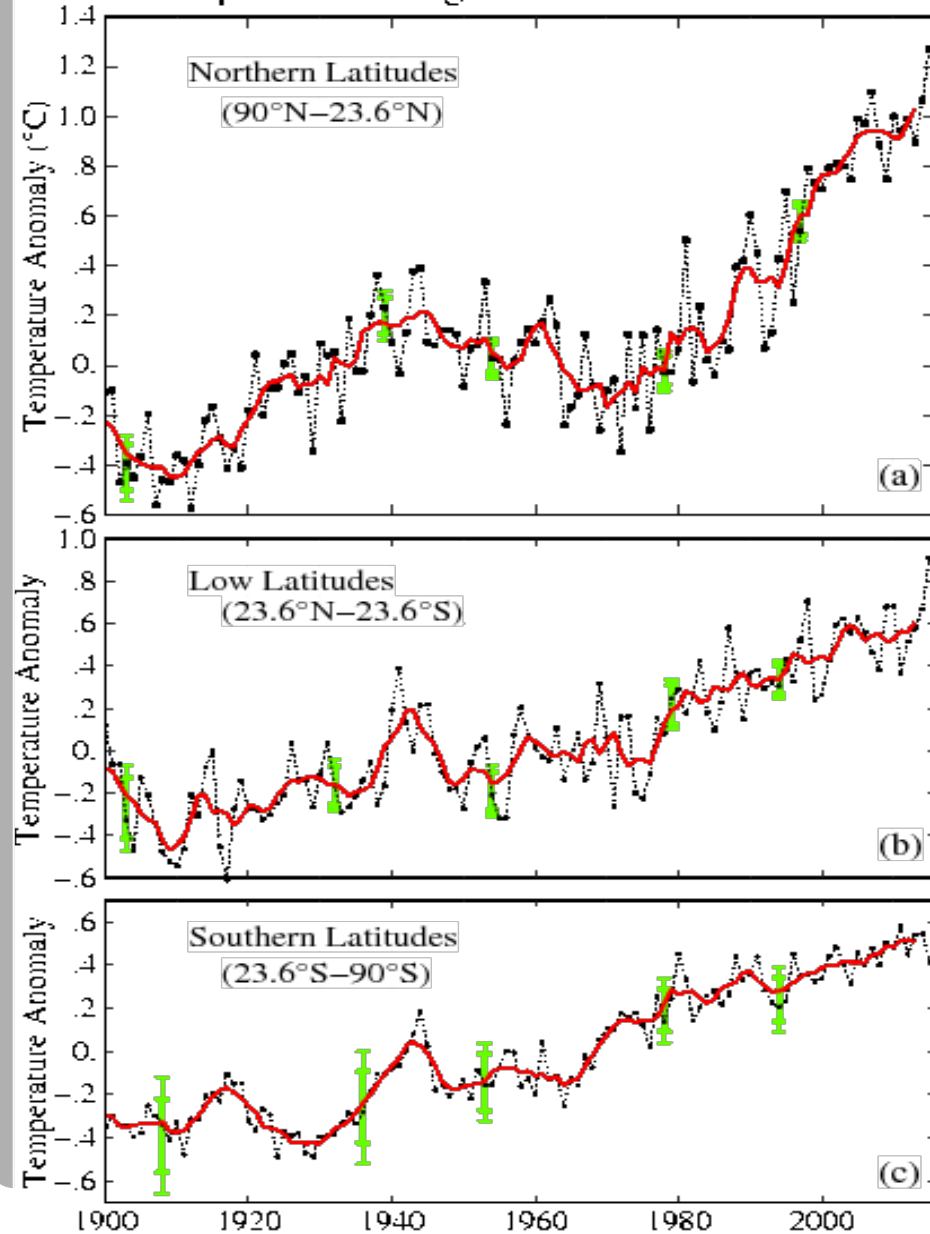


Figure 7.2: Change in the Top of the Atmosphere (TOA) Cloud Radiative Forcing (CRF) associated with a CO₂ doubling (from a review by Le Treut and McAvaney, 2000). The models are coupled to a slab ocean mixed layer and are brought to equilibrium for present climatic conditions and for a double CO₂ climate. The sign is positive when an increase of the CRF (from present to double CO₂ conditions) increases the warming, negative when it reduces it. The contribution of the short-wave (SW, solar) and long-wave (LW, terrestrial) components are first distinguished, and then added to provide a net effect (black bars). Results presented in the diagram are bounded by a 3 Wm⁻² limit. As in

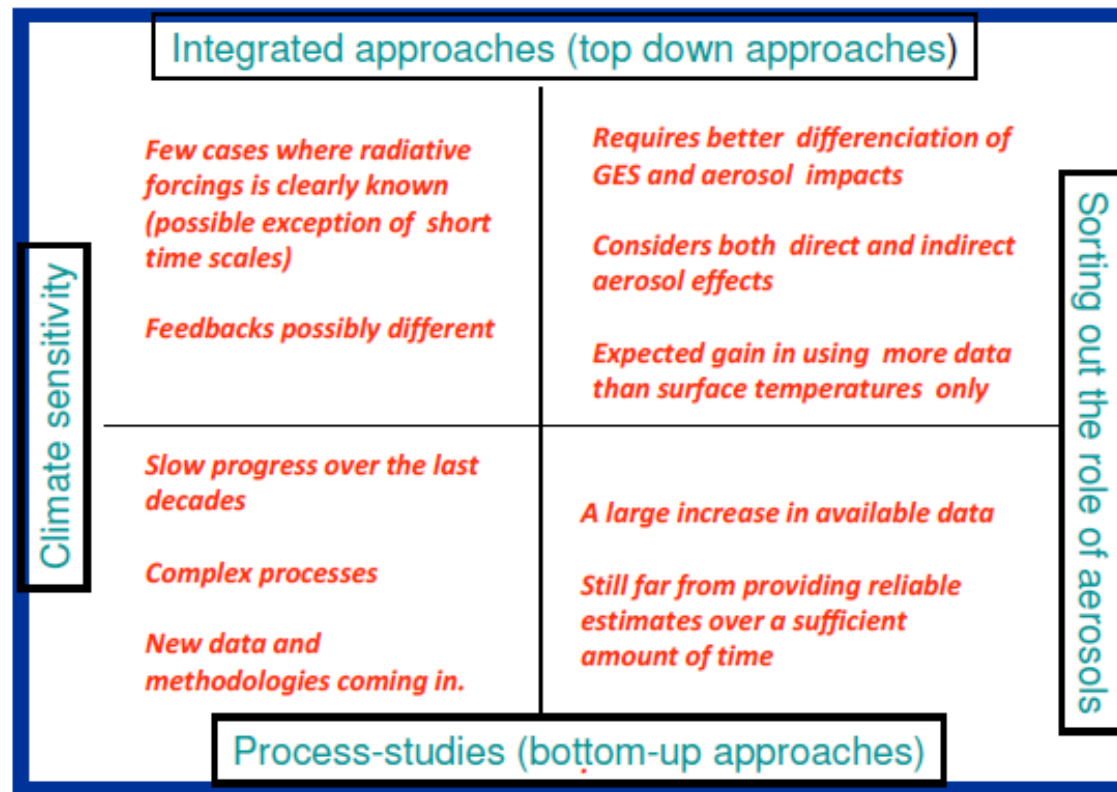
IPCC TAR, 2001

Inception of CMIP

Temperature Change for Three Latitude Bands



**Recent warming:
unable to constrain
climate sensitivity?
(NASA, GISS)**



The only way forward: multi-parameter process-oriented studies. Huge progress through CALIPSO. More is needed